LOON LAKE

2022 SAMPLING HIGHLIGHTS

Station 1 Deep

Effingham, 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 bi-weekly samples collected between May 11 and October 11, 2022.

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

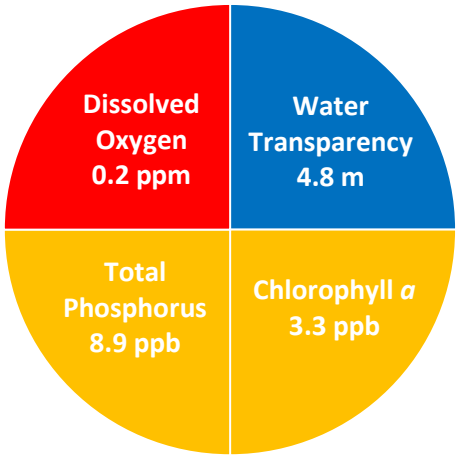


Figure 1. Loon Lake Water Quality (2022)

Table 1. 2022 Loon Lake Seasonal Averages and NH DES Aquatic Life Nutrient Criteria[1]

Parameter	Oligotrophic "Excellent"	Mesotrophic "Fair"	Eutrophic "Poor"	Loon Lake Average (range)	Loon Lake Classification
Water Clarity (meters)	**4.0 – 7.0**	**2.5 - 4.0**	**< 2.5**	**4.8** meters (3.5 – 5.9)	**Oligotrophic**
Chlorophyll *a* [1] (ppb)	**< 3.3**	**> 3.3 – 5.0**	**> 5.0 – 11.0**	**3.3** ppb (1.2 – 7.4)	**Mesotrophic**
Total Phosphorus [1] (ppb)	**< 8.0**	**> 8.0 – 12.0**	**> 12.0 – 28.0**	**8.9** ppb (6.6 – 10.4)	**Mesotrophic**
Dissolved Oxygen (ppm)	**5.0 – 7.0**	**2.0 – 5.0**	**<2.0**	**0.2 ppm (0.1 – 0.2) ***	**Eutrophic**

* Dissolved oxygen concentrations were measured between 10.5 and 15.5 meters, in the bottom cold water layer, on September 13, 2022.

Table 2. 2022 Loon Lake Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					Loon Lake Average (range)	Loon Lake Classification
Color (color units)	**< 10 uncolored**	**10 – 20 slightly colored**	**20 – 40 lightly tea colored**	**40 – 80 tea colored**	**> 80 highly colored**	**25.7** color units (range: 19.0 – 33.6)	**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**	**6.8** ppm (range: 5.6 – 7.9)	**Moderately vulnerable**
pH (std units)	**< 5.5 suboptimal for successful growth and reproduction**		**6.5 – 9.0 optimal range for fish growth and reproduction**			**6.8** standard units (range: 6.5 – 7.5)	**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**		**74.9** *u*S/cm (range: 68.0 – 78.5)	**Characteristic of lakes with some human influence**

Strategies to stabalize and improve water quality

Implement Best Management Practices (BMPs) within the Loon Lake watershed to minimize the adverse impacts of polluted runoff and erosion into Loon Lake. Refer to "Landscaping at the Water's Edge: An Ecological Approach", "New Hampshire Homeowner's Guide to Stormwater Management: Do-It-Yourself Stormwater Solutions for Your Home", and the Green Mountain Conservation Group BMP page for more information on how to reduce nutrient loading caused by overland run-off. NH Lakes also provides a series of resources aimed at educating residents and protecting our lakes and ponds.

