



Lake Mansfield 2022 Aquatic Vegetation Survey



Prepared For:



Town of Great Barrington

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SECTION 1: INTRODUCTION

1. Lake Mansfield is a 28.5-acre lake located in Great Barrington, MA. Geosyntec Consultants, Inc. (Geosyntec) was contracted by the Town of Great Barrington to conduct an aquatic vegetation survey of Lake Mansfield during the summer of 2022. The primary goal of this project was to provide an updated assessment of the composition and distribution Lake Mansfield's aquatic vegetation community to aide in lake management planning efforts.



SECTION 2: AQUATIC VEGETATION SURVEY

2.1 Methodology

On July 30, 2022, Aquatic Restoration Consulting (ARC) conducted a survey of the aquatic vegetation in Lake Mansfield. Plant species were identified at the same 23 sampling locations surveyed in 2012 (see Figure 3 for locations of the sampling locations). Plants were identified by visual inspection using underwater video equipment supplemented with a rake toss to verify images on the video. At each station, the dominant plant(s) were recorded, as well as estimates of plant growth density and biomass. As categorized in Table 1, plant density is an estimate of aerial coverage when looking down to the lake bottom from the water surface. Biomass refers to the amount of plant matter within the water column. For example, a sampling station with dense growth of low-growing plants may have a high density estimate but a relatively low plant biomass estimate. A station with dense growth of a long, ropey plant with stems reaching the water surface would have both high plant density and high biomass estimates. In addition to recording information from the 23 sampling stations, a running documentation of plant growth density and biomass was estimated throughout the lake wide survey.

2.2 Vegetation Survey Results

A listing of plant species present at each of the 23 sampling stations is provided in Table 1, including information on vegetation density, plant biomass, and dominant plants at each station. A summary of major findings and the most common plants species observed during the survey is as follows:

- Plant growth throughout Lake Mansfield was dominated by an assemblage of native species.
- Only one of the four non-native species documented in earlier surveys, Eurasian milfoil (*Myriophyllum spicatum*), was observed in 2022. Eurasian milfoil was encountered at 9 observation locations around the lake at low growth densities. Generally, it was the dominant (or co-dominant) plant in deeper waters (≥ 7.0 ft). Curlyleaf pondweed (*Potamogeton crispus*) was not encountered in 2022, however this does not mean it was not present. Curlyleaf pondweed could be present in locations not directly observed and/or it could have died back prior to the survey. Curlyleaf pondweed growth peaks early in the summer and starts to die back in mid-July. Two other non-natives were documented in earlier surveys but were not observed in 2012 or 2022; these included European naiad (*Najas minor*) and water hyacinth (*Eichornia crassipes*).
- Lake Mansfield was observed to have dense to very dense growth of rooted aquatic plants over most of its area. A majority of sampling stations (21 of 23 stations, 91%) had either dense or very dense plant growth, with 61% of all stations categorized as very dense. These results are similar to 2012 where dense to very dense plant coverage was observed at 20 of the 23 stations (87%). Most stations (14 of 23 stations, 61%) also had high to very high biomass, with plant growth extending through most of the water column. Biomass in 2012 was similar with 69% of the stations containing very high biomass.
- Fifteen (15) different species (species richness) were encountered at the observation stations in 2022. For comparison, 17 different species were encountered at the observation stations in 2012. This doesn't necessarily indicate a loss in diversity as species presence, distribution and biomass can naturally vary year to year.

- There were minor changes in species composition. Three “new” native species were observed in 2022 that were not reported in 2012: flat-stem pondweed (*P. zosteriformis*), tapegrass (*Vallisneria americana*) and bur-reed (*Sparganium* sp.). Bur-reed was observed between sample points in 2022 but was not encountered at the sample stations and therefore not accounted for in the richness number presented above. Four species observed in 2012 were not seen at the sample locations in 2022. One of these was non-native curlyleaf pondweed previously mentioned. The other three were: water star-grass (*Heteranthera dubia*), slender pondweed (*P. pusillus*) and greater duckweed (*Spirodela polyrhiza*).
- Emergent wetland plant species (e.g., pickerelweed, cattails, rushes) were noted only if they were found emerging from within the perimeter of the pond.

