WATER & WETLAND
LAKE, POND & WETLAND MANAGEMENT

December 5, 2024

Methuen Conservation Commission
41 Pleasant Street, Suite 217
Methuen, MA 01844
Sent via email: jgiarrusso@ci.methuen.ma.us

Re: Forest Lake, Methuen, MA – 2024 Year End Report – DEP #219-1145

Dear Commissioners:

It is our pleasure to present a year end summary report to the Methuen Conservation Commission regarding the 2024 aquatic management program at Forest Lake (Figure 1 to the right). Forest Lake is located in Methuen, MA and is approximately 48 acres. The lake is primarily surrounded by residential properties around each shoreline (Ridgewood Lane to the north, 1st Avenue to the east, Palanga Street to the south, and Bumpy Lane to the west/southwest). There are two boat launches at Forest Lake located at the northern point (off of Ridgewood Lane) and within the southeastern shoreline (off of Palanga Street). The boat launch along the northern shoreline is the primary, public boat launch. A Town beach is located along the northwestern shoreline. There is a small island in the southwestern area of the lake. A small fountain runs regularly and is anchored west/southwest of the island off an abutter's property.

Figure 1: Forest Lake - Methuen, MA

Historically, Forest Lake has battled invasive species curly-leaf pondweed (*Potamogeton crispus)* and spiny (brittle) naiad (*Najas minor),* in addition to nuisance densities of clasping-leaf pondweed *(Potamogeton perfoliatus)* and waterlilies *(Nymphaeaceae),* and microscopic algal blooms. The goal of the 2024 program was to document and manage the invasive/nuisance aquatic vegetation through a series of surveys while monitoring water quality. This would be accomplished by implementing an aquatic management program that focused around performing all applicable tasks, including planning, permitting, surveys, treatments, and reporting.

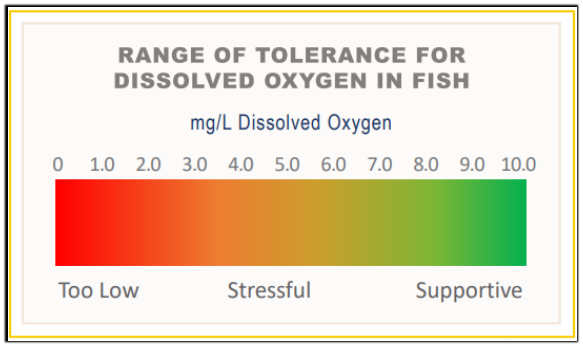

Figure 2: Dissolved oxygen table

During each visit to the lake, a survey was conducted using visual observation paired with a standard throw-rake and handheld GPS/ArcGIS Field Maps, as applicable. Additionally, dissolved oxygen (DO) and temperature readings were collected throughout the season using a calibrated YSI meter with optical sensor. Dissolved oxygen is the amount of oxygen in water that is available to aquatic organisms. DO is necessary to support fish spawning, growth, and activity. Tolerance varies by species, please see the figure provided for a

general range of fish tolerance (Source: epa.gov). Dissolved oxygen can be affected by many outside factors, such as: temperature, time of day, and pollution. Dissolved oxygen levels are typically lowest early in the morning. Healthy water should generally have concentrations of about 6.5-8+ mg/L (table in Figure 2). Water clarity was also assessed using a Secchi disk. A Secchi disk is a disk with alternating black and white quadrants. It is lowered into the water of a pond or lake until it can no longer be seen by the observer. This depth of disappearance, called the Secchi depth, is a measurement of the transparency of the water. All readings are included in the tables throughout this report.

All permitting, treatment and survey tasks were completed without issue and at the proper times. The table below provides the specific dates of each task. Below the table, each visit/task performed is described in additional detail.

Summary Of 2024 Management Activities

Date	Task/Description
May 31, 2024	The early-season vegetation survey was completed to document conditions prior to management and to help guide 2024 management
July 15, 2024	A pre-treatment survey was conducted to confirm treatment areas; An herbicide treatment was completed
August 8, 2024	A post-treatment survey was complete to evaluate the overall conditions of the lake and to guide recommendations for the 2025 season

May 31, 2024 - Early-Season Vegetation Survey

On May 31st, Aquatic Biologist, Grace Adams, made a visit to Forest Lake. The visit consisted of performing a survey and collection of basic water quality data.

