LITTLE ISLAND POND

2023 SAMPLING HIGHLIGHTS

Station 2 Deep

Pelham, NH

Extension

Water quality data displayed in Tables 1 and 2 are surface water measurements with the exception of the dissolved oxygen data that are collected near the lake bottom. Summary statistics are provided for weekly samples collected between July 9 and September 11, 2023.

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

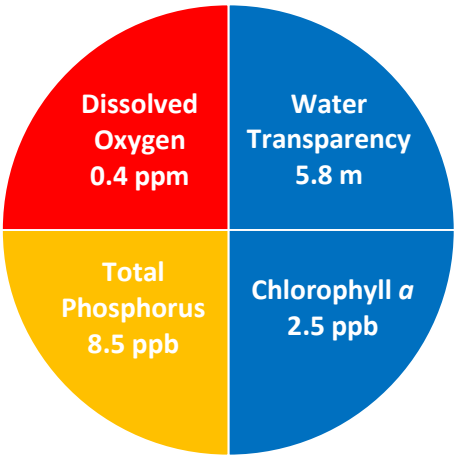


Figure 1. Little Island Pond Water Quality (2023)

Table 1. 2023 Little Island Pond Seasonal Averages and NH DES Aquatic Life Nutrient Criteria[1]

Parameter	Oligotrophic "Excellent"	Mesotrophic "Fair"	Eutrophic "Poor"	Little Island Pond Average (range)	Little Island Pond Classification
Water Clarity (meters)	> 4.0 – 7.0	2.5 - 4.0	< 2.5	**5.8** meters (4.1 – 7.3)	Oligotrophic
Chlorophyll *a* [1] (ppb)	< 3.3	3.3 – 5.0	> 5.0 – 11.0	**2.5** ppb (1.8 – 3.3)	Oligotrophic
Total Phosphorus [1] (ppb)	< 8.0	8.0 – 12.0	> 12.0 – 28.0	**8.5** ppb (7.6 – 9.6)	Mesotrophic
Dissolved Oxygen (ppm)	> 5.0 – 7.0	2.0 – 5.0	< 2.0	**0.4** ppm (0.0 – 1.4) *	Eutrophic

* Dissolved oxygen concentrations were measured between 9.5 and 15.5 meters, in the bottom water layer, on August 17, 2023.

Table 2. 2023 Little Island Pond Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					Little Island Pond Average (range)	Little Island Pond Classification
Color (color units)	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored	**23.7** color units (range: 19.1 – 26.2)	Lightly tea colored
Alkalinity (ppm)	< 0.0 acidified	0.1 – 2.0 extremely vulnerable	2.1 – 10 moderately vulnerable	10.1 – 25.0 low vulnerability	> 25.0 not vulnerable	**11.3** ppm (range: 10.9 – 11.6)	Low vulnerability
pH (std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			**7.1** standard units (single value)	Optimal range for fish growth and reproduction
Specific Conductivity (*u*S/cm)	< 50 *u*S/cm Characteristic of minimally impacted NH lakes		50-100 *u*S/cm Lakes with some human influence	> 100 *u*S/cm Characteristic of lakes experiencing human disturbances		**190.5** *u*S/cm (single value)	Characteristic of lakes experiencing human disturbance

Strategies to stabilize and improve water quality

Implement Best Management Practices (BMPs) within the Little Island Pond watershed to minimize the adverse impacts of polluted runoff and erosion into Little Island Pond. Refer to Landscaping at the Water's Edge: An Ecological Approach and New Hampshire Homeowner's Guide to Stormwater Management: Do-it-yourself Stormwater Solutions for Your Home for more information on how to reduce nutrient loading caused by overland runoff. NH Lakes also provides a series of resources aimed at educating residents and protecting our lakes and ponds through the LakeSmart program.

Figure 2. Little Island Pond (2023 Seasonal Data)

Secchi Disk Transparency and Chlorophyll *a* Data

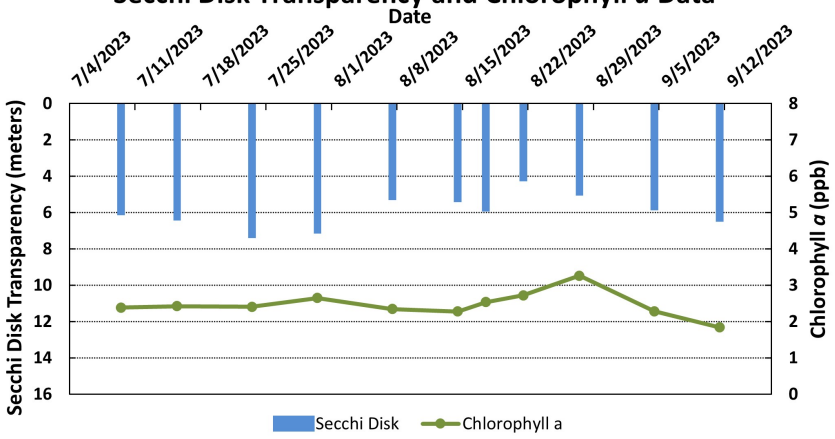


Figure 3. Little Island Pond (2023 Seasonal Data)

