Northeast Aquatic Research

Lake Wononscopomuc 2025 Water Quality Monitoring & Aquatic Plant Report

Prepared for the Lake Wononscopomuc Association, Salisbury, CT

April 1st, 2026

Northeast Aquatic Research, LLC ⁘ 74 Higgins Highway, Mansfield, CT 06250 ⁘ 860-456-3179

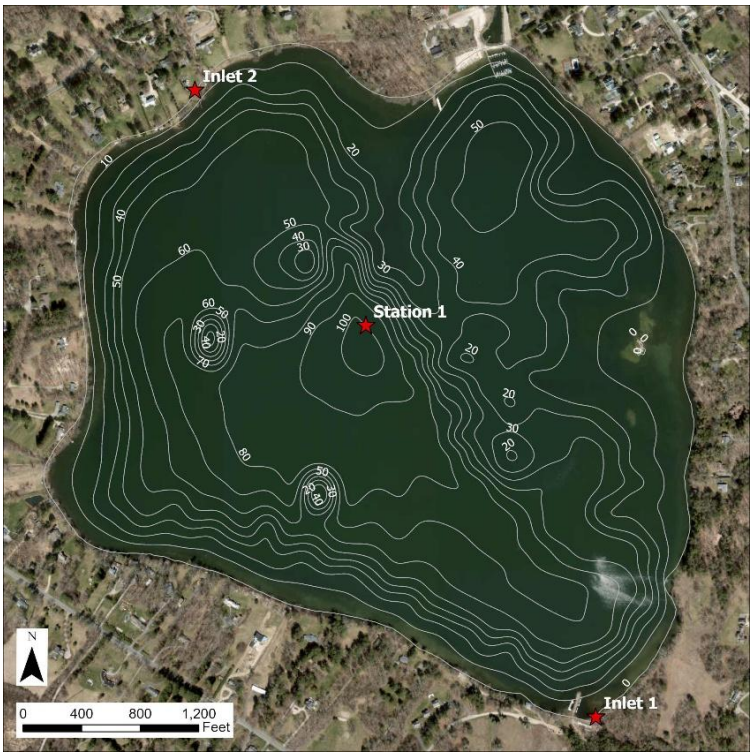
Introduction

Northeast Aquatic Research (NEAR) was contracted by the Lake Wononscopomuc Association (LWA) in 2025 to investigate the water quality, assess the aquatic plant community, and make recommendations for management and ongoing monitoring of Lake Wononscopomuc.

In April, NEAR staff trained an LWA volunteer on how to conduct water quality monitoring. In May, August, and September, LWA volunteers performed the water quality sampling. In June, July, and October, NEAR staff performed the sampling. Each month, data and water samples were collected from the site of deepest water (~101 feet/~30 meters) labeled as Station 1 (**Map 1**). During each visit, water clarity was measured with a Secchi disk and view scope. Water temperature and dissolved oxygen profiles were measured with an in-situ probe at one-meter increments from top to bottom. Water samples were collected from the top (1m), middle (15m), and bottom (30m) depths for analysis of total phosphorus, total nitrogen, nitrate nitrogen, and ammonia.

During NEAR sampling months, one phytoplankton sample and one zooplankton sample were collected. LWA volunteers additionally sampled Belgo Brook and Sucker Brook on eight occasions. **Map 1** depicts the locations of Station 1 and the inlets.

On five occasions, NEAR searched the entire littoral zone of the lake for Hydrilla (*Hydrilla verticillata*), an invasive plant present in nearby waterbodies. Additionally, NEAR conducted a rare plant survey on June 20th, specifically searching for plants listed as “protected” by the State of Connecticut. There are records of two State-listed protected species in Lake Wononscopomuc.



Map 1. Location of the in-lake water quality station and inlets.

Water Quality Results

Lake status is assessed using CT DEEP's categorization of the trophic state of Connecticut lakes (**Table 1**). The goal for Crystal Pond, as with all lakes, is to have the lowest possible TP concentration, ideally less than 10ppb in the epilimnion during stratification and the whole lake in early spring.

We use the Connecticut standard for evaluating lake trophic status (Error! Reference source not found.). This scheme uses total phosphorus (TP) as the lead parameter with others following the TP concentration. Phosphorus is typically bound in the landscape but is released by human activity. Higher TP allows for greater plankton numbers so Chlorophyll increases. More plankton causes the water to be cloudier so the Secchi disk depth decreases. Additionally, phosphorus and nitrogen are the two primary nutrients that fuel plant growth. Ideally, total phosphorus concentrations in a lake are less than 10 ppb. Concentrations as low as 20 ppb can support cyanobacteria blooms.

The goal for Lake Wononscopomuc, as with all lakes, is to have the lowest possible TP concentration, ideally less than 10ppb in the epilimnion during stratification and the whole lake in early spring. This equates to a Secchi disk depth of 6+ meters, though Secchi depths of 4 meters or greater are considered acceptable for Wononscopomuc.

Table 1. Connecticut DEEP Trophic Categories and Ranges of Indicator Parameters.

Category	T. Phosphorus (ppb)	T. Nitrogen (ppb)	Secchi Depth (m)	Chlorophyll *a* (ppb)
Oligotrophic	0 -- 10	2 – 200	6 +	0 -- 2
Oligo-mesotrophic	10 -- 15	200 – 300	4 -- 6	2 -- 5
Mesotrophic	15 -- 25	300 – 500	3 -- 4	5 -- 10
Meso-eutrophic	25 -- 30	500 – 600	2 -- 3	10 -- 15
Eutrophic	30 -- 50	600 – 1000	1 -- 2	15 -- 30
Highly Eutrophic	50 +	1000 +	0 -- 1	30 +

Water Clarity

The best clarity, 5.25 meters, was recorded on October 27th (**Figure 1**). The worst clarity, 2.9 meters, was recorded on April 17th. Clarity remained at or above (worse than) the 4-meter threshold except for in July (4.6m) and October (5.2m). Overall, clarity was generally fair in 2025.

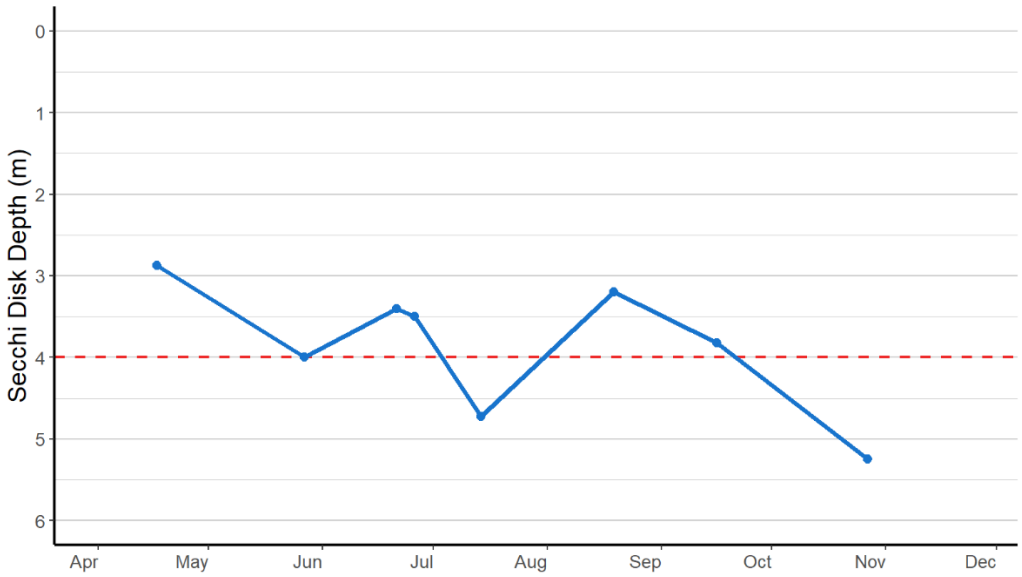


Figure 1. Secchi disk depth (m) at Station 1 in 2025.