Upon arrival to the site, a survey was conducted using visual observation paired with a standard throw-rake and handheld GPS/ArcGIS Field Maps, as applicable. Plants documented during the survey are documented in the table below. (*) denotes an invasive species. Invasive species are non-native to the ecosystem and are likely to cause economic harm, environmental harm, or harm to human health.

Species Identified	
Common Name	**Latin Name**
Curly-leaf Pondweed*	*Potamogeton crispus*
Thin-leaf Pondweed	*Potamogeton pusillus*
Clasping-leaf Pondweed	*Potamogeton perfoliatis*
Waterlilies	*Nymphaeaceae*
Ribbon-leaf Pondweed	*Potamogeton epihydrus*
Benthic Algae	-
Filamentous Algae	-
Cattails	*Typha*

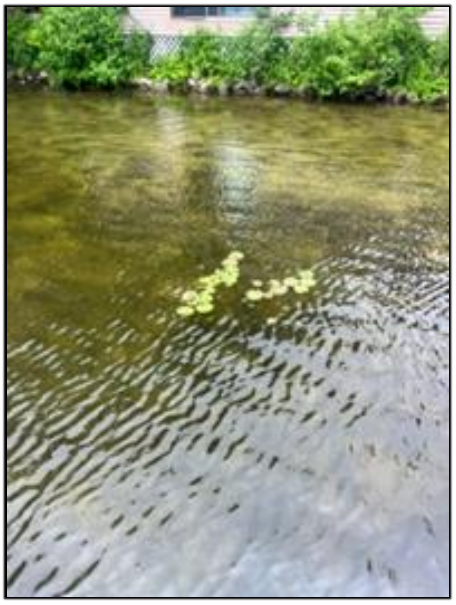

Figure 3: Native waterlilies observed during initial survey

Observed throughout the lake were varying densities of clasping-leaf pondweed, which is a native species that has the ability to reach nuisance

densities. Clasping-leaf pondweed varied from sparse to dense densities. The moderate to dense densities were noted around the island and through the center of the lake. Many of the patches of clasping-leaf pondweed were at the surface or just below the surface of the water. The water clarity was excellent, making visibility high. Additional areas of moderate-dense clasping-leaf pondweed were documented in the cove areas and by the boat launch. Also found near the boat launch was trace densities of curly-leaf pondweed, which was the only invasive species documented during the survey. This species is a colder-water invasive which dies off naturally as water temperatures increase. The curly-leaf pondweed was only found through rake tosses and appeared unhealthy.

Native species observed include waterlilies (pictured in Figure 3), thin-leaf pondweed (*Potamogeton pusillus),* ribbon-leaf pondweed (*Potamogeton epihydrus)*, and cattails (*Typha sp.)*. These species were all found in sparse, beneficial densities. Benthic filamentous algae was also observed scattered throughout the lake. Pollen was noted on the surface of the water and within the water column, this should not be confused with microscopic algae.

Water Quality Data		
Surface Temp (°C)	Surface DO (mg/L)	Secchi Disk Depth (ft)
24.3	9.13	10'4"

July 15, 2024 – Survey / Herbicide Treatment

Figure 4: Clasping-leaf pondweed growing in the water column

On July 15th, Senior Environmental Scientist, James Lacasse, and Aquatic Field Assistant, Harley Westgate, made a visit to Forest Lake. The visit consisted of completing a brief survey, collection of basic water quality data, and applying a treatment.

Upon arrival to the site, a brief survey was conducted using visual observation paired with a standard throw-rake and handheld GPS/ArcGIS Field Maps, as applicable. The survey was completed to confirm potential treatment areas and plant densities present. Plants documented during the survey are documented in the table below.

Species Identified	
Common Name	**Latin Name**
Filamentous Algae	-
Clasping-leaf Pondweed	*Potamogeton perfoliatis*
Waterlilies	*Nymphaeaceae*
Snailseed Pondweed	*Potamogeton bicupulatus*
Cattails	*Typha*
Brittle Naiad*	*Najas minor*

The treatment area of 15 acres was based on a previous survey conducted by a Water & Wetland Biologist several weeks prior (survey data noted above). It appeared that the brittle naiad (*Najas minor)* population had increased in density since first being observed in Forest Lake. Contact herbicide in liquid form was

applied to handle nuisance native plants (Figure 4) in addition to brittle naiad. The herbicide was applied using a treatment boat equipped with a calibrated sub-surface injection system. This application methodology allows for even coverage within the treatment areas. Prior to the treatment, the shoreline was posted with neon signage noting the treatment, affiliated water use restrictions, and Water & Wetland contact information. The signs fulfill permit obligations for shoreline posting.

