Northeast Aquatic Research

Highland Lake
2025 Aquatic Plant Monitoring Report

Prepared for the Highland Lake Watershed Association & Town of Winchester, CT

December 2nd, 2025

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

INTRODUCTION

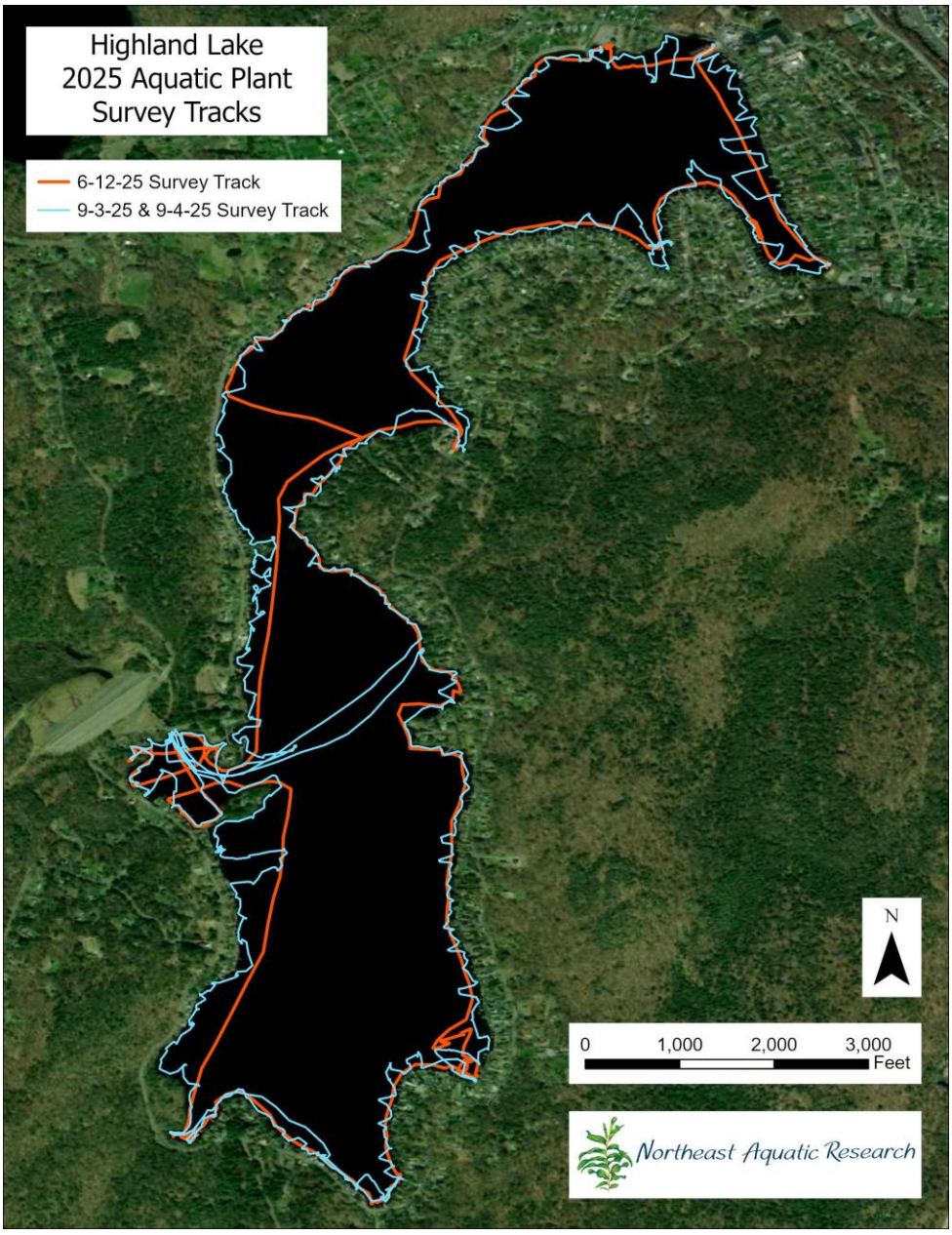
Northeast Aquatic Research (NEAR) has conducted annual surveys of the plants in Highland Lake since 2015 to monitor the management of the invasive Eurasian Milfoil (*Myriophyllum spicatum*) and Variable-Leaf Milfoil (*Myriophyllum heterophyllum*), search for rare species, and scan for any new invasive species, specifically Hydrilla (*Hydrilla verticillata*).

In 2025, NEAR conducted two surveys; a pre-management inspection on June 12th, and a detailed whole-lake survey on September 3rd and September 4th (**Map 1**). The purpose of the pre-management inspection in June was to search for Milfoil and CT-protected *Potamogeton vaseyi* in areas of historical presence. The purpose of the full-lake survey in September was to document all aquatic plant species in the lake with associated frequency and density, assess the areas where divers pulled Milfoil, and search for any new invasive species. 242 new waypoints were made during the September survey (**Map 2**).

New England Aquatic Services, LLC (NEAS), was hired by Highland Lake Watershed Association (HLWA) to remove invasive Milfoil species in 2025. On July 17th, NEAS performed DASH (Diver Assisted Suction Harvesting) operations to remove Variable Milfoil in Suckerbrook Cove (personal commun. with NEAS). On September 22nd, NEAS divers removed Eurasian Milfoil in Sandy Cove (personal commun. with NEAS). NEAR provided maps and GPS coordinates prior to both visits.

No herbicide treatments occurred in 2025.

Map 1. NEAR survey tracks in 2025.



Map 2. September 3rd & 4th, 2025, full-lake comprehensive survey waypoints.