Water Temperature

The lake was nearly isothermal (similar temperature from top to bottom) during the April visit (**Figure 2**). The lake was strongly stratified by June and remained so until the last sampling visit on October 27th. The warmest surface temperature, 27.5°C, was observed in July. The photic zone (upper water with equal temperatures, where algae live) extended from the surface to 3m in June and July, to 5 meters in August, to 7m in September and to 10m in October. The May temperature data was inconsistent with other data, suggesting the probe may not have been calibrated correctly. We removed the May temperature profile from the figure.

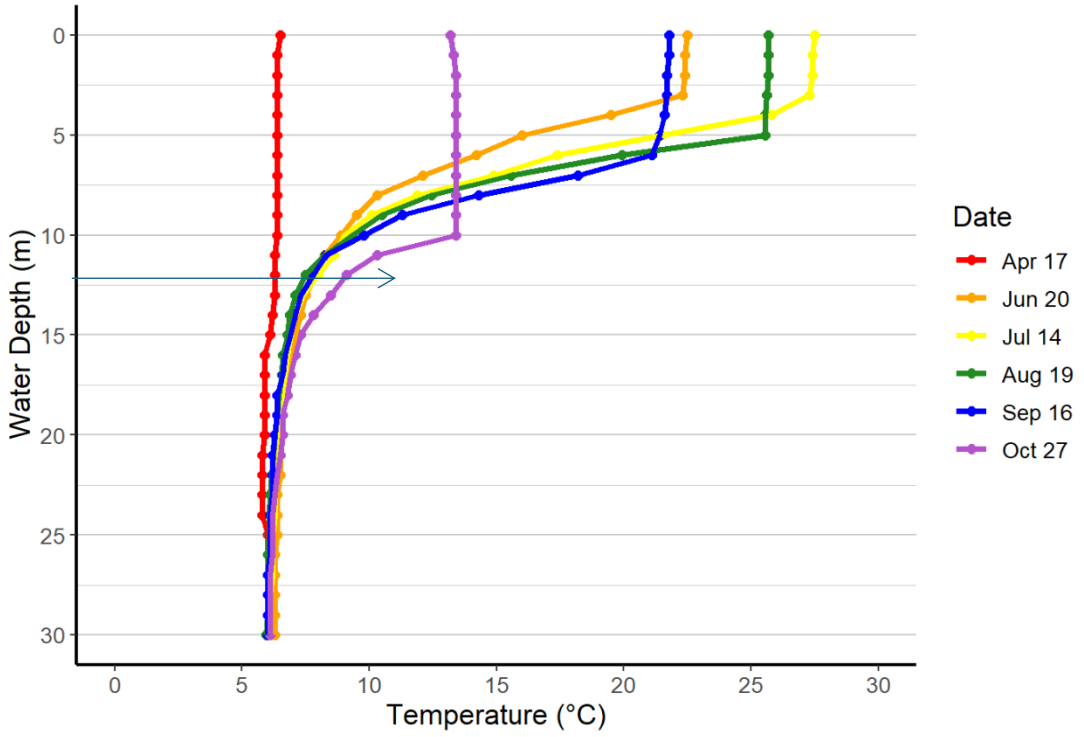


Figure 2. Water temperature profiles in 2025.

Dissolved Oxygen

The lake was fully oxygenated during the April visit, with dissolved oxygen (DO) concentrations generally at or around 10 mg/L (**Figure 3**). By May, the very bottom of the lake was anoxic (DO <1mg/L). From May to September, there was a MOMax (Metalimnetic Oxygen Maximum) between approximately 5 meters and 10 meters. This occurs when dissolved oxygen is super saturated, often caused by phytoplankton at this depth producing oxygen. DO concentrations as high as 18mg/L were measured.

Oxygen saturation followed a similar trend to the DO concentrations (**Figure 4**). Percent oxygen saturation is the percentage of dissolved oxygen at a given depth, relative to the water's capacity to hold oxygen, which is based on temperature.

The absence of oxygen at the bottom of the lake is critical to track. The anoxic boundary is defined as the depth of water at which dissolved oxygen is depleted. Lakes with severe oxygen problems also experience increased nutrient levels at the lake bottom. The progression of the anoxic boundary was substantial, with the highest depth reaching 11.64 meters from the surface on October 27th; this was 1.64 meters below the bottom of the photic zone (**Figure 5**).

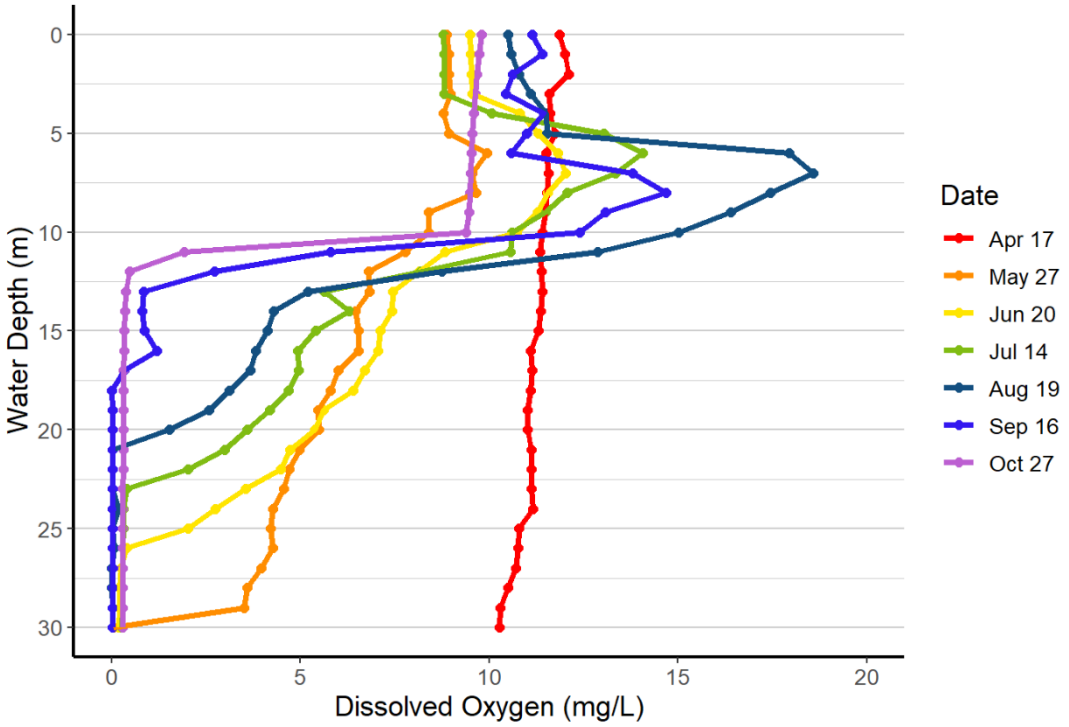


Figure 3. Dissolved oxygen profiles in 2025.

