CRESCENT LAKE

2019 SAMPLING HIGHLIGHTS

Station – 6 Center
Wolfeboro, NH

Extension

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Oligotrophic “Excellent”</th>
<th>Mesotrophic “Fair”</th>
<th>Eutrophic “Poor”</th>
<th>Crescent Lake Average (range)</th>
<th>Crescent Lake Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Clarity (meters)</td>
<td>4.0 – 7.0</td>
<td>2.5 - 4.0</td>
<td>&lt; 2.5</td>
<td>5.1 meters (4.5 – 5.8)</td>
<td>Oligotrophic</td>
</tr>
<tr>
<td>Chlorophyll a (ppb)</td>
<td>&lt; 3.3</td>
<td>&gt; 3.3 – 5.0</td>
<td>&gt; 5.0 – 11.0</td>
<td>1.7 ppb (0.4 – 2.6)</td>
<td>Oligotrophic</td>
</tr>
<tr>
<td>Total Phosphorus (ppb)</td>
<td>&lt; 8.0</td>
<td>&gt; 8.0 – 12.0</td>
<td>&gt; 12.0 – 28.0</td>
<td>5.9 ppb (4.3 – 7.5)</td>
<td>Oligotrophic</td>
</tr>
<tr>
<td>Dissolved Oxygen (mg/L)</td>
<td>5.0 – 7.0</td>
<td>2.0 – 5.0</td>
<td>&lt;2.0</td>
<td>Not Assessed</td>
<td>Not Assessed</td>
</tr>
</tbody>
</table>

* 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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Assessment Criteria</th>
<th>Crescent Lake Average (range)</th>
<th>Crescent Lake Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color (color units)</td>
<td>&lt; 10 uncolored</td>
<td>16.8 color units (13.0 – 21.5)</td>
<td>Slightly Colored</td>
</tr>
<tr>
<td>Alkalinity (mg/L)</td>
<td>&lt; 0.0 acidified</td>
<td>7.9 mg/L (7.0 – 8.8)</td>
<td>Moderately vulnerable</td>
</tr>
<tr>
<td>pH (std units)</td>
<td>&lt; 5.5 suboptimal for successful growth and reproduction</td>
<td>7.2 standard units (single value)</td>
<td>Optimal range for fish growth and reproduction</td>
</tr>
<tr>
<td>Specific Conductivity (uS/cm)</td>
<td>&lt; 50 uS/cm Characteristic of minimally impacted NH lakes</td>
<td>83.3 uS/cm (single value)</td>
<td>Characteristic of lakes with some human influence</td>
</tr>
</tbody>
</table>

Water Transparency

Total Phosphorus 5.9 ppb

Chlorophyll a 1.7 ppb

Dissolved Oxygen Not Assessed

Blue = Excellent = Oligotrophic

Yellow = Fair = Mesotrophic

Red = Poor = Eutrophic

Gray = No Data

Figure 1. Crescent Lake Water Quality (2019)

Figure 2. Crescent Lake - 6 Center (2019 Seasonal Data) Secchi Disk and Chlorophyll a data

Figure 3. Crescent Lake - 6 Center (2019 Seasonal Data) Secchi Disk and Dissolved Color data

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. Shallow 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 \( \alpha \) 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)

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

* 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 \( \alpha \), 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


Disclaimer: Due to the COVID-19 pandemic, access to University files needed to update this image are limited. Thus, the 2018 map was used. The sampling locations, average depth, maximum depth and surface area are accurately depicted. However, the year and seasonal average water transparency have not been updated. Once full University resources become available this map will be updated.

The information in the first two pages of this report has been updated to reflect the 2019 conditions.

Figure 7. Lake Wentworth and Crescent Lake
Wolfeboro, NH
2018 Deep water sampling site locations with seasonal average water clarity

Lake Wentworth
Average Depth = 21.0 feet
Maximum Depth = 83.0 feet
Surface Area = 3018 acres

Crescent Lake
Average Depth = 9.9 feet
Maximum Depth = 21.0 feet
Surface Area = 147 acres

Secchi Disk Transparency = 24.3 feet
6 Center
Secchi Disk Transparency = 17.1 feet
1 Fullers
Secchi Disk Transparency = 22.0 feet
12 Governors
Secchi Disk Transparency = 22.3 feet
2 Triggs

Site location GPS coordinates were collected by the UNH Center for Freshwater Biology
Aerial Orthophoto Source: 2016 Statewide High Resolution Aerial Photography, NH GRANIT