

December 13, 2023

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

Re: Lake Nipmuc, Mendon, MA – 2023 Year End Report – DEP File #218-0725

Dear Commission Members:

It is our pleasure to present the 2023-year end summary report to the Town of Mendon regarding Lake Nipmuc. 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.



Figure 1: Lake Nipmuc - Mendon, MA

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 2023 program at Lake Nipmuc was to manage the variable milfoil, bushy pondweed (*Najas flexilis*), and filamentous algae while monitoring basic water quality data.

During each visit to the pond, 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

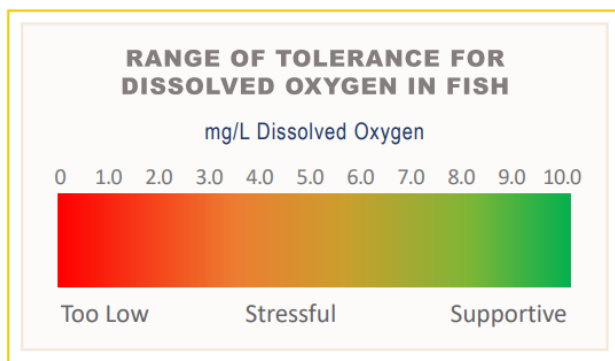


Figure 2: Dissolved Oxygen Table

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. 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 2023 Management Activities

Date	Task/Description
June 16, 2023	MA-DEP Permit #WM04-001268 is obtained
June 22, 2023	Pre-treatment survey conducted to determine vegetation species and densities present/ Treatment is performed to target variable milfoil, bushy pondweed, and algae
September 18, 2023	Post-treatment inspection completed

June 22, 2023 - Monitoring Site Visit / Pre-Treatment Survey

On June 22nd, Co-Owner/Senior Aquatic Biologist, Colin Gosselin, and Aquatic Field Assistant, Grace Adams, made a visit to Lake Nipmuc. 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>
Waterlilies	<i>Nymphaeaceae</i>
Watershield	<i>Brasenia schreberi</i>
Bladderwort	<i>Utricularia</i>
Snailseed Pondweed	<i>Potamogeton bicupulatus</i>
Microscopic Algae	
Filamentous Algae	

Throughout the entire lake, there was a microscopic algae bloom, which had negative impacts on water clarity/visibility. In addition to the microscopic bloom, there were also patches of benthic filamentous algae. The north cove that was treated contained scattered patches of variable milfoil, as well as native bladderwort. The second cove, by Alicante Restaurant contained dense densities of both variable milfoil and bladderwort. The final two coves treated both contained moderate densities of variable milfoil. Along the shoreline and scattered in the middle of the lake were patches of water lilies and watershield. We recommend that the current algae bloom be monitored and potentially sampled to ensure the safety of Lake users.

As planned, and based on the previous pre-treatment survey, a treatment was conducted for the control of target nuisance/invasive plant growth. The liquid contact herbicide diquat was applied using a treatment boat equipped with a calibrated sub-surface injection system. Captain XTR algaecide was mixed where necessary for filamentous algae control. This application methodology allows for even coverage within the treatment areas. The treatment was completed without issue. We anticipate plant die-off within just a few days to a few weeks.



Figure 3: Visibility at Lake Nipmuc

Prior to the treatment(s), the shoreline was posted by town officials with neon pink signs noting the treatment, affiliated water use restrictions, and Water & Wetland contact information. The signs fulfill permit obligations for shoreline posting.

Surface Temp (°C)	Surface Dissolved Oxygen (mg/l)
24.7	8.94

September 8, 2023 - Post-Treatment Survey



Figure 4: Invasive species in Lake Nipmuc

On September 18th, Co-Owner/Senior Aquatic Biologist, Colin Gosselin, made a visit to Lake Nipmuc. 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.

The purpose of the visit to Lake Nipmuc was to conduct a post-treatment survey. This survey is used to assess treatment efficacy and to guide future management, specifically management of invasive variable milfoil and nuisance bushy pondweed. In addition to these target species, the Association has requested treatment of native waterlilies. During this survey, we specifically assessed waterlily growth to determine if they reached densities which would warrant treatment. Lilies are a native species which provide valuable habitat and cover. As waterlilies over-take large areas, they have the ability to reduce biodiversity and oxygen transfer. During the survey,

waterlilies were assessed to determine if they were at a density/cover anywhere in the lake, which would warrant treatment.

Bob Sweet, Mendon Conservation Commission/Lake Nipmuc Association accompanied Water & Wetland during the survey. Conditions were rainy, but visibility was sufficient to complete the survey without issue. A small amount of variable milfoil regrowth was found near the outlet and in the cove near Alicante. This is not uncommon when treatment utilizes diquat, a contact herbicide. Small patches of bushy pondweed were also observed in low, non-nuisance densities.



Waterlilies were present, but only in scattered, low densities (please see attached map). The lilies appeared to be present only in shallow areas where muck was present. While some of the lilies are around a few homes' docks, at the observed densities they provide valuable habitat and cover. Given all of the above, we did not recommend management of native waterlilies at this time.

Summary / 2024 Recommendations

Overall, the 2023 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 2024, 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 hope you have found the information provided in our 2023 year-end report helpful. We look forward to working with the Mendon Conservation Commission in 2024 and beyond, to continue to improve the health of Lake Nipmuc.



WATER & WETLAND

LAKE, POND & WETLAND MANAGEMENT

Sincerely,

Colin Gosselin

Director of Operations

Senior Aquatic Biologist

c: 508-259-3153

o: 888-4WETLAN(D)

colin@waterandwetland.com

www.waterandwetland.com