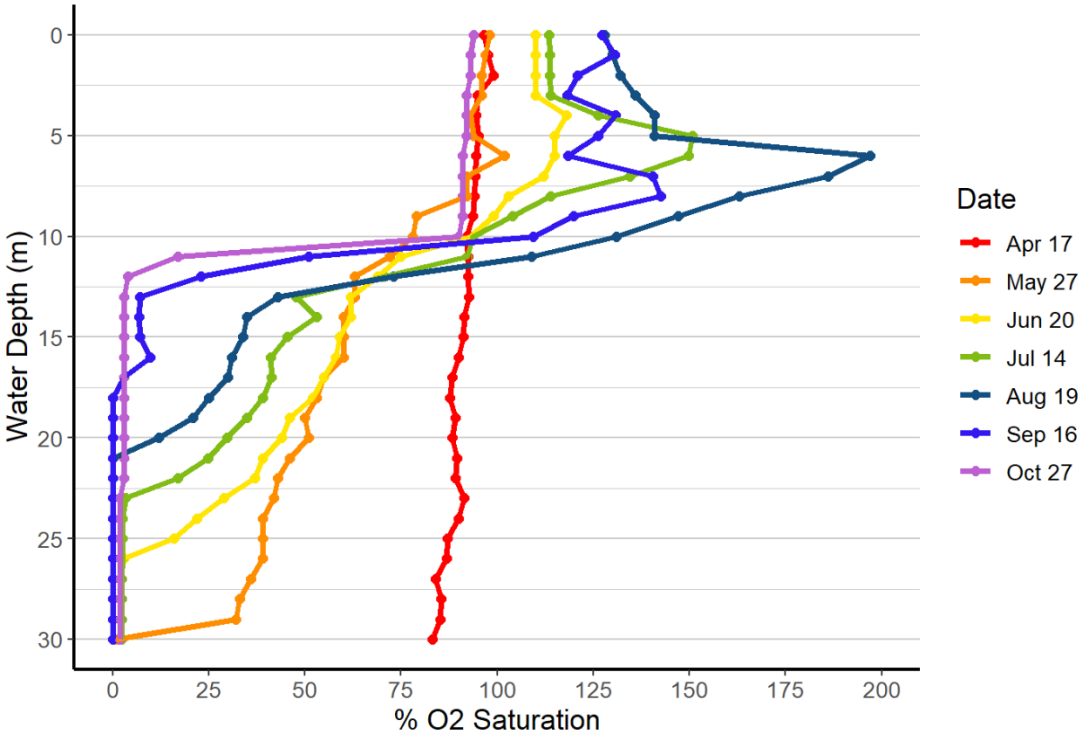


Figure 4. Percent oxygen saturation profiles in 2025.

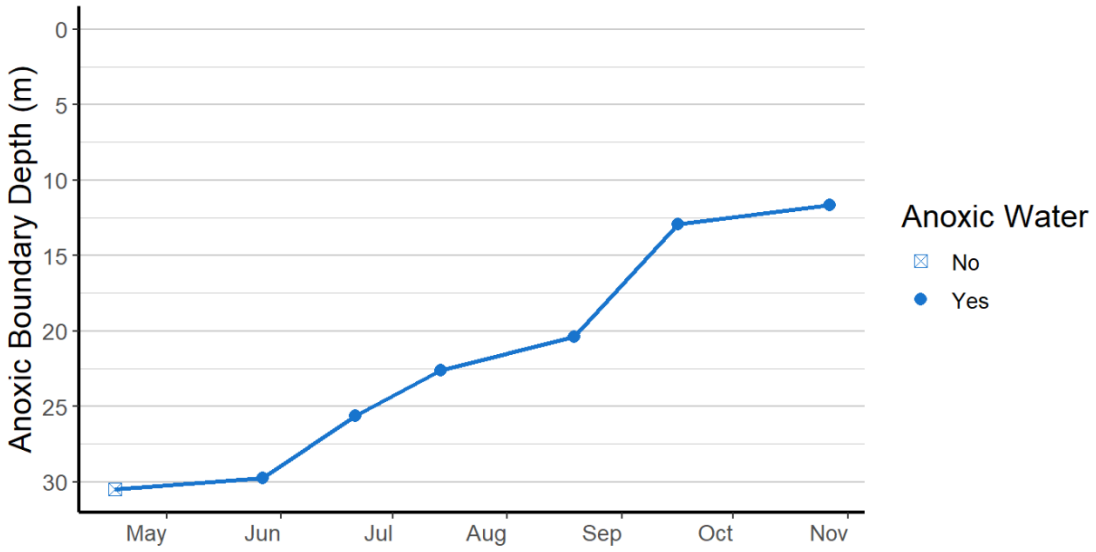


Figure 5. Anoxic boundaries in 2025.

Nutrient Results

Nutrient samples were collected from the top, middle, and bottom at Station 1. We collected the samples at these depths because due to lake stratification, these nutrients are not usually present in the same quantities throughout the lake. Typically, the bottom water of a lake has more phosphorus and nitrogen as the summer progresses because bottom sediments release nutrients when oxygen is depleted. Phosphorus and nitrogen also tend to increase over time as a waterbody becomes more eutrophic, or dominated by plants and algae. Both nutrients can enter the lake from the watershed in the form of natural wetland inputs, septic leachate, lawn fertilizers, sedimentation from roads, and erosion from streams.

Total Phosphorus

Total phosphorus (TP) concentrations in top (1m) waters were very good, ranging from 6ppb to 13ppb (**Table 2**). Middle water (15m) concentrations were also very good, ranging from 8ppb to 14ppb. The bottom water concentrations fluctuated between 25ppb and 75ppb between April and July, but rapidly increased in August to 361ppb and remained high during September and October (**Figure 6**). Phosphorus released from sediments doesn't appear to affect the concentration at the middle or top depths.

Table 2. Total phosphorus concentrations (ppb) in 2025.

