

CRESCENT LAKE

2018 SAMPLING HIGHLIGHTS

Station – 6 Center

Wolfeboro, NH



Station 6 Center (Figure 7) was used as a reference point to represent the overall Crescent 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 summarize conditions near the lake bottom.

Blue = Excellent =
Oligotrophic

Yellow = Fair =
Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

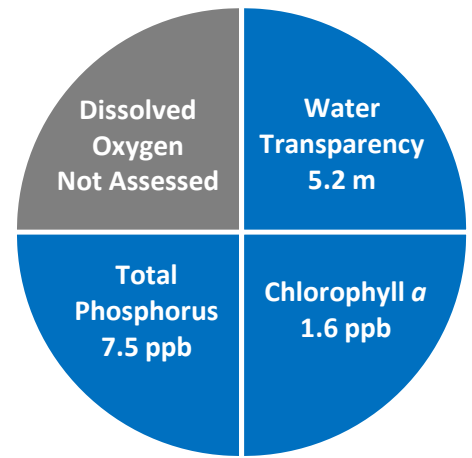


Figure 1. Crescent Lake Water Quality (2018)

Table 1. 2018 Crescent Lake Seasonal Averages and NH DES Aquatic Life Nutrient Criteria¹

| Parameter | Oligotrophic "Excellent" | Mesotrophic "Fair" | Eutrophic "Poor" | Crescent Lake Average (range) | Crescent Lake Classification |
|--|-----------------------------|-----------------------|---------------------|----------------------------------|---------------------------------|
| Water Clarity (meters) | 4.0 – 7.0 | 2.5 - 4.0 | < 2.5 | 5.2 meters (4.0 – 6.1) | Oligotrophic |
| Chlorophyll <i>a</i> ¹ (ppb) | < 3.3 | > 3.3 – 5.0 | > 5.0 – 11.0 | 1.6 ppb (1.1 – 2.5) | Oligotrophic |
| Total Phosphorus ¹ (ppb) | < 8.0 | > 8.0 – 12.0 | > 12.0 – 28.0 | 7.5 ppb (6.8 – 8.1) | Oligotrophic |
| Dissolved Oxygen (mg/L) | 5.0 – 7.0 | 2.0 – 5.0 | <2.0 | Not Assessed | Not Assessed |

* Crescent Lake did not develop a deep cold water layer needed to assess dissolved oxygen concentrations.

Table 2. 2018 Crescent Lake Seasonal Average Accessory Water Quality Measurements

| Parameter | Assessment Criteria | | | | | Crescent Lake Average (range) | Crescent Lake Classification |
|---|---|--------------------------------------|---|---|-----------------------------|--------------------------------------|---|
| Color (color units) | < 10 uncolored | 10 – 20 slightly colored | 20 – 40 lightly tea colored | 40 – 80 tea colored | > 80 highly colored | 18.6 color units (13.4 – 24.1) | Slightly 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 | 8.1 mg/L (7.0 – 8.8) | Moderately vulnerable |
| pH (std units) | < 5.5 suboptimal for successful growth and reproduction | | 6.5 – 9.0 optimal range for fish growth and reproduction | | | 7.3 standard units (single value) | Optimal range for fish growth and reproduction |
| Specific Conductivity (μ S/cm) | < 50 μ S/cm Characteristic of minimally impacted NH lakes | | 50-100 μ S/cm Lakes with some human influence | > 100 μ S/cm Characteristic of lakes experiencing human disturbances | | 96.2 μ S/cm (single value) | Characteristic of lakes with some human influence |