Notable observations regarding specific plant species are summarized below:

- **Coontail** (*Ceratophyllum demersum*) was one of the most well distributed and dominant plants in Lake Mansfield during the 2022 survey and in 2012. Coontail was observed at 17 of the 23 locations (vs 22 out of 23 in 2012) and was a dominant plant at 10 stations. When present, it dominated the plant community 59% of the time. This plant was found at 11 stations in 2005 and 4 stations in 2001.
- **Northern waterweed** (*Elodea canadensis*) continues to be in the top three most frequently encountered plants in Lake Mansfield. It was found at 14 sites in 2022 and 18 sites in 2012. While frequently encountered, it did not dominate the community at most of the stations observed. It dominated 29% of the time at points observed and only 17% of the 23 sample sites lake wide. Northern waterweed had a similar distribution in 2005 and was dominant at only two stations. This plant provides food and habitat for fish, waterfowl and other wildlife. It is relatively low growing plant (in comparison with Richardson’s pondweed and coontail) and is less likely to be a nuisance to recreation.
- **Bushy pondweed** (*Najas flexilis*) continues to be well distributed throughout Lake Mansfield (eight stations, 35%) but has declined in abundance and dominance since 2005 when it was the most abundant plant in the lake. Bushy pondweed remained a dominant plant at four stations in 2022 and 2012, compared to 13 stations in 2005 and 12 stations in 2001. This plant was particularly abundant along the northwestern shore of the lake, where it was observed growing in a very dense, near-monoculture stand. This plant provides an important food source for waterfowl, which eat the entire plant. It also provides shelter for small fish and insects.



- **Richardson's pondweed** (*Potamogeton Richardsonii*) was observed at 17 stations in 2022, similar to 2012 when it was observed at 14 stations. When present in 2022, it was a dominant component of the plant assemblage 82% of the time. This plant was also abundant in prior years: observed at 11 stations in 2005 and dominant at 7 stations. This plant provides desirable food and habitat for aquatic species and waterfowl. It has wavy leaves that clasp around the stem. This plant can reach nuisance growth levels that impede boating, swimming and fish foraging if not in balance with the remaining plant community.



- **Illinois pondweed** (*Potamogeton illinoensis*) was found at the same number of stations in 2022 as in 2012 (12 stations). It was slightly less dominant than in 2012 (at one site vs three in 2012). This plant has increased moderately in abundance since 2005, when it was present at nine stations (39%) and dominant at one station (4%). Illinois Pondweed provides both important food and cover for aquatic animals.



- Non-native **Eurasian milfoil** was found distributed around Lake Mansfield (nine of 23 stations, 39%) in small quantities. Milfoil was only observed to be dominant at deeper water depths (≥ 7.0 ft) but still remained at low to moderate biomass. This is a reduction in frequency of occurrence from 2012 where milfoil was found at 17 locations (eight fewer locations in 2022), and even fewer locations than in 2005 when milfoil was found at 22 out of 23 stations. In the past, many of the milfoil plants were observed to be in poor health and vigor, with significant evidence of insect herbivory that were attributed to milfoil weevils (e.g., bore holes, hollowed/blackened stems). Plants in 2022 appeared relatively healthy with no obvious indications of herbivory.



Two new species encountered at the sample stations during the July 2022 survey (that were not encountered during the July 2012 survey) are summarized below:

- **Flat-stem pondweed** (*Potamogeton zosteriform*) was observed at 6 observation stations in 2022 in water depths of 3-4 feet. This species was not encountered in the 2012 vegetation survey. Flat-stem pondweed is a submerged native aquatic plant, well distributed in Massachusetts except the south shore, cape and islands. It is very distinctive from other pondweeds due to its flattened stem. It reproduces by seed and turions (vegetative buds). It is a beneficial plant providing food and cover for a variety of fish and insects. It rarely reaches nuisance densities.