	Apr 17th	**May 20th**	**Jun 26th**	**Jul 14th**	**Aug 19th**	**Sep 16th**	**Oct 27th**
Top	12	9	11	6	7	6	13
Middle	12	14	11	8	14	9	9
Bottom	16	73	31	51	361	348	281

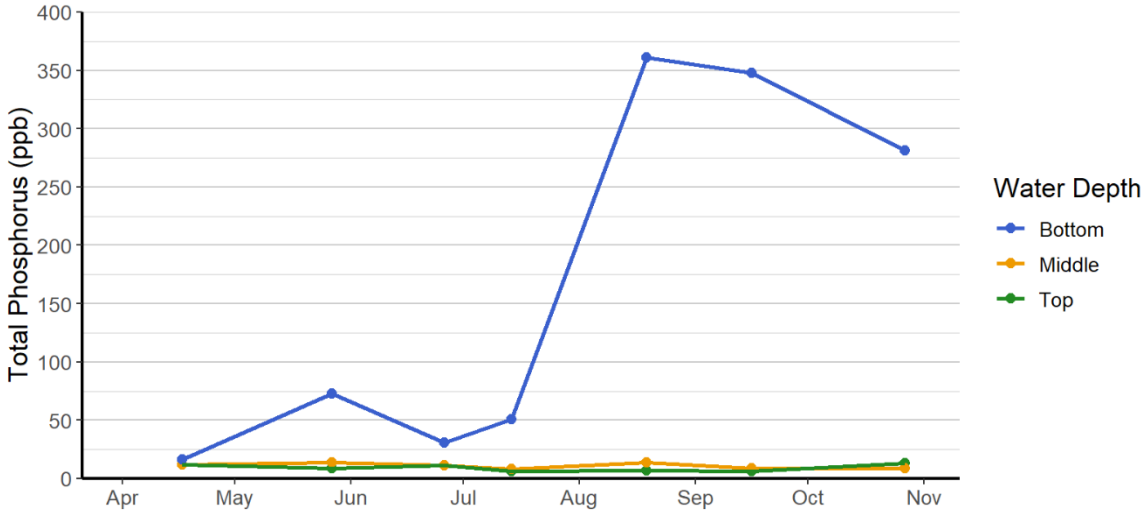


Figure 6. Total phosphorus concentrations in 2025.

Total Nitrogen

Total nitrogen (TN) concentrations in the top waters ranged from 250ppb to 300ppb (**Table 3**). Middle water TN concentrations were slightly lower, ranging from 207ppb to 296ppb. Bottom water TN concentrations were elevated in all months except for April, similar to TP (**Figure 7**). The highest concentration in bottom waters was 1,797ppb in August.

Table 3. Total nitrogen concentrations (ppb) in 2025.

	Apr 17th	May 20th	Jun 26th	Jul 14th	Aug 19th	Sep 16th	Oct 27th
Top	296	286	259	268	250	259	300
Middle	296	290	218	242	278	207	220
Bottom	318	809	596	1,422	1,797	1,701	1,543

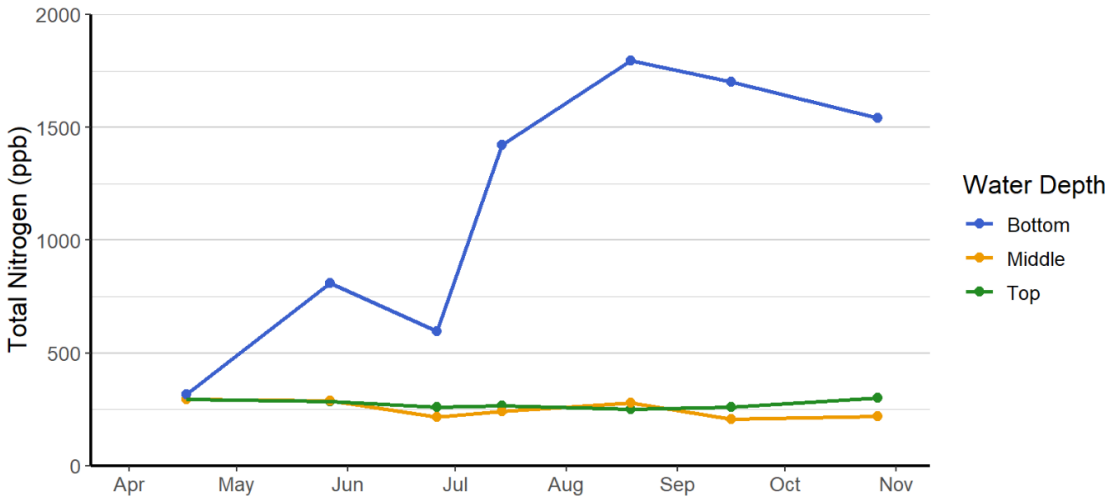


Figure 7. Total nitrogen concentrations in 2025.

Nitrate

The most common forms of nitrogen in lake water are nitrate, ammonia, and organic nitrogen. Nitrate and ammonia forms are readily available for both aquatic plants and phytoplankton.

All nitrate concentrations except for two samples were below the detection limit (**Table 4**). On May 20th, the bottom nitrate concentration was 4ppb, and on June 26th, the bottom nitrate concentration was 59ppb.

Table 4. Nitrate nitrogen concentrations (ppb) in 2025.

	Apr 17th	**May 20th**	**Jun 26th**	**Jul 14th**	**Aug 19th**	**Sep 16th**	**Oct 27th**
Top	ND	ND	ND	ND	ND	ND	ND
Middle	ND	ND	ND	ND	ND	ND	ND
Bottom	ND	4	59	ND	ND	ND	ND

Ammonia

Ammonia concentrations in the bottom waters generally increased each month (**Table 5**), suggesting increased release from bottom sediments as dissolved oxygen diminished. Concentrations of ammonia can increase in bottom water during periods of anoxia. In April, ammonia was not detected in any samples.

Table 5. Ammonia concentrations (ppb) in 2025. "ND"=Not Detected, sample below detection limit.

	Apr 17th	**May 20th**	**Jun 26th**	**Jul 14th**	**Aug 19th**	**Sep 16th**	**Oct 27th**
Top	ND	ND	4	4	ND	4	ND
Middle	ND	3	5	5	11	4	7
Bottom	ND	332	257	988	1,299	1,326	1,158
Bottom TN	318	809	596	1,422	1,797	1,701	1,543
% of TN as NH_3	*0*	*37*	*43*	*69*	*72*	*78*	*75*

Inlet Nutrients

The two inlets that enter Lake Wononscopomuc were sampled on eight occasions by LWA volunteers. Inlet 1, Sucker Brook, enters the lake in the southeast corner, while Inlet 2, Belgo Brook, enters the lake on the northern shoreline.

Inlet 1 TP concentrations were elevated on all but one occasion (**Table 6**). TN concentrations were above 300ppb except for October 27th, when the concentration was 236ppb. The highest concentrations were measured on September 16th, except for ammonia, when the highest concentration was measured on August 19th. Ideally, nutrient concentrations in inlet water should be virtually negligible.

The TP concentrations in Inlet 2 were variable, ranging from 5ppb to 46ppb (**Table 7**). TN concentrations were elevated during all months and generally higher than Inlet 1 concentrations.

Table 6. Inlet 1 (Sucker Brook) nutrient concentrations (ppb) in 2025. "ND"=Not Detected, sample below detection limit. Orange shading are elevated concentrations.

	Apr 17th	May 20th	Jun 20th	Jun 26th	Jul 21st	Aug 19th	Sep 16th	Oct 27th
Total Phosphorus	31	4	11	24	12	20	42	15
Total Nitrogen	357	339	338	645	519	318	730	236
Nitrate Nitrogen	80	110	61	334	180	11	384	16
Ammonia	5	4	7	13	12	43	10	ND

Table 7. Inlet 2 (Belgo Brook) nutrient concentrations (ppb) in 2025. "ND"=Not Detected, sample below detection limit. Orange shading are elevated concentrations.