Before the treatment, a handful of dead trout were spotted on the water, likely due to spawning stress or water temperature. The water clarity was excellent across the lake, and the treatment went extremely well.

Water Quality Data		
Surface Temp (°C)	Surface DO (mg/L)	Secchi Disk Depth (ft)
29.3	9.21	11'2"

August 8, 2024 - Late Season Survey

On August 8th, Senior Environmental Scientist, James Lacasse, made a visit to Forest Lake. The visit consisted of performing a survey and collection of basic water quality data.

Upon arrival to the site, a survey was conducted using visual observation paired with a standard throw-rake and handheld GPS/ArcGIS Field Maps, as applicable. Plants documented during the survey are documented in the table below.

Species Identified	
Common Name	**Latin Name**
Waterlilies	*Nymphaeaceae*
Cattails	*Typha*
Purple Loosestrife*	*Lythrum salicaria*

Figure 5: Survey conditions on Forest Lake during August 8th visit

A survey of Forest Lake (Water and Wetland conducting a survey in Figure 5) was conducted to assess the efficacy of the previous treatment, guide future management needs, and map dominant and invasive species. It was quickly apparent that the previous treatment worked extremely well, with all target species (pondweeds and brittle naiad) controlled. Additionally, areas outside of the treatment locations had great control, as well. Waterlilies were scattered around the perimeter of the lake in sparse to moderate densities, but otherwise, minimal vegetation was documented. The water clarity was great, and the lake appeared to be in good condition.

Water Quality Data		
Surface Temp (°C)	Surface DO (mg/L)	Secchi Disk Depth (ft)
27.2	8.16	11'8"

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Summary / 2025 Recommendations

Similar to previous years, in 2024, the aquatic management program at Forest Lake consisted of a series of surveys, followed by a treatment on an "as necessary" basis. It is important to note that all management is based and driven by survey data only. The 2024 management program featured only two surveys compared to three which usually occurred in the past, a result of shifting the timelines of the survey dates. This is due to the lack of vegetation that was typically present during the early-season survey in previous years. The 2024 aquatic management program featured an herbicide treatment targeted nuisance densities of clasping-leaf pondweed (Figure 6) and invasive brittle naiad (spiny naiad). The waterlily population still appeared to be under control as a result of the 2022 waterlily treatment. It is important and beneficial to have native species, such as waterlilies, within the waterbody as these species provide habitat, improve water quality by filtering nutrients, stabilize shorelines, help promote oxygen levels, etc. – which all lead to a healthy, balanced ecosystem.

Figure 6: Clasping-Leaf Pondweed documented during the July survey

Overall, the 2024 program was successful as the overall health of Forest Lake improved, and each of the tasks was performed successfully in accordance with the contractual obligations. The program focuses on utilizing survey data to guide management of invasive/nuisance species as a total of 15 surface acres of submerged species were treated this year. As described in the final site visit, the treatment was very successful at controlling the target species as open water habitat was created. We look to continue a similar proactive approach regarding growth of invasives/nuisance densities of natives in the 2025 season, in addition to continuing with basic water quality data.

We recommend continued monitoring of the lake with the series of two surveys. The monitoring would include documenting species presence/densities of clasping-leaf pondweed, waterlilies, spiny naiad, and curly-leaf pondweed, in addition to the overall water quality. If densities do reach nuisance levels, then management will be recommended. Consideration should be given to continuing control of curly-leaf pondweed and brittle naiad, the two invasive species in Forest Lake. Clasping-leaf pondweed, although native, has also reached nuisance densities historically. The clasping-leaf pondweed populations did meet nuisance densities this year and warranted an application. Both Sonar and diquat have been used at Forest Lake in the past. Generally, based on the target species in Forest Lake, Sonar will not provide much carry-over control. It is also tremendously more expensive than diquat. Given all of the above, diquat is the recommended approach if densities warrant treatment in 2025. All treatments should be based ono the monitoring visits.

