

Northeast Aquatic Research



Highland Lake 2023 Aquatic Plant Monitoring Report

**Prepared for the Highland Lake Watershed Association & Town of
Winchester, CT**



November 2023

INTRODUCTION

Northeast Aquatic Research (NEAR) has surveyed the plants in Highland Lake annually since 2015, as well as in 2009 and 2010, to monitor the management of Eurasian Milfoil (*Myriophyllum spicatum*) and Variable-leaf Milfoil (*Myriophyllum heterophyllum*). In 2023, NEAR conducted a full-lake pre-management aquatic plant survey on June 23rd. The survey circumnavigated the entire littoral zone of the lake, with waypoints revisited from previous surveys (**Map 1**).

No herbicide treatments were performed in 2023. New England Aquatic Services was hired to conduct DASH (Diver Assisted Suction Harvesting) services to remove Variable milfoil in Sucker Brook Cove after the pre-management survey. NEAR recommended DASH for milfoil management in 2023 because this was the only location where milfoil was documented during the pre-management survey, so an herbicide treatment was not necessary.

A post-management investigation was conducted on September 5th to determine if Milfoil was growing in other areas of the lake, as well as to assess the DASH work.

Map 1. Pre-management survey waypoints, June 23rd, 2023.



MONITORING RESULTS

During the pre-management survey on June 23rd, nineteen aquatic plant species were present in the lake, along with filamentous algae and cyanobacteria mat (*Lyngbya sp.*) (**Table 1**). Southern Naiad (*Najas guadalupensis*) and Largeleaf Pondweed (*Potamogeton amplifolius*) were dominant, meaning they were present at greater than 20% of the survey points (**Map 2, Map 3**). Interestingly, Purple Bladderwort (*Utricularia purpurea*), which was the second-most dominant species in 2022, was not documented in the lake in 2023.

Variable-leaf Milfoil (*Myriophyllum heterophyllum*) was the only invasive species present in the lake during the June survey. Approximately 30 Milfoil plants were found in the small cove off Sucker Brook Cove, in water that was approximately 4.8 feet deep (**Map 4**).

Filamentous algae was abundant in Sucker Brook Cove and in the cove on the eastern shore of Center Bay (**Map 5**), where it has historically been abundant.

Vasey's Pondweed (*Potamogeton vaseyi*), which is a Connecticut state-listed Threatened species, was found at 14 locations in 2022 and was present at 8 locations in 2023 (**Map 6**). The species was mainly found in the lake's coves with an average density of 38%.

The post-management investigation on September 5th involved returning to the areas where Variable-leaf Milfoil was found pre-management, as well as the southeastern area where the infestation was abundant in 2021. Variable-leaf Milfoil was found in three locations in the lake, in the small cove off Sucker Brook Cove and in the immediate vicinity outside of this small cove (**Map 7**).

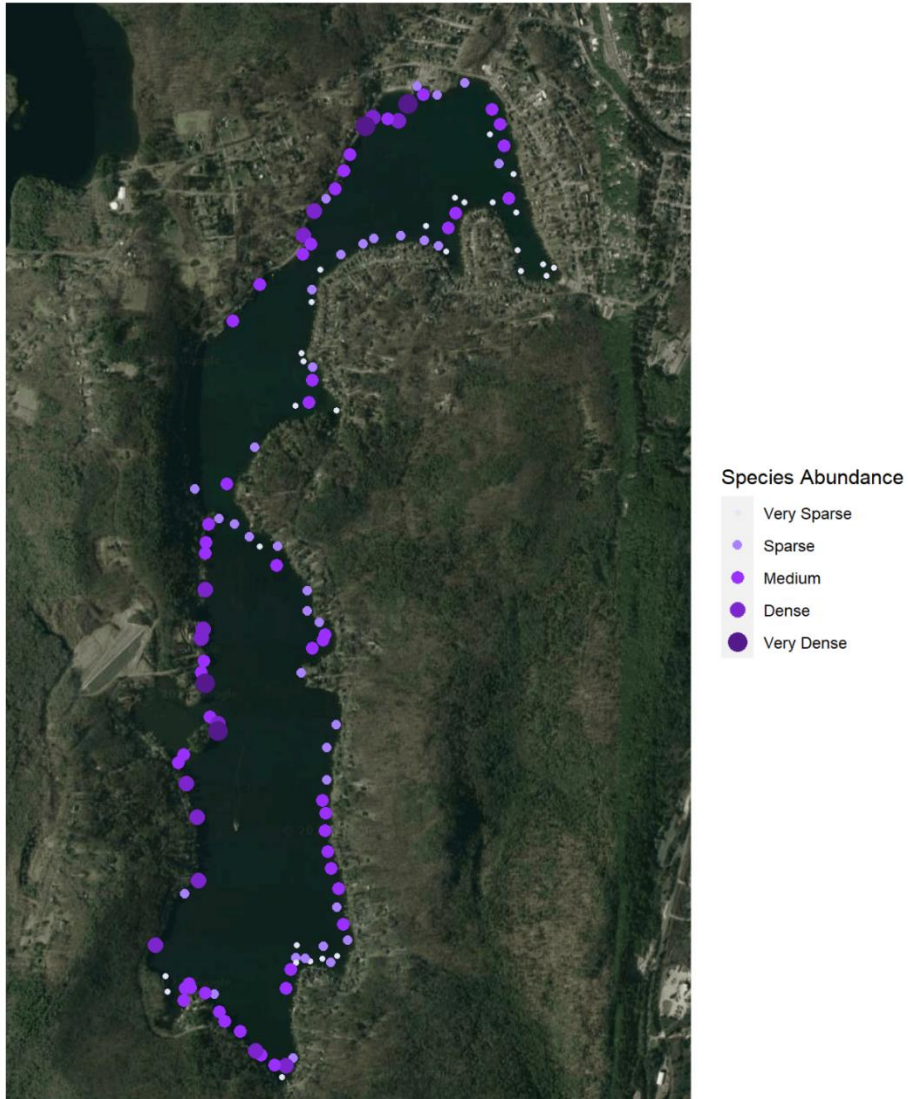
During the post-management survey, the invasive species Eurasian Milfoil (*Myriophyllum spicatum*) was documented at two locations. A few plants were observed at one location and just two plants were observed at the second location.