	Apr 17th	May 20th	Jun 20th	Jun 26th	Jul 21st	Aug 19th	Sep 16th	Oct 27th
Total Phosphorus	5	15	10	17	12	26	19	46
Total Nitrogen	338	534	344	451	545	686	902	495
Nitrate Nitrogen	284	390	244	388	476	633	847	363
Ammonia	ND	4	3	5	5	4	5	ND

Plankton

Phytoplankton

Phytoplankton are microscopic, mostly single-celled, organisms that use pigments to photosynthesize. The most notorious group are cyanobacteria because they can be toxic and are mostly buoyant, meaning they can float to the surface and form scums.

Cyanobacteria were present in April, July, and October (**Figure 8**). In April, the species *Planktothrix* dominated and was present at 11,283 cells/mL (**Figure 9**). All cyanobacteria counts indicated a low probability of adverse health effects following exposure, according to World Health Organization guidelines (**Table 8**). However, the April concentration was just below the lowest threshold.

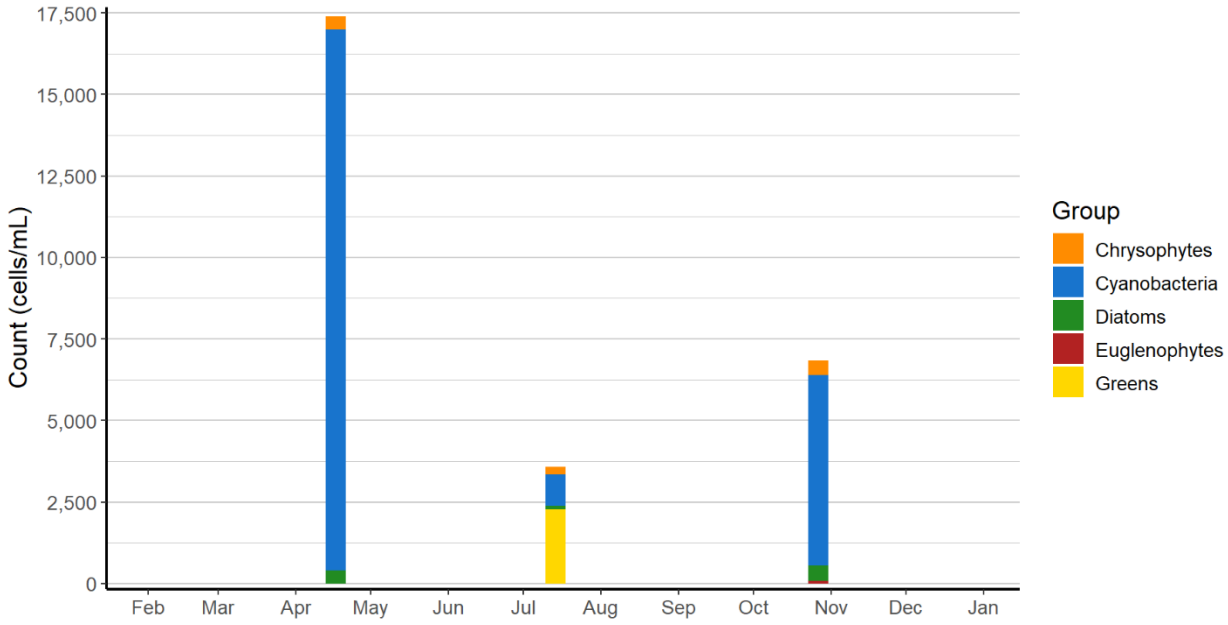


Figure 8. Phytoplankton counts in 2025.

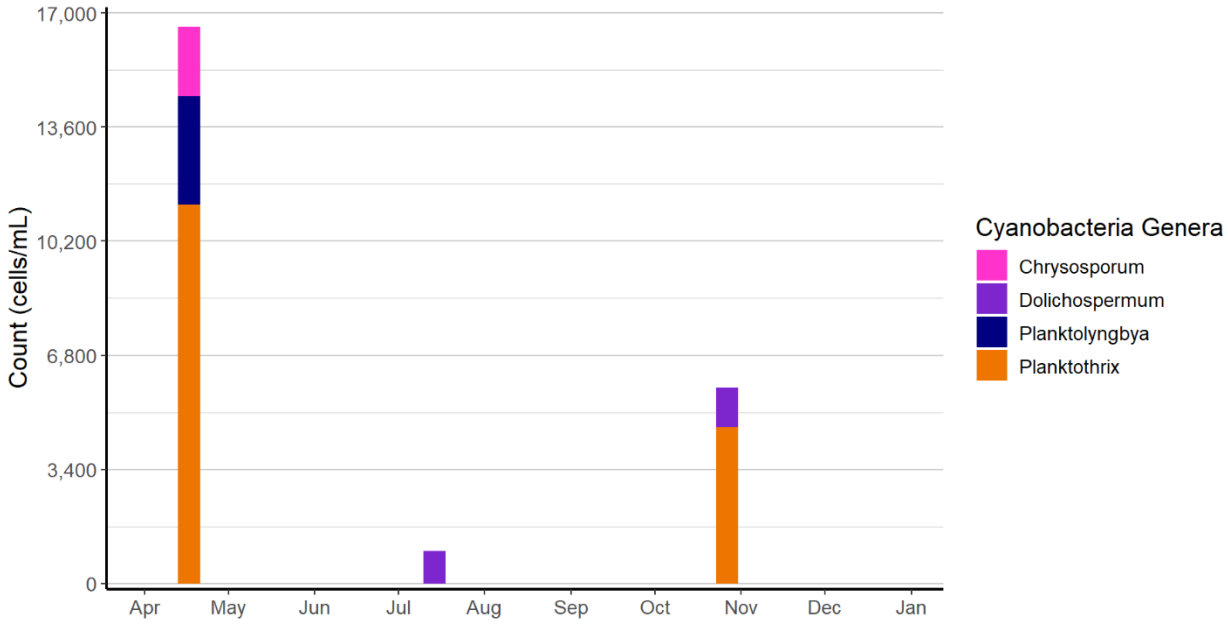


Figure 9. Cyanobacteria counts by genera in 2025.

Table 8. WHO guidance values for the relative probability of health effects resulting from exposure to cyanobacteria.

Relative Probability of Acute Health Effects	Cyanobacteria Density (Cells/mL)
Low	< 20,000
Moderate	20,000-100,000
High	100,000-10,000,000
Very High	> 10,000,000

Zooplankton

Zooplankton are the tiny animals in a lake, also called water fleas. They are predators on other zooplankton and small phytoplankton. The zooplankton community in Lake Wononoscopomuc consisted of tiny rotifers in April, small cyclopoids in July, and tiny cladocera in October (**Figure 10**). The majority of the zooplankton were small-bodied organisms, generally <0.6mm, with only a small number of larger organisms, suggesting heavy fish predation pressure (**Figure 11**).

