CRESCENT LAKE

2019 SAMPLING HIGHLIGHTS

Station – 6 Center

Wolfeboro, NH

Extension

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

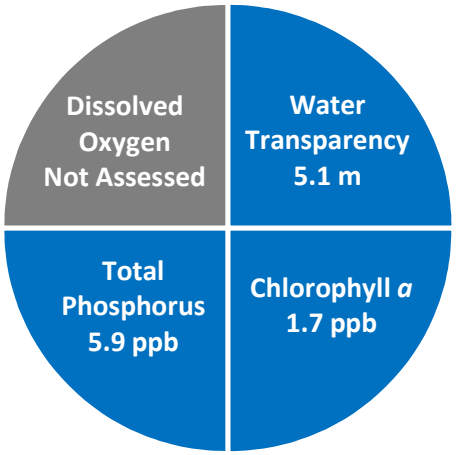


Figure 1. Crescent Lake Water Quality (2019)

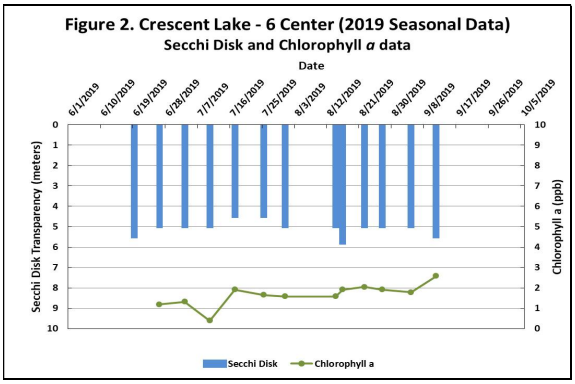
Table 1. 2019 Crescent Lake Seasonal Averages and NH DES Aquatic Life Nutrient Criteria[1]

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	**5.1** meters (4.5 – 5.8)	Oligotrophic
Chlorophyll *a* [1] (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	**1.7** ppb (0.4 – 2.6)	Oligotrophic
Total Phosphorus [1] (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	**5.9** ppb (4.3 – 7.5)	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. 2019 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	**16.8** color units (13.0 – 21.5)	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	**7.9** 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			**7.2** standard units (single value)	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		**83.3** *u*S/cm (single value)	Characteristic of lakes with some human influence



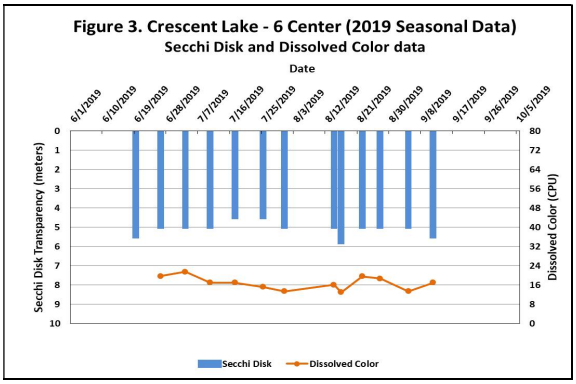


Figure 2 and 3. Seasonal Secchi Disk transparency, chlorophyll *a* changes and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a* and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in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

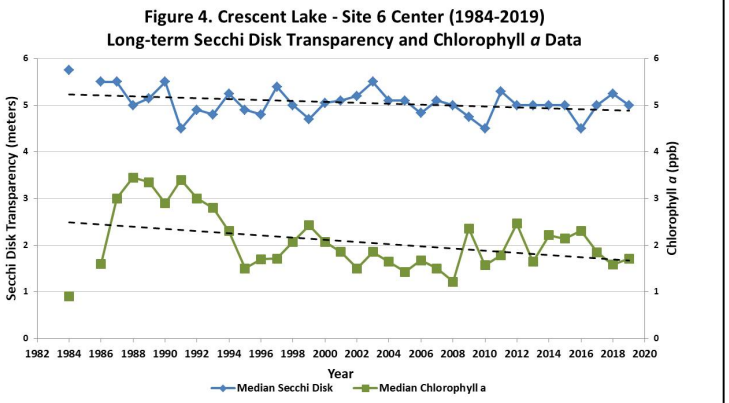
LONG-TERM TRENDS

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 2019, 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 2019 (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 2019 (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 2019 (Figure 5).