The invasive species Brittle Naiad (*Najas minor*) was documented at three locations on September 5th. This species grows later in the season, making it likely that it was not growing, or very low in the water column, during the June survey. Prior to this survey, brittle naiad had not been documented in the lake by NEAR since 2019.

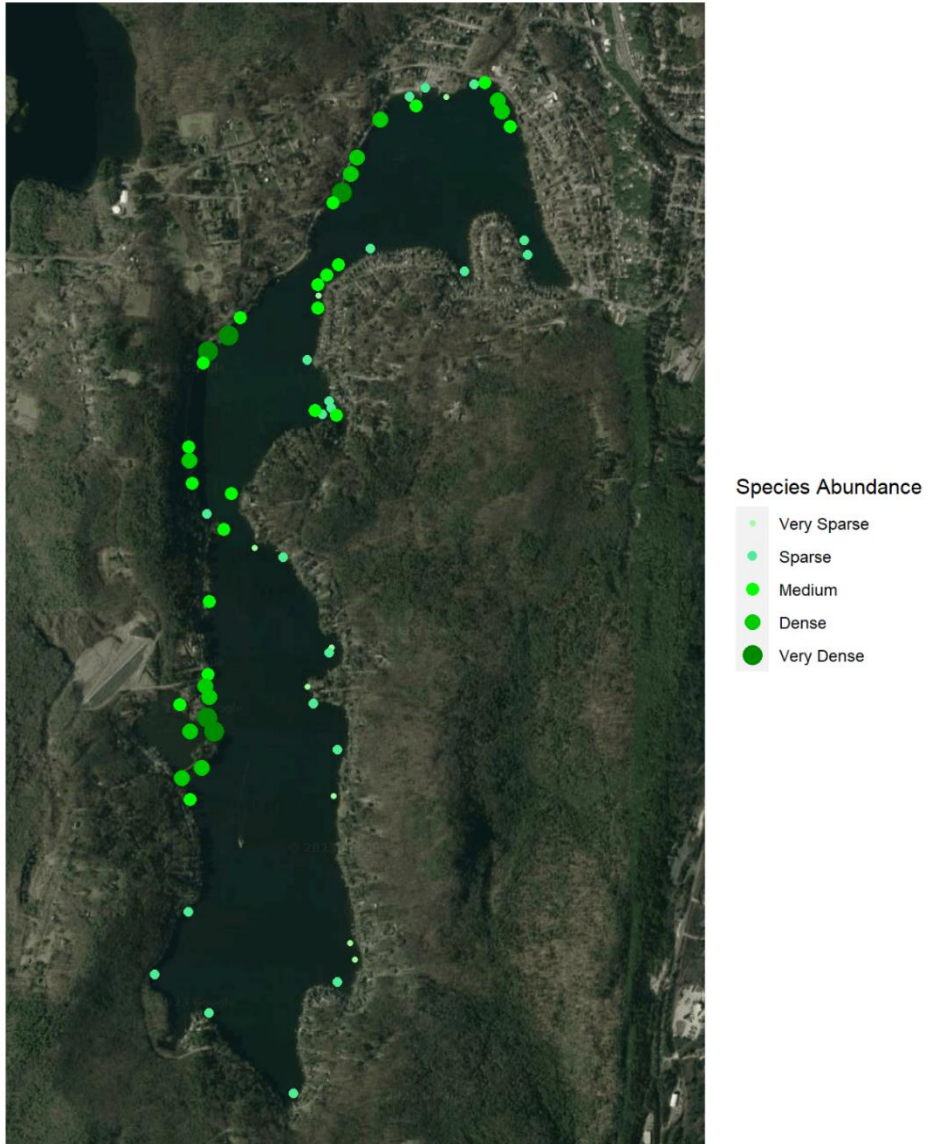
Table 1. Aquatic plant species in Highland Lake during June 23rd, 2023 pre-management aquatic plant survey. Red lettering indicates invasive species. Blue lettering indicates state-listed species.

Scientific Name	% Frequency	Avg. Density
<i>Najas guadalupensis</i>	53	26
<i>Potamogeton amplifolius</i>	26	31
<i>Nitella sp.</i>	19	26
<i>Vallisneria americana</i>	19	24
<i>Potamogeton pusillus</i>	14	14
<i>Potamogeton epihydrus</i>	10	34
<i>Utricularia radiata</i>	9	7
<i>Potamogeton perfoliatus</i>	7	21
<i>Filamentous algae</i>	5	51
<i>Najas flexilis</i>	4	6
<i>Sagittaria graminea</i>	4	18
<i>Potamogeton vaseyi</i>	3	38
<i>Ceratophyllum demersum</i>	3	10
<i>Utricularia gibba</i>	2	5
<i>Elodea nuttallii</i>	2	31
<i>Eleocharis acicularis</i>	3	15
<i>Fontinalis sp.</i>	<1	55
<i>Nuphar variegata</i>	<1	80
<i>Myriophyllum heterophyllum</i>	<1	-
<i>Lyngbya wollei</i>	<1	30
<i>Potamogeton sp.</i>	<1	-

Map 2. Locations of Southern Naiad (*Najas guadalupensis*) in Highland Lake, June 23rd, 2023.



