LOVELL LAKE

2021 SAMPLING HIGHLIGHTS

Station – 2 South

Sanbornville, NH

NH | Extension

Station 2 South was used as a reference point to represent the overall Lovell Lake water quality. Water quality data displayed in Tables 1, 2 and 3 are surface water measurements with the exception of the dissolved oxygen data that were collected near the lake bottom.

Blue = Oligotrophic

Yellow = Mesotrophic

Red = Eutrophic

Gray = No Data

| Dissolved Oxygen 1.9 mg/L | Water Transparency 7.0 m |
| Total Phosphorus 7.1 ppb | Chlorophyll *a* 2.9 ppb |

Figure 1. Lovell Lake Water Quality (2021)

Table 1. 2021 Lovell Lake Seasonal Averages and NH DES Aquatic Life Nutrient Criteria[1]

Parameter	Oligotrophic	Mesotrophic	Eutrophic	Lovell Lake Average (range)	Lovell Lake Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	**7.0** meters (4.7 – 9.7)	**Oligotrophic**
Chlorophyll *a* [1] (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	**2.9** ppb (1.8 – 6.3)	**Oligotrophic**
Total Phosphorus [1] (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	**7.1** ppb (5.7 – 8.5)	**Oligotrophic**
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	<2.0	**1.9** mg/L (0.2 – 5.5)	**Eutrophic**

* Dissolved oxygen concentrations were measured between 6.5 and 11.5 meters, in the layer of rapidly decreasing temperatures, on August 30, 2021.

Table 2. 2021 Lovell Lake Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					Lovell Lake Average (range)	Lovell Lake Classification
Color (color units)	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored	**9.6** color units (range: 7.6 – 11.7)	**Uncolored**
Alkalinity (mg/L)	< 0.0 acidified	0.1 – 2.0 extremely vulnerable	2.1 – 10 moderately vulnerable	10.1 – 25.0 low vulnerability	> 25.0 not vulnerable	**14.2** mg/L (range: 13.5 – 14.6)	**Low vulnerability**
pH (std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			**7.0** standard units (range: 6.7 – 7.2)	**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		**129.3** *u*S/cm (range: 119.8 – 134.3)	**Characteristic of lakes experiencing human disturbances**

Figure 2. Lovell Lake - Site 2 South (2021 Seasonal Data)
Secchi Disk Transparency and Chlorophyll *a* Measurements

Figure 3. Lovell Lake - Site 2 South (2021 Seasonal Data)
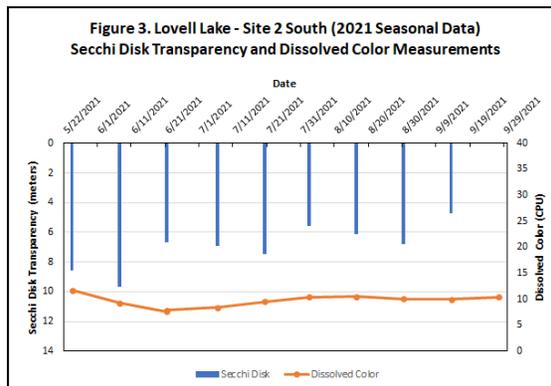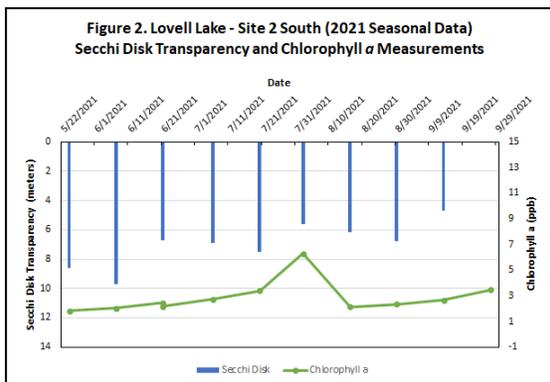**Secchi Disk Transparency and Dissolved Color Measurements**

Figure 2 and 3. Seasonal Secchi disk transparency, chlorophyll *a* concentrations and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in chlorophyll *a* and/or color concentrations.

LONG-TERM TRENDS

WATER CLARITY: The Lovell Lake water clarity measurements, measured as Secchi Disk transparency, display a trend of increasing water clarity over the past thirty-two years (Figure 4).

CHLOROPHYLL: The Lovell Lake chlorophyll *a* concentrations, a measure of microscopic plant life within the lake, display a trend of decreasing concentrations over the past thirty-two years (Figure 4).

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. The Lovell Lake total phosphorus concentrations display a trend of increasing concentrations over the thirty-two year span (Figure 5).

