**SWAINS LAKE**

**2015 SAMPLING HIGHLIGHTS**

**Station B**

Barrington, NH


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**Table 1. 2015 Swains Lake Seasonal Averages and NH DES Trophic Level Classification 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>5.7 meters (5.3 – 6.7)</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>4.2 ppb (2.2 – 9.1)</td>
<td>Mesotrophic</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>12.2 ppb (10.6 – 13.2)</td>
<td>Eutrophic</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>5.8 mg/L (2.7 – 7.2)</td>
<td>Oligotrophic</td>
</tr>
</tbody>
</table>

* Dissolved oxygen concentrations were measured on May 18, 2015 between 6.5 and 8.0 meters, in the bottom waters.

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**Table 2. 2015 Swains Lake 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>25.0 color units (17.9 – 34.3)</td>
<td>Lightly tea colored</td>
</tr>
<tr>
<td>Alkalinity (mg/L)</td>
<td>&lt; 0.0 acidified</td>
<td>2.9 mg/L (2.4 – 3.3)</td>
<td>Moderately vulnerable</td>
</tr>
<tr>
<td>pH (std units)</td>
<td>&lt; 5.5 suboptimal for successful growth and reproduction</td>
<td>Not Measured in 2015</td>
<td>——</td>
</tr>
<tr>
<td>Specific Conductivity (uS/cm)</td>
<td>&lt; 50 uS/cm Characteristic of minimally impacted NH lakes</td>
<td>108.9 uS/cm (102.9– 112.2)</td>
<td>Characteristic of lakes experiencing human disturbances</td>
</tr>
</tbody>
</table>

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**Figure 1. Swains Lake Water Quality (2015)**

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**Figure 2. Swains Lake - Site B (2015 Seasonal Data)**

Secchi Disk Transparency and Chlorophyll a data

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**Figure 3. Swains Lake - Site B (2015 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, have oscillated among years while the long-term water clarity is stable (Figure 4).

CHLOROPHYLL: The Swains Lake chlorophyll a concentrations, a measure of microscopic plant life within the lake, display a trend of increasing concentrations (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, display a trend of increasing concentrations (Figure 5).

Table 3. Swains Lake Seasonal Average Water Quality Inter-site Comparison (2015)

<table>
<thead>
<tr>
<th>Site</th>
<th>Average Secchi Disk Transparency (meters)</th>
<th>Average Chlorophyll a (ppb)</th>
<th>Average Total Phosphorus (ppb)</th>
<th>Average Dissolved Oxygen (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station A</td>
<td>4.6</td>
<td>4.2</td>
<td>12.7</td>
<td>3.9</td>
</tr>
<tr>
<td>Station B</td>
<td>5.7</td>
<td>4.2</td>
<td>12.2</td>
<td>5.8</td>
</tr>
</tbody>
</table>

- Dissolved oxygen measurements were taken early season (mid May) and from the bottom water layer (hypolimnion).
- Dissolved oxygen data are reported for the bottom lake layer (hypolimnion).

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 2015. 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.

Figure 6. May 18, 2015 Swains Lake dissolved oxygen profile. The vertical red line indicates the oxygen concentration commonly considered the threshold for successful growth and reproduction of cold water fish. Notice the low oxygen concentrations near the lake bottom.

Recommendations


Figure 7. Swains Lake
Barrington, NH
2015 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 = 18.1 feet

Site B
Secchi Disk Transparency = 18.7 feet

Aerial Orthophoto Source: NH GRANIT
Site locations GPSed by the UNH Center for Freshwater Biology