Northeast Aquatic Research

# Lake Waramaug
# 2021 Invasive Species Report

**Prepared for the Lake Waramaug Task Force**

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# Introduction

Over the past 15 years, the invasive species curly-leaf pondweed (*Potamogeton crispus*) has been managed in Lake Waramaug via hand harvesting.

In 2021, Northeast Aquatic Research (NEAR) visited the lake on May 25th to search for curly-leaf pondweed plants. The survey consisted of traversing the entire littoral zone of the lake, with particular attention given to locations where curly-leaf pondweed has been found in previous years. This survey utilized a combination of visual assessments, hand-raking in shallow water, grappling rake tosses, and depth-soundings to view plants growing in deep water (>6 feet).

Following the May 25th survey, New England Aquatic Services used hand harvesting to remove all identified curly-leaf plants from the lake.

The post-removal survey, conducted on June 25th, involved revisiting all locations where the suction harvesters had operated, to search for any curly-leaf plants that had been missed by the harvesters or had regrown from turions or fragments post-removal.

# Survey Results

During the May pre-removal survey, curly-leaf pondweed plants were found in only six locations along the lake's northern shoreline. No plants were found in the western State Park arm, or along the southern shore (**Map 1**). Four of the six locations were isolated plants. The two eastern-most locations contained the largest patches. Waypoint #99 contained approximately 20 plants, and the 10 plants at waypoint #100 (Sachem Brook) were large and bushy and grew to the surface (**Table 1**).