COLOR: The Lovell Lake color data, the result of naturally occurring "tea" colored substances from the breakdown of soils and plant materials, have decreased over the past thirty-two years (Figure 5).

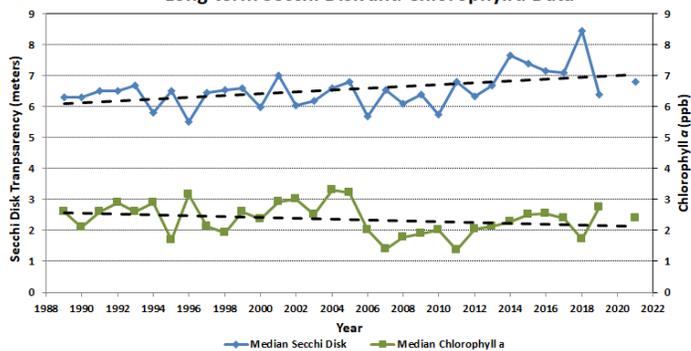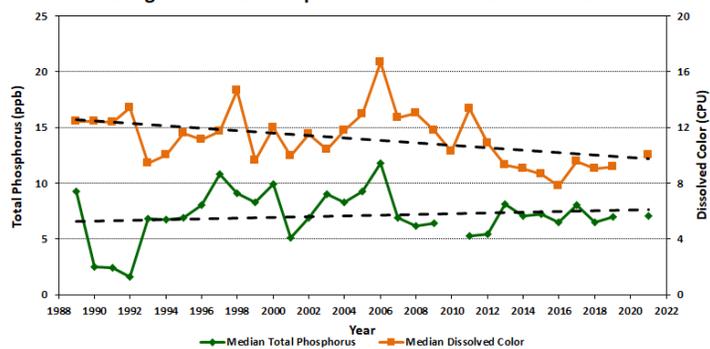Figure 4. Lovell Lake - Site 2 South (1989-2021) Long-term Secchi Disk and Chlorophyll *a* Data

Table 3. Salmon Falls Headwaters Seasonal Average Water Quality Inter-comparison (2021)

Lake	Average Secchi Disk Transparency (meters)	Average Chlorophyll *a* (ppb)	Average Total Phosphorus (ppb)	Average Dissolved Oxygen (mg/L)
Great East Lake	10.4	1.5	3.8	6.0
Wilson Lake	Not Assessed			
Lovell Lake	7.0	2.9	7.1	1.9
Horn Pond	Not Assessed			
Lake Ivanhoe	4.2	4.8	8.2	------

- Water quality data are reported for a deep reference sampling location in each water body
- Dissolved oxygen measurements were collected in the summer (late July and August) in the bottom water layer (metalimnion or hypolimnion).
- ------ Indicates the site is too shallow to form a bottom water layer (metalimnion or hypolimnion) during the summer months.
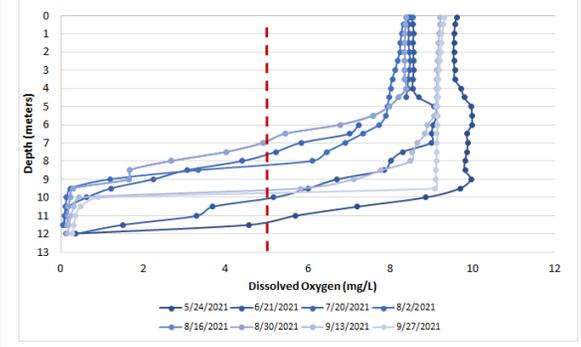

Figure 5. Lovell Lake - Site 2 South (1989-2021) Long-term Total Phosphorus and Dissolved Color Data

Figures 4 and 5. Changes in the Lovell Lake water clarity (Secchi Disk depth), chlorophyll *a*, dissolved color and total phosphorus concentrations measured between 1989 and 2021. **These data illustrate the relationship among plant growth, dissolved color and water clarity. Total phosphorus data are also displayed and are oftentimes correlated with the amount of plant growth.** Long-term trends are based on the analysis of annual median values.

