

## 2021 Survey Report for Pine River Pond in East Wakefield, NH

### INTRODUCTION

For the 2021 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 July 30, 2021, the littoral zone of the 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 2021, twenty-five (25) species (**Table 1-page 4**) 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*), big-leaf pondweed (*P. amplifolius*), and bur-reed (*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).

Whorled watermilfoil was documented in several locations (Figure 2) this year. The milfoil growth around the quaking bog was most dense. The cove to the southeast of Fay Way also supported milfoil growth in sparse-moderate density throughout the cove. During the 2021 survey, no milfoil plants were observed in the cove by Lee Way, east of the island in the cove that is north of Blaney Road, and south of Pinewood Road (Area E).

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

## MANAGEMENT RECOMMENDATIONS



As previously mentioned, the proximity of Pine River Pond to known non-native plant infestations creates a high likelihood of potentially noxious plant introductions. The fact that no non-native species were found or have been reported previously is undoubtedly due to the lack of suitable public boat access and the weed watching efforts of the Pine River Pond Association.

As such, 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 milfoil 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 milfoil 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.

## Whorled Watermilfoil coordinates

Quaking Bog: 43.61877887, -70.99841276

Cove at Blackwood Road: 43.61877048, -70.99941239

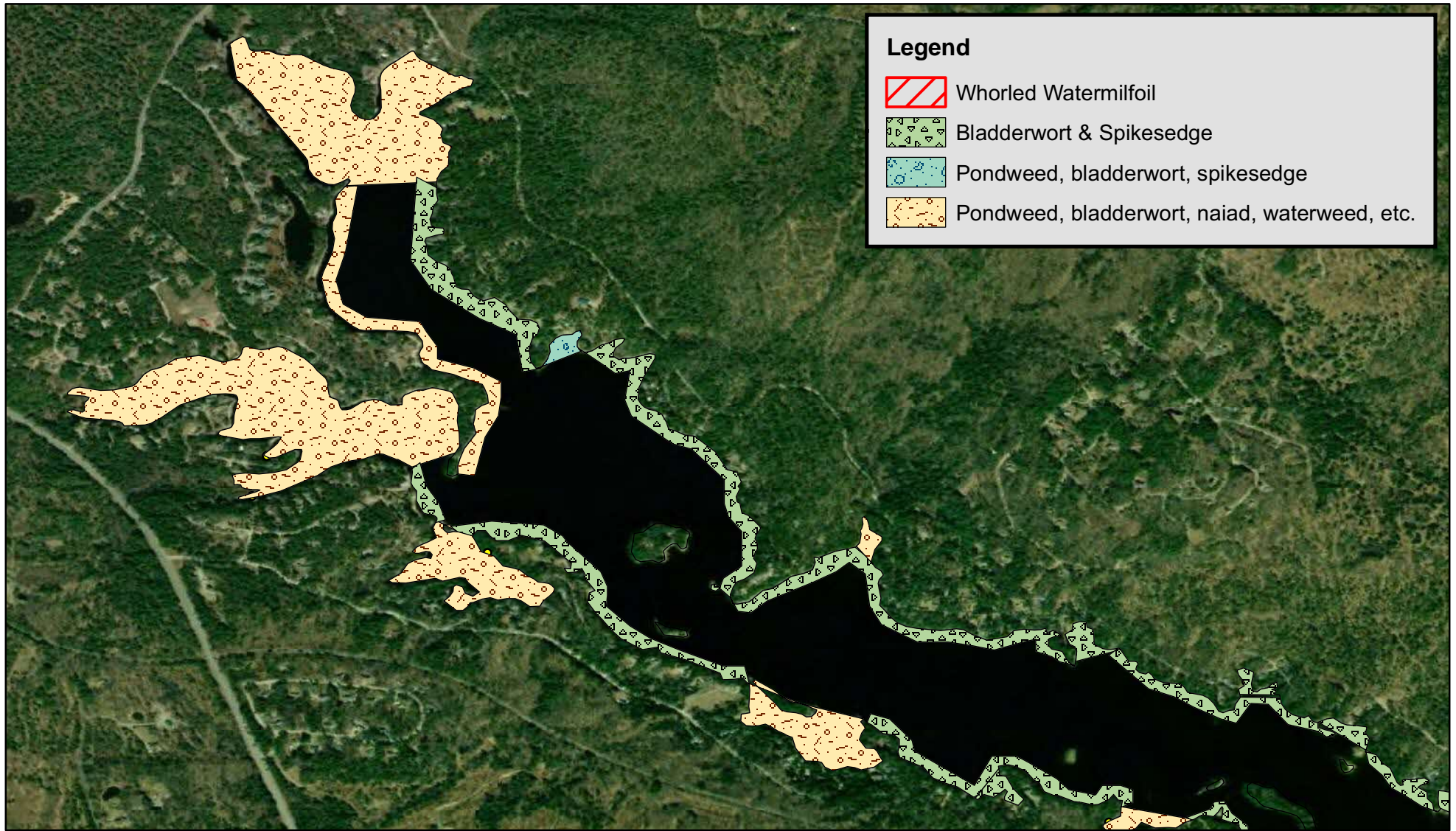
Cove at Fay Way: 43.61914147, -71.00246223