***Map 1.*** *May/pre-removal curly-leaf pondweed locations in Lake Waramaug.*

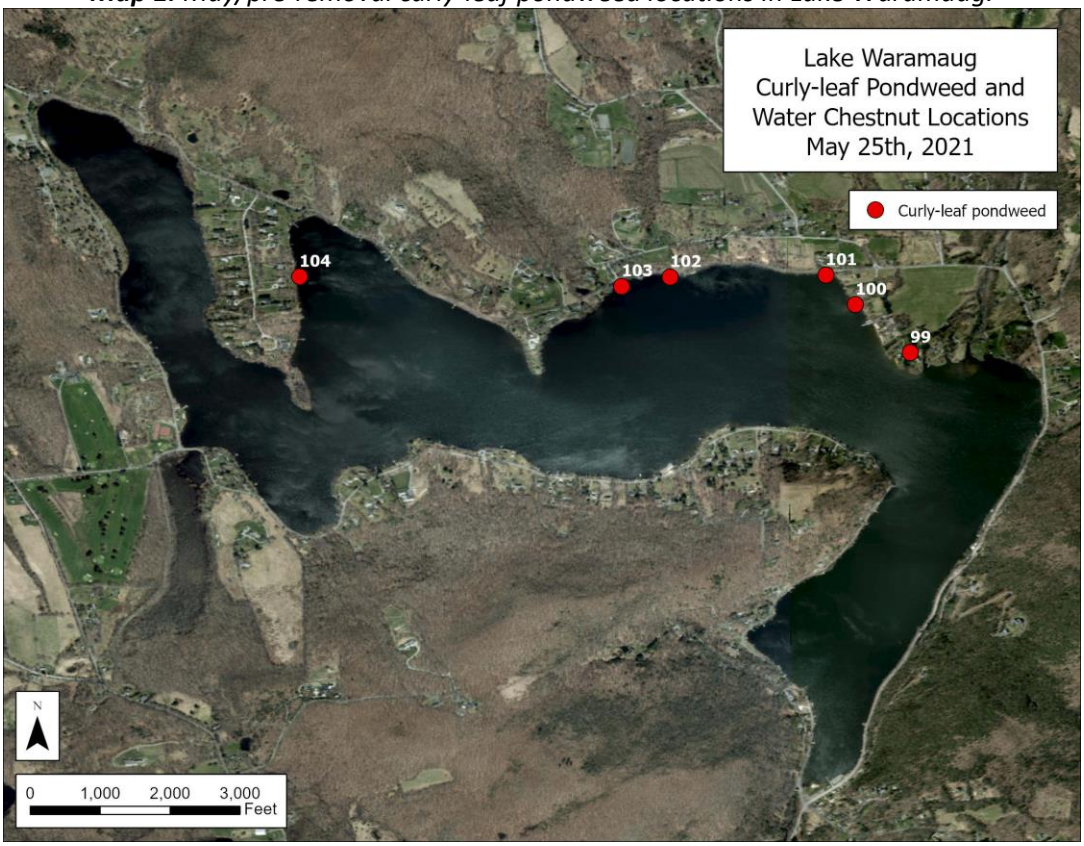
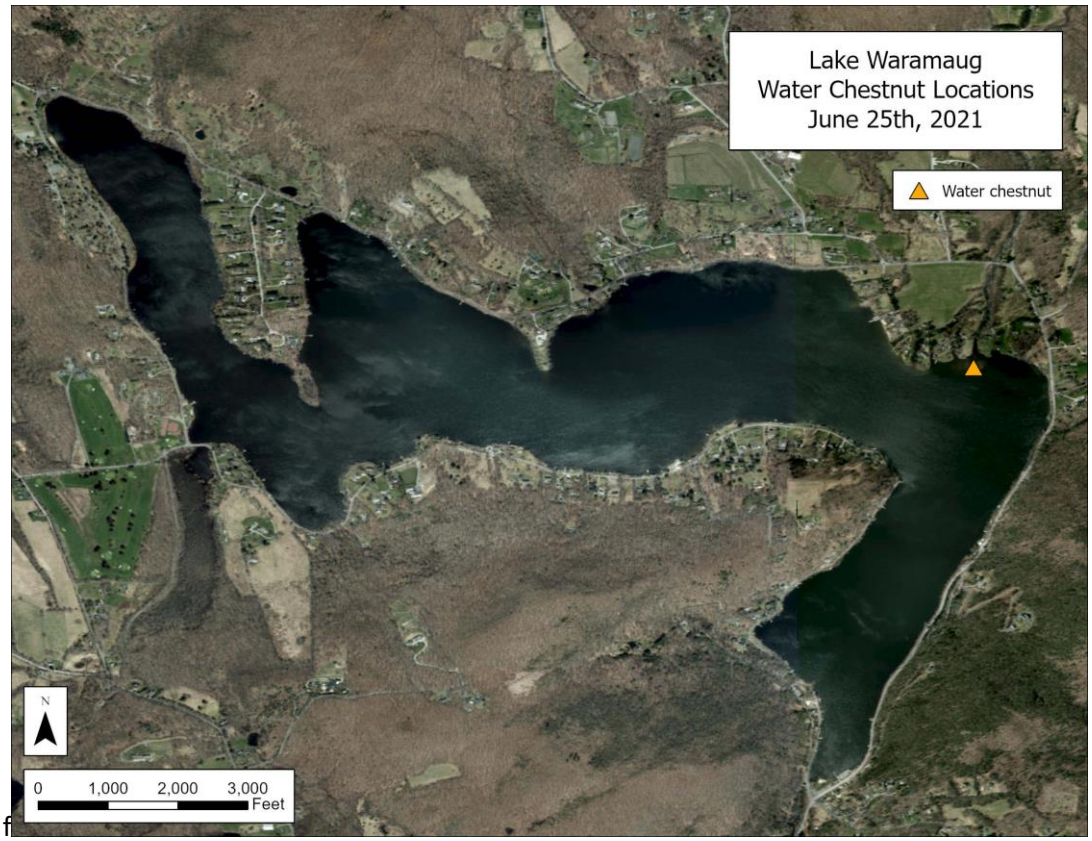



***Table 1****. May 25th, 2021-pre-removal curly-leaf pondweed waypoints and number of plants found.*

| Waypoint number and description | # of Plants |
|---|---|
| 99 - patch of large plants at inner end of lagoon | 20 |
| 100 - clump of large plants inside mouth of Sachem Brook | 10 |
| 101 - isolated plants on lake shore | 5 |
| 102 - isolated plant on lake shore | 1 |
| 103 - isolated plant on delta of brook | 1 |
| 104 - isolated plants on lake shore | 2 |

