

**Northeast Aquatic Research**



# **Lake Waramaug 2023 Invasive Species Report**

**Prepared for the Lake Waramaug Task Force**



**December 2023**

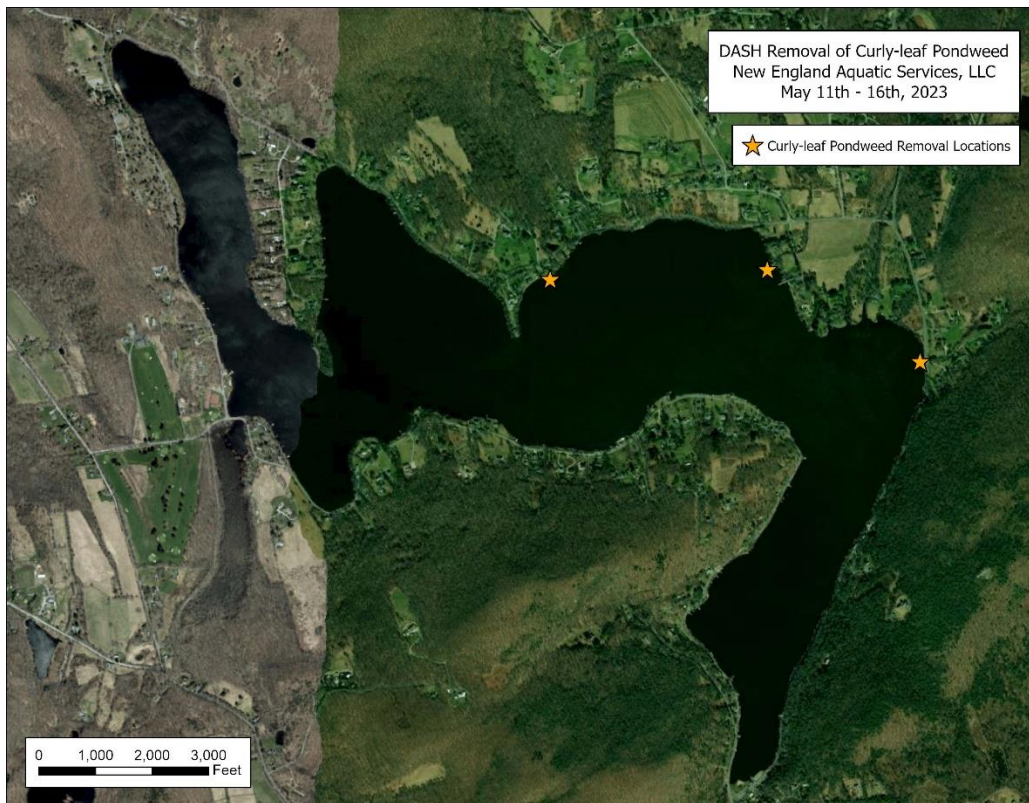
## Introduction

NEAR conducted a full lake-survey on May 4<sup>th</sup> to search for the invasive species *Potamogeton crispus* (Curly-leaf Pondweed) throughout the lake

New England Aquatic Services conducted Diver Assisted Suction Harvesting (DASH) removal of Curly-leaf Pondweed plants over four days between May 11<sup>th</sup> and May 16<sup>th</sup>. They removed approximately five gallons of plants from three locations (**Map 1**).

NEAR staff visited the lake to search for Curly-leaf Pondweed again on June 13<sup>th</sup>. NEAR then conducted a second full-lake aquatic plant survey over two days, on August 21<sup>st</sup> and 22<sup>nd</sup>, to document the presence and abundance of all aquatic plant species in the lake.

*Map 1. Locations of Curly-leaf Pondweed removal by New England Aquatic Services.*



## Survey Results

The May pre-management survey consisted of surveying the entire lake for Curly-leaf Pondweed. No Curly-leaf was found during this survey. NEAR returned to the lake on June 13<sup>th</sup> to search for Curly-leaf again. This time, Curly-leaf Pondweed plants were found in two locations on the lake's northern shoreline (**Map 2**). Also during this survey, the invasive species *Trapa natans* (Water Chestnut) was found in one location in close proximity to one of the Curly-leaf beds. The Water Chestnut patch consisted of approximately 20 plants.

