2022 Survey Report for
Pine River Pond in East Wakefield, NH

INTRODUCTION

For the 2022 season, SŌLitude Lake Management (SŌLitude) was contracted by the Pine River Pond Association to conduct a macrophyte survey of Pine River Pond in East Wakefield, NH. The primary focus of the survey was to monitor and document the growth and potential spread of native whorled watermilfoil (*Myriophyllum verticillatum*) that was first observed during the 2014 growing season. Other macrophyte growth observed within the littoral zone was identified and recorded with an approximate location.

The following report will discuss the extent of macrophyte growth documented during the survey, along with attached distribution maps and plant codes for reference.

LAKE DESCRIPTION

According to New Hampshire Fish and Game, Pine River Pond is an approximately 570-acre lake located in East Wakefield, NH with average and maximum depths of 15 and 55 feet, respectively. The shoreline of the lake is moderately developed with both seasonal and year-round homes. Water flows into the lake through tributaries, surface water run-off, and groundwater, and outflows into the Pine River which then flows towards Ossipee. The Arthur H. Fox Memorial Dam at the northern end of the lake was built in 1977 and augments the lake system and maintains the size of Pine River Pond. Its watershed (8,200 acres) is relatively small and includes undeveloped, forested hillsides. It is likely that the trophic state of the lake is due, in large part, to the limited development within the watershed. The 15 islands and flats of macrophyte growth provide variable habitat for the biota supported by the lake. The substrate of the lake is generally a mixture of rock and sand with limited areas of organic matter/muck.

METHODS

On August 16, 2022, the littoral zone of Pine River Pond was surveyed using a 14-foot boat. The littoral zone was determined on site through the use of an on-board Lowrance unit that displays depth and biovolume. The vegetation growth was assessed visually when possible, and substantiated by the use of a throw-rake when growth was not visible from the boat. Observed macrophytes were identified and recorded to the most appropriate taxon (species level when possible), and relative locations were referenced with a hand-held GPS unit for reporting purposes.

RESULTS & ANALYSIS

As previously determined, the lake supports moderate macrophyte growth up to depths of approximately 15-20 feet. Macrophyte growth can be increased in deeper water with good seasonal water clarity. Other years, when there is poor water clarity, plants may only be able to grow out to 10 feet (as documented in previous survey years).

In 2022, twenty-two (22) species (**Table 1**) of aquatic plants were identified during the course of the survey. Consistent with past years, the plant assemblage was dominated primarily by bladderwort (*Utricularia sp.*), bushy pondweed (*N. flexilis*), variable-leaf pondweed (*P. gramineus)*, and spikerush (*Eleocharis spp.*). Vegetation cover was sparse to moderate density (25-65%) throughout the majority of the littoral zone, with higher densities in protected cove areas. Scattered, low-density growth was found along the more exposed shoreline areas and at deeper depths (13-18 feet)(**Map: Distribution & Abundance of Aquatic Vegetation**).

Whorled watermilfoil was documented in a few locations this year. The watermilfoil growth around the quaking bog was most dense. The cove to the southeast of Fay Way also supported watermilfoil growth in sparse-moderate density throughout the cove.

Growth of floating leaf species was fairly limited, but yellow waterlily (*Nuphar variegata*) was observed in select cove areas. Undeveloped wetland areas of the shoreline supported typical emergent plant growth including cattails (*Typha sp.*), rushes (*Juncus sp.*), bur-reed (*Sparganium sp.*) and other native species.

Table 1: Aquatic vegetation species identified during the August 16, 2022 survey.

Common Name	Scientific Name
Whorled Watermilfoil	*Myriophyllum verticillatum*
Ribbon-leaf Pondweed	*Potamogeton epihydrus*
Big-leaf Pondweed	*Potamogeton amplifolius*
Thin-leaf Pondweed	*Potamogeton pusillus*
Floating-leaf Pondweed	*Potamogeton natans*
Variable-leaf Pondweed	*Potamogeton gramineus*
Robbins' Pondweed	*Potamogeton robbinsii*
Common Bladderwort	*Utricularia vulgaris*
Purple Bladderwort	*Utricularia purpurea*
Flat-leaved Bladderwort	*Utricularia intermedia*
Humped Bladderwort	*Utricularia gibba*
Slender Naiad	*Najas flexilis*
Southern Naiad	*Najas guadalupensis*
Yellow waterlily	*Nuphar variegata*
Waterweed	*Elodea spp.*
Bur-reed	*Sparganium spp.*
Arrowhead	*Sagittaria spp.*
Spike sedge	*Eleocharis spp.*
Seven-angled Pipewort	*Eriocaulon aquaticum*
Aquatic Moss	*Fontinalis spp.*
Macro-algae	*Nitella spp. & Chara spp.*