Microscopic algae has also been present in recent years. Copper sulfate is recommended if warranted for the control of microscopic algae. Additionally, we recommend some level of water sampling to provide a baseline nutrient analysis. Phosphorus is typically the limiting nutrient fueling algae growth. By better understanding nutrients, we are able to provide more proactive solutions.

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We have greatly enjoyed working with the Town of Methuen in 2024. We hope that you were impressed by the communication, timeliness, and expertise provided by Water & Wetland throughout the year. We look forward to working with you in 2025 and beyond.

Sincerely,

James Lacasse
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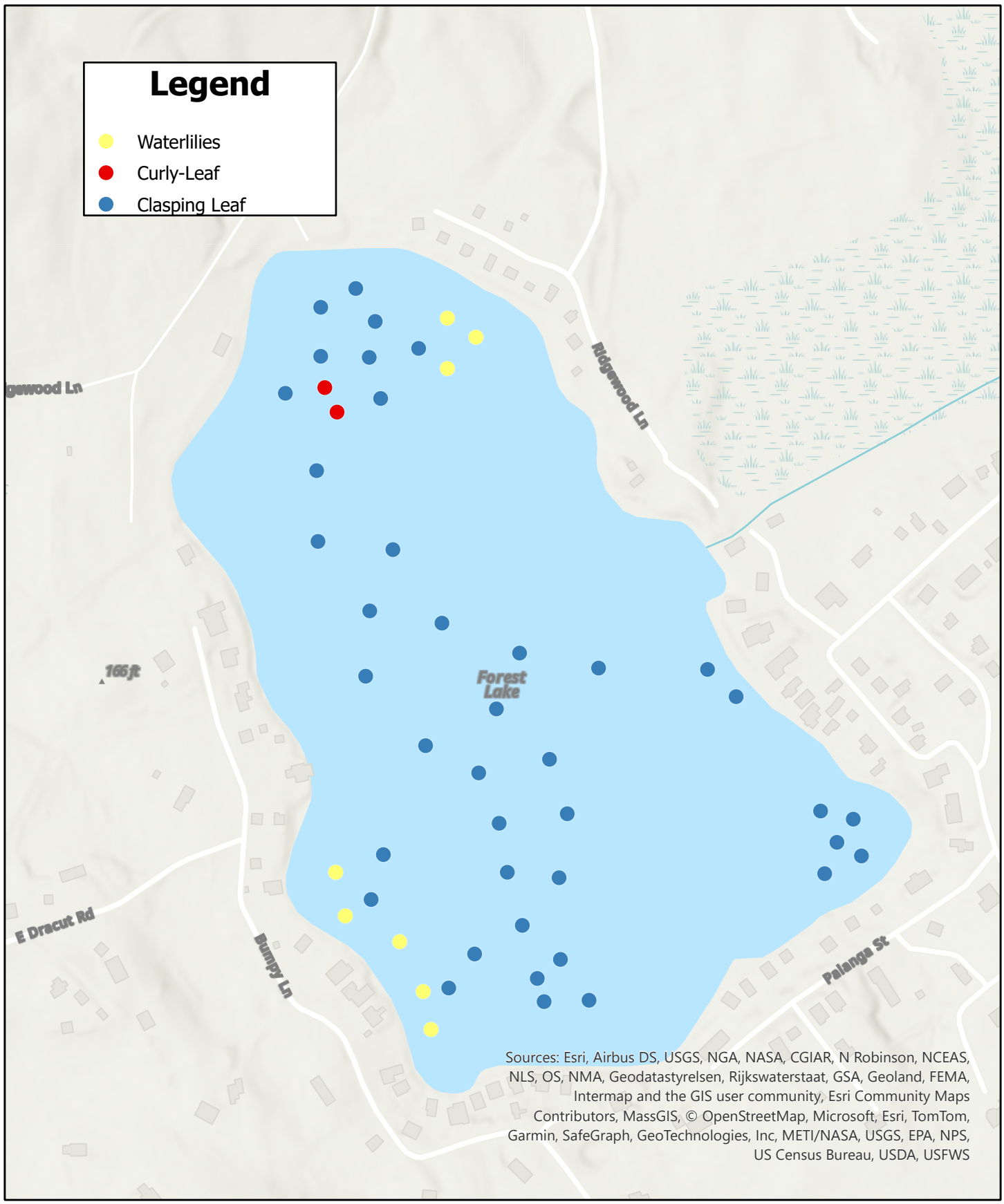
Attachments Include: 2024 Survey Maps