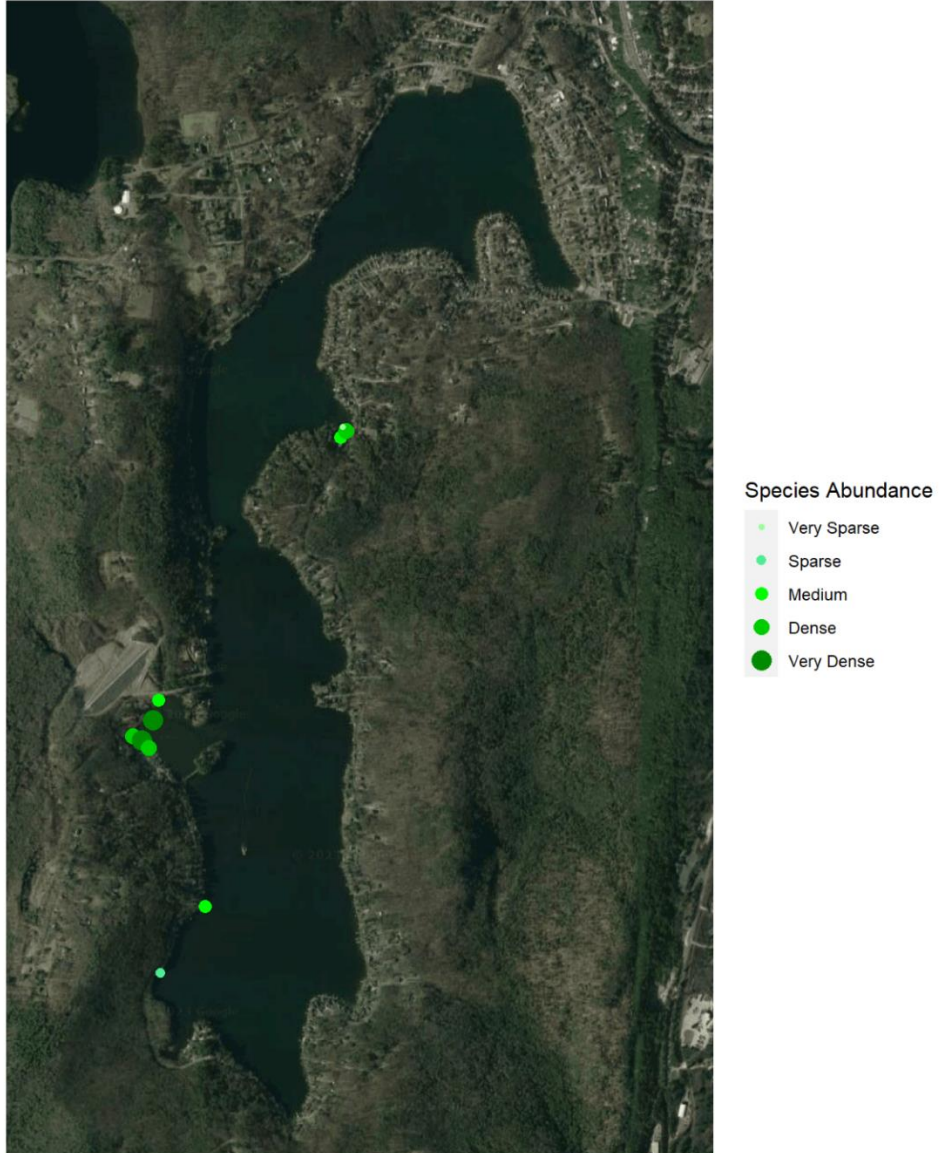
Map 3. Locations of Largeleaf Pondweed (*Potamogeton amplifolius*) in Highland Lake, June 23rd, 2023.



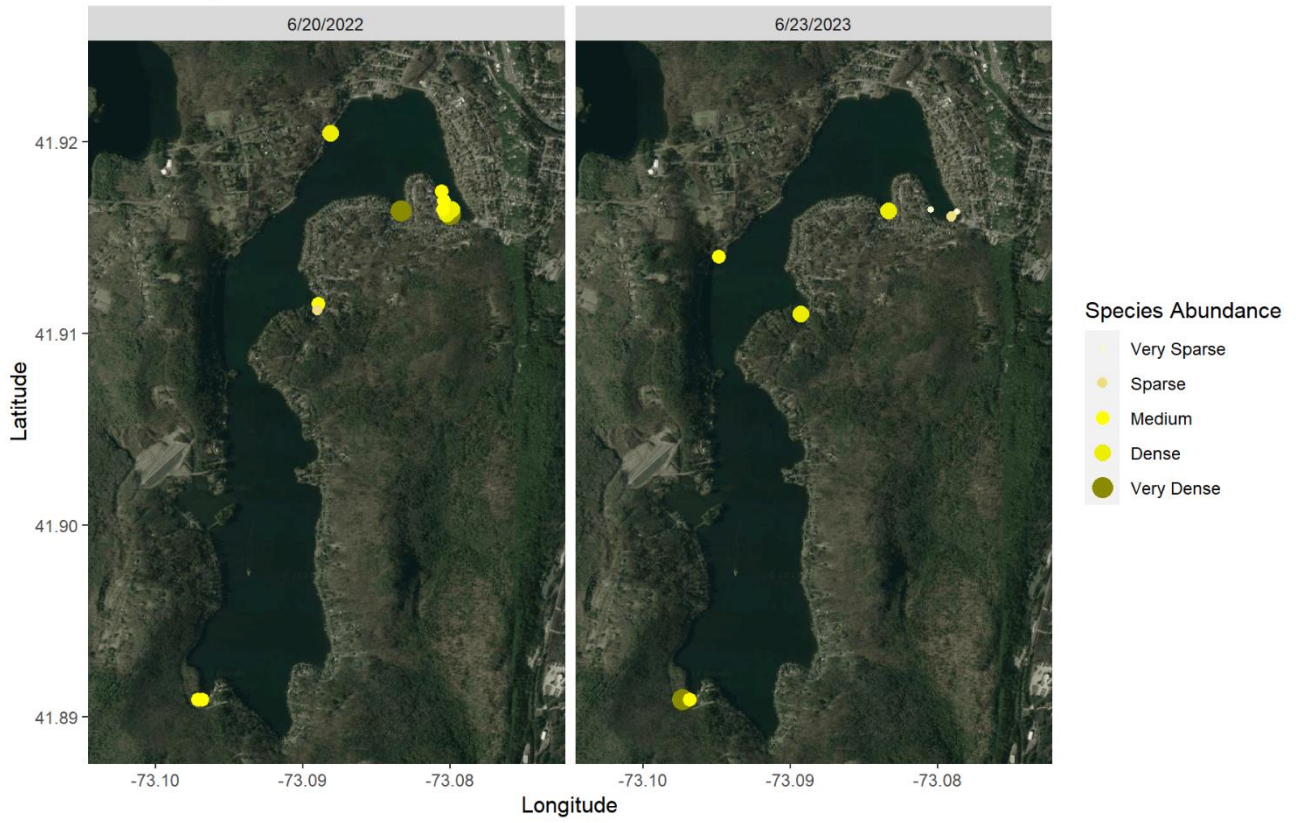
Map 4. Location of Variable-leaf Milfoil (*Myriophyllum heterophyllum*) in Highland Lake, June 23rd, 2023.