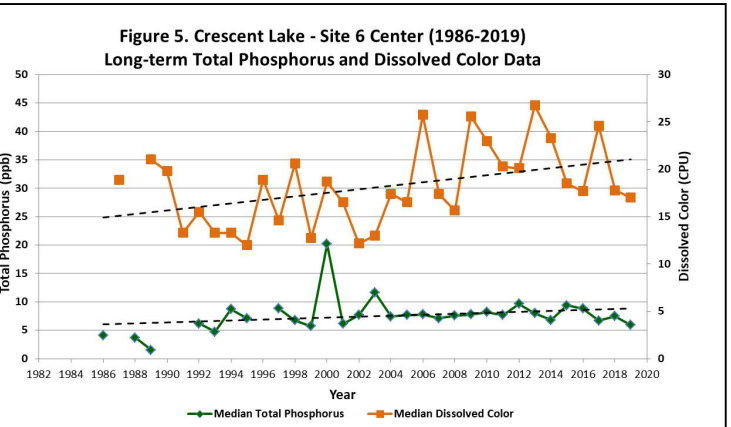


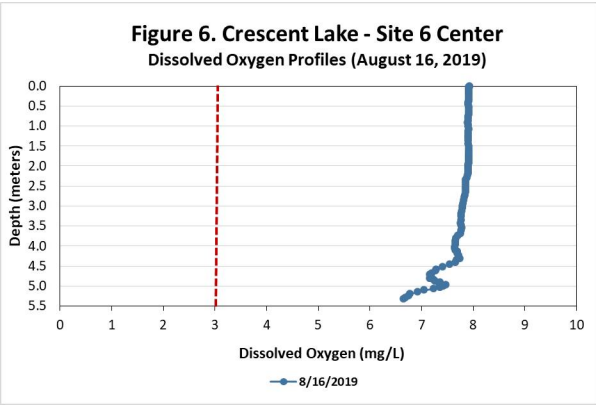
Table 3. Crescent Lake, Site 6 Center, and Lake Wentworth Seasonal Average Water Quality Inter-site Comparison (2019)

Sampling Station	Average (range) Secchi Disk Depth (meters)	Average (range) Total Phosphorus (ppb)	Average (range) Chlorophyll *a* (ppb)	Average (range) Dissolved Color (CPU)
Crescent Lake	* **5.1** m (4.5 – 5.8)	**5.9** ppb (4.3 – 7.5)	**1.7** ppb (0.4 – 2.6)	**16.8** CPU (13.0 – 21.5)
1 Fuller	**6.4** m (5.5 – 7.5)	**6.4** ppb (4.4 – 10.8)	**1.3** ppb (0.9 – 2.0)	**17.7** CPU (9.3 – 23.7)
2 Triggs	**6.4** m (5.5 – 7.0)	**6.7** ppb (single sample)	**1.8** ppb (1.3 – 2.8)	**15.5** CPU (10.7 – 24.6)
12 Governors	**5.9** m (5.0 – 7.1)	**5.0** ppb (single sample)	**1.5** ppb (0.7 – 2.0)	**14.9** CPU (10.7 – 17.9)

* 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 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. Crescent Lake dissolved oxygen profile collected on August 16, 2019. 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