Secchi Disk Transparency and Dissolved Color Data

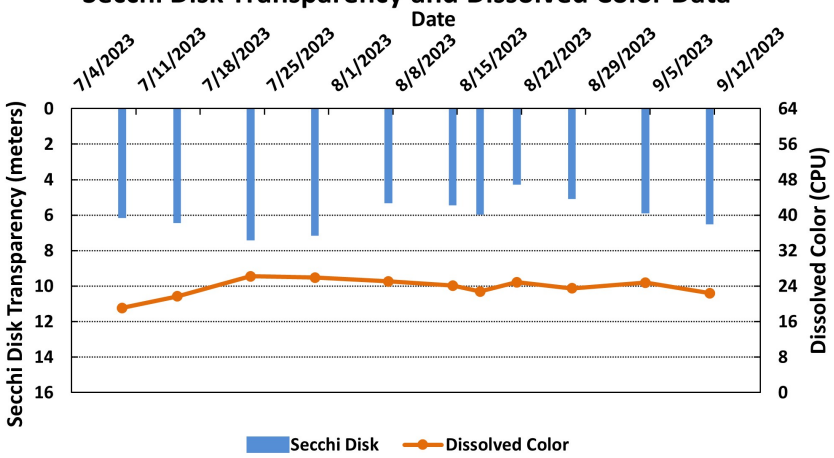


Figure 4. Little Island Pond - Deep Site (1949-2023)

Long-term Secchi Disk Transparency and Chlorophyll *a* Data

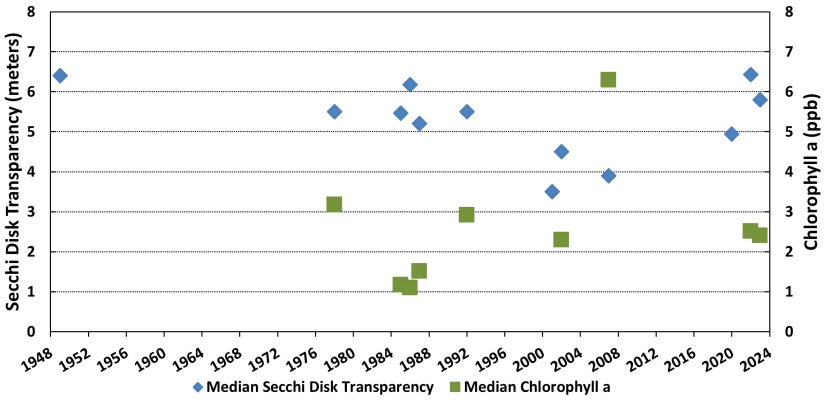
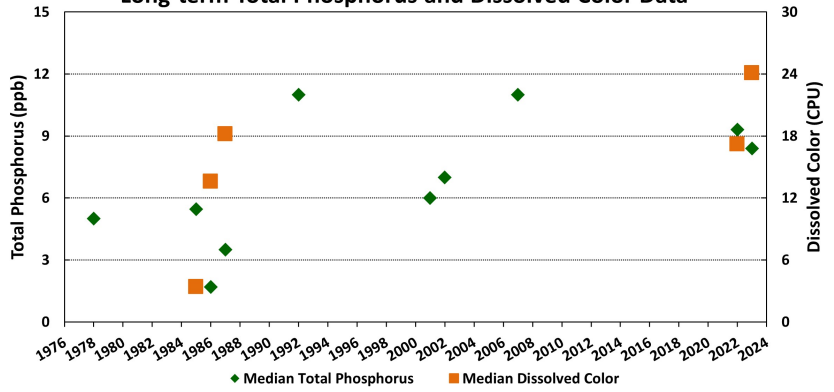


Figure 5. Little Island Pond - Deep Site (1978-2023)

Long-term Total Phosphorus and Dissolved Color Data



Figures 2 and 3. Seasonal comparison of Little Island Pond water transparency (Secchi Disk depth), chlorophyll *a* and dissolved color for 2023. Shallower water transparency measurements oftentimes correspond to increases in chlorophyll *a* and/or color concentrations.