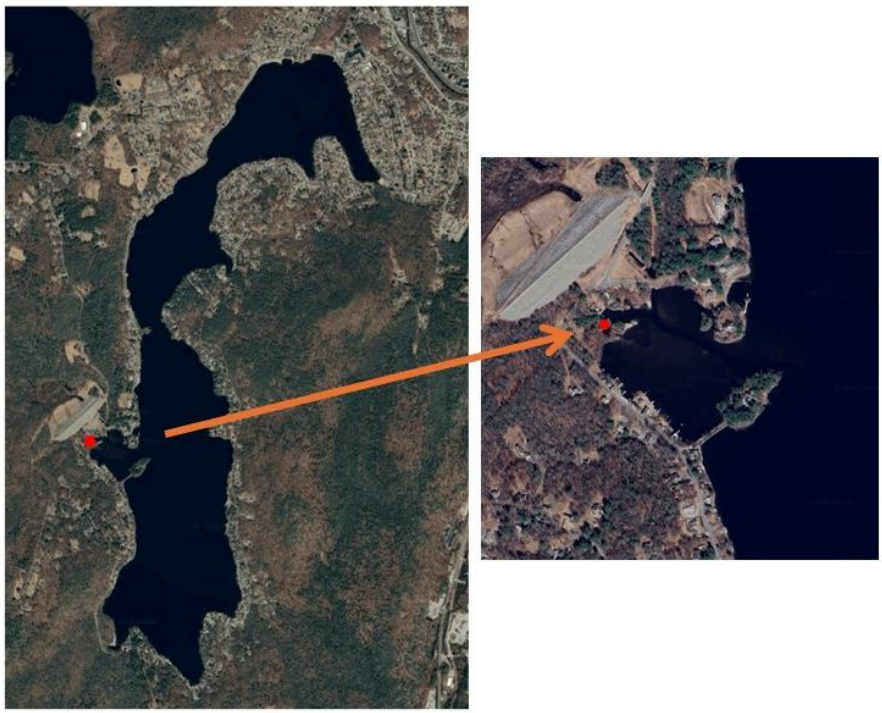
MONITORING RESULTS

June

The June 12th inspection consisted primarily of searching for state-protected Vasey's Pondweed in known historical locations, as well as searching for Milfoil. Vasey's Pondweed was not documented during this visit. NEAR brought several samples back to the office for close examination but none of the samples were confirmed to be Vasey's Pondweed.

Variable-leaf Milfoil was found within Suckerbrook Cove during this inspection (**Map 3**). This has been a consistent location for several years. Two plants were found in water 5 feet deep, and the plants were approximately 3 feet tall. Variable-leaf Milfoil was the only invasive species observed in the lake during the June visit.

Map 3. Location of Variable-leaf Milfoil (*Myriophyllum heterophyllum*) in Highland Lake on June 12th, 2025.



September

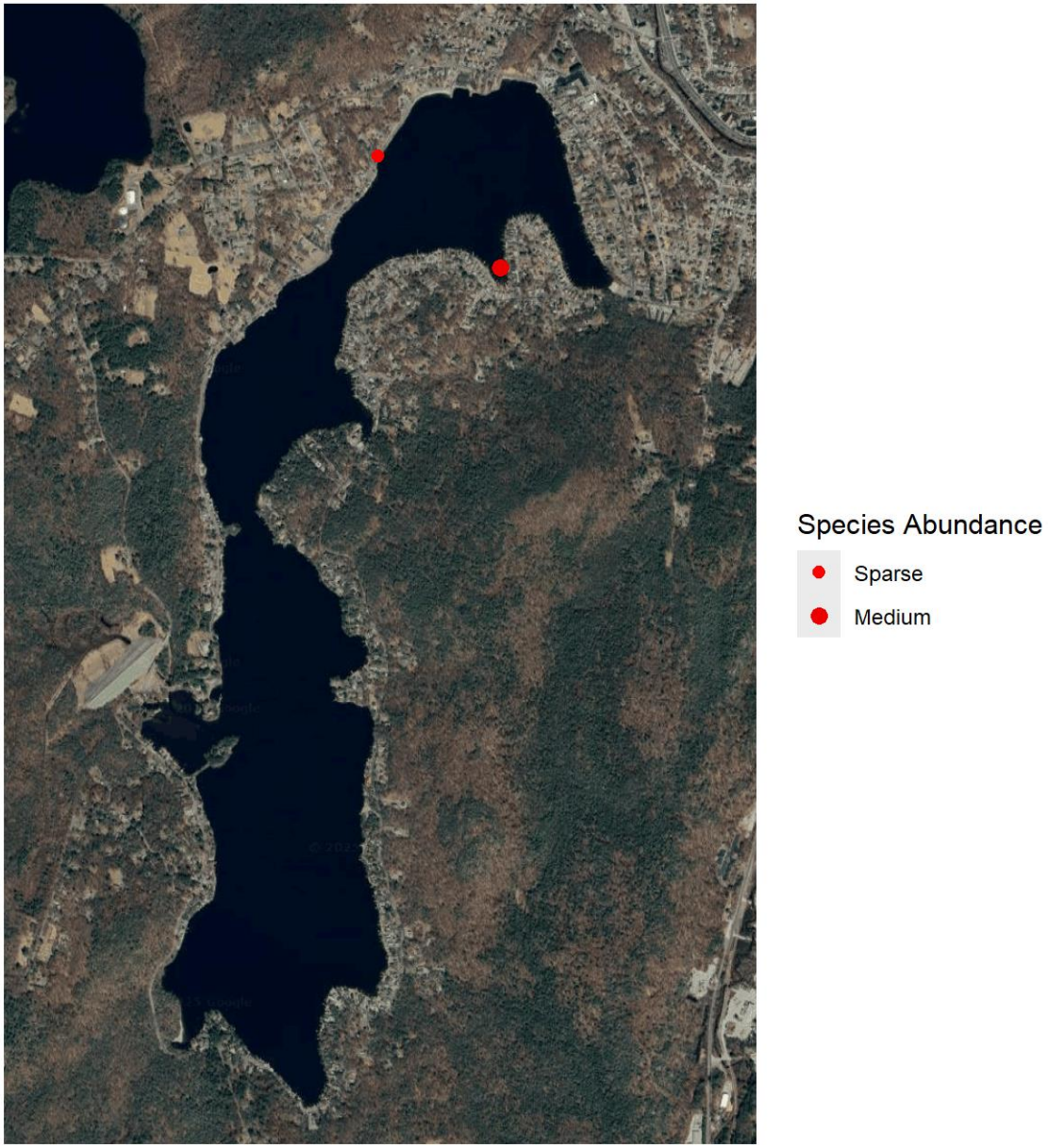
The full-lake, comprehensive survey was conducted over two days: September 3rd & 4th, 2025. 242 new waypoints were made during the survey. Variable-leaf Milfoil was not documented during this survey, as NEAS divers hand pulled the plants that were found during our June survey on July 17th.

Eurasian Milfoil was documented at one location in Sandy Cove (**Map 4**). Two plants were observed in 4.9 feet of water, and the plants were approximately 4 feet tall. NEAR recommended to HLWA that NEAS hand pull those plants, which they did on September 22nd. NEAR did not return to the lake following that removal but will inspect the area during the June 2026 survey.