No curly-leaf pondweed was found during the post-removal survey on June 25th. However, during that survey, the invasive aquatic plant water chestnut (*Trapa natans*) was discovered growing in the shallow water of the Sucker Brook[1] delta, both scattered around on the delta itself where water depths were only a few inches deep, and along the eastern side of the delta where water depths were 2-3 feet deep (**Map 2**). After about 2 hours of searching, approximately 30 plants were found and removed. All the plants were small, with rosettes <6 inches in diameter, and many were only 1-2 inches in diameter. The rosettes of many plants found on the eastern side of the delta, in deeper water, had not yet reached the surface, with the rosettes hidden within the existing native coontail and filamentous algae. It is likely that all the plants that NEAR removed had sprouted in the spring of 2021. The likely source is Bates Pond, a small pond known to contain a significant amount of water chestnut. The outlet of the pond joins Sucker Brook about 0.3 miles upstream of the lake (**Map 3**).

***Map 2.*** *June/post-removal water chestnut location in Lake Waramaug.*

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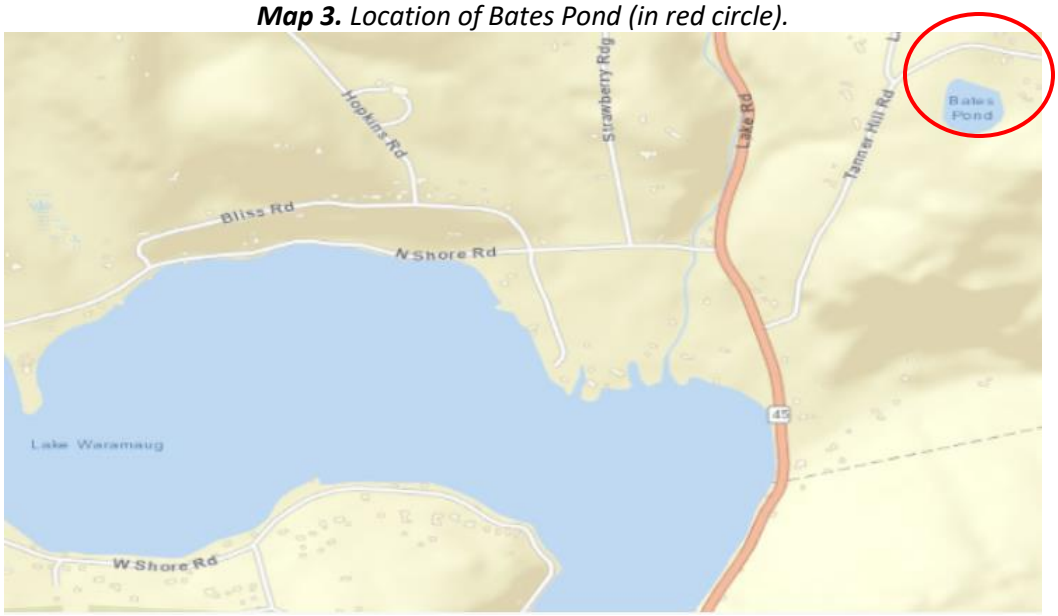
[1] Sucker Brook is labeled "Lake Waramaug Brook" in Google Maps.

***Map 3.*** *Location of Bates Pond (in red circle).*




## Recommendations

The amount of curly-leaf pondweed in Lake Waramaug was significantly reduced in 2021 over all prior years (**Table 2**). The combination of comprehensive census surveys early in the spring that produce a detailed set of GPS locations of all plants, followed by rapid deployment of harvesting crews that can immediately target each of the locations, has drastically reduced the presence of this species in the lake. Most plants that are found now are believed to be new growth from recently settled turions. We believe that only a few locations still contain lingering turion reserves in the sediments: inside the northeastern lagoons and the inner water of the mouth of Sachem Brook. Both areas contain deep unconsolidated muck.