During the full-lake survey in August, 33 aquatic plant species were documented, along with Filamentous Algae and Lyngbya (Cyanomat) (**Table 1**). This is a high species richness, which suggests that no single species is taking over the plant community. *Potamogeton robbinsii* (Robbin’s Pondweed), *Potamogeton amplifolius* (Large-leaf Pondweed), *Elodea nuttallii* (Western Waterweed), *Vallisneria americana* (Tape Grass), and *Ceratophyllum demersum* (Coontail) were dominant, meaning they were present at more than 20% of the survey waypoints (**Map 3**).

Curly-leaf Pondweed was found at two points in close proximity to each other, but in an area where plants were not found in June (**Map 4**). Water Chestnut was located in the same area where it was found in June. The Water Chestnut plants were small, with the “patch” consisting of approximately 10-15 plants scattered among water lilies. The invasive species *Marsilea quadrifolia* (Water Clover) was found at three waypoints at the tip of the northwest cove (**Map 5**).

Filamentous Algae was present in several areas along the lake’s shoreline (**Map 6**). Filamentous Algae is often found in areas of excess nutrient concentration in the water, such as near the mouth of inlets that carry nutrients into the lake.

Map 2. Locations of *Potamogeton crispus* and *Trapa natans* during June 2023 investigation.

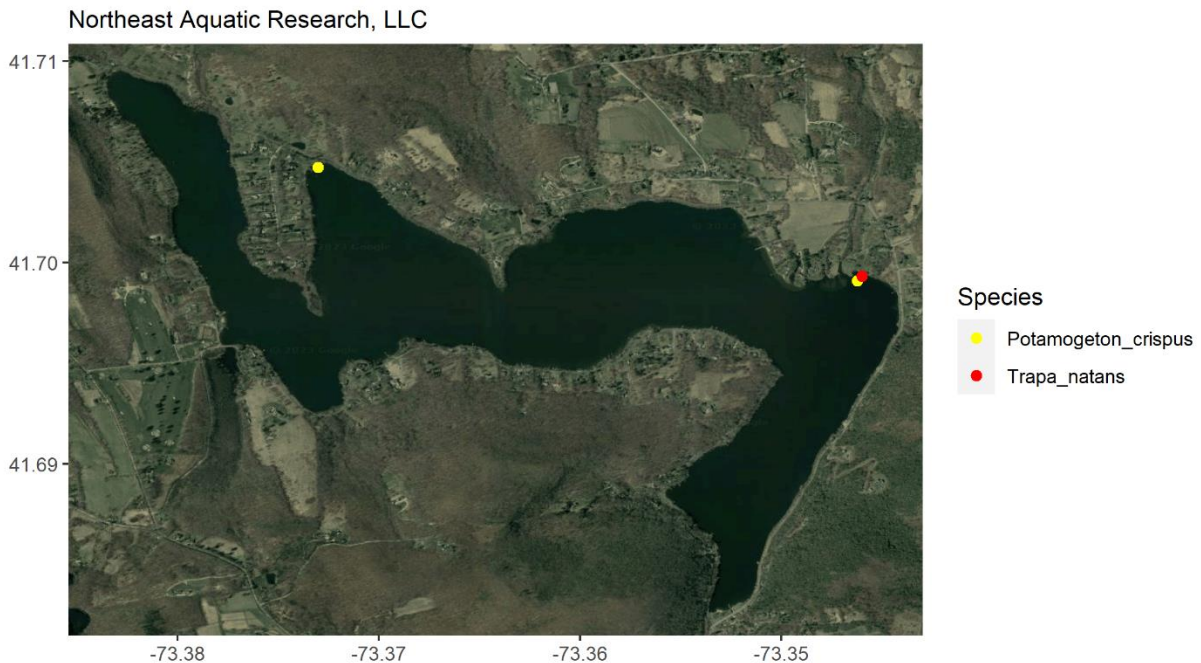


Table 1. Aquatic plant species found in Lake Waramaug during the August 2023 aquatic plant survey. Red text signifies invasive species. Blue text signifies protected species.