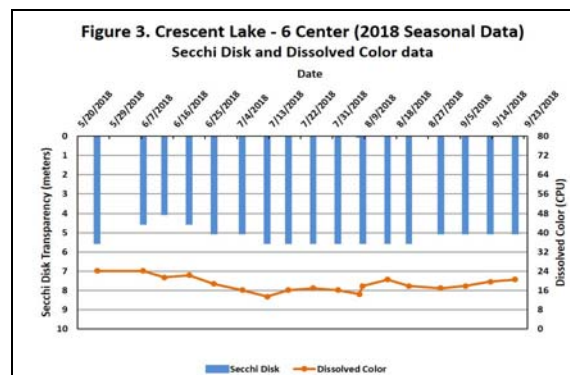
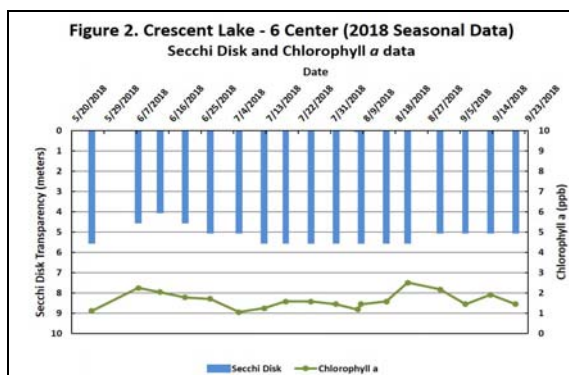


Figure 2 and 3. Seasonal Secchi Disk transparency, chlorophyll *a* changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in chlorophyll *a* and/or color concentrations. *Note: some Secchi Disk transparency measurements reached the lake bottom before disappearing from view and at times underestimate the water clarity.*

LONG-TERM TRENDS

WATER CLARITY: The Crescent Lake water clarity measurements, measured as Secchi Disk transparency, have been highly variable among years. However, the data collected between 1984 and 2018, display a relatively stable long-term trend. (Figure 4). The Secchi Disk is occasionally visible on the lake bottom and, at times, underestimates the Crescent Lake water clarity.

CHLOROPHYLL: The Crescent Lake chlorophyll *a* concentrations, a measure of microscopic plant life within the lake, display a trend of decreasing concentrations between 1984 and 2018 (Figure 4).

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. The Crescent Lake total phosphorus concentrations display a trend of increasing concentrations between 1986 and 2018 (Figure 5).

COLOR: The Crescent Lake color data, the result of naturally occurring “tea” color substances from the breakdown of soils and plant materials, display a trend of increasing concentrations between 1986 and 2018 (Figure 5).

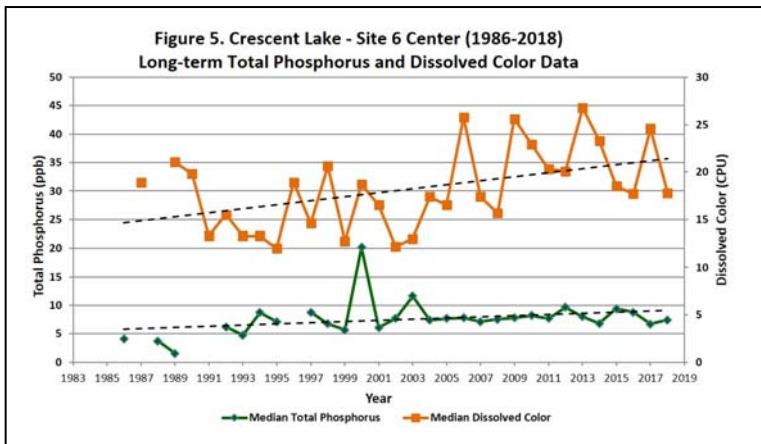
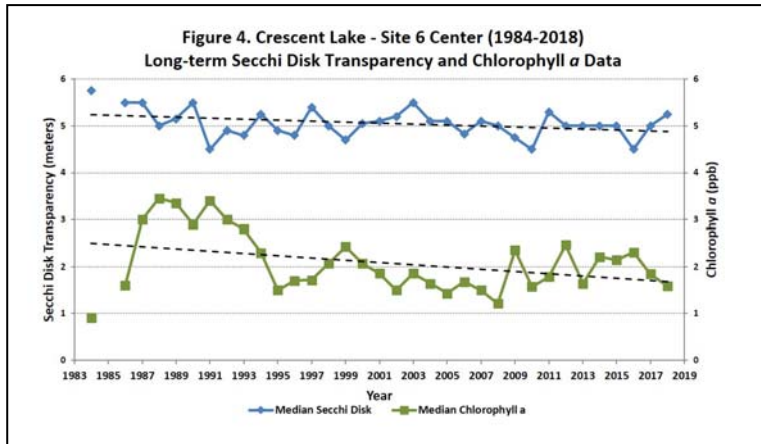


