NORTH RIVER LAKE

2017 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 were collected near the lake bottom.

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

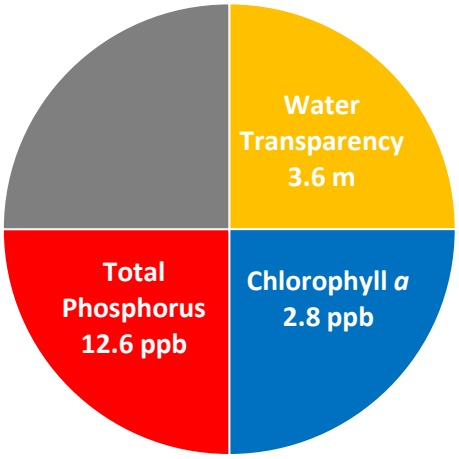


Figure 1. North River Lake Water Quality (2017)

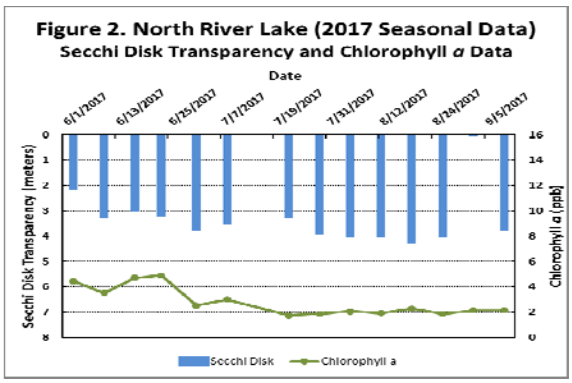
Table 1. 2017 North River Lake Seasonal Averages and NH DES Aquatic Life Nutrient Criteria[1]

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	**3.6** meters (2.1 – 4.5)	Mesotrophic
Chlorophyll *a* [1] (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	**2.8** ppb (1.7 – 4.9)	Oligotrophic
Total Phosphorus [1] (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	**12.6** ppb (10.9 – 14.6)	Eutrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	< 2.0	No Data	Not Assessed

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

Table 2. 2017 North River Lake Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					North River Lake Average (range)	North River Lake Classification
Color (color units)	< 10 uncolored	10 – 20 slightly colored	20 – 40 Lightly tea colored	40 – 80 tea colored	> 80 highly colored	**22.4** color units (range: 16.8 – 30.9)	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	**6.8** mg/L (range: 5.8 – 7.4)	Moderately vulnerable
pH (std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			**7.5** standard units (range: 7.4 – 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		**161.7** *u*S/cm (range: 160.7 – 162.7)	Characteristic of Lakes Experiencing human disturbances



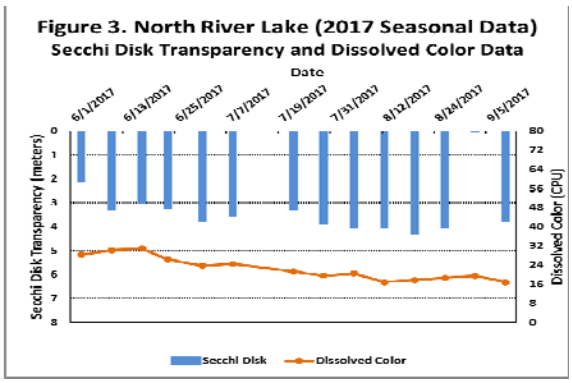


Figure 2 and 3. Seasonal Secchi disk transparency, chlorophyll *a* changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* concentrations and dissolved color concentrations. Shallower water transparency measurements oftentimes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