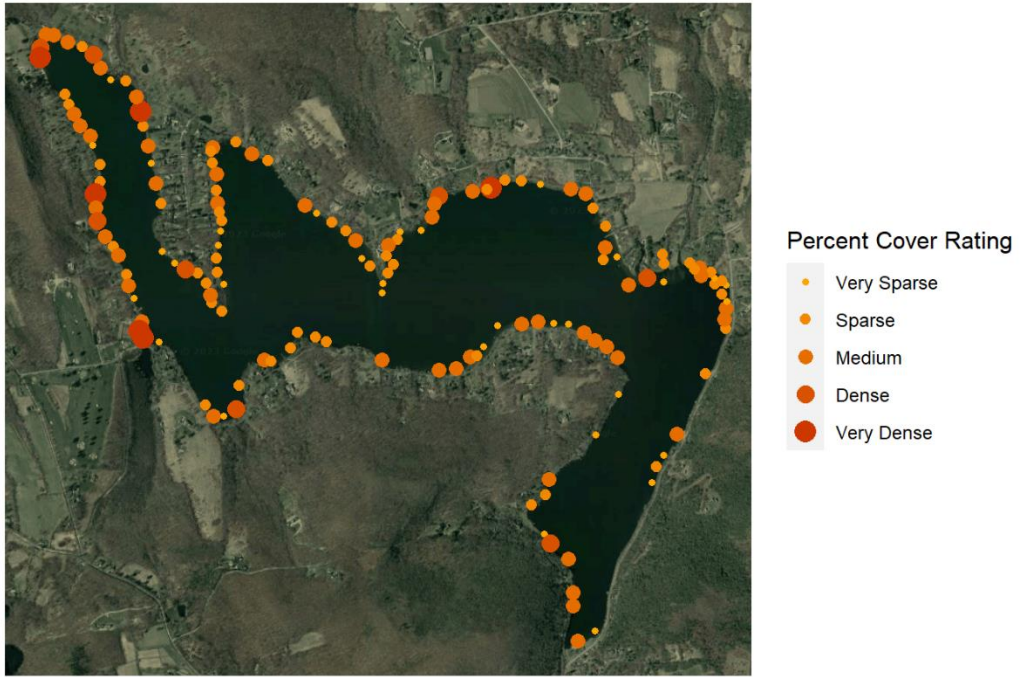
Scientific Name	% Frequency	Average Density
<i>Potamogeton robbinsii</i>	67	22
<i>Potamogeton amplifolius</i>	39	32
<i>Elodea nuttallii</i>	35	20
<i>Vallisneria americana</i>	32	14
<i>Ceratophyllum demersum</i>	27	21
<i>Lyngbya sp</i>	19	29
<i>Potamogeton perfoliatus</i>	12	26
<i>Potamogeton bicupulatus</i>	7	9
<i>Potamogeton gramineus</i>	7	12
<i>Sagittaria graminea</i>	6	9
<i>Nymphaea odorata</i>	5	16
<i>Polygonum amphibium</i>	4	19
Filamentous algae	3	11
<i>Najas flexilis</i>	3	11
<i>Phragmites australis</i>	3	NA
<i>Typha latifolia</i>	2	NA
<i>Zosterella dubia</i>	2	5
<i>Lemna minor</i>	2	8
<i>Pontederia cordata</i>	2	13
<i>Spirodela polyrhiza</i>	2	29
<i>Eleocharis acicularis</i>	1	18
<i>Ludwigia sp</i>	1	5
<i>Marsilea quadrifolia</i>	1	33
<i>Nuphar variegata</i>	1	57
<i>Potamogeton pusillus</i>	1	12
<i>Chara sp</i>	1	5
<i>Fontinalis sp</i>	1	5
<i>Potamogeton crispus</i>	1	8
<i>Wolffia sp</i>	1	28
<i>Callitriche sp</i>	0.4	10
<i>Nitella sp</i>	0.4	5
<i>Potamogeton berchtoldii</i>	0.4	5
<i>Trapa natans</i>	0.4	10



Map 3. Locations of dominant species during the August 2023 survey.

