

NORTH RIVER LAKE

2019 SAMPLING HIGHLIGHTS

Station 1 Turtle Rock

Barrington, Northwood and Nottingham, NH



Station 1 Turtle Rock (Figure 7) was used as a reference point to represent the overall North River Lake water quality. 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.

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

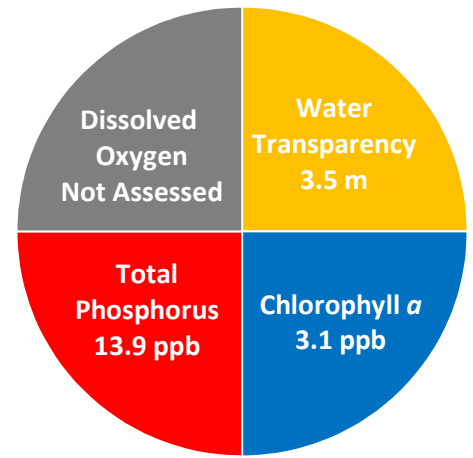


Figure 1. North River Lake Water Quality (2019)

Table 1. 2019 North River Lake Seasonal Averages and NH DES Aquatic Life Nutrient Criteria¹

Parameter	Oligotrophic "Excellent"	Mesotrophic "Fair"	Eutrophic "Poor"	North River Lake Average (range)	North River Lake Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	3.5 meters (2.8 – 4.0)	Mesotrophic
Chlorophyll a ¹ (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	3.1 ppb (1.4 – 5.3)	Oligotrophic
Total Phosphorus ¹ (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	13.9 ppb (10.1 – 17.6)	Eutrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	< 2.0	No Data	Not Assessed

* North River Lake does not develop a deep water layer that is the basis for the dissolved oxygen classification criteria.

Table 2. 2019 North River Lake Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					North River Lake Average (range)	North River Lake Classification
	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored		
Color (color units)	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored	27.2 color units (range: 18.5 – 34.9)	Lightly tea colored
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	7.2 mg/L (range: 6.1 – 8.1)	Moderately vulnerable
pH (Std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			7.2 standard units (single value)	Optimum range for fish growth and reproduction
Specific Conductivity (uS/cm)	< 50 uS/cm Characteristic of minimally impacted NH lakes		50-100 uS/cm Lakes with some human influence	> 100 uS/cm Characteristic of lakes experiencing human disturbances		159.1 uS/cm (single value)	Characteristic of lakes experiencing human disturbances

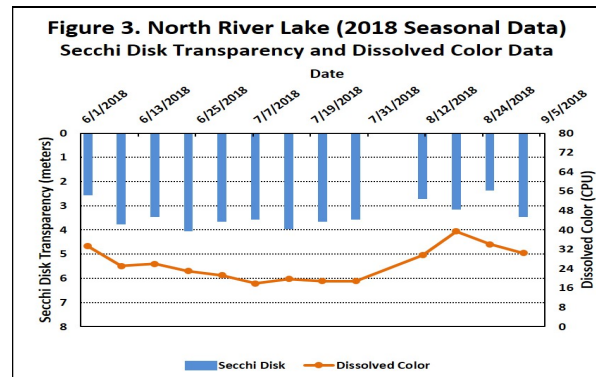
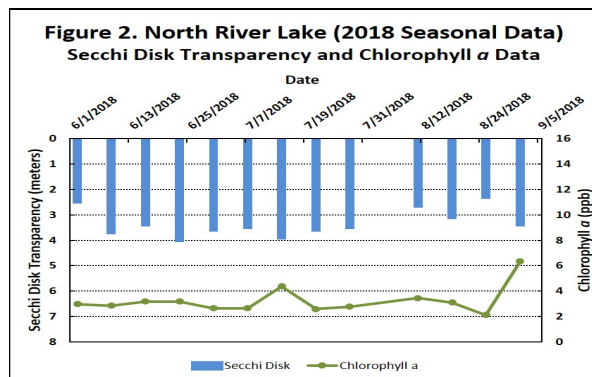


Figure 2 and 3. Seasonal Secchi disk transparency, chlorophyll a changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll a concentrations and dissolved color concentrations. Shallower water transparency measurements oftentimes correspond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