- **Tapegrass** (*Vallisneria americana*) was observed at 3 stations in 2022. This species was not encountered in the 2012 vegetation survey. While this is a low percent occurrence among the lake sampling points, it was very dense at one of these locations and dense in areas between points along the western side of the lake. This plant is native and has high habitat value by providing desirable food and shelter for aquatic biota. However, it has



become a nuisance in many Massachusetts lakes when forming dense monocultures. Tapegrass can grow up to six feet under ample light and desirable sediment conditions. The long ribbon-like leaves extending from a rosette (Figure 1) and the female reproductive structure, a long flower stalk (peduncle), often binds up boat motors and entangle swimmers. The plant is prolific and can spread rapidly. It can reproduce by seeds and runners (rhizomes) and can form winter buds (turions) allowing the plant to overwinter more successfully than other native plants (Figure 2). These multiple forms of reproduction and climate resiliency make controlling plant growth exceedingly difficult.



Figure 1. Tapegrass Sexual Reproductive Structures. a) Tapegrass (*Vallisneria americana*) staminate flower on the male plant on the left, and seedpod on the female plant on the right. b) Seedpods carry hundreds of tiny seeds, which are about 1.6 mm or 1/16 of an inch in size.



Figure 2. Tapegrass Rhizomes (a) and Turions (b)

Other native plant species encountered but not overly abundant (<25% of stations) included:

- Two submerged species: **musk grass** (*Chara sp.*) and **stiff water crowfoot** (*Ranunculus longirostris*) as well as several emergent wetland species: **pickerelweed** (*Pontederia cordata*), and **Robbin's Spikerush** (*Eleocharis robbinsii*), **broadleaf cattail** (*Typha latifolia*), **water smartweed** (*Polygonum natans*), and **chairmaker's rush** (*Scirpus pungens*).



Pickerelweed

Summary of Lake Mansfield Aquatic Vegetation Density and Biomass Ratings (July 30, 2022)

GROWTH DENSITY	# of stations	% of stations
Sparse: 0-25% density	1	4%
Moderate: 26-50% density	1	4%
Dense: 51-75% density	7	30%
Very Dense: 76-100% density	14	61%

PLANT BIOMASS	# of stations	% of stations
1: Scattered plant growth or primarily at lake bottom	1	4%
2: Less abundant growth, or in less than half of the water column	8	35%
3: Substantial growth through majority of water column	2	9%
4: Abundant growth throughout water column to surface	12	52%

A vegetation survey tally sheet (Table 1) and vegetation density map (Figure 3) from the July 2022 vegetation survey are provided on the following pages.

Table 1: Aquatic Vegetation Survey Tally Sheet

Location: Lake Mansfield (Great Barrington, MA)