Map 4. Location of Eurasian Milfoil (*Myriophyllum spicatum*) in Highland Lake on September 3rd, 2025.

The invasive species Curly-leaf Pondweed (*Potamogeton crispus*) was documented at two locations in the North Bay during the September visit (**Map 5**). Identification of this species was not confirmed in the field, but with samples brought back to the office for further examination with a magnifying lens. This is the first documentation of Curly-leaf Pondweed in Highland Lake, according to available NEAR records. NEAR will verify this species again during the May 2026 survey.

Map 5. Locations of Curly-leaf Pondweed (*Potamogeton crispus*) in Highland Lake on September 3rd & 4th, 2025.



In total, 30 species including Spirogyra, a Filamentous Green Algae, were documented during the September survey (**Table 1**). Vasey's Pondweed was documented at four locations (**Map 6**) in very sparse densities. Five species were dominant (present at 20% frequency and greater). Four of the five dominant species in September 2025 were also dominant in September 2024 (the exception being Stonewort sp.).

Southern Naiad (*Najas guadalupensis*) was the overall most dominant species at 78% frequency and was found throughout the littoral zone (**Map 7**). While dominant, this species is low-growing, and rarely, if ever, reaches the surface of the water column in Highland Lake, however we have seen this species form

topped out beds in other lakes. Tapegrass (*Vallisneria americana*), was present at 61% frequency and found throughout the littoral zone. This species can become a nuisance later in the summer (**Map 8**). Large-leaf Pondweed (*Potamogeton amplifolius*) was also dominant, present at 34% frequency and an average density of 30%. The majority of plants were found in the first and second bays (**Map 9**), though Large-leaf Pondweed was found throughout the lake. Stonewort (*Nitella sp*.) was most abundant in coves, particularly Suckerbrook, Hurlbut, and Sandy Coves (**Map 10**). Stonewort is a macroalgae and typically found on the bottom of the lake. Floating Bladderwort (*Utricularia radiata*) is a tiny plant that is typically floating, was found generally in very sparse to sparse abundances (**Map 11**). Filamentous Algae (**Map 12**) was most abundant in Suckerbrook Cove, though this was not a dominant species.

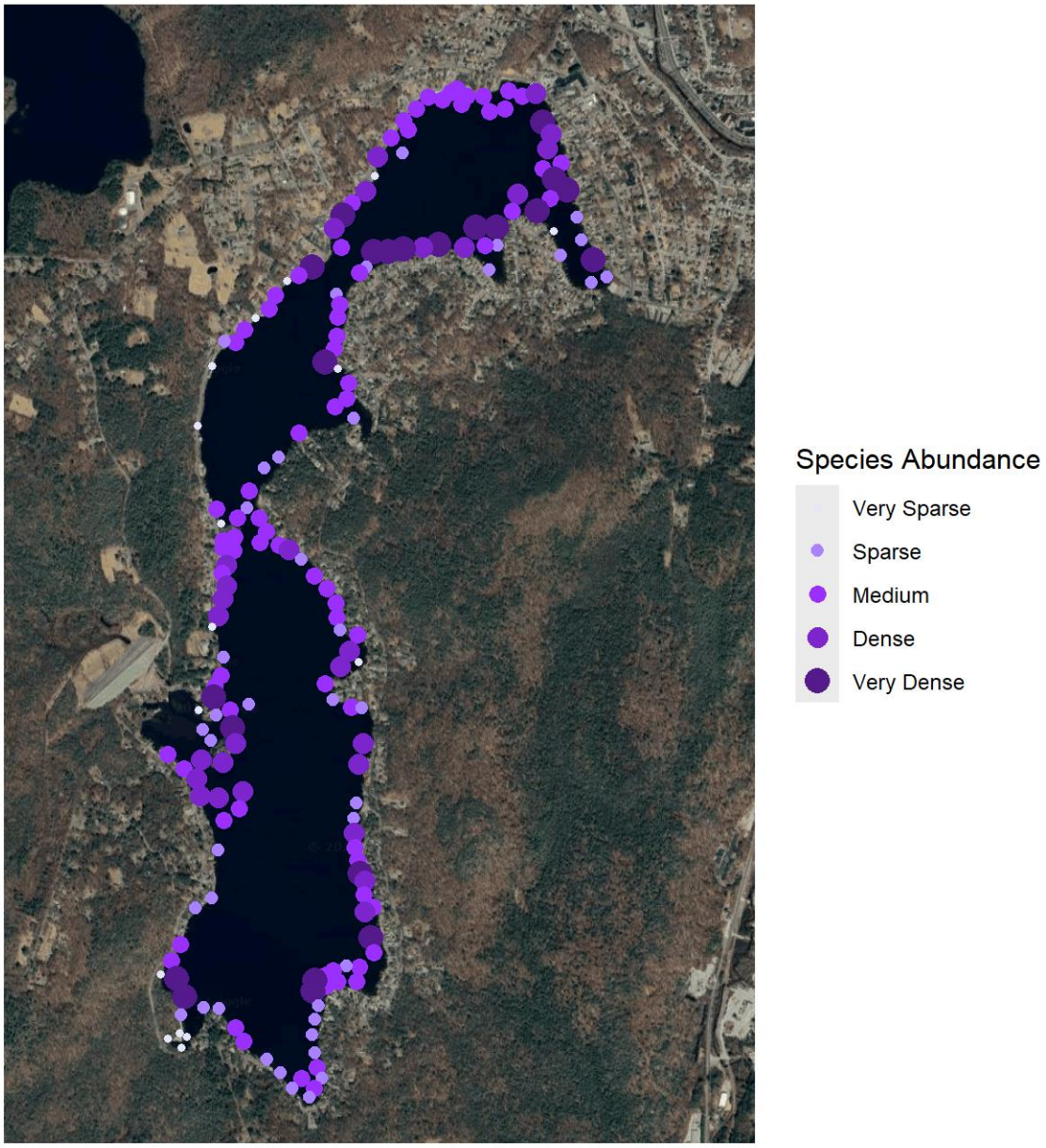
Table 1. *Aquatic plant species in Highland Lake during September 3rd & 4th, 2025 full-lake comprehensive survey, in order of decreasing frequency. Red lettering indicates invasive species. Blue lettering indicates protected species.*