Map 5. Locations of Filamentous Algae in Highland Lake, June 23rd, 2023.

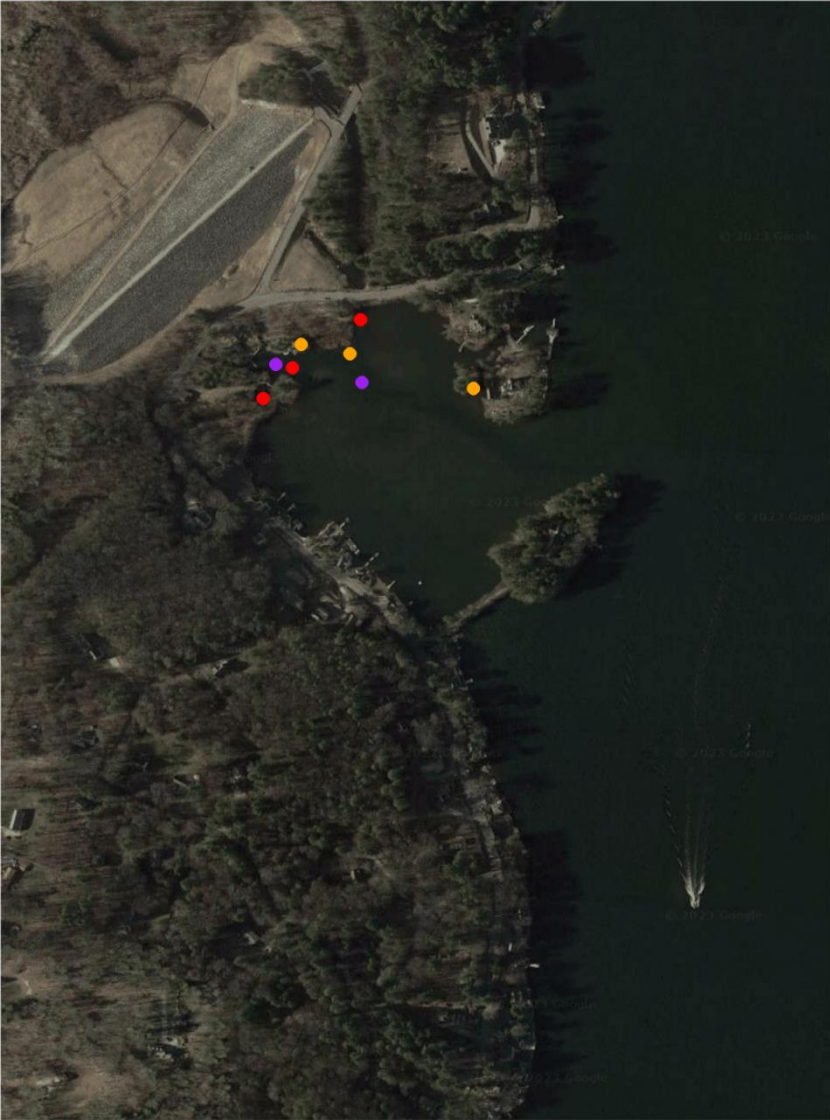


Map 6. Locations of state-protected Vasey's Pondweed (*Potamogeton vaseyi*) in Highland Lake, June 20th, 2022 and June 23rd, 2023.



Map 7. Locations of invasive species documented during September 5th, 2023 post-management survey.

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- Myriophyllum heterophyllum
- Myriophyllum spicatum
- Najas minor

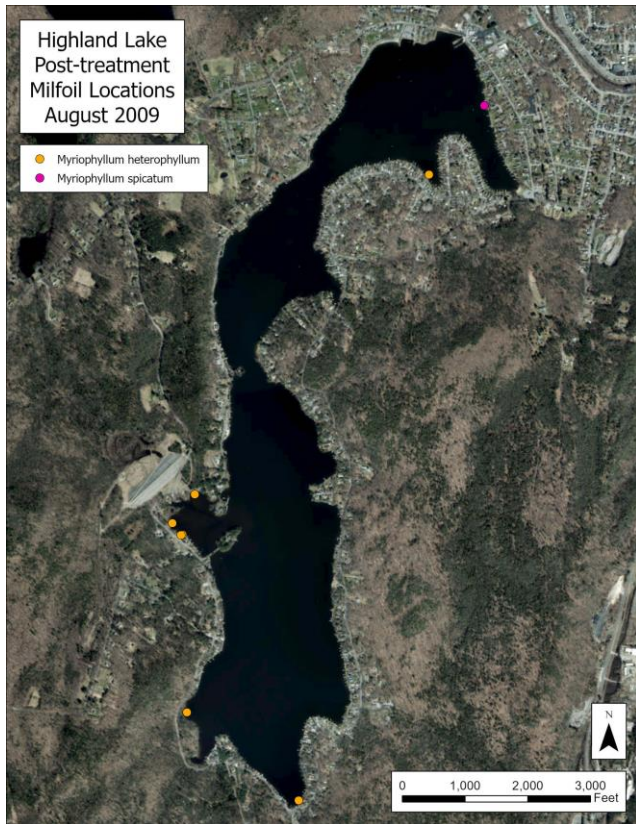
Discussion of Historical Milfoil Growth

NEAR conducted pre-treatment aquatic plant surveys in June 2017 and 2018. Post-treatment surveys were conducted in July or August in 2009, 2010, 2015, 2016 and 2018. Beginning in 2019, NEAR has conducted both pre- and post-management surveys annually (**Maps 8-19**).