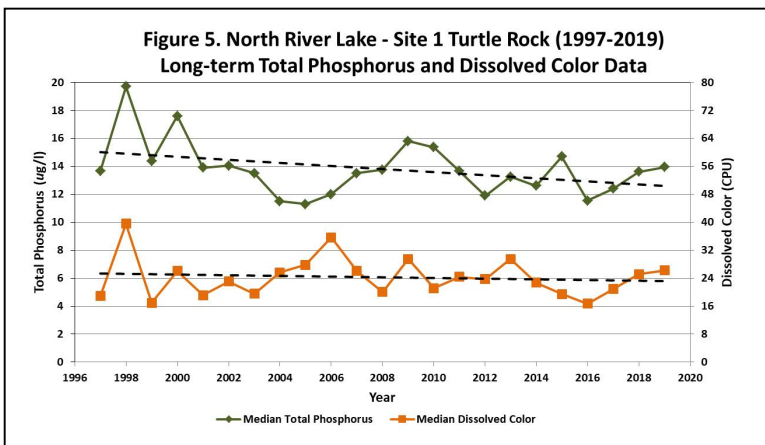
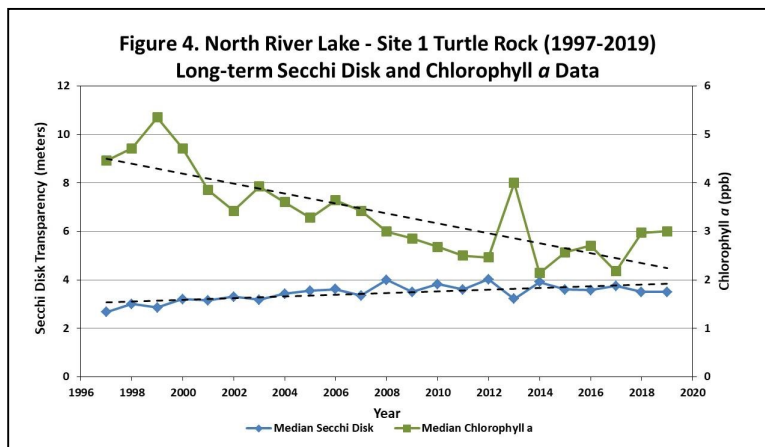
LONG-TERM TRENDS

WATER CLARITY: The North River Lake water clarity measurements, measured as Secchi Disk transparency, display a trend of increasing water clarity over the twenty-three year span from 1997 to 2019 (Figure 4).

CHLOROPHYLL: The North River Lake chlorophyll *a* concentrations, a measure of microscopic plant life within the lake, display a trend of decreasing concentrations over the twenty-three year span from 1997 to 2019 (Figure 4).

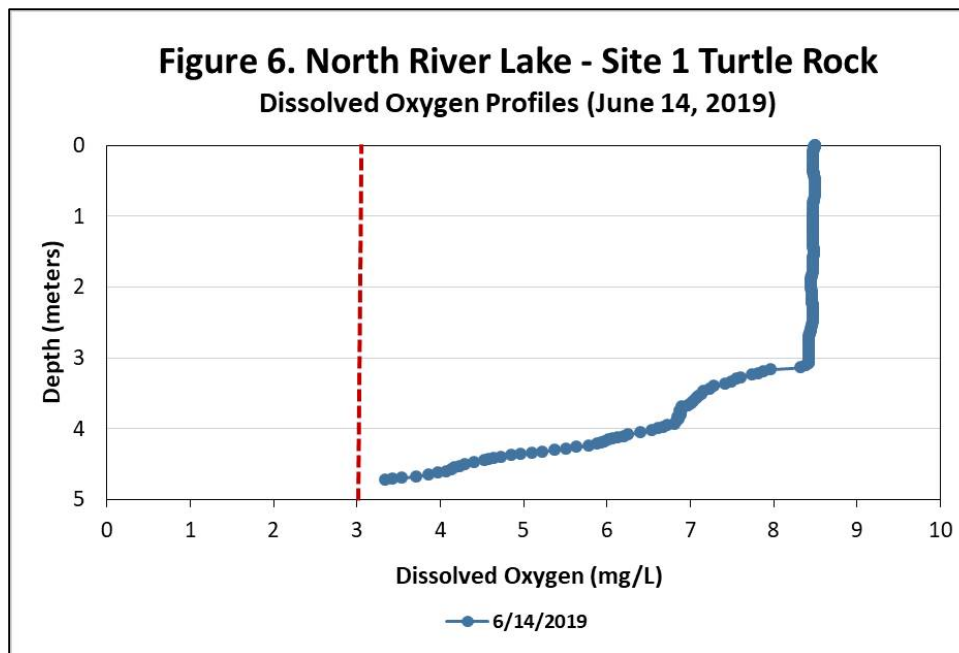
TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. The North River Lake total phosphorus concentrations display a trend of decreasing concentrations over the twenty-three year span from 1997 to 2019 (Figure 5).

COLOR: The North River Lake color data, the result of naturally occurring “tea” color substances from the breakdown of soils and plant materials, have oscillated among years while the long-term trend is stable from 1997 to 2019 (Figure 5).



Figures 4 and 5. Changes in the North River Lake water clarity (Secchi Disk depth), chlorophyll *a*, dissolved color and total phosphorus concentrations measured between 1997 and 2019. **These data illustrate the relationship among plant growth, water 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. June 4, 2019 North River Lake dissolved oxygen profile. The vertical red line indicates the oxygen concentration commonly considered the threshold for successful growth and reproduction of warm water fish. *Notice the decreasing dissolved oxygen concentrations towards the lake bottom.*



Recommendations

Implement Best Management Practices within the North River Lake watershed to minimize the adverse impacts of polluted runoff and erosion in North River 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.

- https://extension.unh.edu/resources/files/Resource004159_Rep5940.pdf
- <https://www.des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-11.pdf>

Figure 7. North River Lake

Barrington, Northwood and Nottingham, NH
2018 Deep water sampling stations and seasonal average water clarity