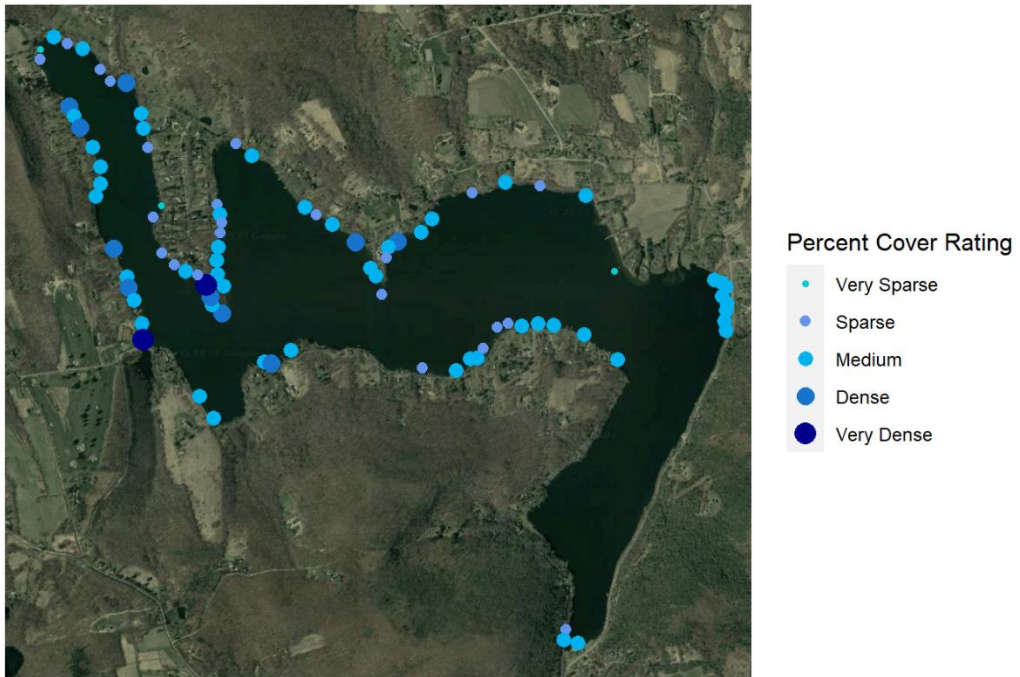
August 2023 Waramaug: Robbin's Pondweed (*Potamogeton robbinsii*)

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August 2023 Waramaug: Largeleaf Pondweed (*Potamogeton amplifolius*)

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August 2023 Waramaug: Nuttall's waterweed (*Elodea nuttallii*)

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August 2023 Waramaug: Tape Grass (*Vallisneria americana*)

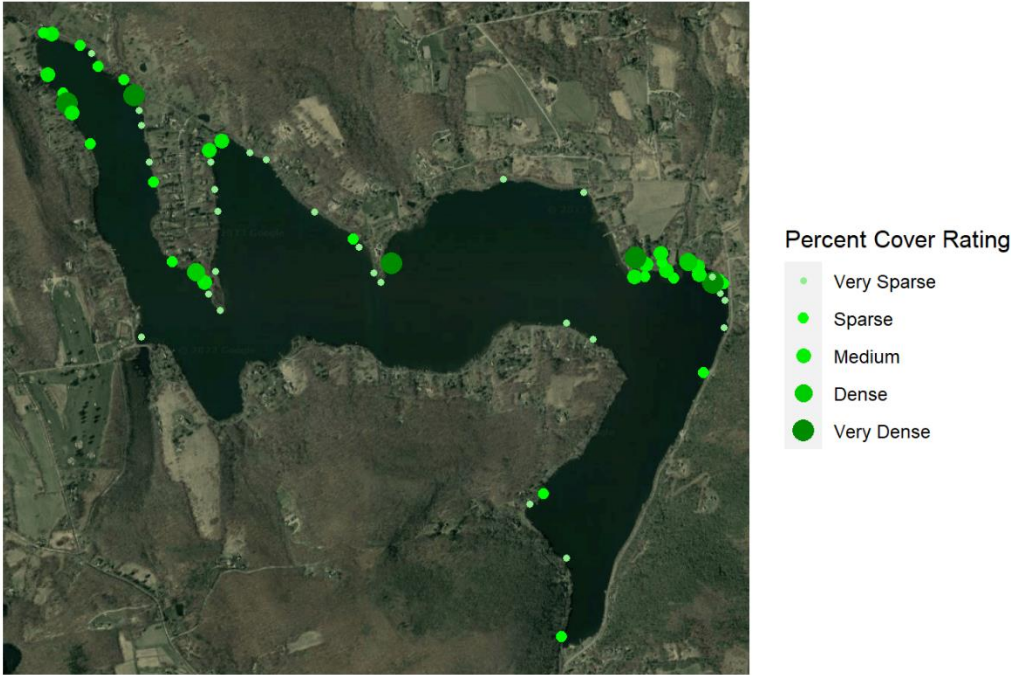
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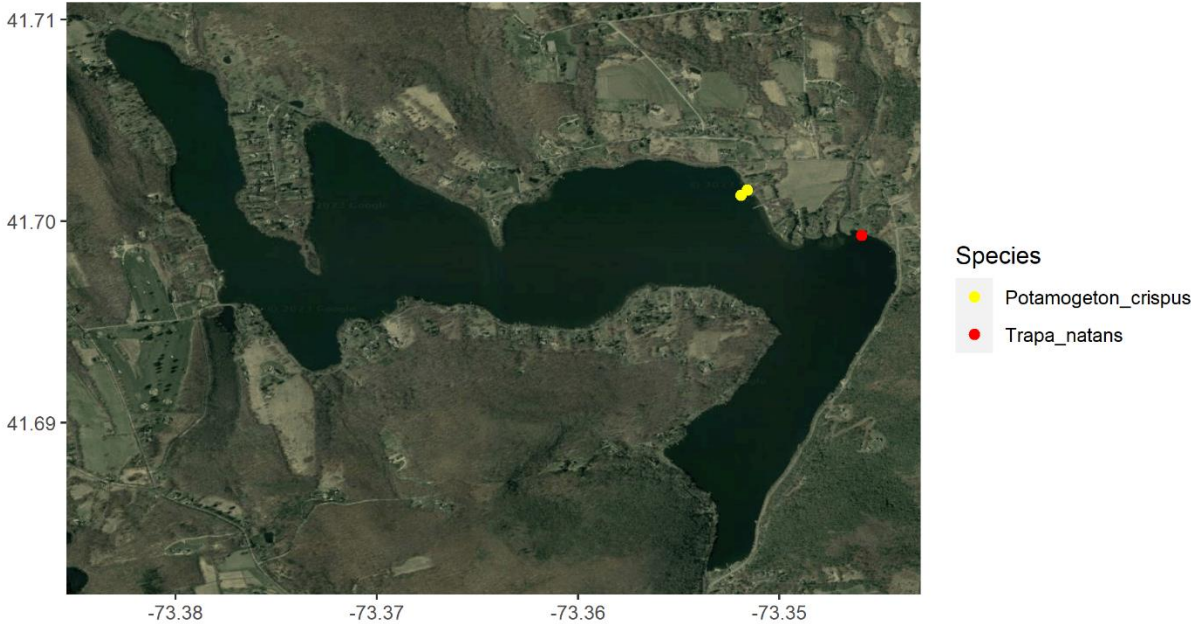
August 2023 Waramaug: Coontail (*Ceratophyllum demersum*)