		Sept 2025	
Scientific Name	Common Name	Frequency	Avg Density
Najas guadalupensis	Southern Naiad	78	37
Vallisneria americana	Tapegrass	61	20
Potamogeton amplifolius	Large-leaf Pondweed	34	30
Nitella sp.	Stonewort	25	22
Utricularia radiata	Floating Bladderwort	21	5
Potamogeton perfoliatus	Clasping-leaf Pondweed	15	16
Potamogeton epihydrus	Ribbon-leaf Pondweed	15	16
Elodea nuttallii	Nuttall's Waterweed	8	10
Sagittaria graminea	Grassy Arrowhead	7	16
Ceratophyllum demersum	Coontail	6	5
Spirogyra	Filamentous Algae	6	15
Najas flexilis	Slender Naiad	4	11.5
Potamogeton pusillus	Small Pondweed	4	8
Utricularia gibba	Humped Bladderwort	3	7
Eleocharis acicularis	Needle Spikerush	3	9
Potamogeton bicupulatus	Snailseed Pondweed	2	7
Ludwigia sp.	Water Purslane	2	7.5
Potamogeton robbinsii	Robbin's Pondweed	2	7.5
Potamogeton vaseyi	Vasey's Pondweed	2	5
Typha sp.	Cattail	2	33
Nuphar variegata	Yellow Water Lily	1	60
Potamogeton spirillus	Spiral Pondweed	1	5

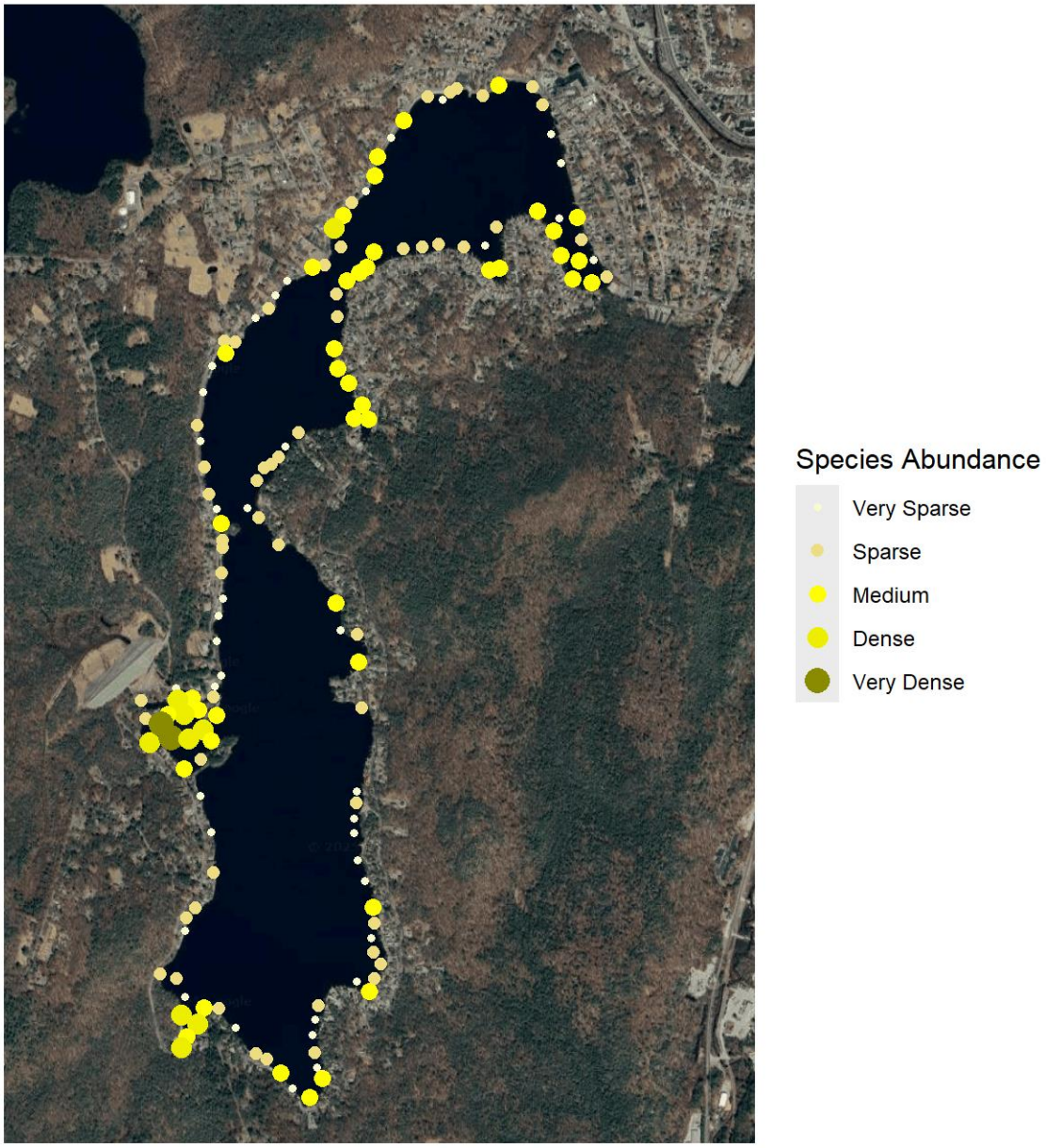
Fontinalis sp.	Aquatic Moss	<1	10
Potamogeton crispus	Curly-leaf Pondweed	<1	15
Utricularia purpurea	Purple Bladderwort	<1	5
Alisma sp.	Water Plantain	<1	5
Callitriche sp.	Water Starwort sp.	<1	15
Elatine sp.	Waterwort sp.	<1	15
Myriophyllum spicatum	Eurasian Milfoil	<1	5
Schoenoplectus sp.	Bulrush sp.	<1	15
Sparganium sp.	Bur-reed sp.	<1	5

Map 6. Locations of state protected Vasey's Pondweed (*Potamogeton vaseyi*) in Highland Lake on September 3rd & 4th, 2025.