Figures 4 and 5. Annual median Little Island Pond water transparency, chlorophyll *a*, dissolved color and total phosphorus concentrations measured through the New Hampshire Lakes Lay Monitoring Program (1985-1987, 2022 & 2023), the New Hampshire Department of Environmental Services (1978, 1992, 2001, 2002, 2007 & 2022), New Hampshire Fish and Game (1949) and Aquatic Ecosystem Research (2020). The long-term data provide insight into the water quality fluctuations, among years, that have been documented in Little Island Pond.

L

Figure 6. Little Island Pond - Site Deep

Temperature Profiles (August 17, 2023)

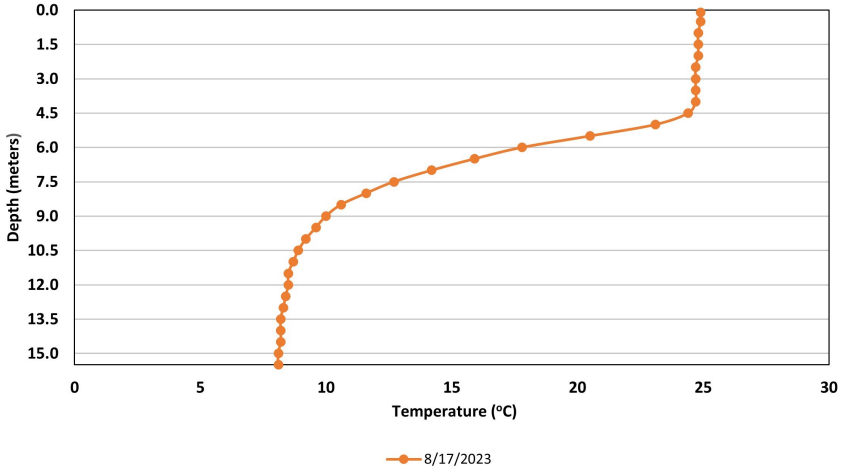


Figure 7. Little Island Pond - Site Deep

Dissolved Oxygen Profiles (August 17, 2023)

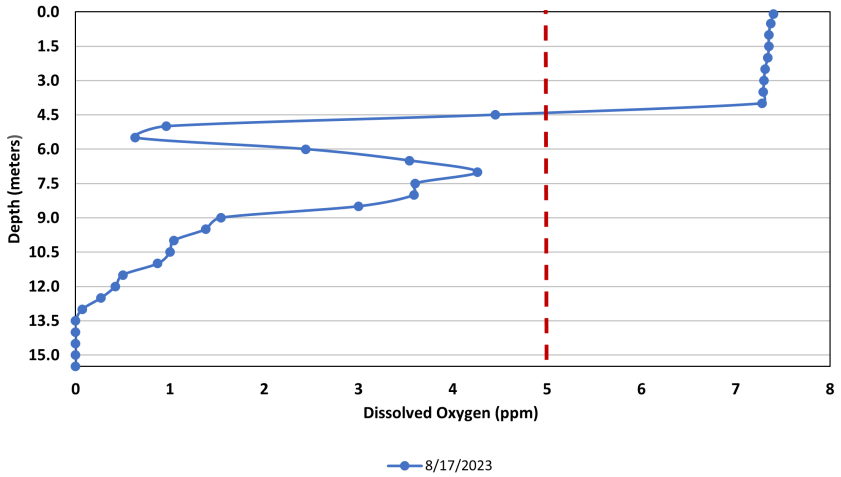


Figure 8. Little Island Pond - Site Deep

Specific Conductivity Profiles (August 17, 2023)