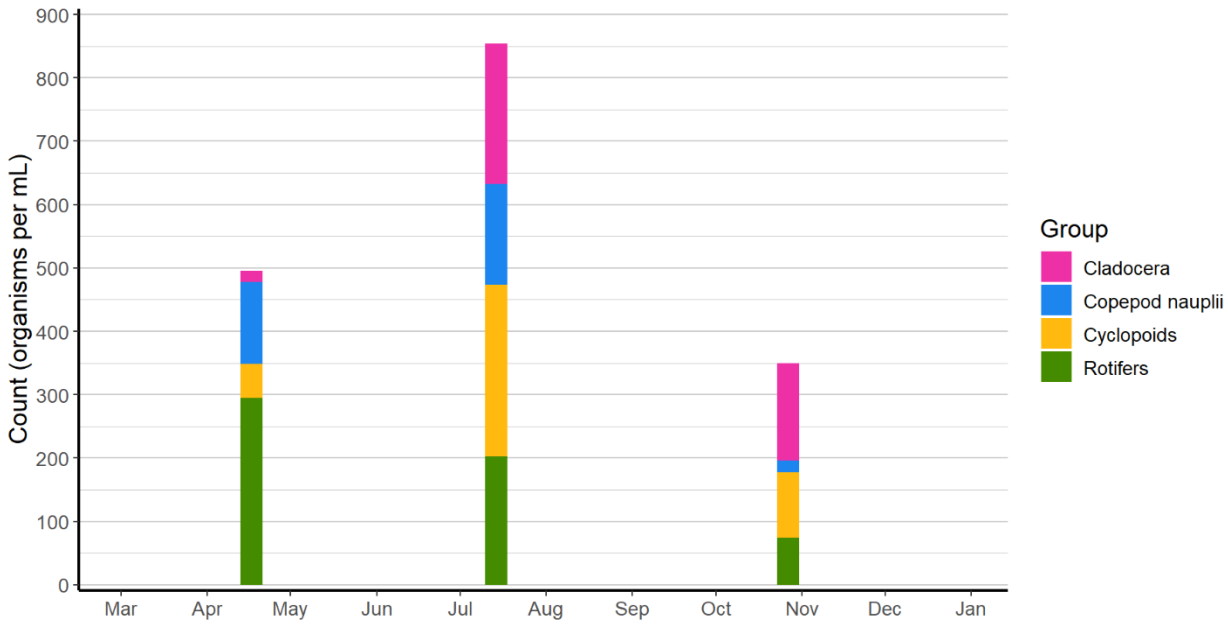


Figure 10. Zooplankton counts in 2025.

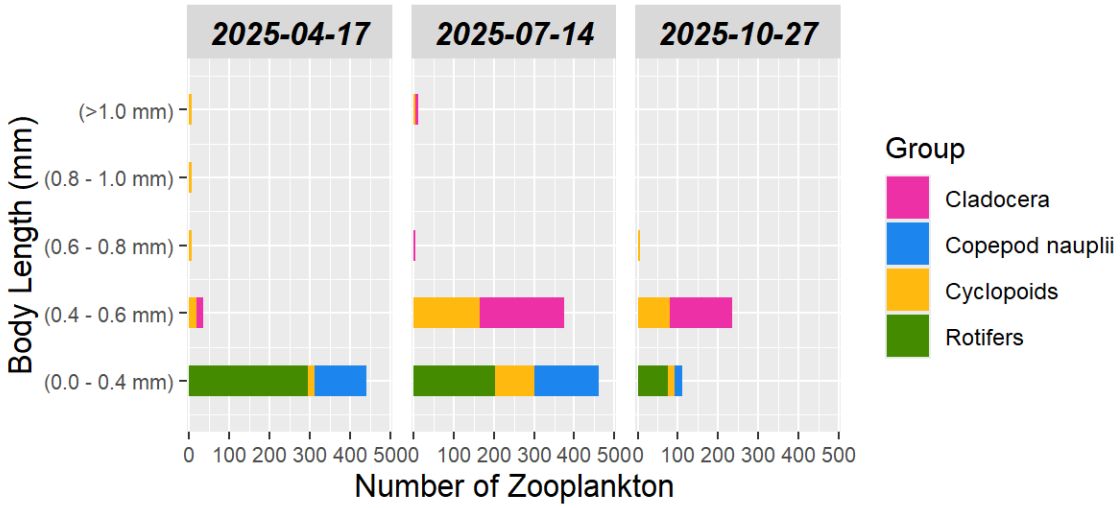


Figure 11. Zooplankton body lengths in 2025.

Aquatic Plant Survey Results

On June 20th, 2025, NEAR conducted a detailed survey for rare aquatic plant species at Lake Wononscopomuc. Native and invasive species were also recorded. This visit was the first of five monthly inspections carried out between June and October 2025 to search for Hydrilla (*Hydrilla verticillata*), an invasive plant known to be present in nearby waterbodies. The survey track from this visit, along with those from all other 2025 inspections, is shown in **Map 2.**

A total of thirteen plant species were identified on June 20th, 2025, along with Filamentous Algae (**Table 9**). Two invasive species were found during the June survey: Eurasian Milfoil (*Myriophyllum spicatum*) and Curly-leaf Pondweed (*Potamogeton crispus*) (**Map 3** and **Map 4**).

During the July 14th search, one invasive Water Chestnut (*Trapa natans*) plant was found in 3.1 feet of water and was manually removed by NEAR staff (**Map 5**).

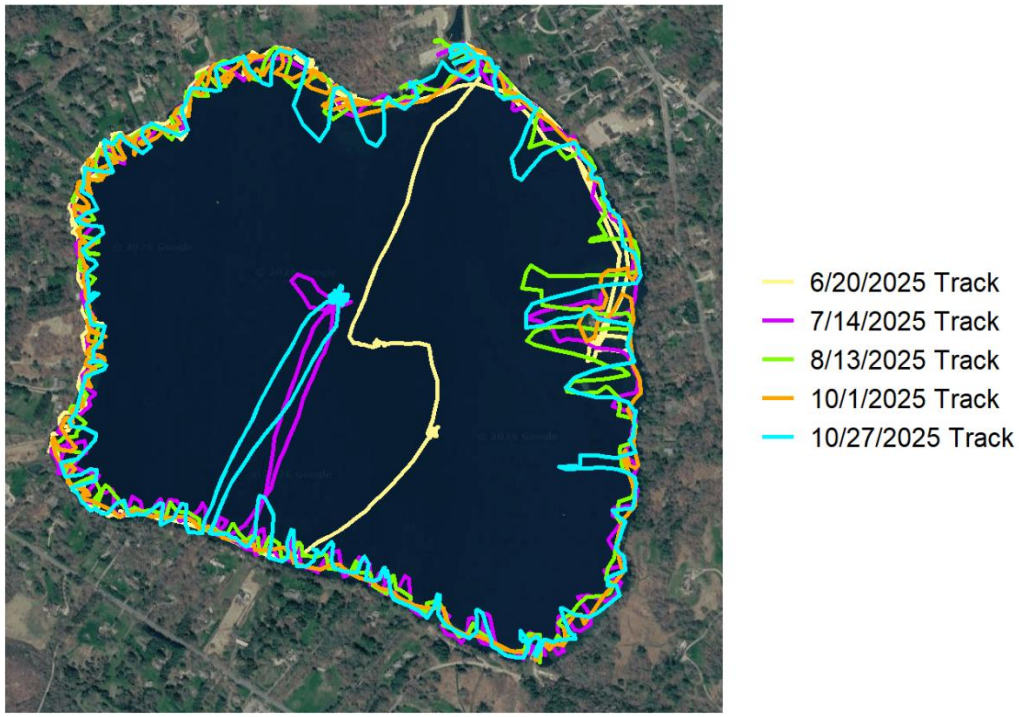
Eurasian Milfoil was found in sparse or very sparse patches, while Curly-leaf Pondweed was found in very sparse patches. One Connecticut-listed endangered plant species, Fries' Pondweed (*Potamogeton friesii*), was also observed at three locations (**Map 6**). The most frequently found species was Stonewort (*Chara sp.*), which appeared at 66% of waypoints (**Map 7**). Stonewort patches were primarily found around the western and northern shorelines at a moderate density. Filamentous Algae were found in several locations along the northwestern shore (**Map 8**).