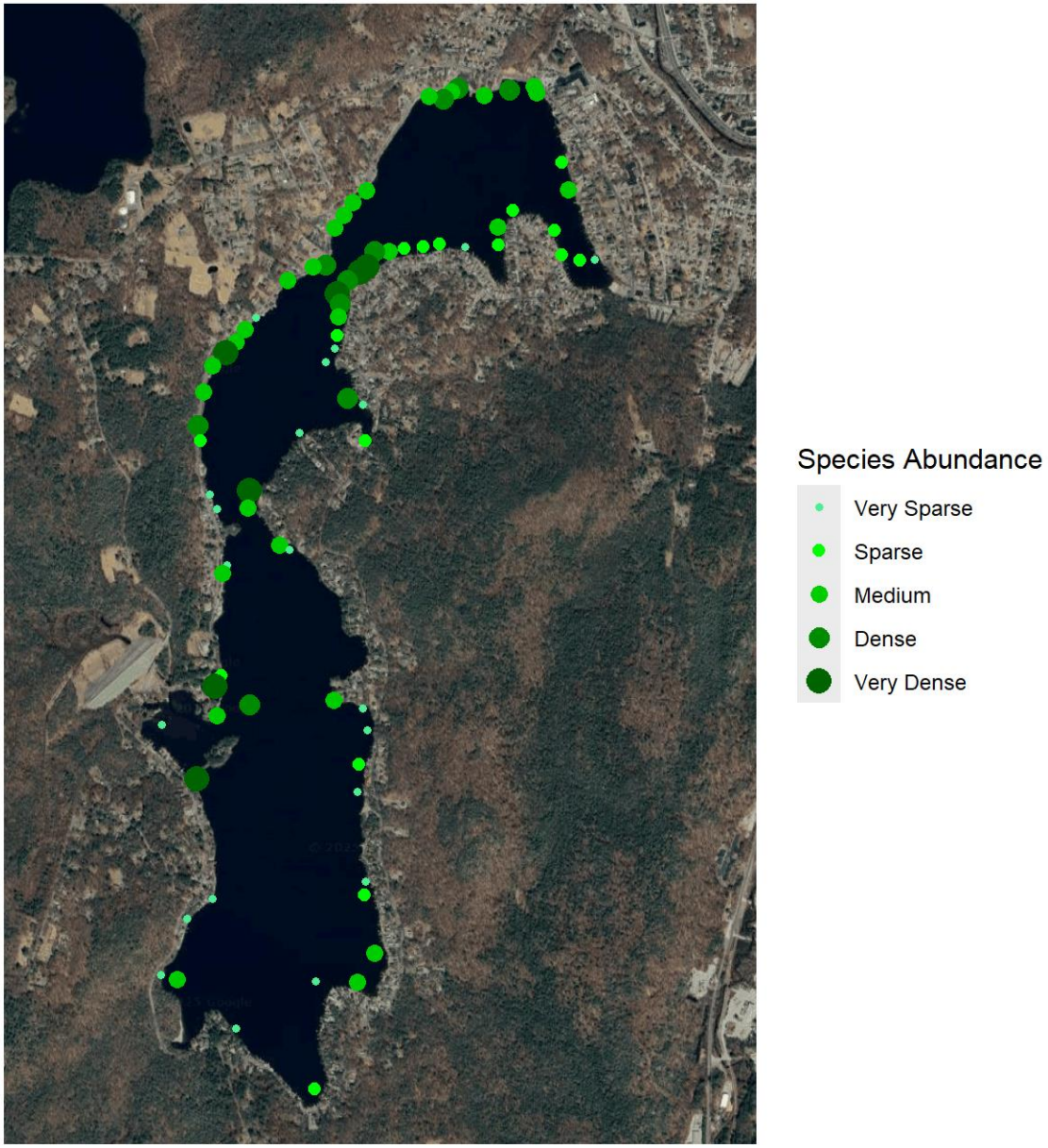
Map 7. Locations of Southern Naiad (*Najas guadalupensis*) in Highland Lake on September 3rd & 4th, 2025.



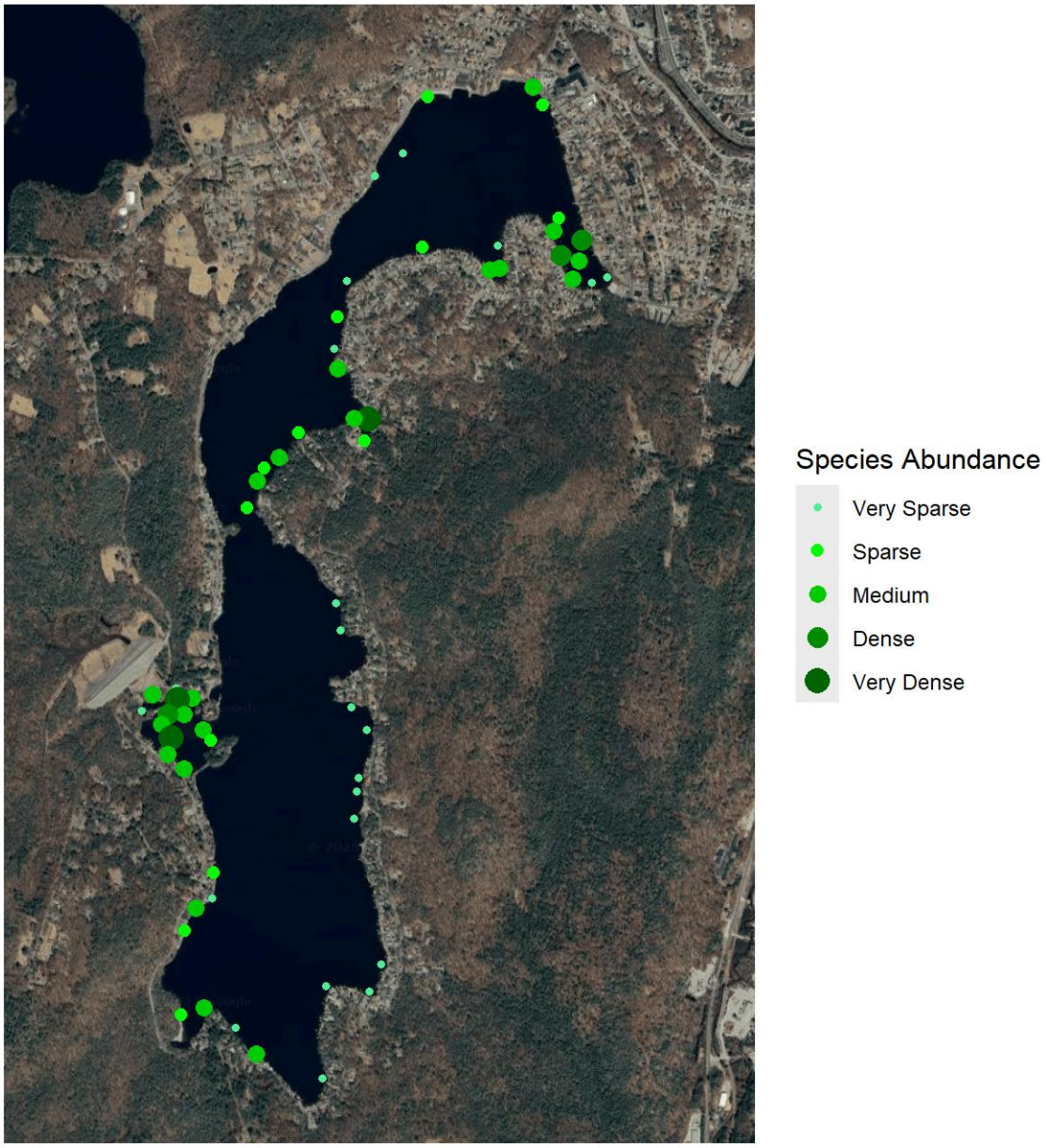
Map 8. Locations of Tapegrass (*Vallisneria americana*) in Highland Lake on September 3rd & 4th, 2025.



