

November 5, 2024

Town of Mendon – Conservation Commission
20 Main Street
Mendon, MA 01756
Sent via email: concom@mendonma.gov

Re: Lake Nipmuc, Mendon, MA – 2024 Year End Report – DEP File #218-0725

Dear Commission Members:

It is our pleasure to present the 2024-year end summary report to the Town of Mendon regarding the aquatic management program at Lake Nipmuc (pictured in Figure 1 to the right). Lake Nipmuc is approximately 85 surface acres and is located in Mendon, MA (adjacent to Route 16, Uxbridge Road). The Lake is primarily bordered by small woodlands mixed in with residential houses along each shoreline. The majority of the shoreline has a natural buffer. Water and Wetland used a small, private boat launch at the intersection of Uxbridge Road and Old Taft Avenue to launch the boat for each site visit.

Historically, Lake Nipmuc has battled invasive species variable milfoil (*Myriophyllum heterophyllum*), in addition to nuisance densities of native pondweeds and filamentous algae. The goal of the 2024 program at Lake Nipmuc was to manage the variable milfoil, bushy pondweed (*Najas flexilis*), and filamentous algae while monitoring basic water quality data.



Figure 1: Lake Nipmuc - Mendon, MA

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

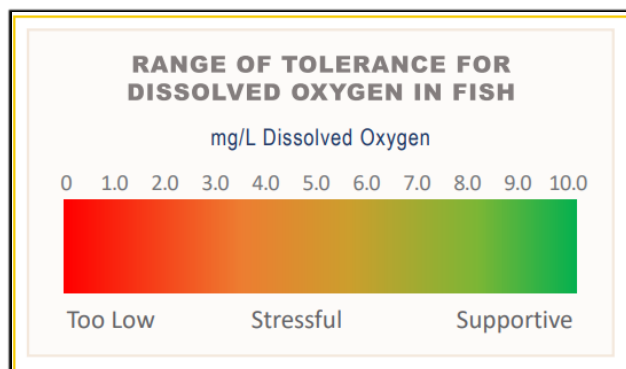


Figure 2: Dissolved Oxygen Table

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, but the figure shown provides 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 (see Figure 2). Water clarity was also assessed using a Secchi

disk when appropriate. 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 24, 2024	Pre-treatment survey conducted to document pre-management conditions and to determine vegetation species and densities present
June 20, 2024	Interim inspection completed to confirm potential treatment areas; An herbicide treatment was conducted
July 31, 2024	Post-treatment inspection conducted to gauge efficacy of previous treatment and to help determine/guide recommendations for 2025 management

May 24, 2024 - Monitoring Site Visit / Pre-Treatment Survey

On May 24th, Senior Aquatic Biologist, Colin Gosselin, made a visit to Lake Nipmuc. 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
Variable Milfoil*	<i>Myriophyllum heterophyllum</i>
Ribbon Leaf Pondweed	<i>Potamogeton epihydrus</i>
Cattails	<i>Typha</i>
Tape Grass	<i>Vallisneria americana</i>
Benthic Algae	
Filamentous Algae	
Watershield	<i>Brasenia schreberi</i>
Bladderwort	<i>Utricularia</i>



Figure 3: Variable milfoil prior to treatment during May 24th visit

Invasive variable milfoil (documented in Figure 3) was found in the typical areas consisting of the old Nipmuc Marina, the shallow cove near Alicante

Restaurant, and the southwestern cove near the outlet. The milfoil was documented as dense. Tape grass (*Vallisneria americana*), bladderwort (*Utricularia sp.*), and waterlilies (*Nymphaeaceae*) were found in

sparse densities throughout the Lake. The water clarity was excellent as demonstrated by the high Secchi depth (below). There were no signs of an algal bloom. A small film of pollen was documented across the surface near the shorelines. This was not to be confused with algae.

Water Quality Data		
Surface Temp (°C)	Surface DO (mg/L)	Secchi Disk Depth (ft)
21.6	8.96	13'4"

June 20, 2024 - Survey / Herbicide Treatment



Figure 4: Variable milfoil surfacing during the June 20th visit

On June 20th, Senior Aquatic Biologist, Colin Gosselin, and Aquatic Field Assistant, Jake McNary, made a visit to Lake Nipmuc. The visit consisted of performing a survey, collection of basic water quality data, and completing a treatment.

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
Variable Milfoil*	<i>Myriophyllum heterophyllum</i>
Tape Grass	<i>Vallisneria americana</i>
Waterlilies	<i>Nymphaeaceae</i>
Bladderwort	<i>Utricularia</i>
Watershield	<i>Brasenia schreberi</i>

The conditions were consistent with our pre-management survey. As planned, a treatment was conducted (milfoil surfacing in Figure 4). The liquid contact 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. The treatment went extremely well and conditions were good. Water clarity during the visit was excellent, without any visual signs of an algal bloom. The treatment focused on the old marina cove, the Alicante cove, and the area near the outlet. Prior to the treatment, the shoreline was posted by the Town of Mendon with neon signage noting the treatment, affiliated water use restrictions, and Water & Wetland contact information. The signs fulfill permit obligations for shoreline posting.