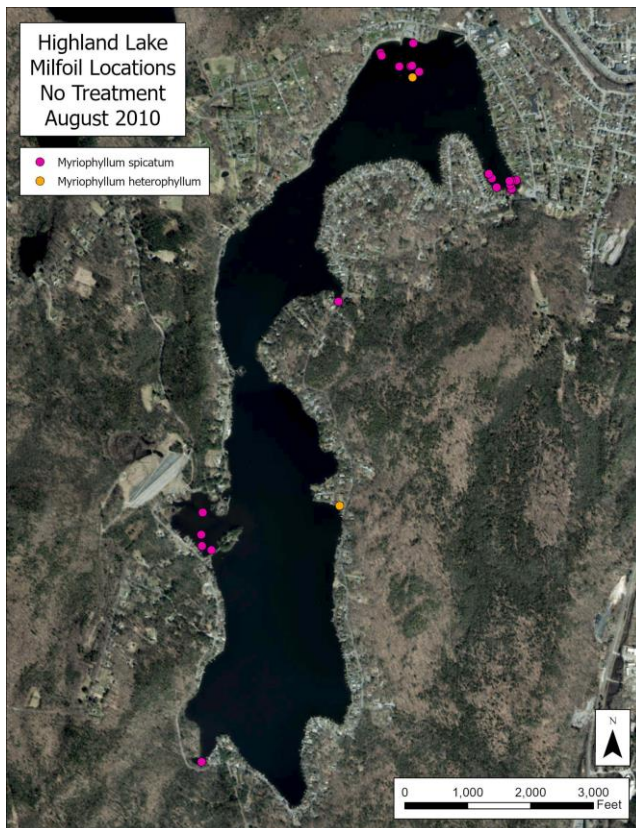
Maps show that the distribution and density of Eurasian Milfoil fluctuated considerably between 2009 and 2021, with large stands developing in the north, centered around the boat ramp, and along the southeastern shore. Treatments to control Eurasian Milfoil generally have had very good results. In July 2015, the lake had large stands of Eurasian Milfoil that were largely gone in August 2016 (**Maps 10 & 11**). Plants grew back in June 2017 but very few plants could be found in June 2018 (**Maps 12 & 13**). Very little Eurasian Milfoil was found in the lake during two surveys in 2019 (**Map 14**). In June 2020 (**Map 15**) a few isolated Milfoil plants were found, which we immediately requested a contracted DASH firm to remove. Unfortunately, the DASH firm didn't get to the site until early September, by which time the Milfoil had spread to other areas of the lake. The June 2021 survey (**Map 16**) showed Eurasian Milfoil distribution similar to September 2020. By August 2021, following a large herbicide treatment one month prior, all the Eurasian Milfoil was gone. No Eurasian Milfoil was found in 2022 (**Map 17**), and only a few plants in Sucker Brook Cover were found in 2023 (**Map 7**).

In recent years, the distribution of Variable-leaf Milfoil has remained limited to the tiny cove near Sucker Brook inlet. During our September 2023 post-management survey of the area, we found both Milfoils scattered around the Sucker Brook Cove.

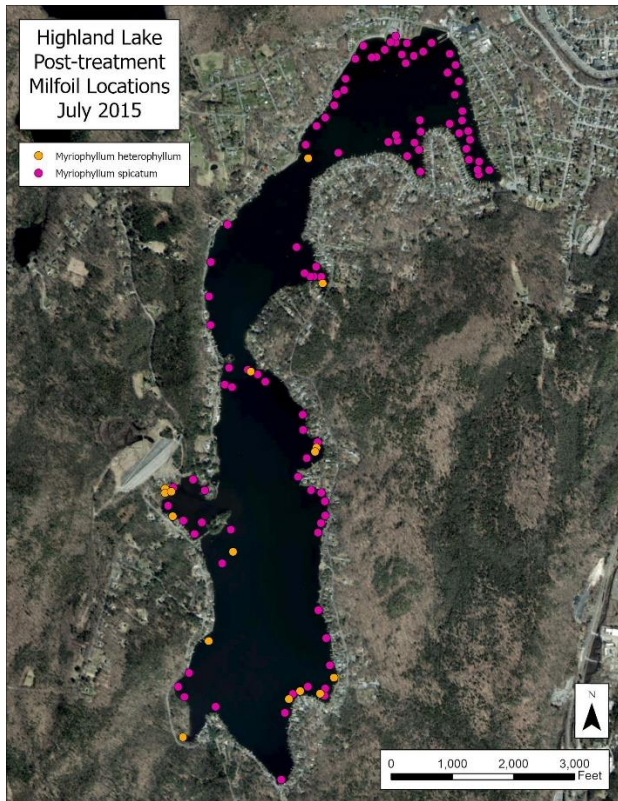
Map 8. Locations of Eurasian Milfoil and Variable-leaf Milfoil in 2009.