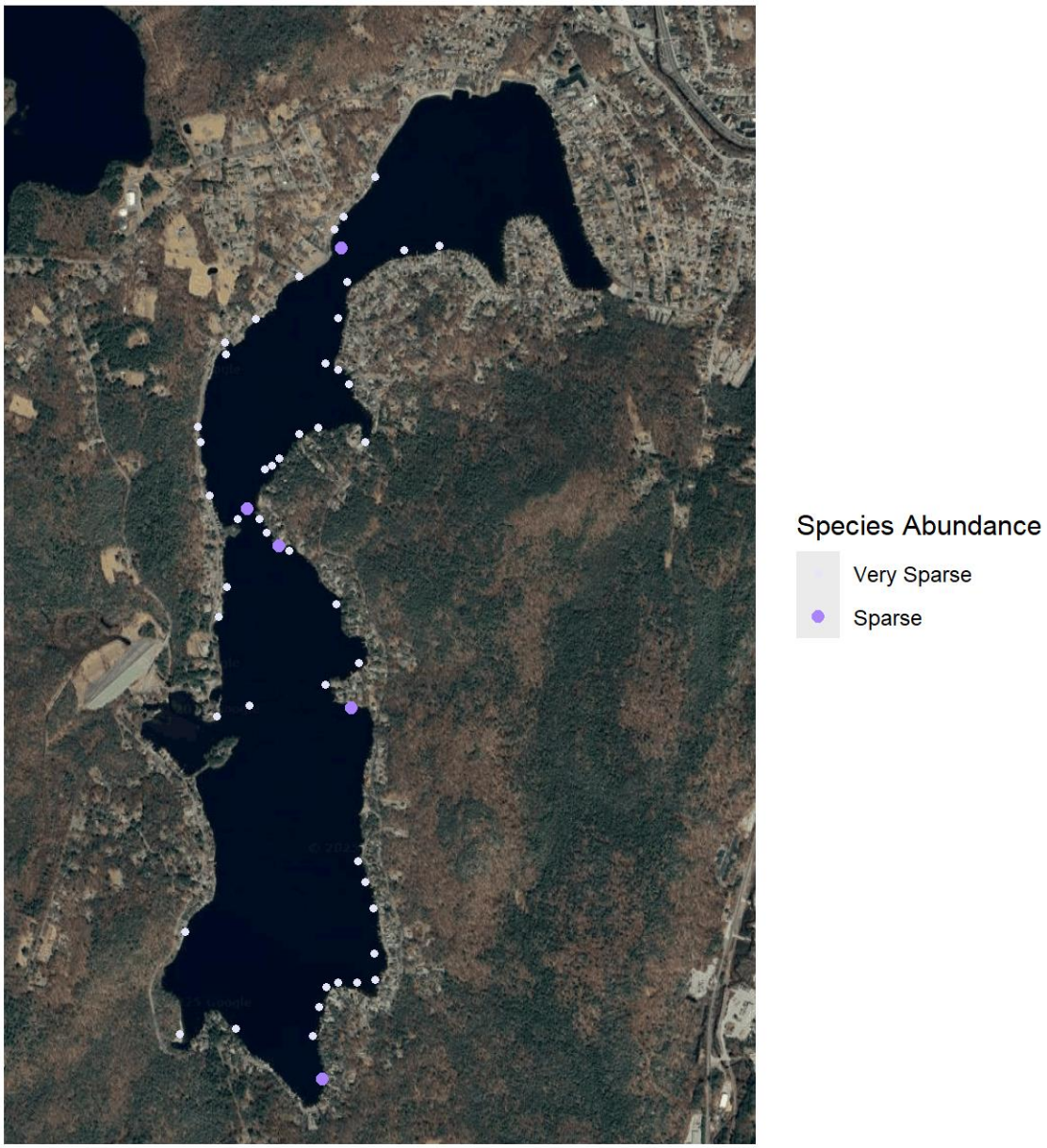
Map 9. Locations of Large-leaf Pondweed (*Potamogeton amplifolius*) in Highland Lake on September 3rd & 4th, 2025.



Map 10. Locations of Stonewort (*Nitella sp.*) in Highland Lake on September 3rd & 4th, 2025.



Map 11. Locations of Floating Bladderwort (*Utricularia radiata*) in Highland Lake on September 3rd & 4th, 2025.



Map 12. Locations of Filamentous Algae (*Spirogyra sp.*) in Highland Lake on September 3rd & 4th, 2025.

Recommendations

- An inspection in May 2026 is warranted, specifically to search for Curly-leaf Pondweed. The two sites from September 2025 will be revisited, and the littoral zone will be inspected for Curly-leaf Pondweed.
- Conduct two full-lake aquatic surveys in 2026: one survey in early to mid-June, and the second in late August to early September. The purpose of these surveys is to identify CT protected species and monitor for Eurasian Milfoil, Variable-Leaf Milfoil, Curly-leaf Pondweed, and any other new invasive species, specifically Hydrilla (*Hydrilla verticillata*). A later season survey is crucial for finding new infestations, when plants have reached peak abundance. All native and invasive species will be documented during both of these surveys.
- If the number of Milfoil (Variable-leaf and Eurasian) plants is few in 2026, DASH (Diver Assisted Suction Harvesting) will likely be recommended. If the infestation(s) are significant then treatment is warranted. ProcellaCOR should be used at those locations.
- No herbicide treatments were performed in 2025 for invasives or nuisance native vegetation. Limit the use of a board spectrum contact herbicide to control native pondweed and naiad to specific selected control areas, based on the June 2026 survey. Historical locations, and any new locations in June 2026 of the state-protected Vasey's Pondweed should be completely avoided.
- Closely monitor growth of Curly-leaf Pondweed. If infestation is manageable proceed with DASH, removal immediately following May and/or June survey. This is to ensure plants are removed prior to turion formation (which is typically by mid-July). If more Curly-leaf Pondweed is found during the September survey, have NEAS hand remove the plants. If the population is too large for DASH operations, treat with Diquat.