Water Quality Data	
Surface Temp (°C)	Surface DO (mg/L)
29.8	8.41

July 31, 2024 - Post-Treatment Survey

On July 31st, Aquatic Biologist, Grace Adams, made a visit to Lake Nipmuc. The visit consisted of a post-treatment 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	<i>Nymphaeaceae</i>
Tape Grass	<i>Vallisneria americana</i>
Variable Milfoil*	<i>Myriophyllum heterophyllum</i>
Watershield	<i>Brasenia schreberi</i>
Bladderwort	<i>Utricularia</i>
Benthic Algae	
Cattails	<i>Typha</i>



Figure 5: Water and Wetland conducting a post-treatment survey

A post-treatment survey was carried out at Lake Nipmuc to evaluate the effectiveness of the treatment from the previous visit (Figure 5). The survey concentrated on the treated areas, where the treatment was found to be successful, with only minor regrowth of variable milfoil at the bottom of the littoral zone. The rest of the Lake showed a healthy mix of native species with no visual signs of harmful blooms observed. Overall, the water clarity was excellent. Native species, such as tapegrass, bladderwort, watershield (*Brasenia schreberi*), and waterlilies were found in scattered patches throughout the Lake. There were also benthic and macro algae populating the bottom of the Lake at non-nuisance densities. It should also be noted that weather conditions at the time of survey were windy and rainy, which limited visibility in some areas.

Water Quality Data	
Surface Temp (°C)	Surface DO (mg/L)
26.6	7.68

Summary / 2025 Recommendations

Overall, the 2024 program was successful as the overall health of Lake Nipmuc improved, and each of the tasks was performed successfully in accordance with the contractual obligations and the Order of Conditions. A proactive aquatic management program designed for Lake Nipmuc worked well as we were able to monitor and control invasive and nuisance vegetation throughout the entirety of the season. Open water habitat and recreational fishing areas were created following the application of the treatment.

When making management recommendations, we always conduct an internal alternatives analysis to determine the most appropriate approach. Mechanical removal of milfoil is not only expensive, but



typically promotes the spread of this invasive species through fragmentation. Triploid grass carp, a fish species commonly used for vegetation control, are prohibited in Massachusetts. Small scale techniques such as diver assisted suction harvesting and benthic mats were considered, however the milfoil and bushy pondweed distribution and density in Lake Nipmuc is well beyond what could reasonably be controlled using these approaches. For 2025, we recommend continuing milfoil and bushy pondweed management using the most appropriate MA/EPA approved aquatic herbicides. Diquat worked extremely well in Lake Nipmuc during the past several years and is a cost effective approach. Given that diquat is a contact herbicide, it only provides seasonal control and should be repeated annually.

One other option for treatment of milfoil is Procellacor (florpyrauxifen-benzyl) herbicide which was heavily considered but ultimately ruled out. ProcellaCOR is a highly selective systemic herbicide used for the management of freshwater aquatic vegetation. ProcellaCOR is highly selective and impacts milfoil with minimal impact to native pondweeds. While ProcellaCOR provides multiple year systemic control of milfoil, it also acts much like a contact herbicide in that it makes spot-treatment possible, yet also has a very short half-life in water (roughly 9 hours). Usage of ProcellaCOR allows for less product in the water. Due to its selective formulation, ProcellaCOR can be applied at very low concentrations. The cost of Procellacor is considerably higher than that of diquat but would provide multiple years of nuisance level milfoil control. The rationale for ruling out this specific product is due to its' selectivity. Particularly near Nipmuc Marina, bushy pondweed has become the most nuisance target plant. Procellacor will have very minimal impacts to this species, vs. diquat which is effective on both milfoil and bushy pondweed. All treatments should be accompanied by pre- and post-treatment monitoring.

We've also been working with the Lake Nipmuc Association to guide management of invasive purple loosestrife along the shoreline. This treatment has been discussed with members of the Conservation Commission and is already being planned for 2025. At this time, we do not believe that native waterlilies warrant treatment. This species should continue to be monitored in 2025, as dense waterlilies have the ability to limit oxygen transfer and biodiversity.

We hope you have found the information provided in our 2024 year-end report helpful. We look forward to working with the Mendon Conservation Commission in 2025 and beyond, to continue to improve the health of Lake Nipmuc.

Sincerely,

Colin Gosselin

Director of Operations

Senior Aquatic Biologist

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