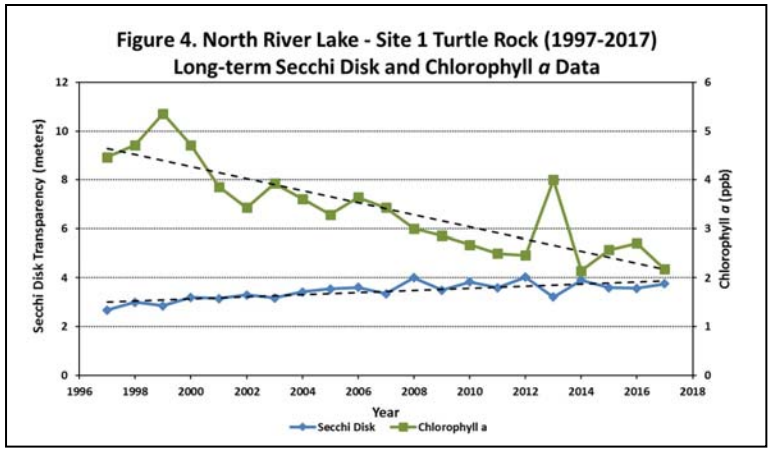
LONG-TERM TRENDS

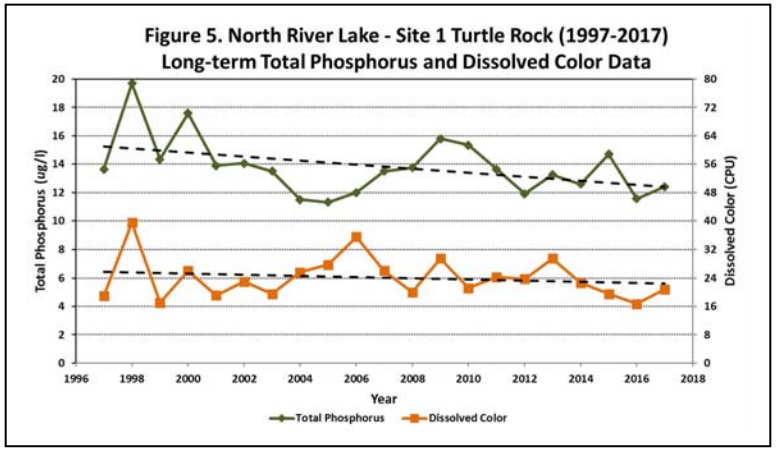
WATER CLARITY: The North River Lake water clarity measurements, measured as Secchi Disk transparency, display a trend of increasing water clarity over the twenty-one year span from 1997 to 2017 (Figure 4).

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-one year span from 1997 to 2017 (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-one year span from 1997 to 2017 (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 2017 (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 2017. **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.**

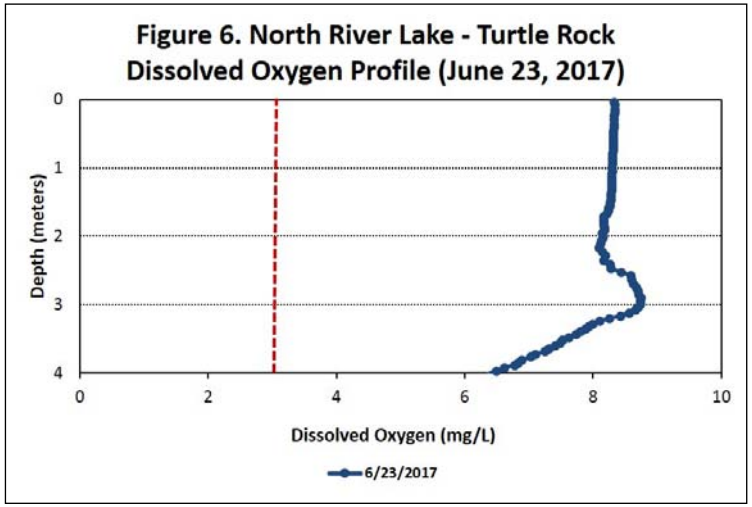


Figure 6. June 23, 2017 North River Lake dissolved oxygen profile. The vertical red line indicates the oxygen concentration commonly considered the threshold for successful growth and reproduction of warm water fish.

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.

- http://extension.unh.edu/resources/files/Resource004159_Rep5940.pdf
- http://soaknh.org/wp-content/uploads/2016/04/NH-Homeowner-Guide-2016.pdf

Figure 7. North River Lake

Barrington, Northwood and Nottingham, NH

2017 Deep water sampling stations and seasonal average water clarity

0 0.1 0.2 0.3 0.4 Miles

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

NH Extension

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