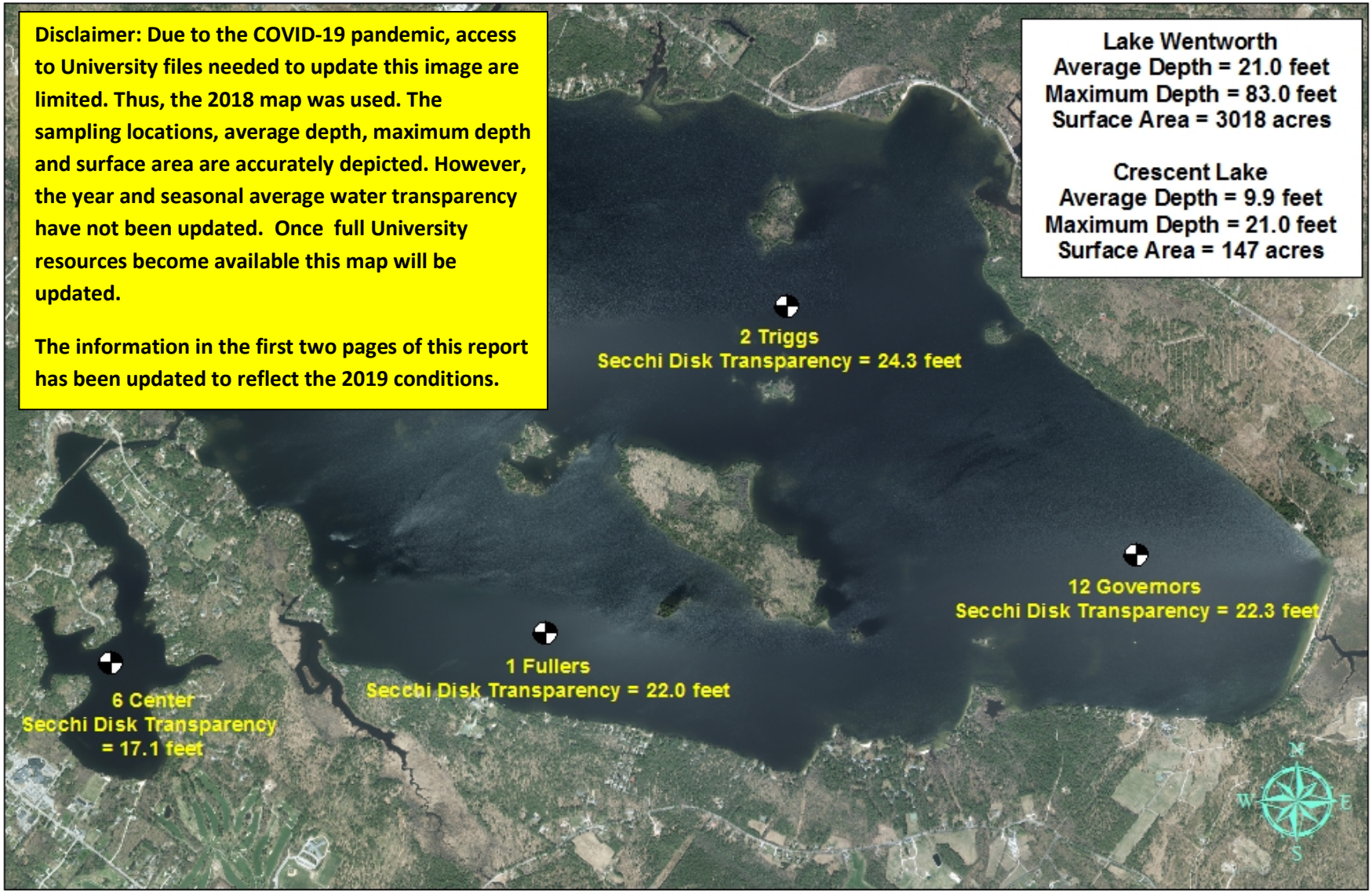
Implement Best Management Practices within the Crescent Lake watershed to minimize the adverse impacts of polluted runoff and erosion into Crescent Lake. Refer to "Landscaping at the Water's Edge: An Ecological Approach" and "New Hampshire Homeowner's Guide to Stormwater Management: Do-It-Yourself Stormwater 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



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

NH Extension