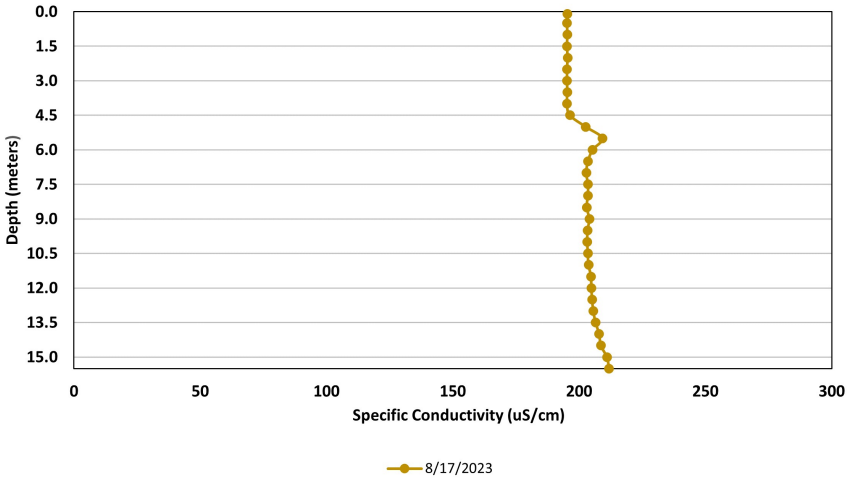
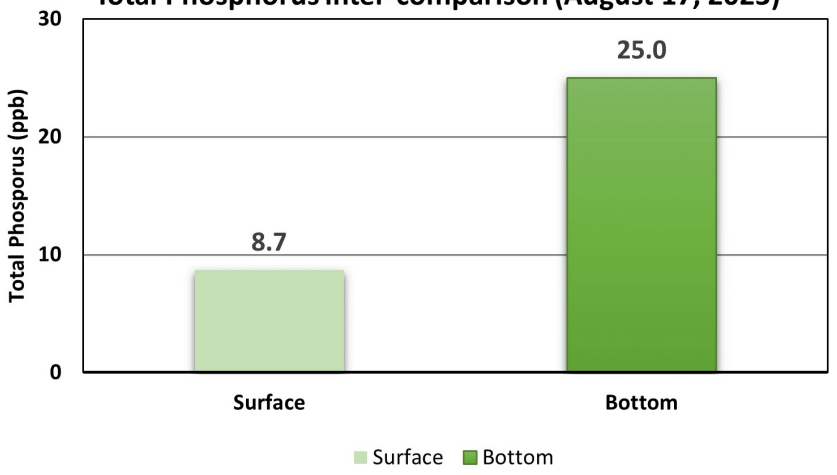


Figure 9. Little Island Pond - Site Deep

Total Phosphorus inter-comparison (August 17, 2023)



Figures 6, 7 and 8. Temperature, dissolved oxygen and specific conductivity profiles displaying the water quality differences in 0.5-meter increments. Notice the decreasing dissolved oxygen concentrations, near the lake bottom, through the season. The dashed vertical red line in Figure 7 displays the dissolved oxygen threshold for the successful growth and reproduction of cold-water fish such as trout and salmon.

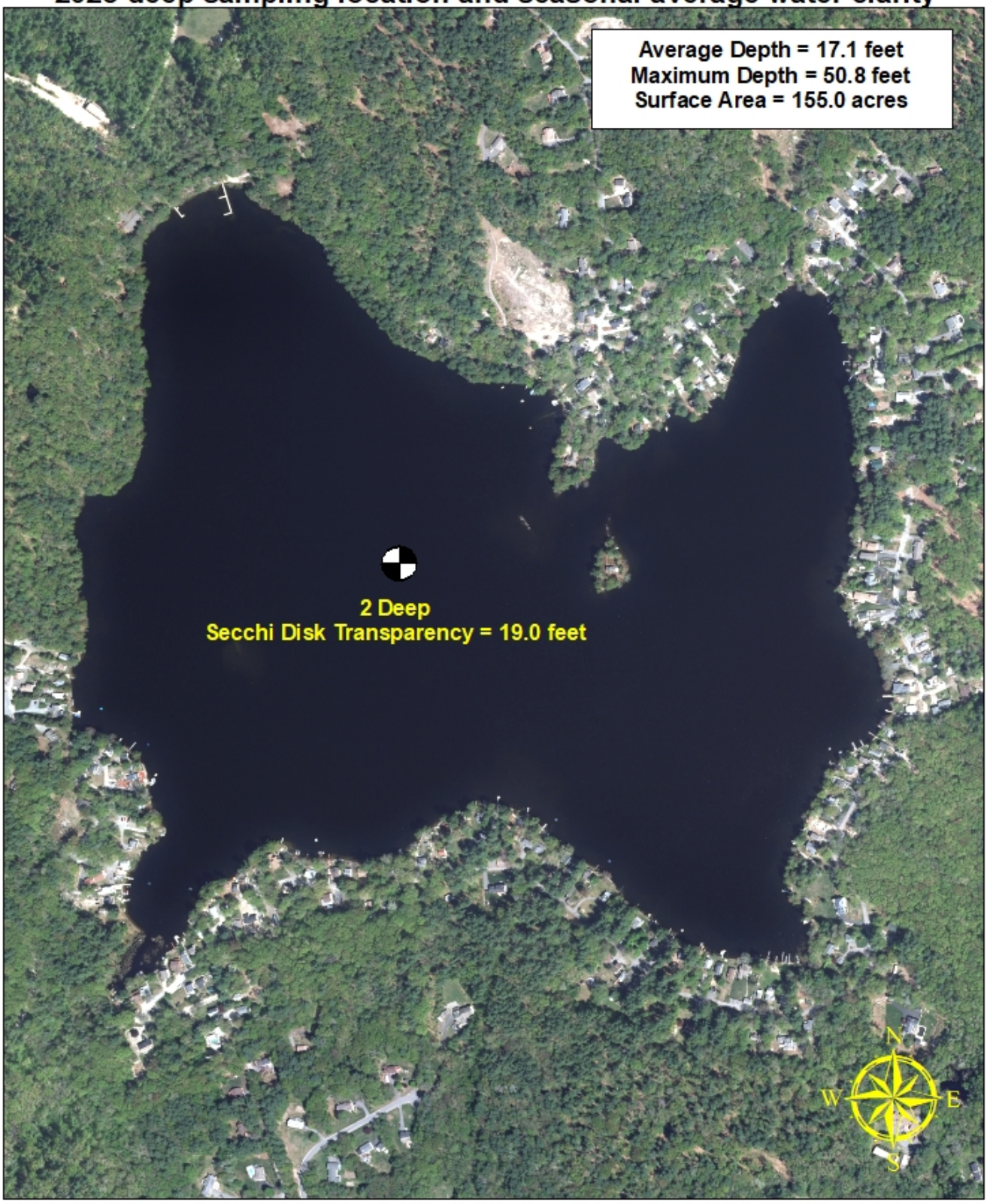
Figure 9. Total phosphorus comparison between the surface (epilimnion) and bottom water (hypolimnion) zones. Notice the elevated bottom water total phosphorus concentration, relative to surface water concentration, on August 17, 2023.

