GOOSE POND
2017 SAMPLING HIGHLIGHTS
Station 1 Deep
Canaan and Hanover, NH

Station 1 Deep (Figure 8) was used as a reference point to represent the overall Goose Pond water quality. Water quality data displayed in Tables 1 and 2 are surface water measurements with the exception of the dissolved oxygen concentrations that were collected near the lake bottom.

Table 1. 2017 Goose Pond 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>Goose Pond Average (range)</th>
<th>Goose Pond 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>5.0 meters (4.5 – 5.8)</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>5.0 ppb (2.6 – 10.5)</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 (8.0 – 20.4)</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>Not Measured</td>
<td>Not Assessed</td>
</tr>
</tbody>
</table>

* Dissolved oxygen concentrations in the deep water layer are the basis for the dissolved oxygen classification criteria.

Table 2. 2017 Goose Pond Seasonal Average Accessory Water Quality Measurements

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Assessment Criteria</th>
<th>Goose Pond Average (range)</th>
<th>Goose Pond Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color (color units)</td>
<td>&lt; 10 uncolored</td>
<td>10 – 20 lightly tea colored</td>
<td>31.4 color units (range: 29.0 – 33.4)</td>
</tr>
<tr>
<td>Alkalinity (mg/L)</td>
<td>&lt; 0.0 acidified</td>
<td>0.1 – 2.0 moderately vulnerable</td>
<td>6.7 mg/L (range: 6.2 – 7.5)</td>
</tr>
</tbody>
</table>

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 Goose Pond water clarity measurements, measured as Secchi Disk transparency, display a trend of increasing water clarity over a twenty-nine year span from 1989 to 2017 (Figure 4).

CHLOROPHYLL: The Goose Lake chlorophyll a concentrations, a measure of microscopic plant life within the lake, display a trend of decreasing concentrations over a twenty-nine year span from 1989 and 2017 (Figure 4). However, there are some indications of a slight increase in the chlorophyll a concentrations in recent years.

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. The Goose Pond total phosphorus concentrations have oscillated among years but display a stable long-term trend over a twenty-nine year span from 1989 to 2017 (Figure 5).

COLOR: The Goose Pond color data, the result of naturally occurring “tea” color substances from the breakdown of soils and plant materials, display a trend of decreasing concentrations over a twenty-nine year span from 1989 to 2017 (Figure 5).

Figures 4 and 5. Changes in the Goose Pond water clarity (Secchi Disk depth), chlorophyll a, dissolved color and total phosphorus concentrations measured between 1989 and 2017. 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. August 25, 2014 Goose Pond 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. The most recent dissolved oxygen data were collected through the New Hampshire Department of Environmental Services Volunteer Lake Assessment Program on August 25, 2014.

Figure 7. Goose Pond surface water and bottom water total phosphorus inter-comparison. Notice the difference between the surface water and bottom water total phosphorus concentrations. The increasing deep water total phosphorus concentrations may be associated with the phenomenon known as internal nutrient loading that is typically associated with low dissolved oxygen concentrations near the lake bottom.

Recommendations


Figure 8. Goose Pond
Canaan & Hanover, NH
2017 Deep sampling site with seasonal average water clarity

Site 1 Deep
Secchi Disk Transparency = 16.4 feet

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