- https://extension.unh.edu/resources/files/Resource004159_Rep5940.pdf
- https://www.des.nh.gov/sites/g/files/ehbemt341/files/documents/2020-01/homeowner-guide-stormwater.pdf
- https://www.gmcg.org/project-bmp/
- https://nhlakes.org/lakesmart-resource-library/

Figure 2. Loon Lake (2022 Seasonal Data)
Secchi Disk Transparency and Chlorophyll *a* Data

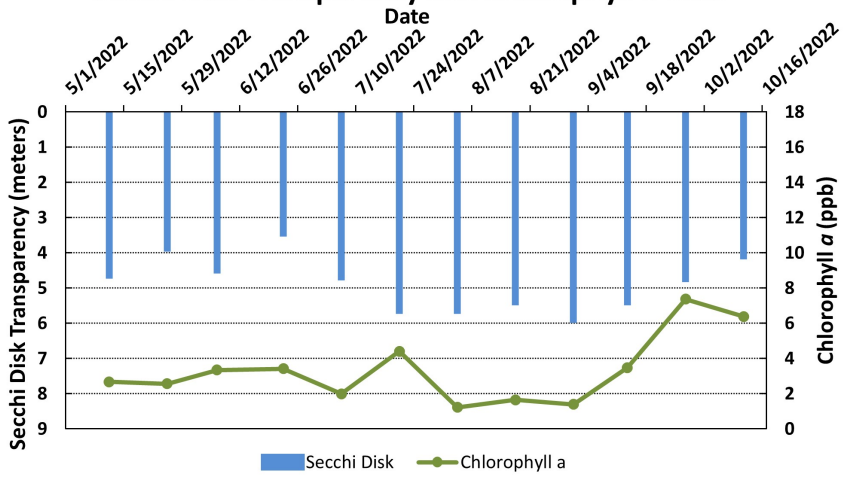


Figure 3. Loon Lake (2022 Seasonal Data)
Secchi Disk Transparency and Dissolved Color Data

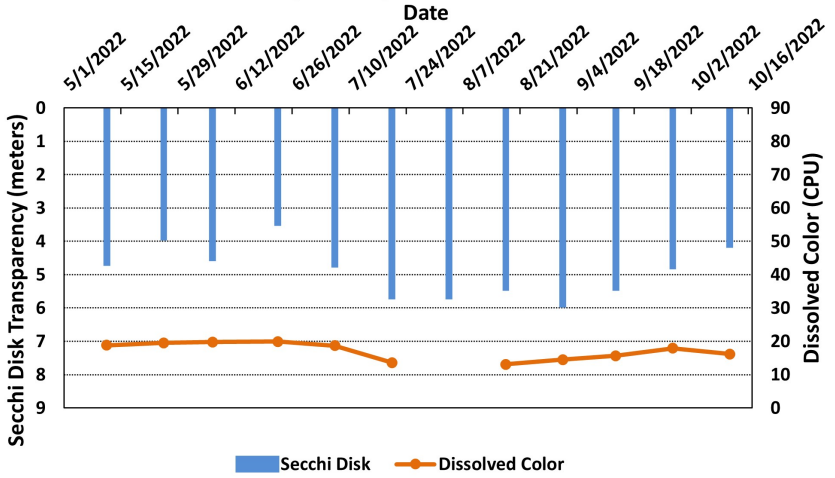


Figure 4. Loon Lake - Deep Site (1993-2022)
Long-term Secchi Disk Transparency and Chlorophyll *a* Data