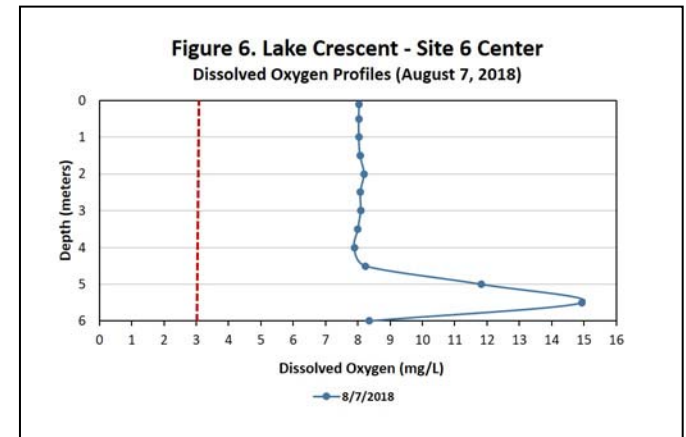
Table 3. Crescent Lake, Site 6 Center, and Lake Wentworth Seasonal Average Water Quality Inter-site Comparison (2018)

| Sampling Station | Average (range) Secchi Disk Depth (meters) | Average (range) Total Phosphorus (ppb) | Average (range) Chlorophyll <i>a</i> (ppb) | Average (range) Dissolved Color (CPU) |
|------------------|--|--|--|---------------------------------------|
| Crescent Lake | * 5.2 m (4.0 – 6.1) | 7.5 ppb (6.8 – 8.1) | 1.6 ppb (1.1 – 2.5) | 18.6 CPU (13.4 – 24.1) |
| 1 Fuller | 6.7 m (5.5 – 7.9) | 5.3 ppb (3.7 – 7.4) | 1.3 ppb (0.8 – 2.1) | 14.2 CPU (9.0 – 21.6) |
| 2 Triggs | 7.4 m (6.8 – 7.8) | 5.1 ppb (4.7 – 5.4) | 1.1 ppb (0.6 – 1.7) | 16.8 CPU (9.9 – 19.6) |
| 12 Governors | 6.8 m (6.3 – 8.3) | 5.4 ppb (4.9 – 5.8) | 1.2 ppb (0.8 – 1.8) | 11.3 CPU (9.0 – 13.5) |

* indicates the Secchi disk occasionally reached the lake bottom before disappearing from view.

Figures 4 and 5. Changes in the Crescent Lake water clarity (Secchi Disk depth), chlorophyll *a*, dissolved color and total phosphorus concentrations measured between 1984 and 2018. **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. Crescent Lake dissolved oxygen profile collected on August 7, 2018. The vertical red line indicates the dissolved oxygen concentration commonly considered the threshold for successful growth and reproduction of warm water fish such as bass and perch.