Figure 6. Monthly Lovell Lake dissolved oxygen profiles collected between May 24 and September 27, 2021. The vertical red line indicates the oxygen concentration commonly considered the threshold for successful growth and reproduction of cold water fish such as trout and salmon. *Notice the lower late season dissolved oxygen concentrations near the lake bottom.*

Figure 6. Lovell Lake - Site 2 South Dissolved Oxygen Profiles (May 24 through September 27, 2021)
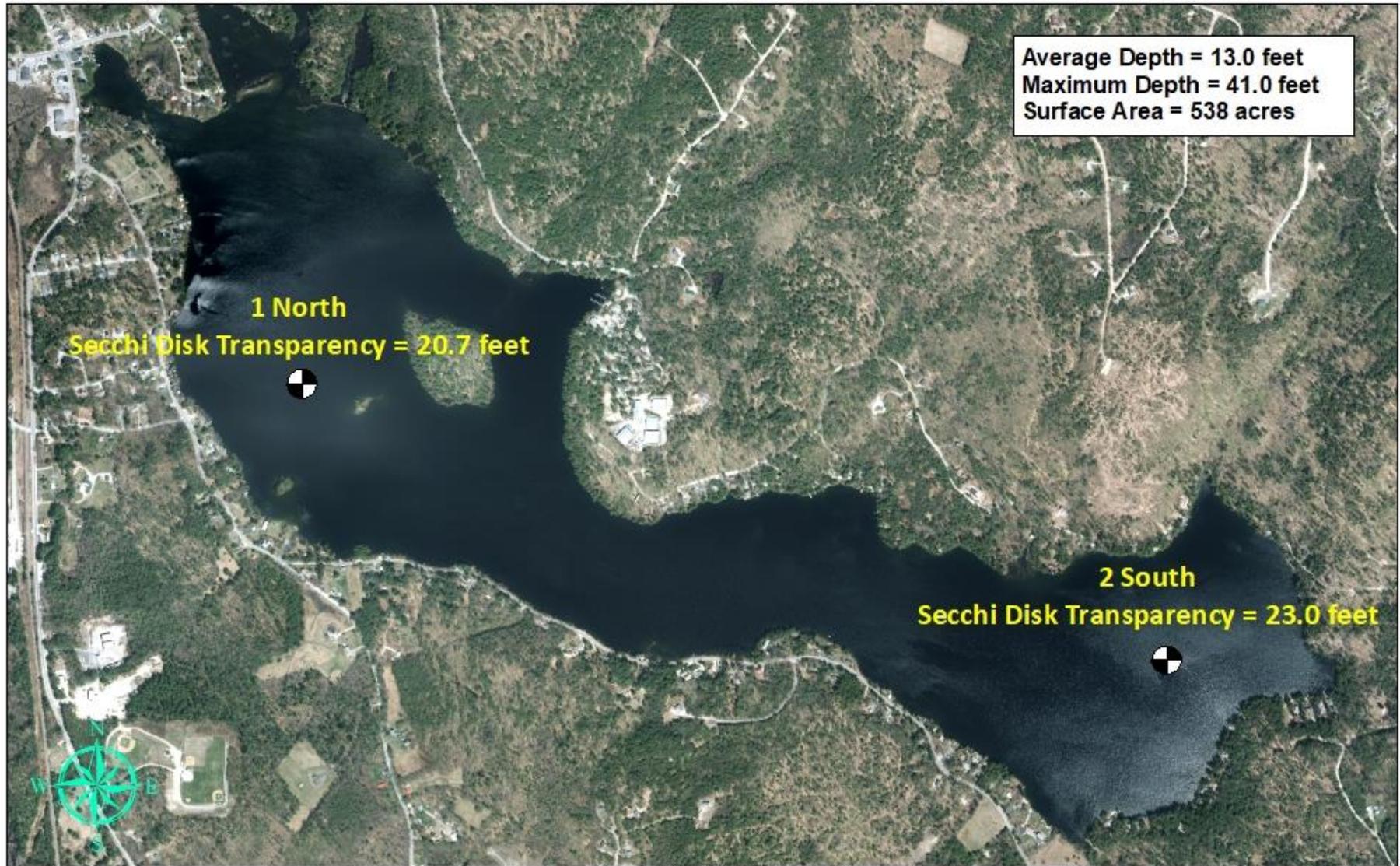
Recommendations

Implement Best Management Practices within the Lovell Lake watershed to minimize the adverse impacts of polluted runoff and erosion on the lake. 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 run-off. The Acton Wakefield Watersheds Alliance also offers technical assistance to help design and implement erosion control projects that protect and improve the water quality.

- 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://awwatersheds.org/healthy-lakes/conservation-practices-for-homeowners/

Figure 7. Lovell Lake

Sanbornville, NH

2021 deep water sampling site locations that display the seasonal average water clarity

Average Depth = 13.0 feet
Maximum Depth = 41.0 feet
Surface Area = 538 acres

1 North
Secchi Disk Transparency = 20.7 feet

2 South
Secchi Disk Transparency = 23.0 feet

0   0.2   0.4   0.6   0.8
Miles

NH | Extension