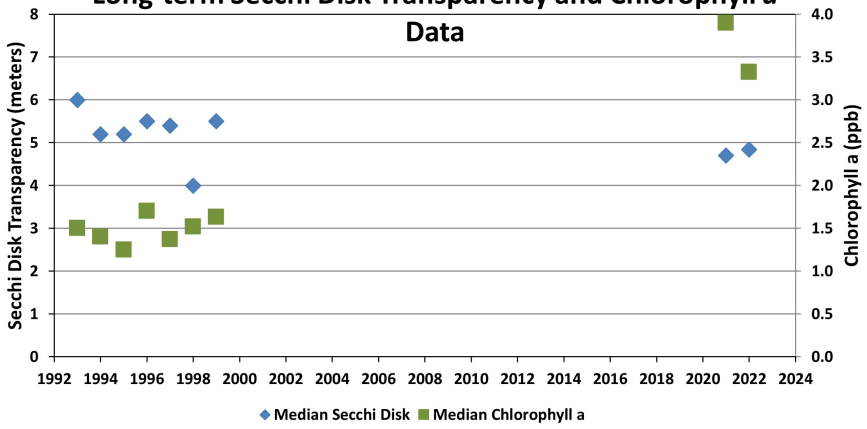
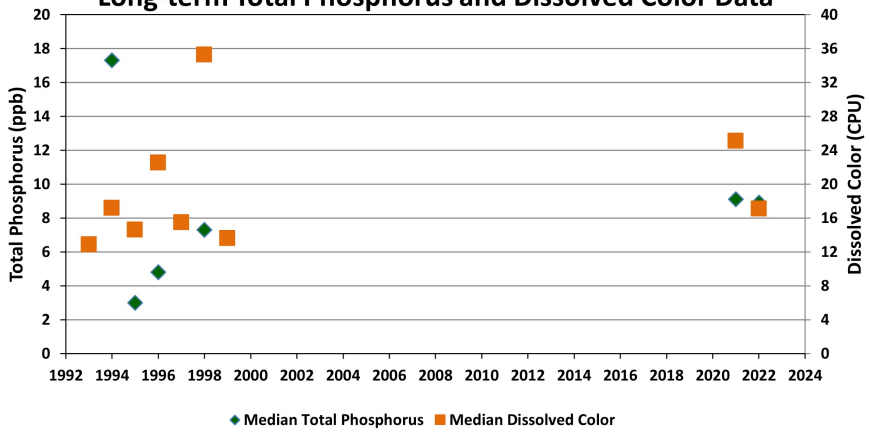


Figure 5. Loon Lake - Deep Site (1993-2022)
Long-term Total Phosphorus and Dissolved Color Data



Figures 2 and 3. Seasonal comparison of Loon Lake water transparency (Secchi Disk depth), chlorophyll *a* and dissolved color for 2022. Shallower water transparency measurements oftentimes correspond to increases in chlorophyll *a* and/or color concentrations.

Figures 4 and 5. Annual median Loon Lake water transparency, chlorophyll *a*, dissolved color and total phosphorus concentrations measured between 1993 and 2022, through the New Hampshire Lakes Lay Monitoring Program**.** The long-term data provide insight into the water quality fluctuations, among years, that have been documented in Loon Lake.

Figure 6. Loon Lake - Site Deep
Temperature Profiles (May 11 through October 11, 2022)

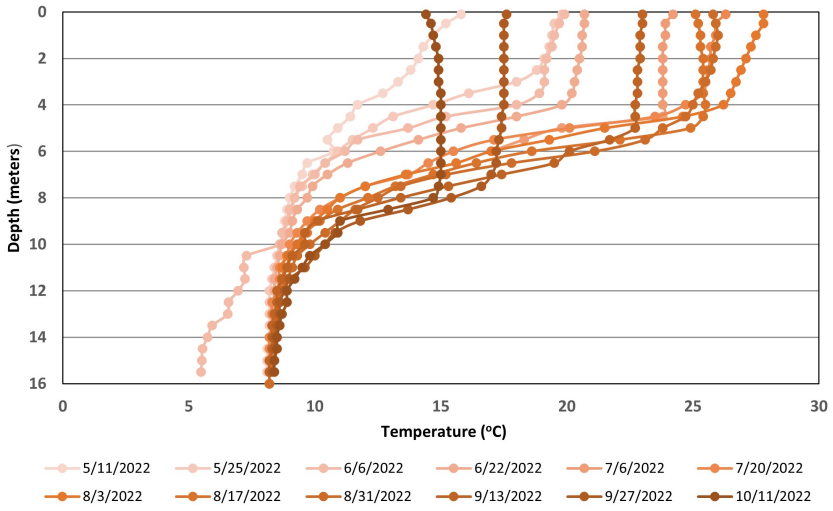


Figure 7. Loon Lake - Site Deep
Dissolved Oxygen Profiles (May 11 through October 11, 2022)

