**SWAINS LAKE**

**2018 SAMPLING HIGHLIGHTS**

**Station A**
Barrington, NH

Water quality data displayed in Tables 1 and 2 are surface water measurements with the exception of the dissolved oxygen data that were collected near the lake bottom. Refer to the Swains Lake Annual Report (2018) for additional information.

**Table 1. 2018 Swains Lake (Site A) 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>Swains Lake Average (range)</th>
<th>Swains 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>4.4 meters (3.3 – 5.0)</td>
<td>Oligotrophic</td>
</tr>
<tr>
<td>Chlorophyll a 1 (ppb)</td>
<td>&lt; 3.3</td>
<td>&gt; 3.3 – 5.0</td>
<td>&gt; 5.0 – 11.0</td>
<td>3.9 ppb (2.9 – 4.9)</td>
<td>Mesotrophic</td>
</tr>
<tr>
<td>Total Phosphorus 1 (ppb)</td>
<td>&lt; 8.0</td>
<td>&gt; 8.0 – 12.0</td>
<td>&gt; 12.0 – 28.0</td>
<td>11.2 ppb (8.4 – 13.8)</td>
<td>Mesotrophic</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>1.3 mg/L (0.2 – 4.7)*</td>
<td>Eutrophic</td>
</tr>
</tbody>
</table>

* Dissolved oxygen concentrations were measured on August 17, 2018 between 4.0 and 6.5 meters, in the layer of rapidly decreasing temperatures.

**Table 2. 2018 Swains Lake (Site A) Seasonal Average Accessory Water Quality Measurements**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Assessment Criteria</th>
<th>Swains Lake Average (range)</th>
<th>Swains Lake Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color (color units)</td>
<td>&lt; 10 uncolored</td>
<td>36.0 color units (range: 27.7 – 41.6)</td>
<td>Lightly tea colored</td>
</tr>
<tr>
<td></td>
<td>10 – 20 slightly colored</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20 – 40 lightly tea colored</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40 – 80 tea colored</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 80 highly colored</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alkalinity (mg/L)</td>
<td>&lt; 0.0 acidified</td>
<td>3.2 mg/L (range: 2.7 – 3.7)</td>
<td>Moderately vulnerable</td>
</tr>
<tr>
<td></td>
<td>0.1 – 2.0 extremely vulnerable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.1 – 10 moderately vulnerable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.1 – 25.0 low vulnerability</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 25.0 not vulnerable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH (std units)</td>
<td>&lt; 5.5 suboptimal for successful growth and reproduction</td>
<td>6.6 standard units (range: 6.5 – 6.8)</td>
<td>Optimal range for fish growth and reproduction</td>
</tr>
<tr>
<td></td>
<td>6.5 – 9.0 optimal range for fish growth and reproduction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific Conductivity (uS/cm)</td>
<td>&lt; 50 uS/cm Characteristic of minimally impacted NH lakes</td>
<td></td>
<td>Characteristic of lakes experiencing human disturbances</td>
</tr>
<tr>
<td></td>
<td>50-100 uS/cm Lakes with some human influence</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 100 uS/cm Characteristic of lakes experiencing human disturbances</td>
<td>135.7 uS/cm (range: 130.5 – 139.8)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1. Swains Lake Water Quality (2018)

Figure 2. Swains Lake - Site A (2018 Seasonal Data) Secchi Disk Transparency and Chlorophyll a data

Figure 3. Swains Lake - Site A (2018 Seasonal Data) Secchi Disk Transparency 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. Shallower water transparency measurements oftentimes correspond to increases in chlorophyll a and/or color concentrations.
LONG-TERM TRENDS

WATER CLARITY: The Swains Lake water clarity measurements, measured as Secchi Disk transparency, display a trend of increasing water clarity (Figure 4).

CHLOROPHYLL: The Swains Lake chlorophyll a concentrations, a measure of microscopic plant life within the lake, have oscillated among years while the long-term trend is stable (Figure 4).

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

COLOR: The Swains Lake color data, the result of naturally occurring “tea” color substances from the breakdown of soils and plant materials, have oscillated among years while the long-term trend is stable (Figure 5).

Figures 4 and 5. Changes in the Swains Lake water clarity (Secchi Disk depth), chlorophyll a, dissolved color and total phosphorus concentrations measured between 1989 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. Inter-site comparison of the annual Swains Lake Site A (dark shading) and Site B (light shading) water clarity and chlorophyll a concentrations. The inter-site comparison data provide a general sense of the variability between the two long-term Swains Lake sampling locations. The inter-site comparison is based on the analysis of annual median values.

Recommendations


Figure 7. Swains Lake
Barrington, NH
2018 deep water sampling stations and seasonal average water clarity

Average Depth = 9.2 feet
Maximum Depth = 26.1 feet
Surface Area = 341 acres

Site A
Secchi Disk Transparency = 14.4 feet

Site B
Secchi Disk Transparency = 16.4 feet

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