CHOCORUA LAKE

2019 SAMPLING HIGHLIGHTS

Station – 1 South

Tamworth, NH

Extension

Refer to the 2019 Chocorua Lake Annual Report for additional information.

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

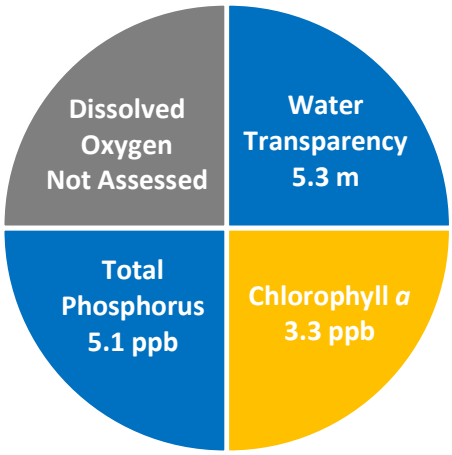


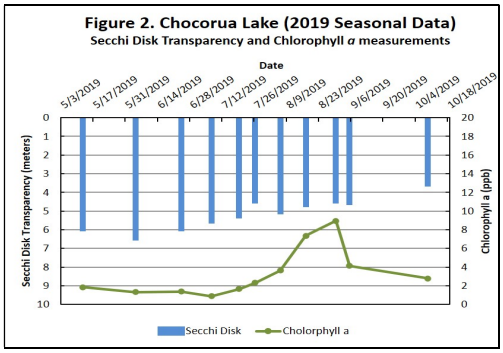
Figure 1. Chocorua Lake Water Quality (2019)

Table 1. 2019 Chocorua Lake Seasonal Averages and NH DES Aquatic Life Nutrient Criteria[1]

Parameter	Oligotrophic "Excellent"	Mesotrophic "Fair"	Eutrophic "Poor"	Chocorua Lake Average (range)	Chocorua Lake Classification
Water Clarity (meters)	> 4.0	2.5 – 4.0	< 2.5	**5.3** meters (4.5 – 6.5)	Oligotrophic
Chlorophyll *a* [1] (ppb)	< 3.3	3.3 – 5.0	> 5.0	**3.3** ppb (0.9 – 8.9)	Mesotrophic
Total Phosphorus [1] (ppb)	< 8.0	8.0 – 12.0	> 12.0	**5.1** ppb (3.2 – 6.6)	Oligotrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	< 2.0	Not Assessed	Not Assessed

Table 2. 2019 Chocorua Lake Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					Chocorua Lake Average (range)	Chocorua Lake Classification
Color (color units)	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored	**32.5** color units (range: 23.5 – 50.0)	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	**3.4** mg/L (range: 2.3 – 4.0)	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: 6.7 – 7.1)	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		**37.7** *u*S/cm (range: 36.2 – 39.3)	Characteristic of minimally impacted NH lakes



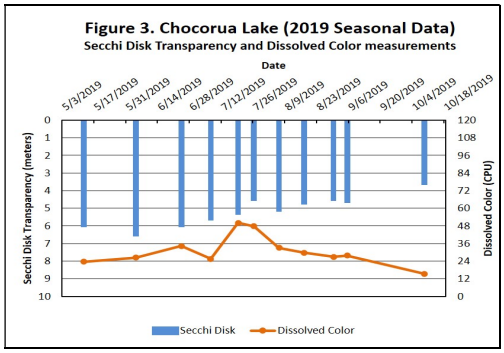


Figure 2 and 3. Seasonal Secchi disk transparency, chlorophyll *a* changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in chlorophyll *a* and/or color concentrations. The sharp increase in Chlorophyll *a* during late July reflects an algae bloom (Figure 2).

LONG TERM TRENDS

WATER CLARITY: Water clarity, measured as Secchi disk depth, display a relatively stable trend between 1982 and 2019 (Figure 4). A closer examination of the water transparency data collected before the implementation of erosion control measures (1982-1999) along the Route 16 travel corridor display a trend of decreasing water clarity (Figures 6). On the other hand, the post-BMP (2000-2019) water transparency data display a trend of stable to slightly improving water transparency over the past nineteen years (Figure 7).

CHLOROPHYLL: Chlorophyll *a*, a measure of microscopic plant life within the lake, oscillates between 1982 and 2019 but overall displays a stable trend. An examination of the chlorophyll data collected before and after the installation of erosion control measures along the Route 16 travel corridor indicates the water quality has improved in recent years. The chlorophyll *a* concentrations increased by approximately 2.0 parts per billion (ppb) between 1982 and 1999 (Figure 6) while the chlorophyll *a* concentrations documented between 2000 and 2019 (Figure 7), following the installation of erosion control measures, have stabilized.

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. The long-term total phosphorus data display a relatively stable trend between 1999 and 2019 (Figure 5) while the total phosphorus concentrations exhibit significant variability from year to year. Note: total phosphorus data were not collected consistently prior to the 1999 sampling season.

COLOR: Color is a result of naturally occurring "tea" color substances from the breakdown of soils and plant materials. Color has varied annually but displays a relatively stable long-term trend between 1986 and 2019 (Figure 5).