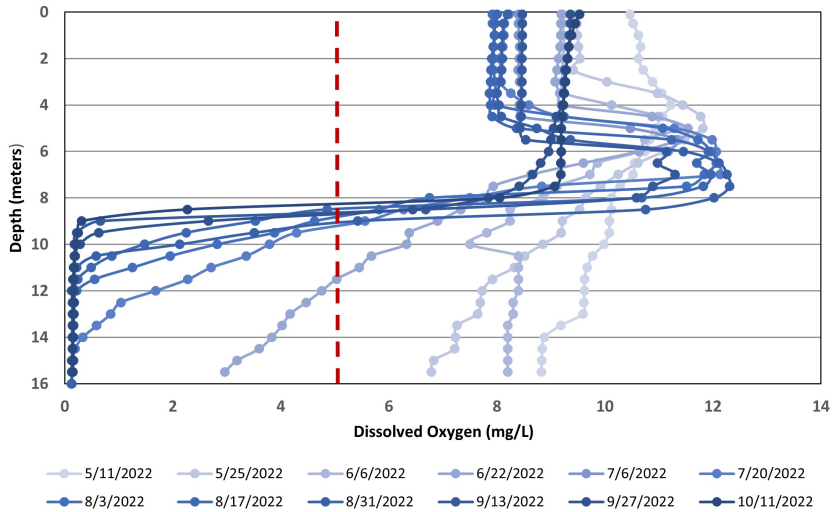


Figure 8. Loon Lake - Site Deep
Total Phosphorus inter-comparison

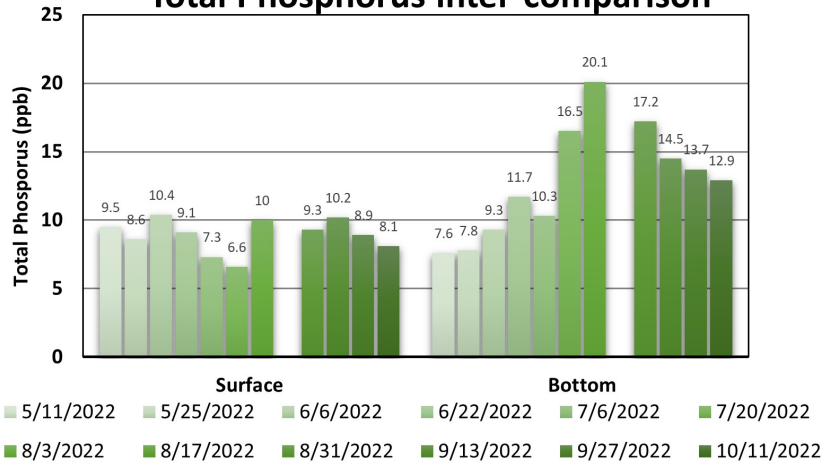
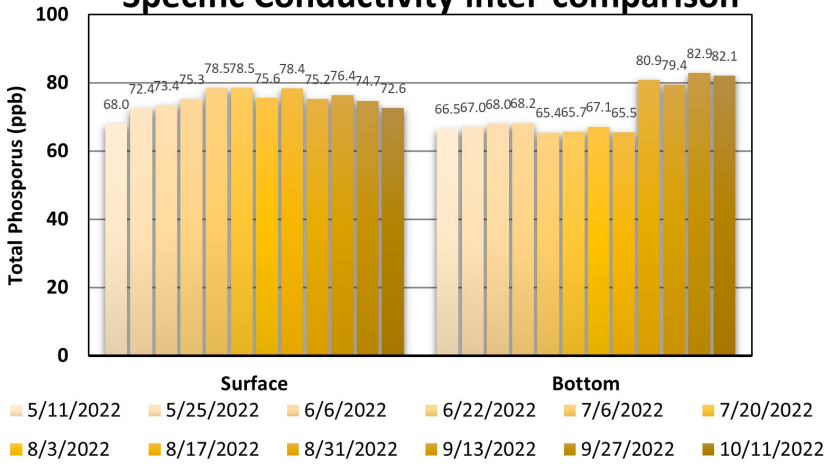