Recommendations

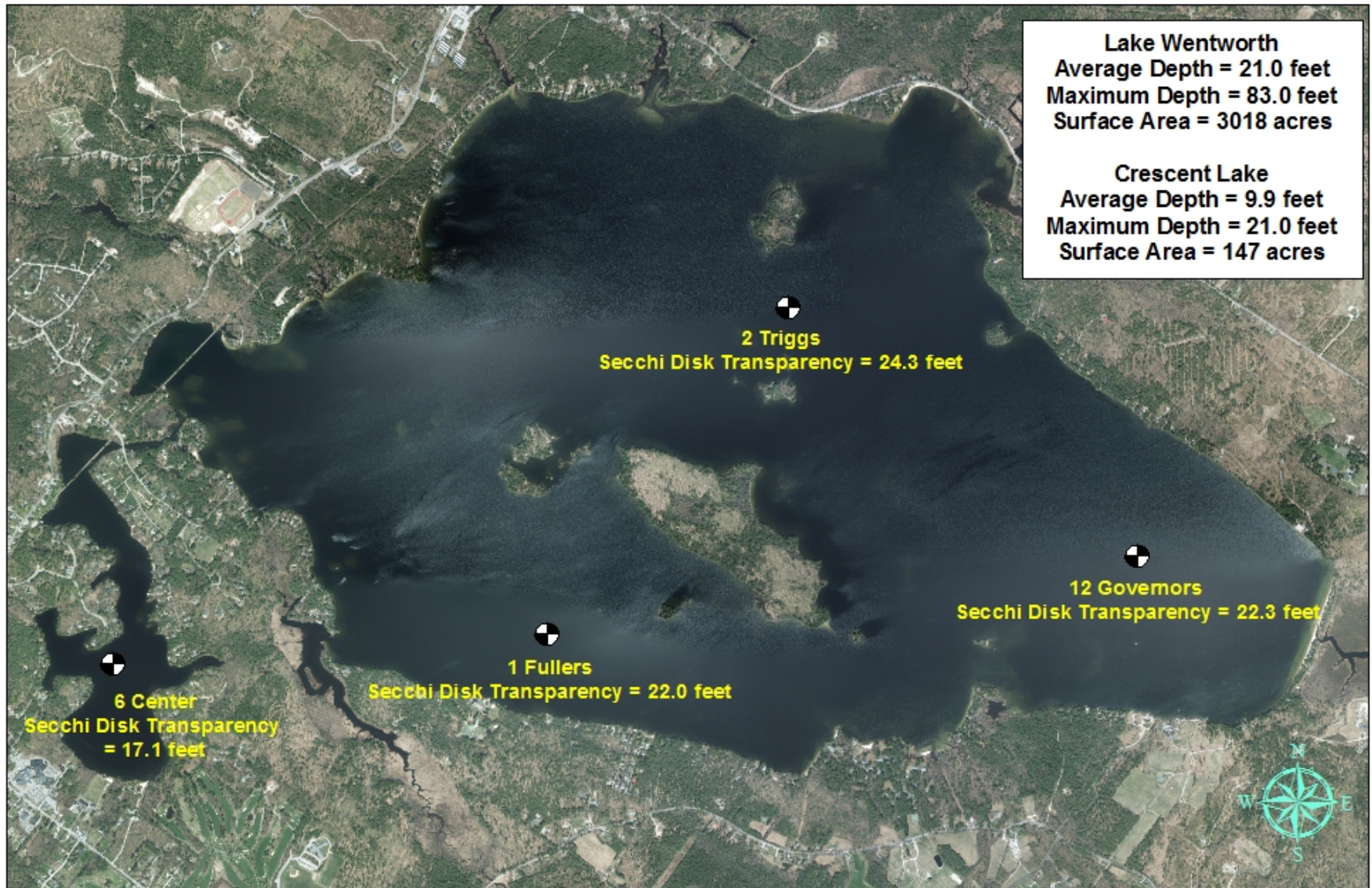
Implement Best Management Practices within the Crescent Lake watershed to minimize the adverse impacts of polluted runoff and erosion into Crescent Lake. Refer to “Landscaping at the Water’s Edge: An Ecological Approach” and “New Hampshire Homeowner’s Guide to Stormwater Management: Do-It-Yourself Stormwater Solutions for Your Home” for more information on how to reduce nutrient loading caused by overland run-off.

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

Figure 7. Lake Wentworth and Crescent Lake

Wolfeboro, NH

2018 Deep water sampling site locations with seasonal average water clarity



0 0.4 0.8 1.2 1.6 Miles

Site location GPS coordinates were collected by the UNH Center for Freshwater Biology
Aerial Orthophoto Source: 2015 Statewide High Resolution Aerial Photography, NH GRANIT



Extension