Continued annual pre-removal surveys are necessary for locating all curly-leaf plants, along with searching for any other invasive species and removing them immediately, when possible. These surveys are timed to be conducted as soon as curly-leaf pondweed begins to grow, typically around May 25$^{th}$. surveys conducted earlier are unsuccessful at finding the plants, while waiting too much later risks allowing plants to mature and begin forming turions.

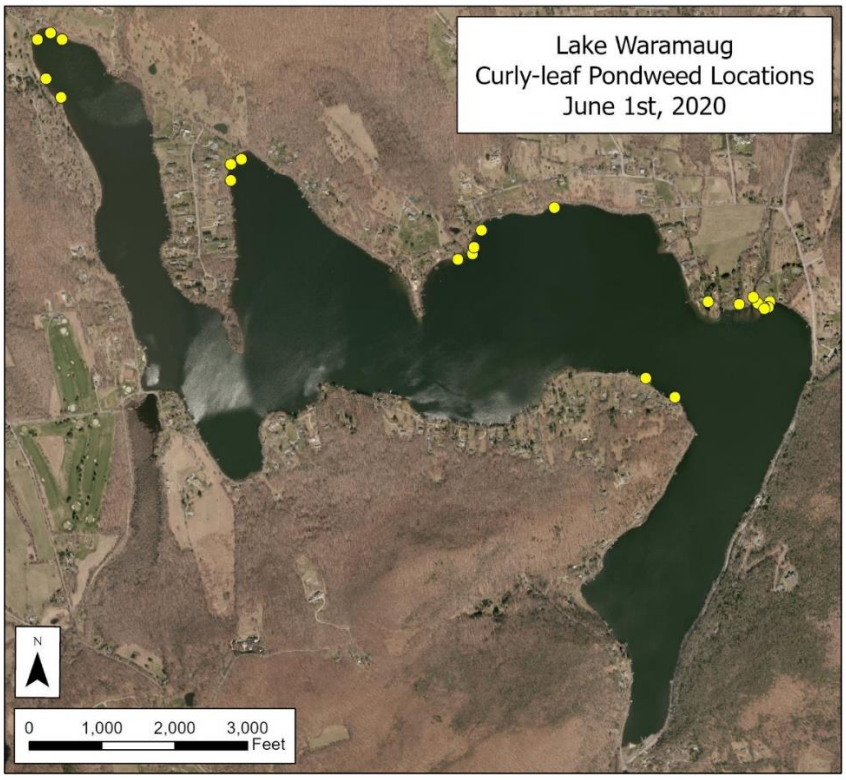
The sediment delta of Sucker Brook requires regular attention during the season to search for newly sprouted water chestnut plants. If any plants are found, they should be hand-pulled immediately. The stream connecting Bates Pond and Sucker Brook should be investigated to determine if plants are coming out of the pond, and if there are ways to either prevent plants from leaving the pond or determine where plants can be collected and removed from the stream prior to entering Sucker Brook. Eventually, an eradication program should be considered for water chestnut in Bates Pond. These plants will continually inoculate Lake Waramaug with new mature nutlets and provide a source of nutlets for Great Blue Herons to spread water chestnut to other lakes.

***Table 2**. Spring/pre-removal aquatic plant survey dates, and number of locations where curly-leaf pondweed were found 2008 – 2021.*