Date: 7/30/2022

Surveyed by: W. Gendron



species present



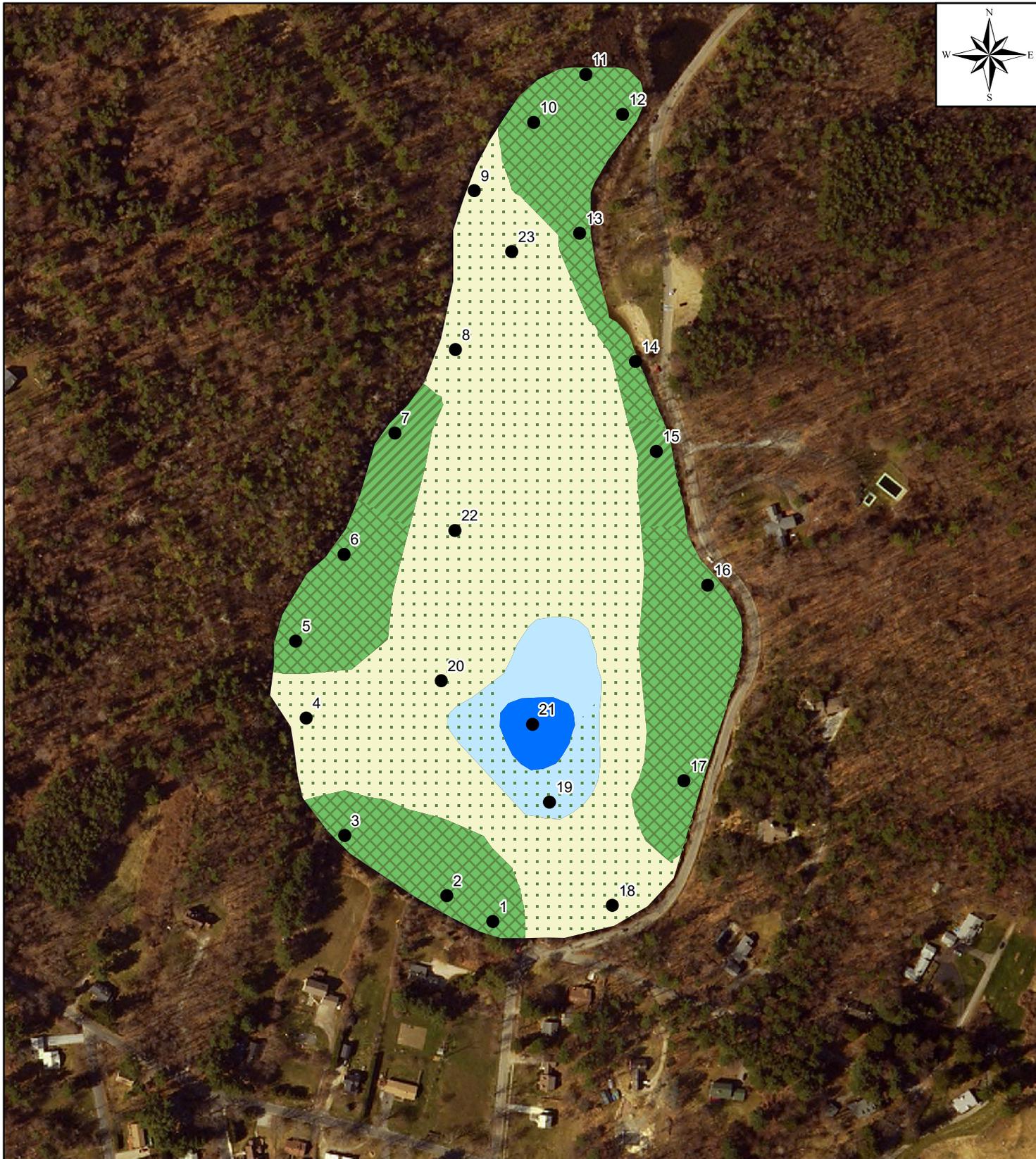
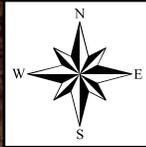
species dominant

Plant Species (Common Name)	Plant Species (Scientific Name)	# stations	# dominant	Monitoring Locations																							
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
coontail	<i>Ceratophyllum demersum</i>	17	10	●	●	●	●	●			●	●	●	●	●	●					●	●	●	●	●		
Richardson's pondweed	<i>Potamogeton richardsonii</i>	17	14	●	●	●	●	●	●	●	●				●	●	●	●	●	●	●			●			
northern waterweed	<i>Elodea canadensis</i>	14	4	●	●	●	●	●	●			●	●	●	●		●	●	●	●							
Illinois pondweed	<i>Potamogeton illinoensis</i>	12	1	●	●	●	●	●			●		●	●			●			●	●			●			
Eurasian milfoil *	<i>Myriophyllum spicatum</i>	9	3									●	●	●					●	●	●	●		●			
bushy pondweed	<i>Najas flexilis</i>	8	4	●	●		●	●		●	●			●	●												
flat-stem pondweed**	<i>Potamogeton zosteriformis</i>	6	2					●				●	●	●	●									●			
musk grass	<i>Chara sp.</i>	5	0					●					●	●	●					●							
pickerelweed	<i>Pontederia cordata</i>	4	1					●					●	●	●		●										
stiff water crowfoot	<i>Ranunculus longirostris</i>	3	0			●		●						●													
tapegrass**	<i>Vallisneria americana</i>	3	1	●					●					●													
Robbins' spikerush	<i>Eleocharis robbinsii</i>	2	1										●							●							
broadleaf cattail	<i>Typha latifolia</i>	2	0					●	●																		
water smartweed	<i>Polygonum natans</i>	1	0																	●							
chair-maker's rush	<i>Scirpus pungens</i>	1	0																	●							
water star grass	<i>Heteranthera dubia</i>	0	0																								
curlyleaf pondweed *	<i>Potamogeton crispus</i>	0	0																								
slender pondweed	<i>Potamogeton pusillus</i>	0	0																								
greater duckweed	<i>Spirodela polyrhiza</i>	0	0																								
Plant Density Rating				4	4	4	3	4	4	4	3	3	4	4	4	4	4	4	4	4	3	2	3	1	3	3	
Plant Biomass Rating				4	4	4	2	4	4	3	2	2	4	4	4	4	4	4	3	4	4	2	2	2	1	2	2