The other dominant species (found at >20% of waypoints) included Illinois Pondweed (*Potamogeton illinoensis*) (**Map 9**), Tapegrass (*Vallisneria americana*) (**Map 10**), Flat-stem Pondweed (*Potamogeton zosteriformis*) (**Map 11**), and Water Crowfoot (*Ranunculus sp.*) (**Map 12**).

NEAR returned to the lake on July 14th, August 13th, October 1st, and October 27th to search for Hydrilla. No Hydrilla was found during these inspections.

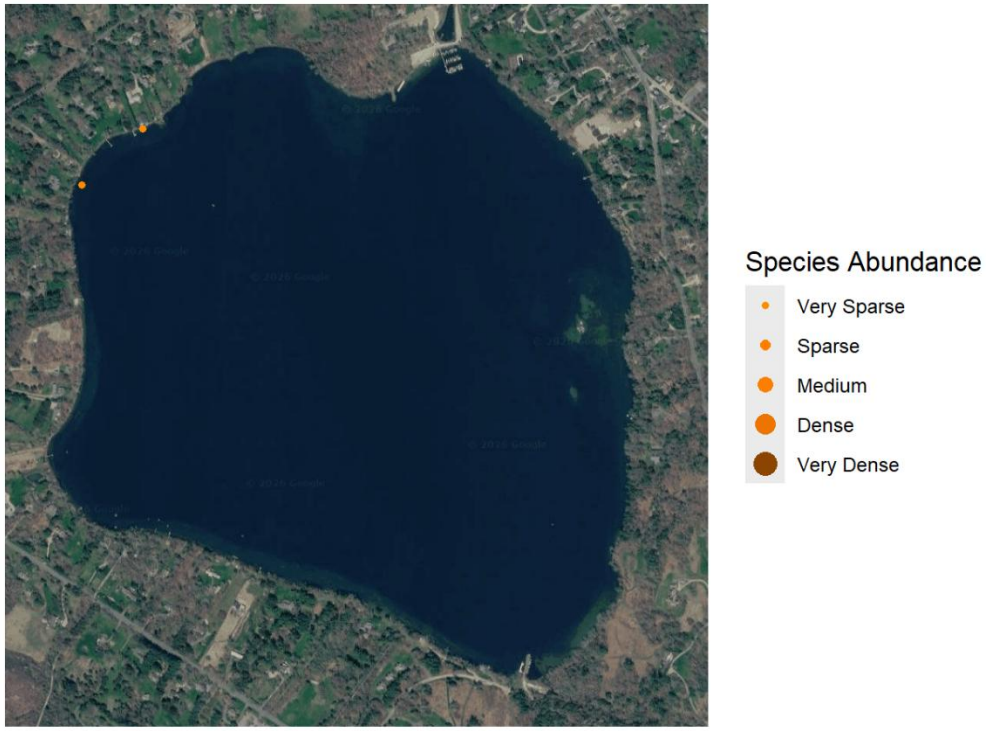
Table 9. Aquatic plant species found in Lake Wononscopomuc during June 20th, 2025 full-lake survey.

Scientific Name	Common Name	Frequency	Avg. Density
Chara sp.	Stonewort	66	28
Potamogeton illinoensis	Illinois Pondweed	50	9
Vallisneria americana	Tapegrass	34	15
Potamogeton zosteriformis	Flat-stem Pondweed	25	21
Ranunculus sp.	Water Crowfoot	25	31
Myriophyllum spicatum	Eurasian Milfoil	22	6
Spirogyra sp.	Filamentous Algae	19	32
Potamogeton amplifolius	Large-leaf Pondweed	16	8
Potamogeton pusillus	Small Pondweed	16	6
Elodea canadensis	Canadian Waterweed	9	10
Potamogeton friesii	Fries' Pondweed	9	5
Potamogeton crispus	Curly-leaf Pondweed	6	5
Najas flexilis	Slender Naiad	3	5
Potamogeton perfoliatus	Clasping-leaf Pondweed	3	40



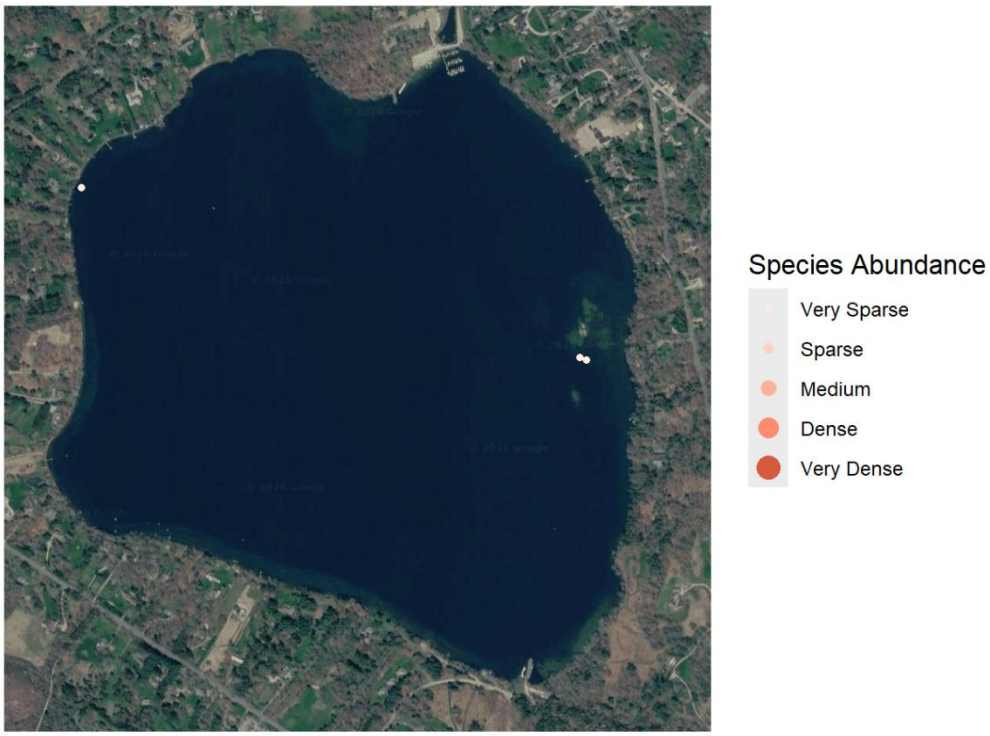
Map 2. Lake Wononscopomuc 2025 survey and inspection tracks.

Map 3. Locations and densities of Eurasian Milfoil (Myriophyllum spicatum) on June 20th, 2025.