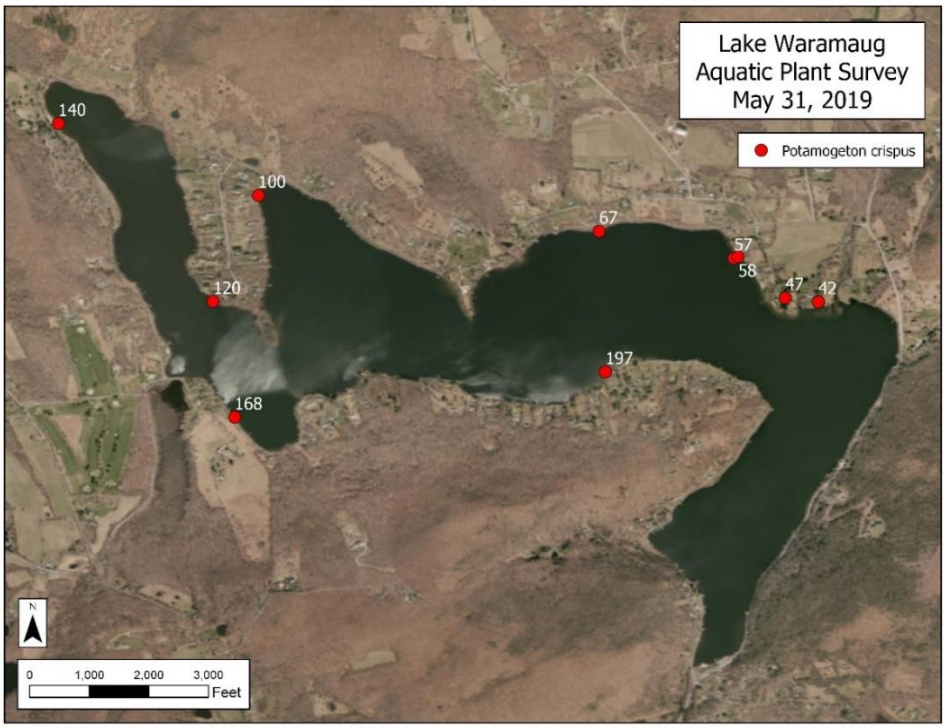
| Date of Survey | Map # | Number of curly leaf locations |
|---|---|---|
| 2021 – May 25 | 1 | 6 |
| 2020 – June 1 | 4 | 24 |
| 2019 – May 31 | 5 | 10 |
| 2018 – May 24 and May 25 | 6 | 63 |
| 2017 – June 1 | 7 | 50 |
| 2016 – May 31 and June 2 | 7 | 104 |
| 2015 – June 8 | 7 | 48 |
| 2014 – June 10 | 7 | 120 |
| 2013 – June 4 | 7 | 33 |
| 2012 – May 30, and May 31 | 7 | 19 |
| 2011 – June 15 | 7 | 5 |
| 2010 – June 7, 8, and 9 | 7 | 45 |
| 2009 – May 21, June 16, and June 25 | 7 | 16 |
| 2008 – June 18, July 2 (first spring curly-leaf survey) | 8 | 5 |

# Appendix

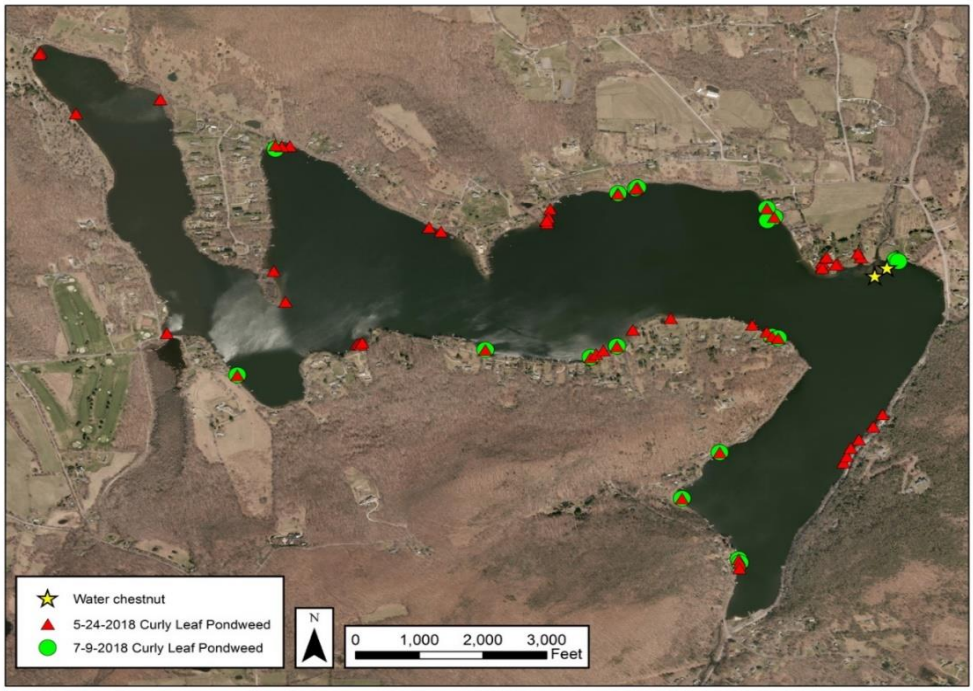
***Map 4**. Locations of Curly-leaf Pondweed plants found in Lake Waramaug during June 2020 survey.*