Figure 9. Loon Lake - Site Deep
Specific Conductivity inter-comparison



Figures 6 and 7. Temperature and dissolved oxygen 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.

Figures 8 and 9. Total phosphorus and specific conductivity comparison between the surface (epilimnion) and bottom water (hypolimnion) zones. Notice the incresing bottom water total phosphorus and specific conductivity concentrations, relative to surface water concentrations, later in the season.

Table 3. Loon Lake and Round Pond inter-depth (2022 Data: bi-weekly sampling between May 11 and October 13)

Lake / Zone	Average (range) Total Phosphorus (ppb)	Average (range) Specific Conductivity (uS/cm)	Average (range) Total Alkalinity @ pH 5.2 (ppm)	Average (range) pH (standard units)
Loon Lake – surface composite (epilimnion)	8.9 ppb (range: 6.6 – 10.4)	74.9 *uS/cm* (range: 68.0 – 78.5)	6.8 ppm (range: 5.6 – 7.9)	6.8 std units (range: 6.5 – 7.5)
Loon Lake – surface zone (epilimnion)	7.9 ppb (range: 5.2 – 12.2)	74.6 *uS/cm* (range: 69.1 – 76.8)	6.5 ppm (range: 5.5 – 7.3)	6.8 std units (range: 6.5 – 7.4)
Loon Lake - mid-lake zone (metalimnion)	10.9 ppb (range: 8.6 – 13.6)	66.6 *uS/cm* (range: 62.7 – 71.3)	6.1 ppm (range: 5.6 – 6.8)	6.8 std units (range: 6.3 – 7.1)
Loon Lake – deep water zone (hypolimnion)	12.9 ppb (range: 7.6 – 20.1)	71.6 *uS/cm* (range: 65.4 – 82.9)	9.7 ppm (range: 5.1 – 19.1)	6.2 std units (range: 5.6 – 6.5)
Round Pond – surface composite (epilimnion)	8.7 ppb (range: 5.8 – 12.8)	45.8 *uS/cm* (range: 41.8 – 48.5)	3.3 ppm (range: 2.1 – 4.4)	6.2 std units (range: 5.9 – 6.5)
Round Pond – surface zone (epilimnion)	8.4 ppb (range: 5.8 – 11.4)	45.4 *uS/cm* (range: 41.7 – 47.8)	3.3 ppm (range: 2.4 – 4.1)	6.4 std units (range: 6.1 – 7.0)
Round Pond – mid-lake zone (metalimnion)	11.6 ppb (range: 10.2 – 15.9)	45.4 *uS/cm* (range: 41.3 – 48.3)	3.2 ppm (range: 2.2 – 4.4)	6.3 std units (range: 5.7 – 6.8)

- Water quality summary statistics are reported for Loon Lake and Round Pond. Summary data are included for each of the three thermal zones (when applicable), as well as the epilimnetic surface composite samples. *Note: Round Pond becomes thermally stratified intermittently and does not develop a deep water (hypolimnion) zone.*

