Lake Pocotopaug monitoring conducted to track the Trophic Factors related to cyanobacteria blooms.

Water Clarity
Water Temperature
Dissolved Oxygen
Phosphorus
Nitrogen
Cyanobacteria
### Categories of increasing nutrient levels

<table>
<thead>
<tr>
<th>Trophic state=&gt;</th>
<th>Oligotrophic</th>
<th>Mesotrophic</th>
<th>Eutrophic</th>
<th>Highly Eutrophic</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP –ppb</td>
<td>0 – 10</td>
<td>10 – 30</td>
<td>30 – 50</td>
<td>&gt;50</td>
</tr>
<tr>
<td>TN –ppb</td>
<td>0 - 200</td>
<td>200 - 600</td>
<td>600 - 1000</td>
<td>&gt;1000</td>
</tr>
<tr>
<td>Secchi –meters</td>
<td>&gt;6</td>
<td>6 - 2</td>
<td>2 – 1</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Chlor.-a –ppb</td>
<td>0 - 2</td>
<td>2 – 15</td>
<td>15 – 30</td>
<td>&gt;30</td>
</tr>
</tbody>
</table>

Lakes should remain on the left side of the red line to support Recreational Use.
Relationship between increasing phosphorus and declining water clarity
July and August 1975 Secchi disk = 4.5/4.3 meters
Water Temperature

![Water Temperature Graphs]

**Markham**

- Epilimnion
- Metalimnion
- Hypolimnion

**Oakwood**

- Date:
  - 4/3
  - 5/22
  - 6/16
  - 7/5
  - 7/21
  - 8/3
  - 8/24
  - 9/18
  - 9/28
  - 10/27
  - 11/15
Phosphorus

Positive numbers mean 5m TP was higher than 1 meter TP. Negative numbers mean 1 meter TP was higher than 5m.
Phosphorus as mass (kg)
Total Nitrogen
Total Nitrogen and Secchi disk depth

$y = 2173.6x^{-1.161}$

$R^2 = 0.7952$
Total Nitrogen

[Graph showing Total Nitrogen (ppb) from April 15 to December 17 for Markham and Oakwood with three water depth levels: Bottom, Middle, and Top]
Surface water nitrate

Nitrate (ppb)

Station
- Markham
- Oakwood
Cyanobacteria Cell Numbers

Cyanobacteria cell numbers /mL

Apr May Jun Jul Aug Sep Oct Nov Dec
<table>
<thead>
<tr>
<th>8-3-2017</th>
<th>Christopher Brook</th>
<th>Hales Brook</th>
<th>Fawn Brook</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At Lake</td>
<td>Christopher Road</td>
<td>Clark Hill</td>
</tr>
<tr>
<td>Total Phosphorus ppb</td>
<td>111</td>
<td>60</td>
<td>85</td>
</tr>
<tr>
<td>Total Nitrogen ppb</td>
<td>939</td>
<td>842</td>
<td>687</td>
</tr>
<tr>
<td>Suspended Solids mg/L</td>
<td>16</td>
<td>10</td>
<td>13</td>
</tr>
</tbody>
</table>
Summary

- Water clarity is good for only two months every year; May and June.
- Water clarity declines rapidly in July as cyanobacteria numbers increase to reach seasonal low values between August-October.
- Temperature profiles show very strong stratification below about 3 meters that persists until October.
- Oxygen is depleted below 6 meters by June, and 5 meters by August.
- Oxygen and water temperature profiles show abnormalities in changes with depth suggesting groundwater influx.
- Phosphorus in upper waters mostly remains between 10 and 30 ppb suggesting that the lake has enough phosphorus generally to promote blooms.
- Phosphorus in bottom water can reach 150-300 ppb during summer, however it is unclear if these high concentrations are transferred to upper water.
- Nitrogen levels are good in spring months March – June, but rapidly increases in July to remain at high levels for the remainder of the season.
- Increased nitrogen levels occur contemporaneously with increased cyanobacteria numbers such that this is a good relationship between TN and cyanobacteria.
- It is unclear if there is transference between high bottom nitrogen an upper waters.
- High levels of nitrate nitrogen appear in the lake water in late fall and early spring indicative of watershed loading.
- Cyanobacteria numbers exceed 100,000 cells/mL each summer and fall
- Watershed nutrient loading may be getting worse based on declining vernal phosphorus content but inlets were not monitored in 2017