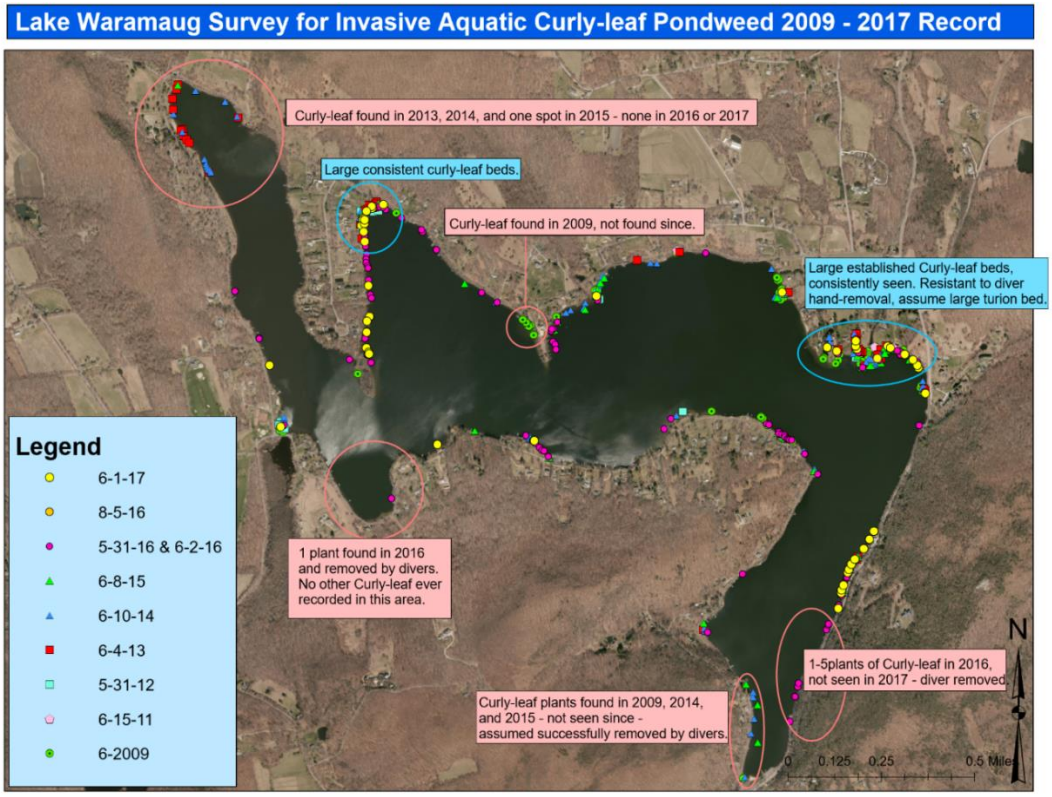
***Map 5.*** *Locations of Curly-leaf Pondweed plants found in Lake Waramaug during May 2019 survey.*




***Map 6****. Locations of Curly-leaf Pondweed and Water chestnut during 2018 surveys.*



***Map 7.*** *Locations of Curly-leaf Pondweed plants found in Lake Waramaug during aquatic plant surveys, 2009 – 2017.*




***Map 8.*** *Lake Waramaug showing sites were curly-leaf pondweed was observed during June 18, and July 2, 2008 surveys.*