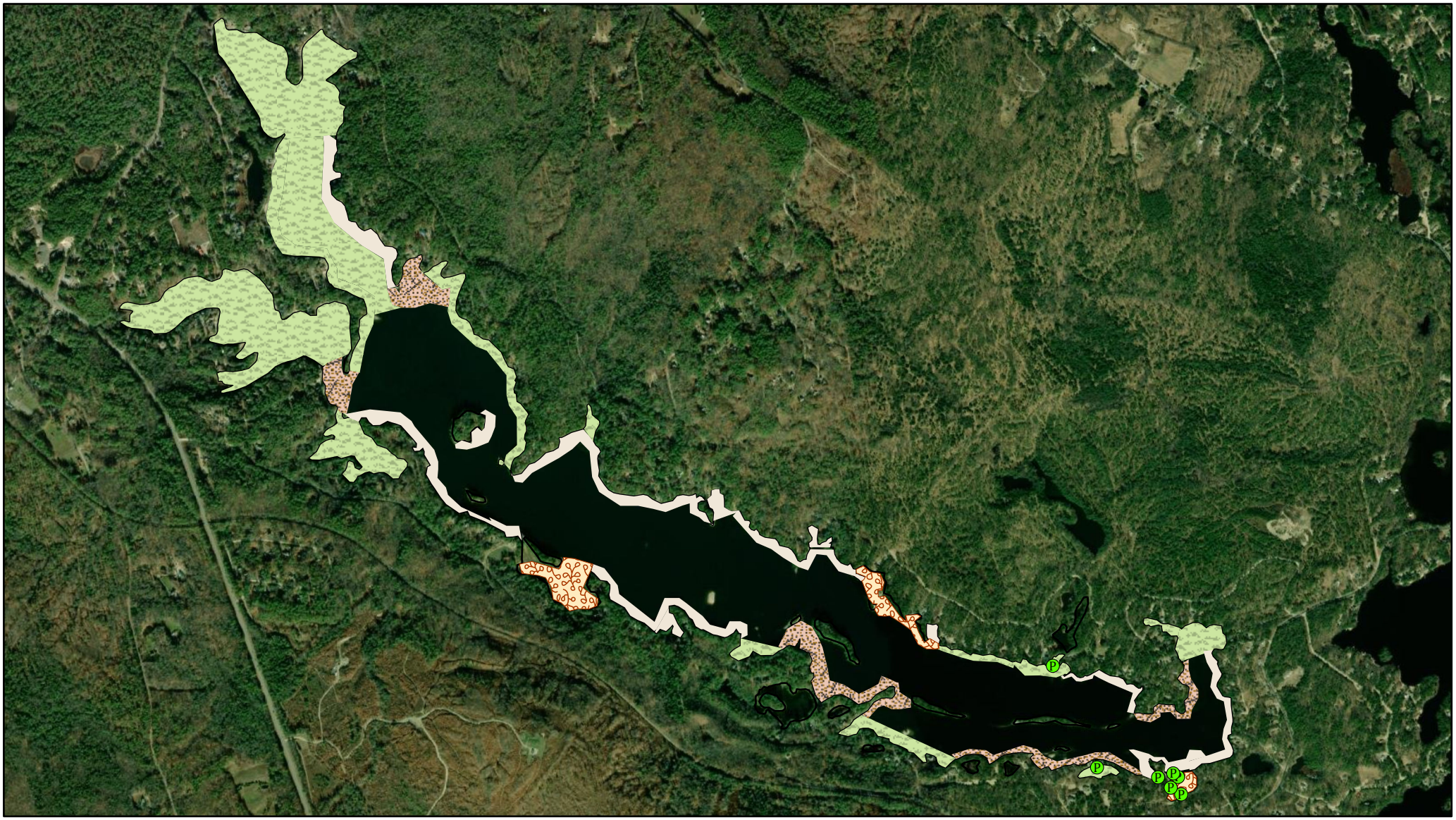
MANAGEMENT RECOMMENDATIONS

Similar to past years' reports, our recommendations remain unchanged; we recommend that the Association continue with the preventative efforts to keep from introducing non-native aquatic species to Pine River Pond, including the annual survey to confirm the lack of non-native species. Employing state trained 'weed watchers' for additional monitoring can be an effective means of documenting seasonal changes and/or issues. Early detection is paramount for the success of preventative management and should remain a priority for the Association and lake residents. The use of diver hand-pulling, through the proper state-regulated channels, can be employed to control nuisance native whorled watermilfoil. The use of hand-pulling inflicts minimal disturbance on the surrounding species, especially in areas like the quaking bog with high native aquatic plant diversity. Due to the

nature of whorled watermilfoil growth, and conversations with NH DES, and other projects involving nuisance native plant control, selective use of herbicide is not feasible. Diver hand-pulling requires a permit from the NH Wetlands Bureau. Using this control activity has the highest probability of being approved by the State for removal of nuisance native watermilfoil growth.

We look forward to assisting in the continued monitoring of Pine River Pond in the future. We hope you find this information helpful in making your pond management decisions, but please let us know if you have any questions or need anything further.

Distribution & Abundance of Aquatic Vegetation
Pine River Pond



Pine River Pond
E. Wakefield, NH

0 1,000 2,000 3,000 Feet

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Legend

- Whorled Watermilfoil
- 1-2 species
- 3-4 species
- 4-6 species
- 6+ species

~Dominant Plants: Bladderwort & pondweed spp., Spikerush
~Less dominant but frequent: Elodea, tapegrass, macro-alga, naiad spp., arrowhead, pipewort, & whorled watermilfoil

Map Date: 10/11/2022
Survey Date: 08/16/2022
Office: Shrewsbury, MA