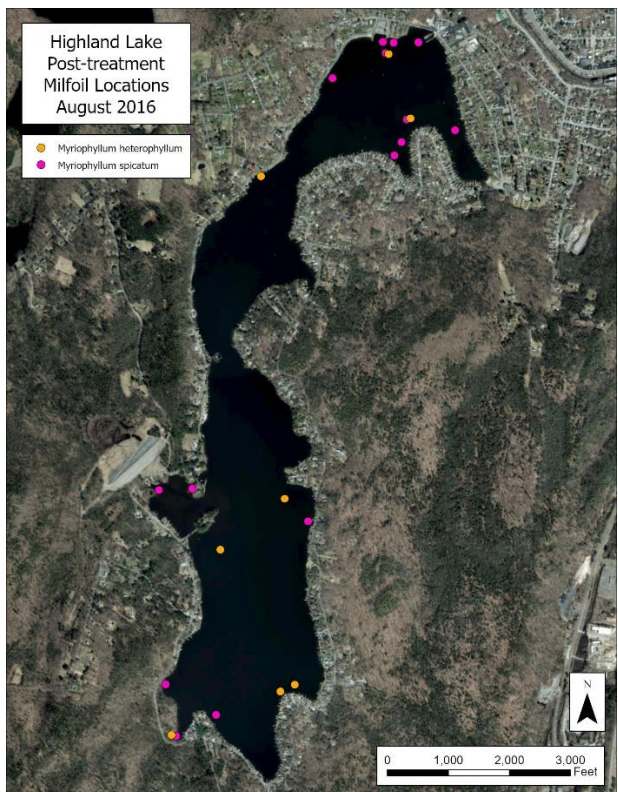
Map 9. Locations of Eurasian Milfoil and Variable-leaf Milfoil in 2010.



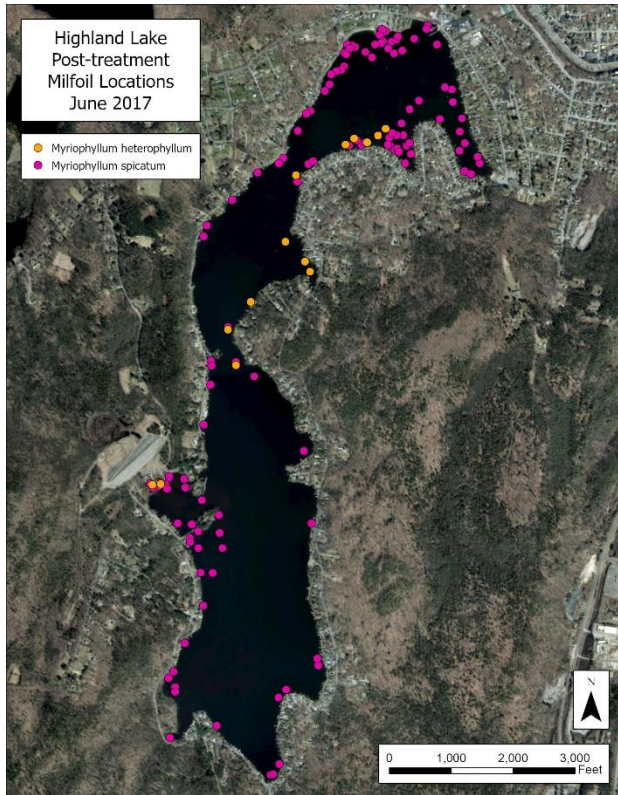
Map 10. Locations of Eurasian Milfoil and Variable-leaf Milfoil in 2015.



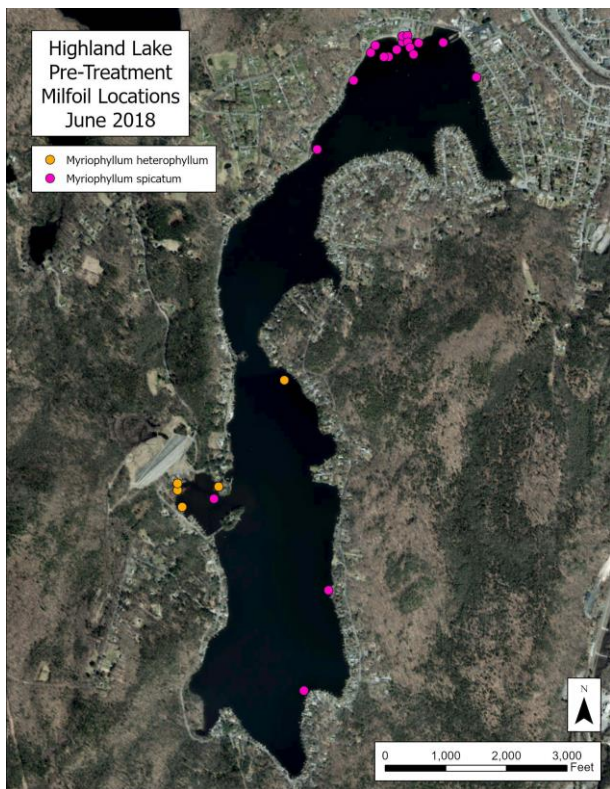
Map 11. Locations of Eurasian Milfoil and Variable-leaf Milfoil in 2016.



