CHOCORUA LAKE

2015 SAMPLING HIGHLIGHTS

Station – 1 South

Tamworth, NH

University of New Hampshire Cooperative Extension

Refer to the 2015 Chocorua Lake Annual Report for additional information.

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

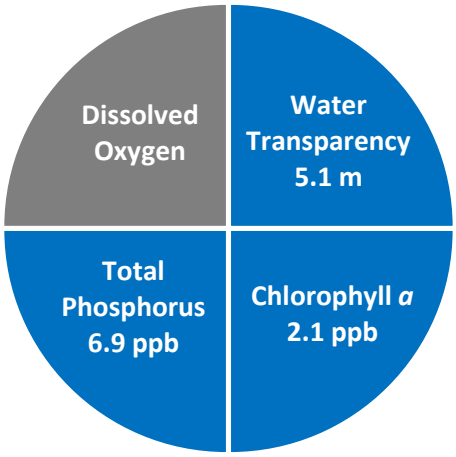


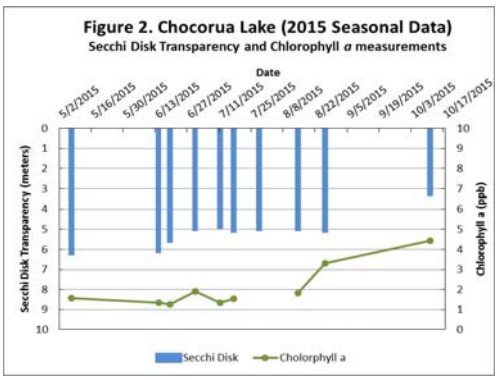
Figure 1. Chocorua Lake Water Quality (2015)

Table 1. 2015 Chocorua Lake Seasonal Averages and NH DES Trophic Level Classification Criteria

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	**5.1** meters (3.3 – 6.2)	**Oligotrophic**
Chlorophyll *a* (ppb)	< 3.3	3.3 – 5.0	> 5.0	**2.1** ppb (1.2 – 4.4)	**Oligotrophic**
Total Phosphorus (ppb)	< 8.0	8.0 – 12.0	> 12.0	**6.9** ppb (3.0 – 14.0)	**Oligotrophic**
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	< 2.0	Not Measured	Not Measured

Table 2. 2015 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	**24.7** color units (17.0 – 40.3)	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	**4.0** mg/L (3.5 – 4.5)	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 (range: 7.0 – 7.4)	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		**36.9** *u*S/cm (range: 35.5 – 38.3)	Characteristic of minimally impacted NH lakes



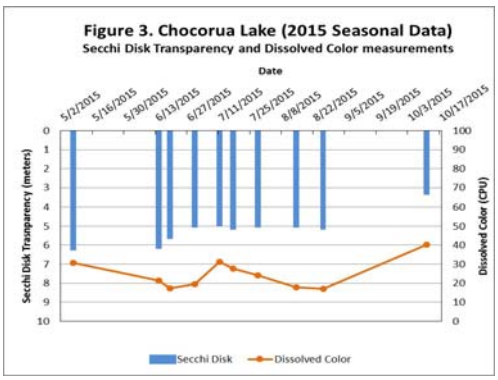


Figure 2 and 3. Seasonal Secchi disk transparency, chlorophyll *a* changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in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

LONG TERM TRENDS

WATER CLARITY: Water clarity, measured as Secchi disk depth, decreased between 1982 and 2015 (Figure 4). 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 (2000-2015) water transparency data display a trend of slightly decreasing to stable water transparency over the past sixteen years (Figure 7).

CHLOROPHYLL: Chlorophyll *a*, a measure of microscopic plant life within the lake, increased between 1982 and 2015. 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 chloropyll *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 2015 (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 2015 (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 and displays a relatively stable trend between 1986 and 2015 (Figure 5).

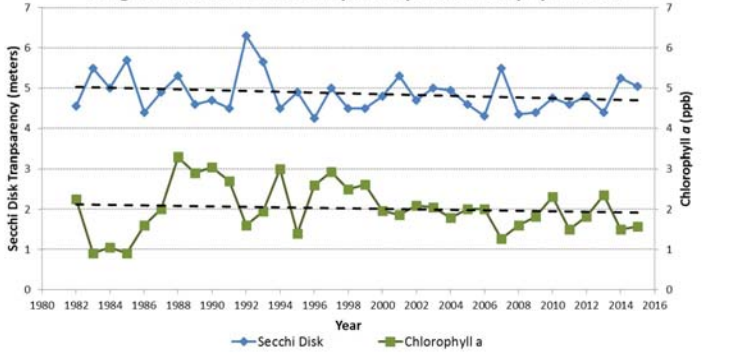


Figure 4. Chocorua Lake- Site 1 South (1982-2015)
Long-Term Secchi Disk Transparency and Chlorophyll *a* Data