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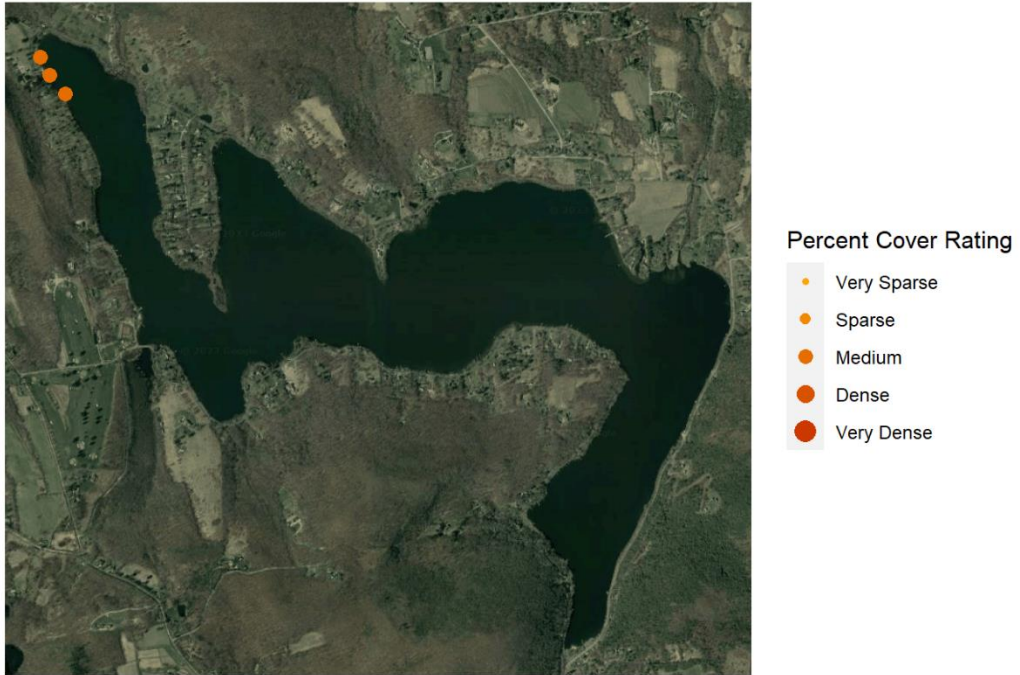
Map 4. Locations of *Potamogeton crispus* and *Trapa natans* during August 2023 survey.