* Non-native, invasive plant

** Newly observed in 2022

Key to Density and Biomass Ratings		
	Density	Biomass
1	Sparse: 0-25%	Scattered plant growth; or primarily at lake bottom
2	Moderate: 26-50%	Less abundant growth, or in less than half of the water column
3	Dense: 51-75%	Substantial growth through majority of water column
4	Very Dense: 76-100%	Abundant growth throughout water column to surface



Legend

Density

- Sparse
- Moderate
- Dense
- Very Dense

0 300
Feet

Biomass

- 1. Scattered plant growth; or primarily at lake bottom
- 2. Less abundant growth, or in less than half of water column
- 3. Substantial growth through majority of water column
- 4. Abundant growth throughout water column to surface

**Lake Mansfield Vegetation Map
July 2022**

Great Barrington, Massachusetts

Geosyntec
consultants

Acton, Massachusetts

October 2022

Figure

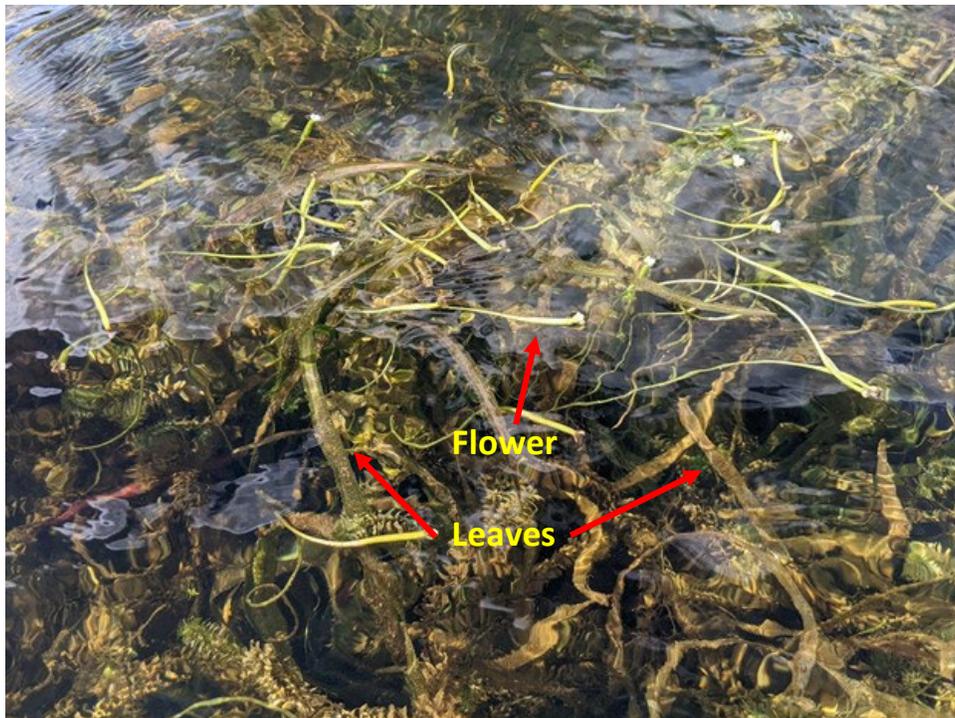
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2.3 Vegetation Survey Photos

The photos below were taken during the Lake Mansfield vegetation survey on July 30, 2022.



View of Lake Mansfield from the southern end of the lake.



Tapegrass in Lake Mansfield, peduncle, flower, and ribbon leaves.



Dense tapegrass and Richardson's pondweed near monitoring location 6 (*Potamogeton Richardsonii*).



Dense Richardson's pondweed adjacent to the swim area/town beach (monitoring location 14) at the northeastern section of the lake.