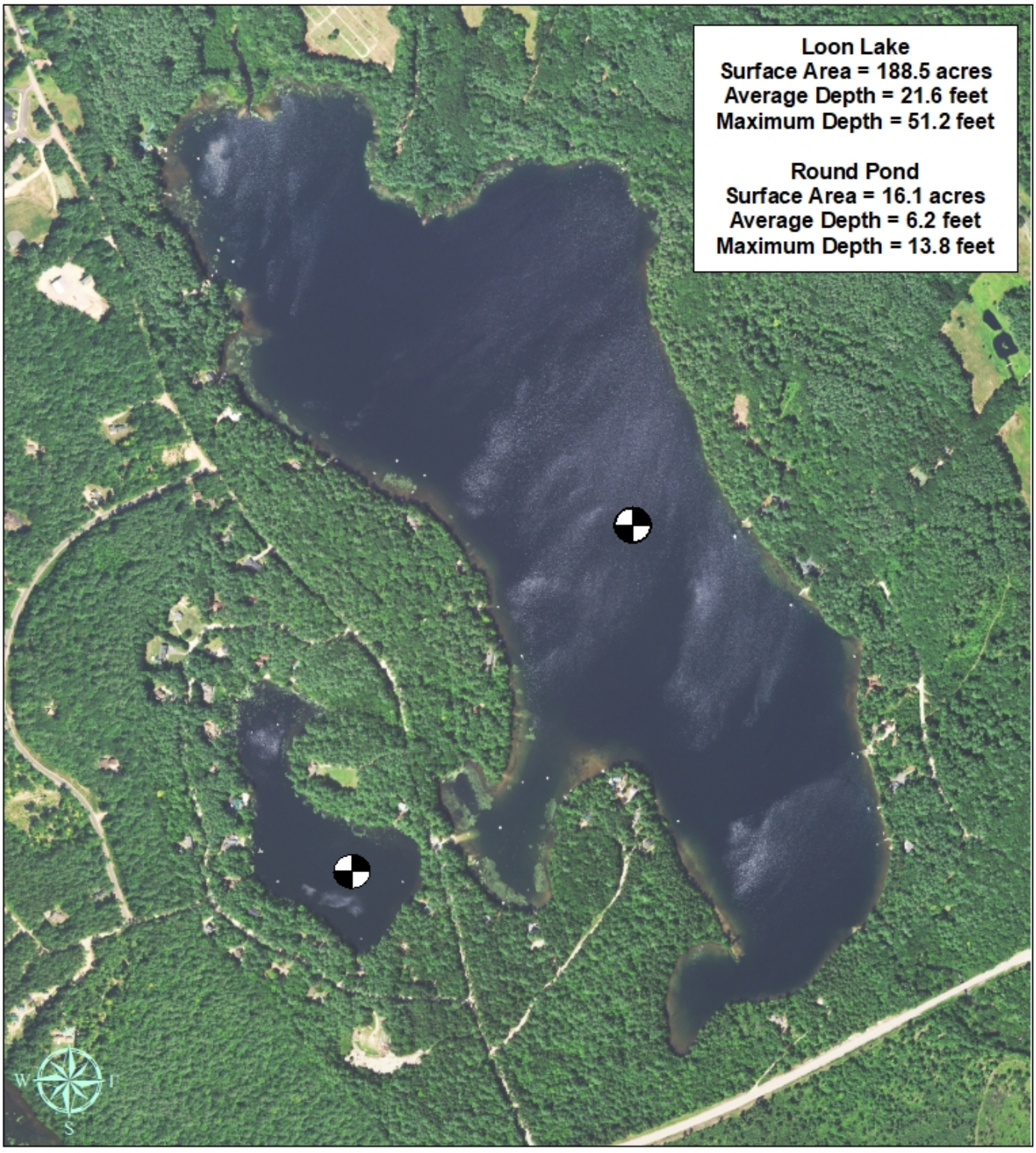
Data Interpretation: Overview of factors to consider when reviewing the Loon Lake data

This highlight report provides a general overview of the current and historical conditions of Loon Lake. 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 9).
- **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 (Figure 8). 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 9).

Figure 10. Loon Lake and Round Pond

Effingham, NH
2022 deep sampling locations



Aerial Orthophoto Source: NH Granit, 2018 National Agriculture Imagery Program
GPS Coordinates collected by the UNH Center for Freshwater Biology

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