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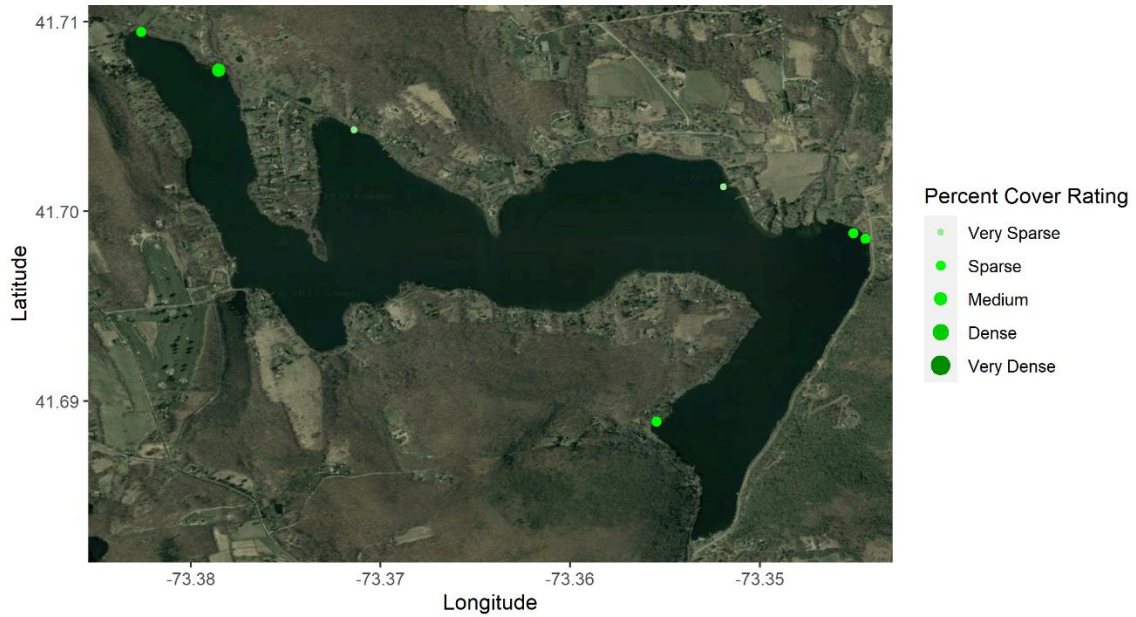
Map 5. Locations of *Marsilea quadrifolia* during August 2023 survey.

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Map 6. Locations of *Filamentous Algae* during August 2023 survey.

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## Recommendations

The management efforts of recent years have drastically reduced the Curly-leaf Pondweed population in Lake Waramaug. These efforts should be continued in order to eventually eradicate this plant from the lake. A Curly-leaf Pondweed search should be conducted in mid Spring 2024. If any Curly-leaf plants are found, this information will be shared with the contracted DASH operator, who should remove the plants as soon as possible. Following completion of the removal operation, the management areas should be inspected to ensure that all plants were removed.

A full lake aquatic plant survey should be conducted at the time of maximum plant growth, to assess the composition and abundance of the aquatic plant community and to search for new invasive species infestations.

## Appendix

*Spring/pre-removal aquatic plant survey dates, and number of locations where curly-leaf pondweed were found 2008 – 2023.*

<b>Date of Survey</b>	<b>Number of Curly-leaf Locations</b>
2023 – June 13	2
2022 – May 26 & 31	5
2021 – May 25	6
2020 – June 1	24
2019 – May 31	10
2018 – May 24 and May 25	63
2017 – June 1	50
2016 – May 31 and June 2	104
2015 – June 8	48
2014 – June 10	120
2013 – June 4	33
2012 – May 30, and May 31	19
2011 – June 15	5
2010 – June 7, 8, and 9	45
2009 – May 21, June 16, and June 25	16
2008 – June 18, July 2 (first spring curly-leaf survey)	5

*See past years' reports for maps of Curly-leaf Pondweed locations from 2008 to 2022.*