Management history at Highland Lake since 2009, based on available NEAR records.

Year	Date(s)	Herbicide/Management	Target Species	Treatment	Contractor
2009	July 9th, 2009	Diquat	Eurasian Milfoil Variable-leaf Milfoil	30 acres	ACT
2018	July 18th, 2018	Diquat	Eurasian Milfoil Variable-leaf Milfoil	60 acres	Applicator?
2019	June 19th. 2019	Diquat	Eurasian Milfoil Variable-leaf Milfoil	10.9 acres	AllHabitat Services, LLC
2020	No herbicide treatment. DASH by New England Aquatic Services?				

2021	July 22nd, 2021	Diquat ProcellaCOR	Eurasian Milfoil Variable-leaf Milfoil	33.2 acres 16.1 acres	AllHabitat Services, LLC?
2022	July 11th, 2022	Diquat	Variable-leaf Milfoil Large-leaf Pondweed Southern Naiad	35 acres	AllHabitat Services, LLC
2023	July 3rd, 2023	NO treatment. DASH (Diver Assisted Suction Harvesting)	Variable-leaf Milfoil	Sucker Brook Cove	New England Aquatic Services, LLC
2024	June 26th, 2024	Diquat	Large-leaf Pondweed Southern Naiad	80 acres	AllHabitat Services, LLC
		ProcellaCOR	Variable-leaf Milfoil	8 acres	
2025	No treatments. DASH by New England Aquatic Services on July 17th and September 22nd to remove Variable-leaf Milfoil and Eurasian Milfoil, respectively.				

Resumes

The resume of Dr. George Knoecklein is included below because he is the principal Northeast Aquatic Research expert on state-listed aquatic plant identification. He verified identification of all plant specimens.

Resume of Dr. George Knoecklein

EDUCATION

Ph. D., **1997**. **UNIVERSITY OF CONNECTICUT**, Storrs, Connecticut. Major: Limnology. Thesis: *Anaerobic Respiration Dynamics of a Eutrophic Lake.*

M.S., **1981**. **MICHIGAN STATE UNIVERSITY**, East Lansing, Michigan. Major: Limnology. Thesis: *The Vegetation and Hydrology of a Lakeside Wetland.*

B.S., **1978**. **SOUTHERN CONNECTICUT STATE UNIVERSITY**, New Haven, Connecticut. Major: Biology.

A.A.S., **1973**. **UNITY COLLEGE**, Unity, Maine, Major: Fisheries and Wildlife.

C.L.M., 2013-2023. North American Lake Management Society**.**

EMPLOYMENT

10/97 - Present Principal, Northeast Aquatic Research, LLC

Founder and principal investigator of ecological consulting and research company specializing in:

- Lake diagnostic studies, continued monitoring programs, and aquatic plant management planning.
- Aquatic plant surveys, including detection and mapping of invasive and protected species, and evaluation herbicide and other plant management projects.

Selected projects include:

- CT DEEP funded on-going diagnostic/feasibility study and weed management planning for Lower Bolton Lake, Bolton, CT, 2012-2017.
- Rapid response invasive species management program including intensive survey of Coventry Lake for the invasive *Hydrilla verticillata*, Coventry CT, 2015.
- Expert limnological witness for the defense in pond impact litigation, North Granby, CT.
- FirstLight GDF-Suez funded on-going monitoring of trophic status of Candlewood Lake, CT in 2013-2015.
- Planned and implemented intensive hydroraking project for pike fishery habitat remediation at Winchester Lake, Winchester, CT.
- Aquatic plant surveys of VT lakes; Lake Iroquois (2014), Lake Saint Catherine, and Lake Fairlee, 2015.
- Intensive investigation of nutrient budget and trophic status of Mirror Pond on the Storrs campus of University of Connecticut 2013-2014.
- Evaluation of impacts on the ecology of Candlewood Lake from 25 years of winter water level drawdown to control Eurasian milfoil. 2011.
- Intensive evaluations of highly eutrophic; Lake Pocotopaug (East Hampton CT).
- Full aquatic plant surveys in 2010 and 2012 of Johnson's Pond (Flat River Reservoir, Coventry, RI). Herbicide management plan in 2014-2016, for control or invasive non-native aquatic plants; variable milfoil (*Myriopyllum heterophyllum*), and fanwort (*Cabomba caroliniana*).
- Identification and management of invasive aquatic plants in all water bodies in the town of Vernon, CT, ongoing 2009-2017.
- CT DEP funded feasibly study of Hatch Pond with Water Resources Services 2013-2014.
- Diagnostic/feasibility study and weed management plan of Bantam Lake, Morris, CT.
- Organized multi-year (2006-2012) suction harvesting project in Bantam Lake, Morris, CT to remove invasive non-native aquatic plant fanwort (*Cabomba caroliniana*) from state protected aquatic plant beds. Developed herbicide treatment plan for Bantam River, first river treatment in CT, for control of invasive non-native aquatic plant fanwort (*Cabomba caroliniana*).