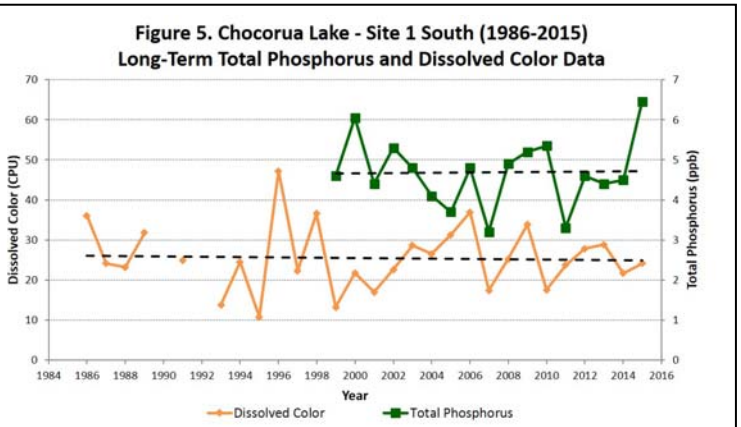


Figure 5. Chocorua Lake - Site 1 South (1986-2015)
Long-Term Total Phosphorus and Dissolved Color Data

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 2015. **These data illustrate the relationship among plant growth, water color and water clarity. Total phopshorus 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.

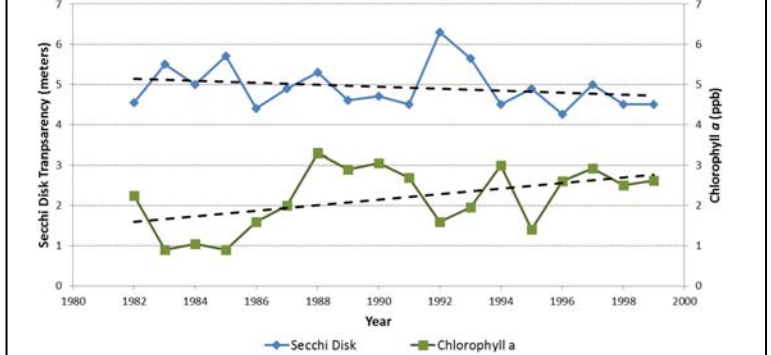


Figure 6. Chocorua Lake- Site 1 South (Pre-BMPs: 1982-1999)
Long-Term Secchi Disk Transparency and Chlorophyll *a* Data

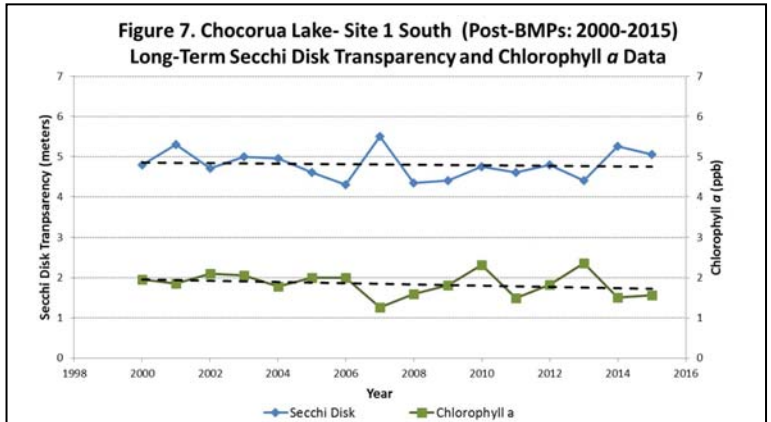


Figure 7. Chocorua Lake- Site 1 South (Post-BMPs: 2000-2015)
Long-Term Secchi Disk Transparency and Chlorophyll *a* Data

Figures 6 and 7. Changes in the Chocorua Lake water clarity (Secchi Disk depth) and chlorophyll *a* measured before (1982-1999) and after (2000-2015) the installation of erosion control measures, known as best management practices (BMPs), along the Route 16 travel corridors. 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
- http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-11.pdf

Figure 8. Chocorua Lake

Tamworth, NH

2015 Deep sampling site and seasonal average water clarity

University of New Hampshire
Cooperative Extension

NEW HAMPSHIRE LAKES LAY MONITORING

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