**Table 1:** Aquatic vegetation species identified during the July 30, 2021 survey

<b>Common Name</b>	<b>Scientific Name</b>
Whorled Watermilfoil	<i>Myriophyllum verticillatum</i>
Large-leaf Pondweed	<i>Potamogeton amplifolius</i>
Ribbon-leaf Pondweed	<i>Potamogeton epihydrus</i>
Thin-leaf Pondweed	<i>Potamogeton pusillus</i>
Floating-leaf Pondweed	<i>Potamogeton natans</i>
Variable-leaf Pondweed	<i>Potamogeton gramineus</i>
Snail-seed Pondweed	<i>Potamogeton bicupulatus</i>
Common Bladderwort	<i>Utricularia vulgaris</i>
Purple Bladderwort	<i>Utricularia purpurea</i>
Flat-leaved Bladderwort	<i>Utricularia intermedia</i>
Humped Bladderwort	<i>Utricularia gibba</i>
Horned Bladderwort	<i>Utricularia cornuta</i>
Mixed Bladderwort	<i>Utricularia gemniscapa</i>
Slender Naiad	<i>Najas flexilis</i>
Southern Naiad	<i>Najas guadalupensis</i>
Yellow waterlily	<i>Nuphar variegata</i>
Waterweed	<i>Elodea spp.</i>
Tapegrass	<i>Vallisneria americana</i>
Burreed	<i>Sparganium spp.</i>
Arrowhead	<i>Sagittaria spp.</i>
Spike sedge	<i>Eleocharis spp.</i>
Water Starwort	<i>Callitriche spp.</i>
Seven-angled Pipewort	<i>Eriocaulon aquaticum</i>
Aquatic Moss	<i>Fontinalis spp.</i>
Macro-algae	<i>Nitella spp. &amp; Chara spp.</i>

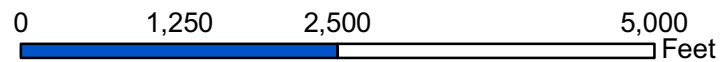
FIGURE 1: EAST PORTION of PINE RIVER POND  
July 30, 2021