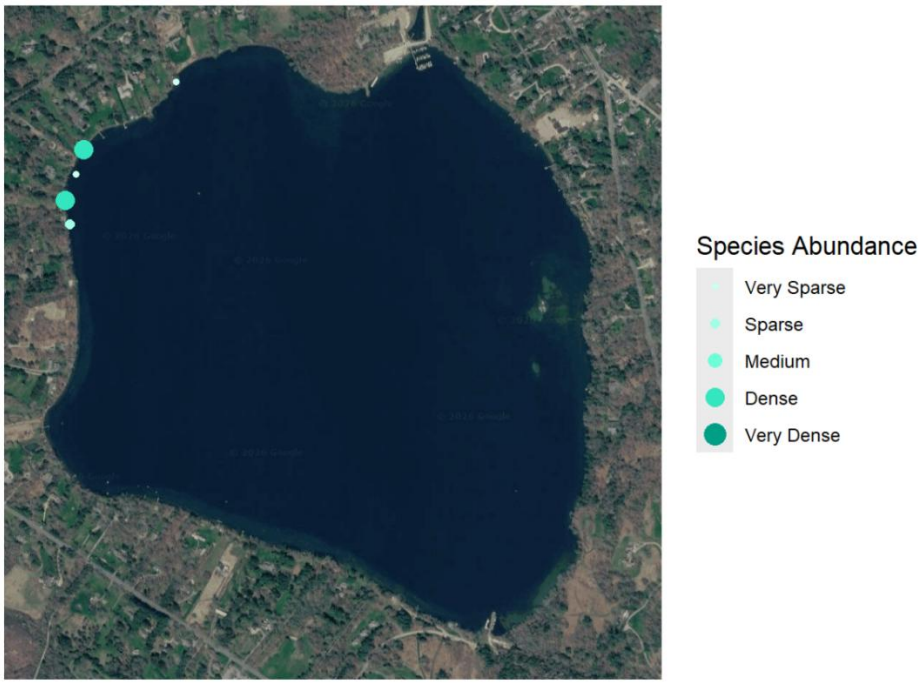
Map 4. Locations and densities of Curly-leaf Pondweed (Potamogeton crispus) on June 20th, 2025.

Map 5. Location of Water Chestnut (Trapa natans) on July 14th, 2025.



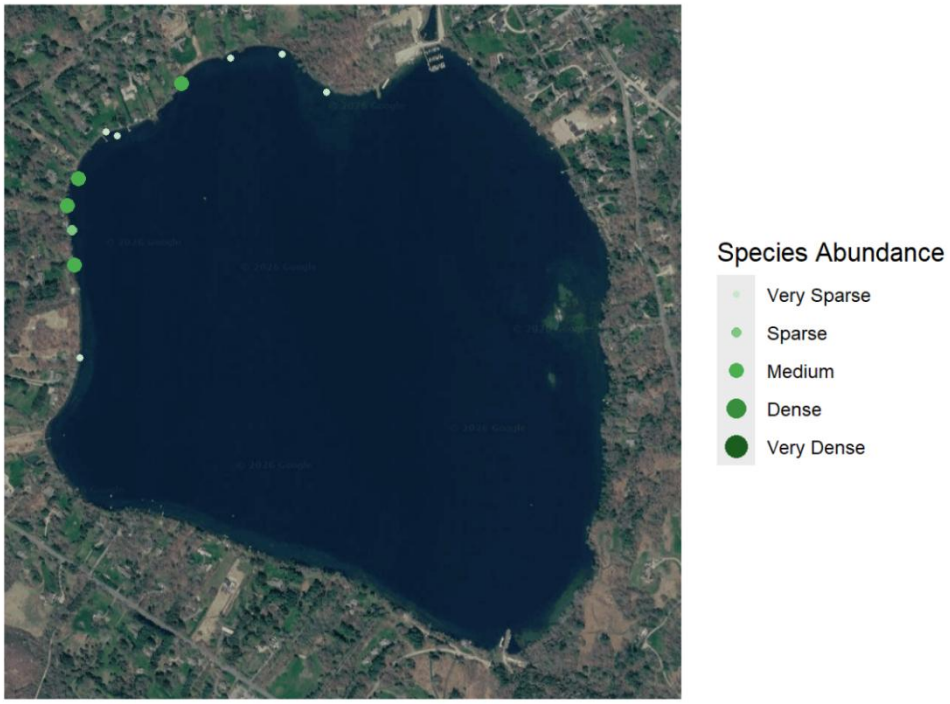
Map 6. Locations and densities of Fries' Pondweed (Potamogeton friesii) on June 20th, 2025.

Map 7. Locations and densities of Stonewort (Chara sp.) on June 20th, 2025.



Map 8. Locations and densities of Filamentous Algae on June 20th, 2025.

Map 9. Locations and densities of Illinois Pondweed (Potamogeton illinoensis) on June 20th, 2025.



Map 10. Locations and densities of Tapegrass (Vallisneria americana) on June 20th, 2025.

Map 11. Locations and densities of Flat-stem Pondweed (Potamogeton zosteriformis) on June 20th, 2025.

Map 12. Locations and densities of Water Crowfoot (Ranunculus sp.) on June 20th, 2025.

Conclusions

The clarity in Lake Wononscopomuc was fair to good in 2025. Dissolved oxygen loss was substantial, and the lake was still mostly anoxic by the end of the season. One of the goals of the first and last monitoring visits is to catch the lake when there is no stratification, with similar temperatures from top to bottom. Increasingly around the region, we have noticed this occurs earlier and later in the season. *April was sufficient, but the last sampling should be conducted in November. If the lake is still stratified in November, consider sampling in December in future years.*

Nutrient concentrations in-lake were generally moderate, with increased concentrations during periods of anoxia at the bottom of the lake. Inlet concentrations were elevated on several occasions. Inlet 2 had extremely elevated nitrate concentrations. The phytoplankton community was dominated by cyanobacteria in April and October, but again, numbers were low. Zooplankton populations are abundant and organisms are mostly small-bodied.

Shutting down the boat launch at the Town Grove has so far been beneficial in reducing the risk of introduction of Hydrilla. However, the introduction of invasive species is always a possibility, given the documentation of Water Chestnut in 2025.

Recommendations

- Monthly water quality monitoring from April through November at Station 1.
- Consider adding a second station for water temperature and dissolved oxygen profiles only – note yellow star in map below. The goal is to determine when the water below 40ft becomes anoxic at this station.
- Nitrate was barely detectable in 2025, so it is not necessary to continue testing for this parameter. Ammonia was only detectable in bottom water, so it is not necessary to test for ammonia in top and middle waters.
- Total phosphorus reached very high concentrations in August, September, and October, yet little to no change in concentration was detected in middle depth water (15m), although this was anoxic by early September. One or two additional samples could be collected from intermediate depths between 15m and 30m, such as 20m and 25m, to determine how high into the water column TP concentration is elevated.
- TP concentrations were occasionally high in both inlets, while nitrate was very high in Inlet 2.
    - Collect inlet samples during each visit only if inlets are flowing.
    - NEAR would like to conduct a preliminary inspection of Belgo Brook (Inlet 2) in late summer 2026 to search for possible sources of the increased nitrate. This will include visual assessment of land abutting the brook, along with collecting additional water samples upstream, if accessible. A water sample will also be collected from the mouth of

the brook potassium analysis. This will be conducted at the time of the August or September Hydrilla search.

- Conduct Hydrilla searches once per month from June to October.
    - Continue to monitor for Water Chestnut, and any other new invasive species during each survey.

Recommended second sampling station (yellow star).