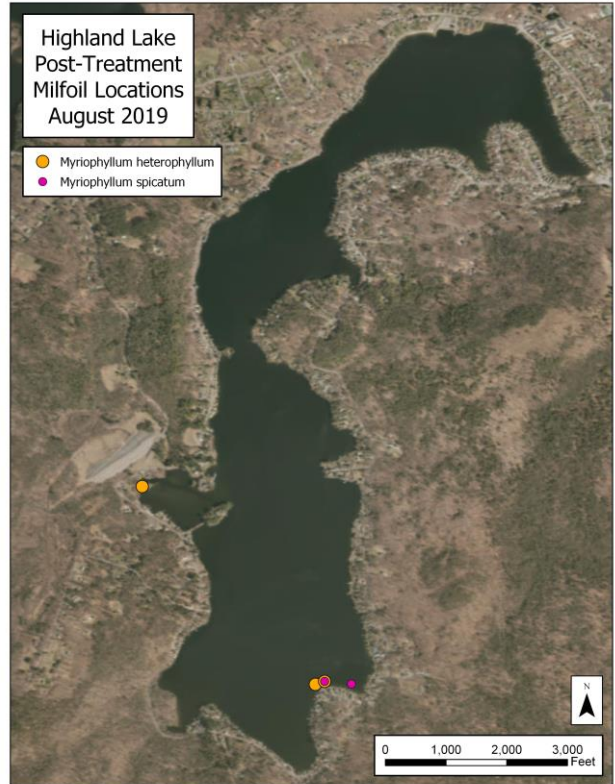
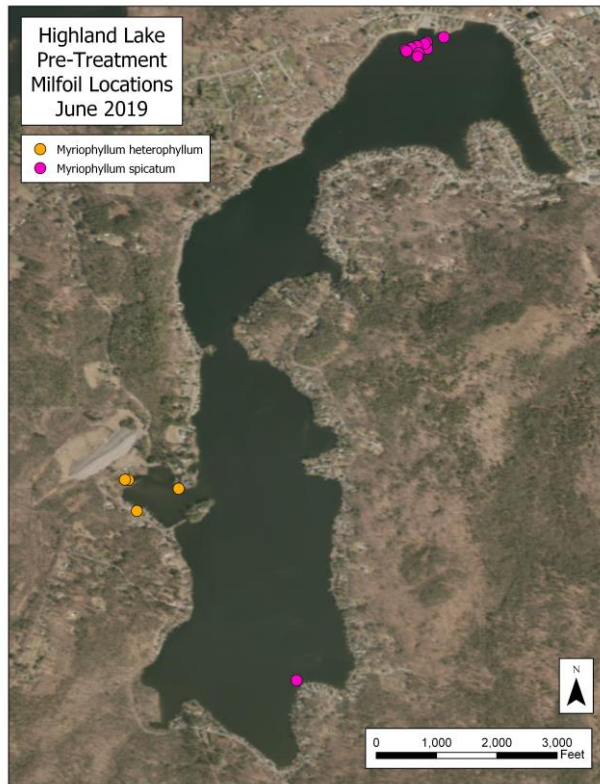
Map 12. Locations of Eurasian Milfoil and Variable-leaf Milfoil in 2017.



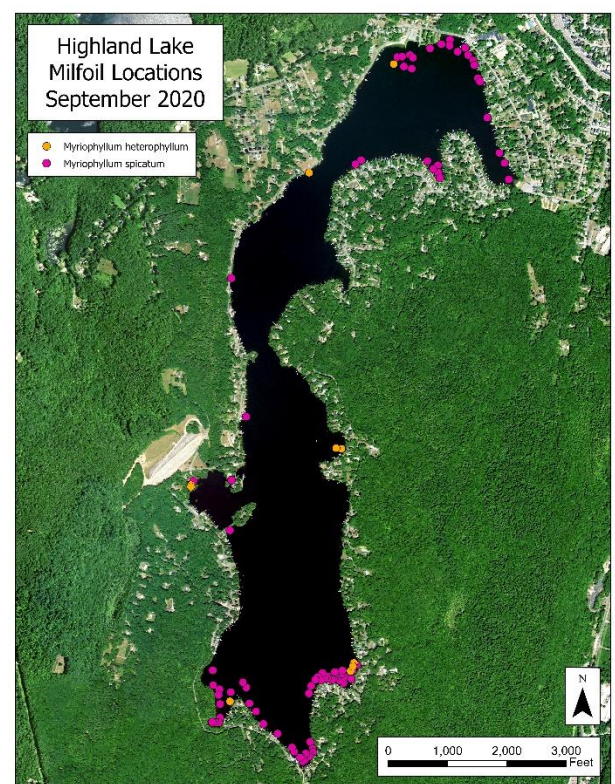
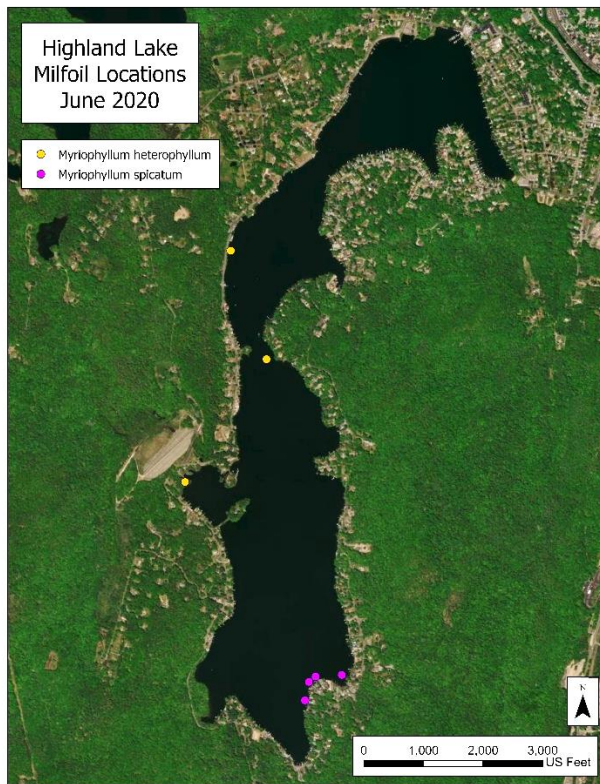
Map 13. Locations of Eurasian Milfoil and Variable-leaf Milfoil in 2018.