- Organized multi-year (2008-2010) suction harvesting project to remove invasive non-native aquatic plant variable milfoil (*Myriopyllum heterophyllum*) in state protected aquatic plant beds following DEP Funded Demonstration Project to Evaluate Suction Harvesting as weed removal technique Crystal Lake Ellington/Stafford, CT.
- Evaluation of impacts of proposed winter water level drawdown on MA protected aquatic plant species *Potamogeton ogdenii* in Onoda Lake, Pittsfield, MA.
- Evaluation of impacts of winter water level drawdown on ecology of Highland Lake, Winchester, CT 2008.
- EPA/DEP 319 funded diagnostic investigation of Lake Zoar in 2011.
- Steering Committee for Water Resource Foundation's Manual: Reservoir Operations and Maintenance Strategies (2010 - 2014).
- EPA/CT DEP 319 funded 5 year diagnostic investigation of Lake Lillinonah, CT, 2006–2010.
- CT DEP funded diagnostic/feasibility study of Hatch Pond, Kent, CT, 2004–2005. Follow-up EPA/DEP 319 funded trophic assessment and watershed loading evaluation 2010-2012.
- Detection/distribution mapping of CT protected aquatic plant species; *Potamogeton fresii* and *Myiropyllum sibiricum* in Lake Wononscoponuc, Salisbury, CT, 2004 and 2007.
- CT DEP funded aquatic plant management study of Pickerel Lake, Colchester, CT.
- Detailed CT DEP funded aquatic plant mapping of Pachaug Pond 2004/2005 repeated in 2009/2010, Griswold, CT.
- Detailed hydrological and nutrient budget for Doolittle Lake, Norfolk, CT.
- Review of proposed aeration on existing trophic characteristics of Lily Pond, Cohasset, MA.
- Intensive diagnostic evaluations of; Nantucket Harbor, Hummock Pond, Miacomet Pond, Long Pond, and Madaket Harbor, on the island of Nantucket, MA. 1998 – 2008.
- CT DEP funded diagnostic/feasibility studies of Lake Hayward (2001), Rogers (2003), Lillinonah (2002-2003), Bashan (2002), Crystal--Ellington/Stafford—(2004),
- Detection/distribution mapping of CT protected aquatic plant species *Potamogeton ogdenii* in Indian Lake, Sharon, CT.
- Detection/distribution mapping of CT protected aquatic plant species *Potamogeton ogdenii* in West Twin Lake, Salisbury. CT.
- Aquatic plant survey and CT protected aquatic plant species *Megalodonta beckii* mapping in Lake Quonnipaug, Guilford,
- Detection/distribution mapping of CT protected aquatic plant species *Megalodonta beckii* in West Twin Lakes, Salisbury. CT.
- Conducted water quality characterization of storm water discharges from Tilcon CT's Branford Quarry.
- Cooperative involvement in CT DEP funded lake diagnostic feasibility study of Lake Kenosia with ENSR, and ACT, Inc. Responsible for conducting field sampling and data analysis.
- Developed 'Resident Sampling Program' to enable lake residents to collect their own lake monitoring data (managing 10 lake groups as of 2015).

PROFESSIONAL MEMBERSHIPS

Connecticut Federation of Lakes, (President 1999 – 2007)
Northeast Aquatic Plant Management Society (Board of Director 2010 - 2013)
North American Lake Management Society (member since 1986)
New England Chapter of North American Lake Management Society, (Leadership Committee)
Association for the Sciences of Limnology and Oceanography

Last full revision 2017 ▪

The resume of Kendra Kilson is included below as she was the primary contact for the project period and conducted both surveys in 2025.

Resume of Kendra Kilson

Kendra Kilson

Contact: cell: (203) 312 -3941; email: kendra.k@ne-aquatic.com

EDUCATION

State University of New York College at Oneonta, Oneonta, NY & **Biological Field Station,** Cooperstown, NY
Master of Science, Lake Management, December 2019

University of Connecticut, Storrs, CT
Bachelor of Science, Natural Resources, Concentration in Environmental Conservation, May 2016

PROFESSIONAL EXPERIENCE

Northeast Aquatic Research, Mansfield, CT
Research Scientist, August 2019-present, *Seasonal Intern*, April 2017-November 2017

- Client manager for ongoing lake and pond management projects.
  - Aid applicators and professional contractors in aquatic plant management planning to minimize ecological harm and maximize target plant species control.
- Perform aquatic plant surveys to identify native and invasive species presence and abundance.
  - Highly competent in taxonomic identification of aquatic plants in New England.
- Lake and pond water quality monitoring for management purposes.
  - Experience with measuring dissolved oxygen, temperature, conductivity, pH and Secchi transparency.
  - Perform algae and zooplankton collection, and limited experience in microscopic identification.
- Sample stormwater discharge in a timely manner to analyze nutrient runoff in the watershed.
  - Improve knowledge in Low Impact Development (LID) and innovative stormwater infiltration systems.

SOLitude Lake Management, Washington, NJ and Shrewsbury, MA
Seasonal Aquatic Biologist, May 2019-August 2019

- Performed aquatic plant surveys to identify native and invasive species presence and abundance.
  - Further developed skills in taxonomic identification of aquatic plants in New England.
- Monitored water quality on lakes, ponds, and rivers for management purposes.

CT Department of Energy and Environmental Protection, Hartford, CT
Water Permitting and Enforcement Division, Stormwater Section
Intern, May 2015-August 2015

- Implemented stormwater compliance evaluations by inputting data to be utilized by the companies and DEEP.
- Drafted inspection reports for EPA by compiling organizational observations to assess stormwater quality.

The Mayflower Inn and Spa, Washington, CT
Waiter's Assistant/Server, October 2011-August 2014

- Assisted fellow employees to ensure maximum efficiency and customer satisfaction in a time-oriented environment.
- Prioritized and assessed workload to meet demands in a well-organized manner to provide optimal assistance.

VOLUNTEER EXPERIENCE

Connecticut Federation of Lakes
Board of Directors, September 2025-present

Friends of the Lake: Lake Lillinonah, Bridgewater, CT
Volunteer, April 2014-present

- Collect water quality data from a research buoy to better understand the health and conditions of the lake.
- Participate in annual Save-the-Lake Day by picking up trash and hand-pulling invasive aquatic plants.

CT Department of Energy and Environmental Protection (DEEP): Riffle Bioassessment by Volunteers Program (RBV)
RBV Volunteer/Trainer, September 2014-present

- Discover pollution-sensitive macroinvertebrates to be studied by DEEP in order to identify streams with excellent water quality.

SKILLS ACQUIRED TO DATE

- Professional Association of Diving Instructors (PADI) Open Water Diver Certified No. 19070H2801
- Lake Management Associate (LMA), North American Lake Management Society (NALMS)
- Certificate of Personal Watercraft Operation (Connecticut)
- Experience in trailer and small powerboat operation
- Computer: Microsoft Office: Word; PowerPoint; Excel; Outlook. ArcGIS; ArcMap. Developmental Tools: RStudio

Appendix

The Vasey's Pondweed population in Highland Lake has persisted in recent years, but appears to be slightly declining. Densities were high in 2022 and 2023, with a few dense beds in 2024. In 2025, populations were very sparse. It is strongly recommended if treatment(s) occur, that the treatment areas are planned according to NEAR surveys, as locations of Vasey's Pondweed may change each year, and new locations are discovered. This is to avoid treatment in the most up-to-date locations.