Figure 4. Chocorua Lake- Site 1 South (1982-2019)
Long-Term Secchi Disk Transparency and Chlorophyll *a* Data

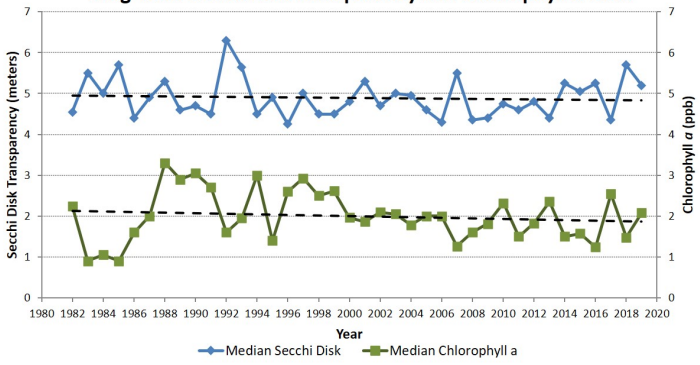
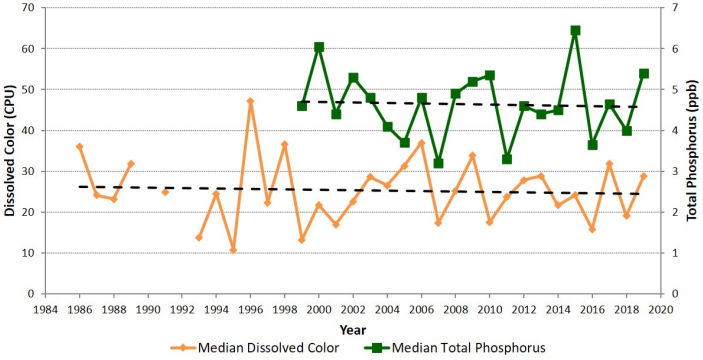


Figure 5. Chocorua Lake - Site 1 South (1986-2019)
Long-Term Total Phosphorus and Dissolved Color Data



Figures 4 and 5. Changes in the Chocorua Lake water clarity (Secchi Disk depth), chlorophyll *a*, total phosphorus and dissolved color concentrations measured between 1982 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.** Trendlines are displayed for each of the four water quality measurements.

Figure 6. Chocorua Lake- Site 1 South (Pre-BMPs: 1982-1999)
Long-Term Secchi Disk Transparency and Chlorophyll *a* Data

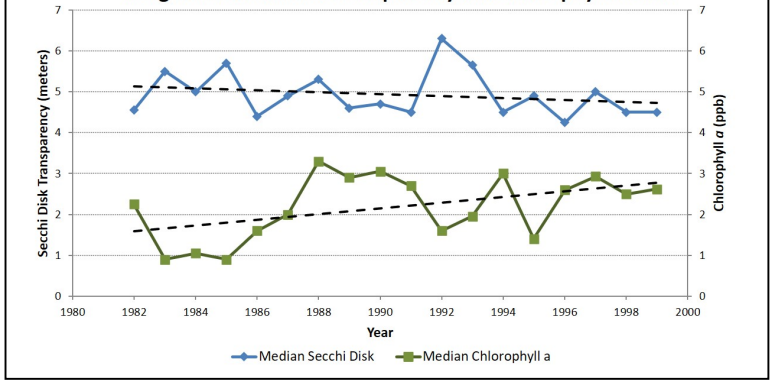
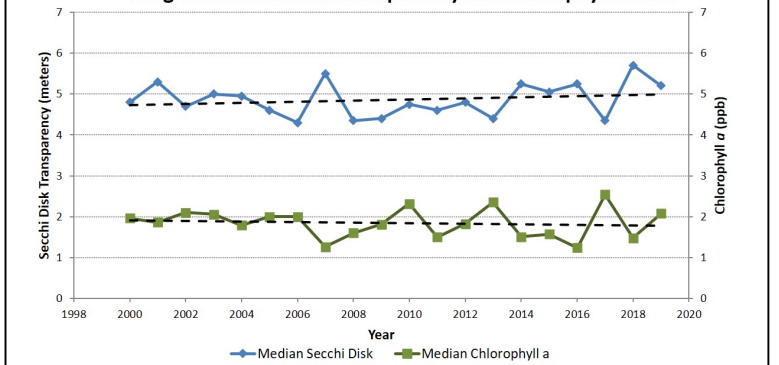


Figure 7. Chocorua Lake- Site 1 South (Post-BMPs: 2000-2019)
Long-Term Secchi Disk Transparency and Chlorophyll *a* Data



Figures 6 and 7. Changes in the Chocorua Lake water clarity (Secchi Disk depth) and chlorophyll *a* measured before (1982-1999) and after (2000-2019) the installation of erosion control measures, known as best management practices (BMPs), along the Route 16 travel corridor. Trendlines are displayed for both the water clarity and chlorophyll *a* measurements.

Recommendations

Implement Best Management Practices within the Chocorua Lake watershed to minimize the adverse impacts of polluted runoff and erosion into Chocorua 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 homeowners can reduce nutrient loading caused by overland run-off.

- http://extension.unh.edu/resources/files/Resource004159_Rep5940.pdf
- https://www4.des.state.nh.us/SoakNH/wp-content/uploads/2016/04/NH-Homeowner-Guide-2016.pdf

Figure 8. Chocorua Lake

Tamworth, NH

2019 Deep sampling site and seasonal average water clarity

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

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