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Forest Lake

Spring Survey Map

Methuen, MA

Survey Date
5/31/2024
Map Date
6/15/2024

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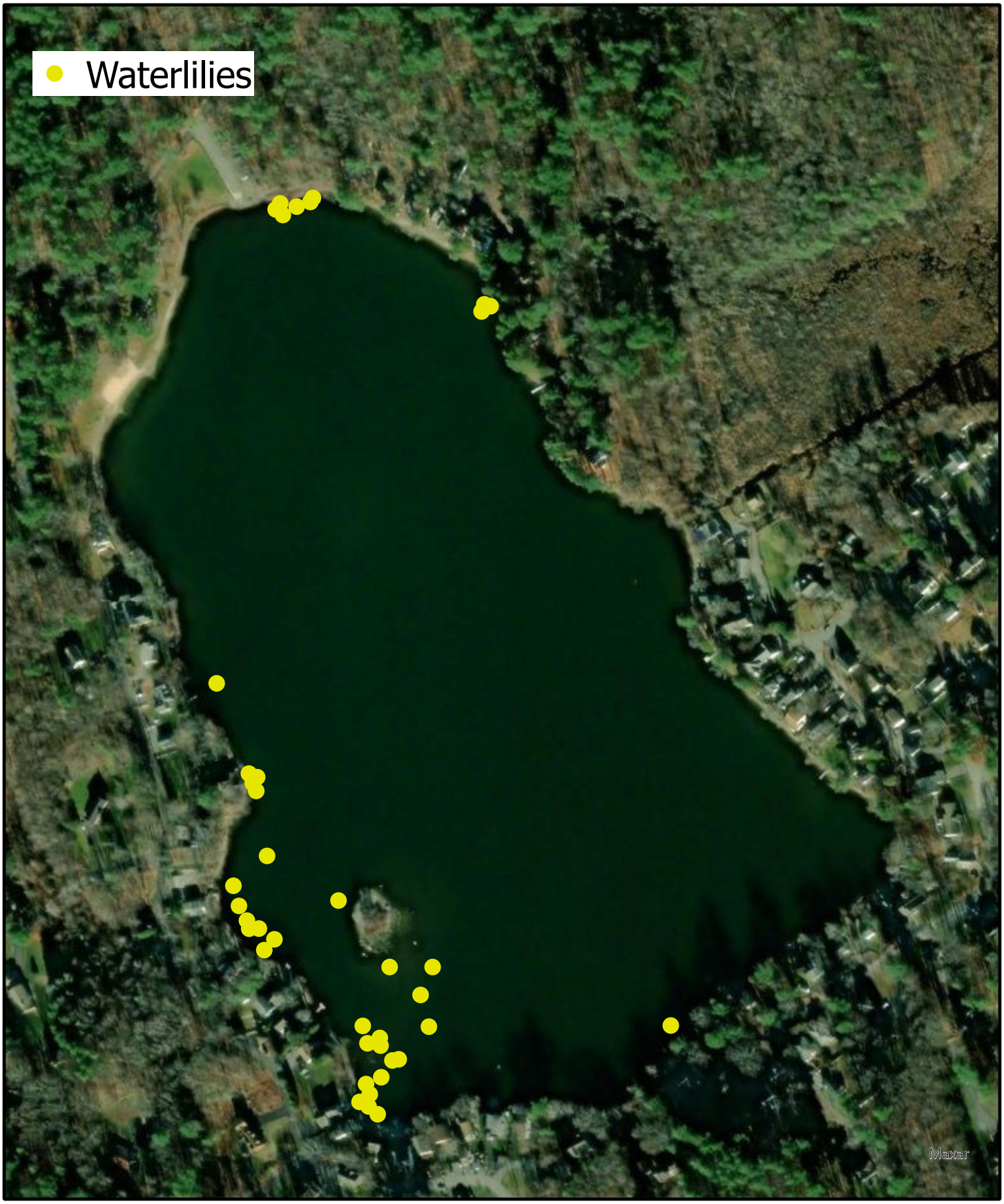

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Forest Lake
Waterlily Distribution
Methuen, MA

Survey Date
8/8/2024

Map Date
8/12/2024

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