Data Interpretation: Overview of factors to consider when reviewing the Little Island Pond data

This highlight report provides a general overview of the current and historical conditions of Little Island Pond. The report is intended to provide a simple assessment of the water quality trends. Should you have additional questions about interpreting your water quality results, we would be happy to discuss the data with you and/or any concerns you may have. In general, some factors that influence the current and long-term water quality results/trends for our New Hampshire lakes and ponds include:

- **Land-use Patterns** within the watershed (drainage basin) – Research indicates land use patterns have an impact on how much phosphorus (nutrient) is washing into our lakes. In general, more urbanized watersheds have a greater degree of phosphorus runoff than highly forested/vegetated drainage areas.
- **Weather Patterns** – Rainfall and temperature can influence water quality. Wet periods, and overland runoff, tend to be a time when elevated nutrients and other pollutants are transported into our lakes. Temperature can also influence water quality conditions since many aquatic plants and algae tend to respond to changing seasonal conditions. Unusually warm periods are sometimes tied to short-term algal and cyanobacteria blooms.
- **Best Management Practices (BMPs)** – The presence/absence of best management practices can have an interplay on water quality. BMPs are measures that are used to manage nutrients and other pollutants that could otherwise make their way into our lakes. Properties that employ BMPs, designed specifically to remove pollutants of concern (e.g. sediments and phosphorus), are less likely to contribute nutrients and other pollutants into our lakes.
- **Temperature (Thermal) Stratification** – Many lakes become thermally stratified during the summer months and may form three distinct thermal layers: upper water layer (epilimnion), middle lake layer (metalimnion) and bottom cold-water layer (hypolimnion). These thermal zones form a barrier to lake mixing, during the summer months, and can coincide with differences in dissolved oxygen and specific conductivity through the water column (Figures 6, 7 and 8).
- **Internal Nutrient Loading** (nutrients that are introduced from the sediments along the lake bottom) – Some of our lakes experience significant internal nutrient loading. Such lakes generally tend to be well stratified and exhibit increasing deep water phosphorus concentrations, relative to surface levels, from May through September/October. Lakes that exhibit internal nutrient loading may also exhibit increasing deep water specific conductivity concentrations (a measure of dissolved materials) through the summer months.

Figure 10. Little Island Pond
Pelham, NH
2023 deep sampling location and seasonal average water clarity



0 0.07 0.14 0.21 0.28 0.35 Miles

Aerial Orthophoto Source: NH GRANIT
Site location GPS coordinates collected by the UNH Center for Freshwater Biology

NH Extension