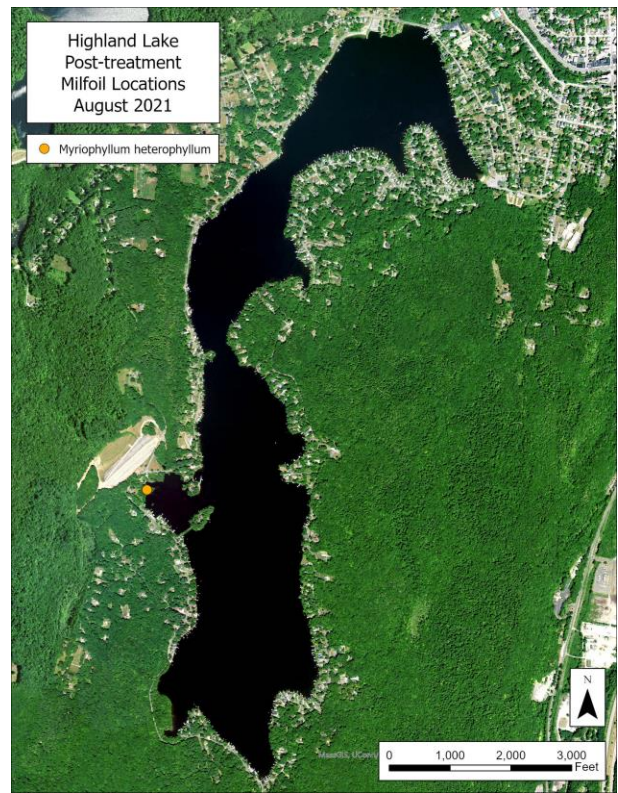
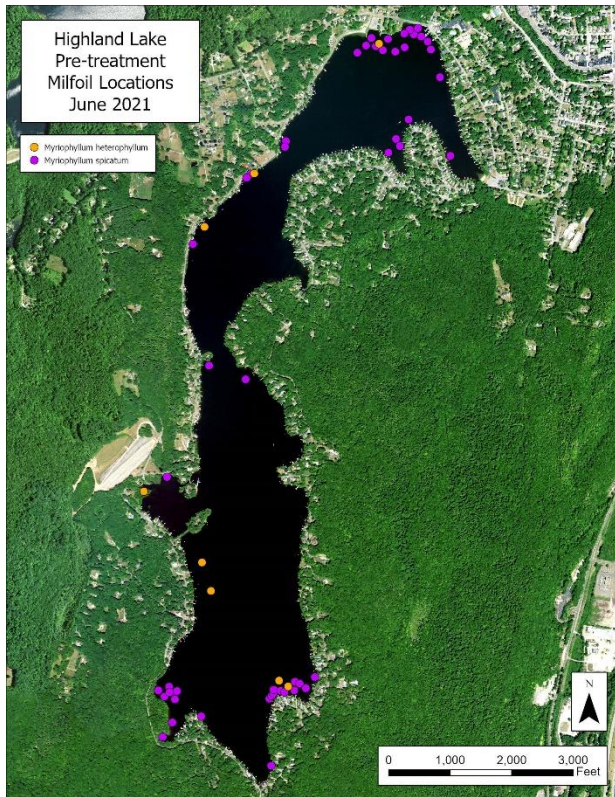
Map 14. Locations of Eurasian Milfoil and Variable-leaf Milfoil in 2019.



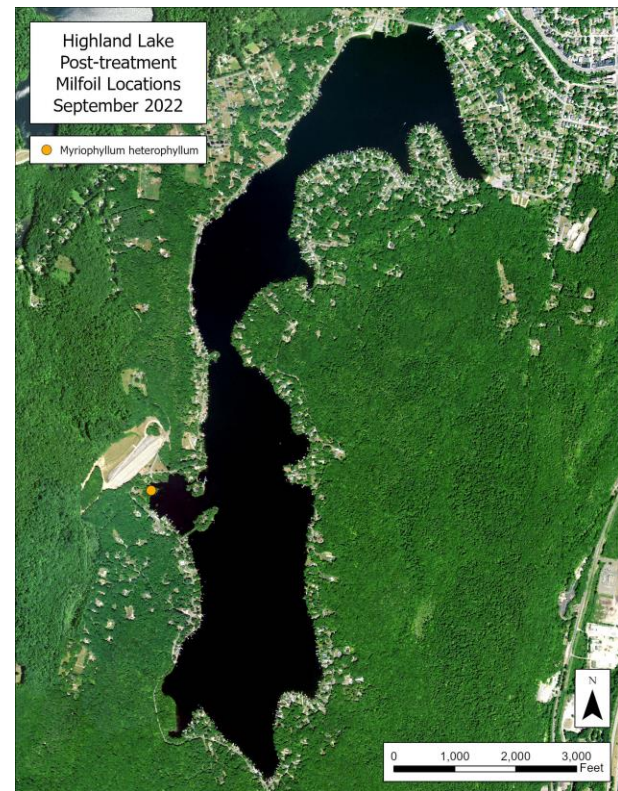
Map 15. Locations of Eurasian Milfoil and Variable-leaf Milfoil in 2020.



Map 16. Locations of Eurasian Milfoil and Variable-leaf Milfoil in 2021.



Map 17. Locations of Eurasian Milfoil and Variable-leaf Milfoil in 2022.



Recommendations

HLWA members have expressed interest in using ProcellaCOR in 2024 to treat the Milfoil in Sucker Brook Cove and any other locations where Variable-leaf Milfoil or Eurasian Milfoil are found. The locations of all state-listed species must be given a buffer zone during the treatment. NEAR recommends treating the entire Sucker Brook cove and the smaller cove under the bridge. Any additional areas requiring treatment will be determined following the pre-treatment survey in June.

Conduct two full-lake aquatic plant surveys to scan for all invasive, nuisance, and state-listed species. The first survey should occur in early to mid-June, specifically to find any Eurasian and Variable Milfoil growing outside of Sucker Brook Cove, as well as to search for State of CT protected species. The second full-lake aquatic plant survey, in late August or early September, will assess any changes to the native and State of CT protected species populations and will assess the outcome of any milfoil management efforts.