Pine River Pond  
East Wakefield, NH

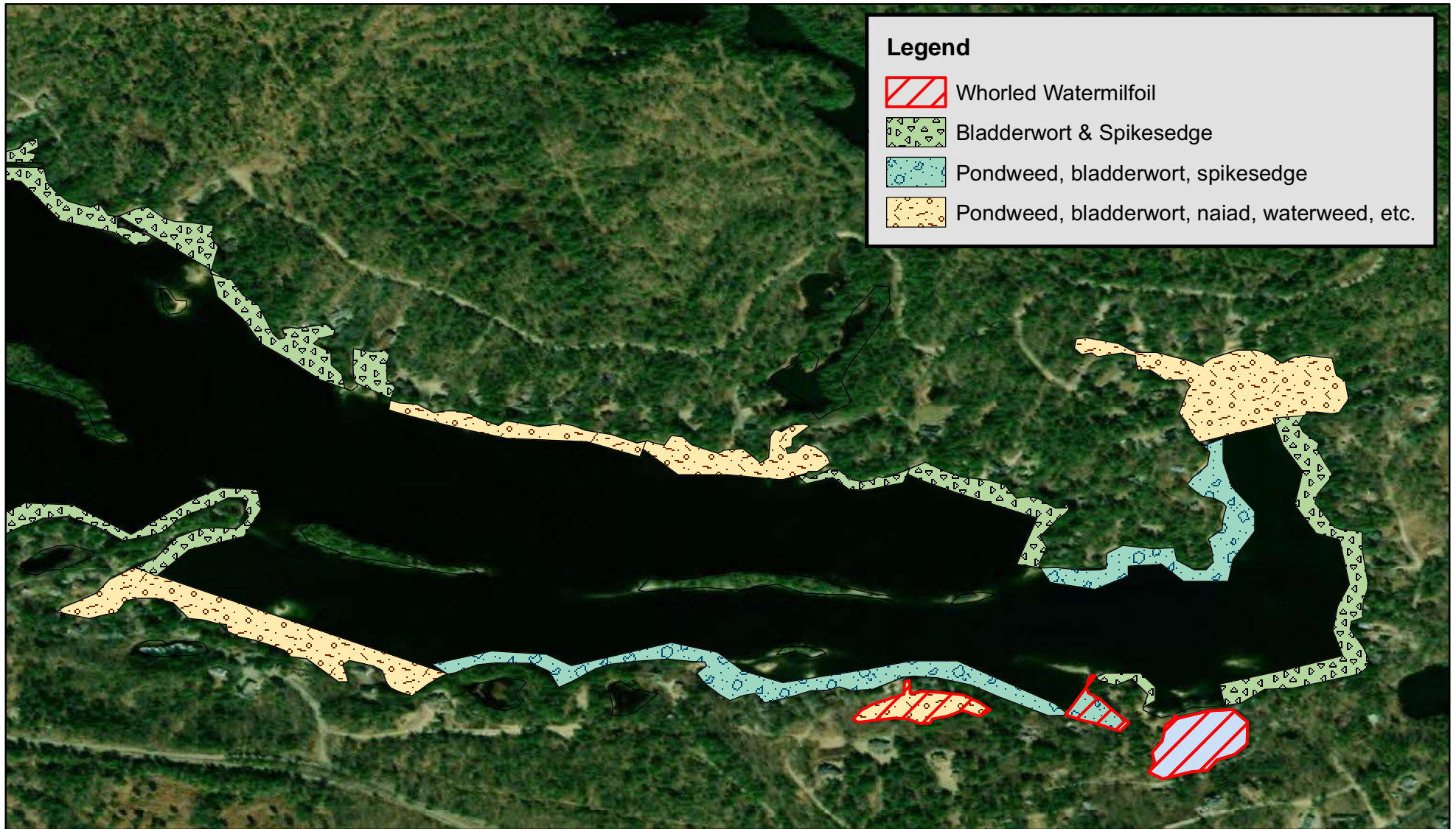


**PINE RIVER POND**



Map Date: 08/19/2021  
Prepared by: Amanda M  
Office: SHREWSBURY, MA

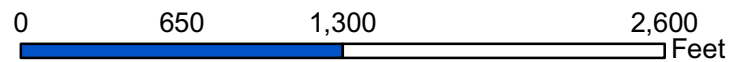
FIGURE 2: WEST PORTION of PINE RIVER POND  
July 30, 2021



Pine River Pond  
East Wakefield, NH



**PINE RIVER POND**



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