Loon Lake, Steuben Co., Loon Lake Association

2017 CSLAP Report

Lake Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Surface Area (ac/ha)</th>
<th>Max Depth (ft/m)</th>
<th>Mean Depth (ft/m)</th>
<th>Retention Time (years)</th>
<th>Water Class</th>
<th>Dam Class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>166</td>
<td>43</td>
<td>20</td>
<td>1.79</td>
<td>B</td>
<td></td>
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</table>

Watershed Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Watershed Area(ac/ha)</th>
<th>Watershed/Lake Ratio</th>
<th>Lake and Wetlands</th>
<th>Agricultural</th>
<th>Forests, shrubs, grasses</th>
<th>Residential</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2544</td>
<td>1029</td>
<td>8.1%</td>
<td>43.8%</td>
<td>41.6%</td>
<td>6.5%</td>
<td>0.0%</td>
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</tbody>
</table>

CSLAP Participation

<table>
<thead>
<tr>
<th></th>
<th>Years</th>
<th>Volunteers</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>1994-2017</td>
<td>Chris Feenaughty, John Pryor, Mary Lindsey, Roderic Lindsey</td>
</tr>
</tbody>
</table>

Trophic State

Mesotrophic

HABs Susceptibility

Moderate

Invasive Vulnerability

High

PWL Assessment

Fully Supports Uses

Open Water Indicators

<table>
<thead>
<tr>
<th></th>
<th>2017 Sampling Results</th>
<th>Seasonal Change</th>
<th>Long Term Avg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6/3</td>
<td>6/19</td>
<td>7/5</td>
</tr>
<tr>
<td>Chl.a (µg/L)</td>
<td>.1</td>
<td>.4</td>
<td>13.5</td>
</tr>
<tr>
<td>BG Chl.a (µg/L)</td>
<td>1.0</td>
<td>0.8</td>
<td>1.6</td>
</tr>
<tr>
<td>Clarity (m)</td>
<td>4.6</td>
<td>5.3</td>
<td>4.5</td>
</tr>
<tr>
<td>pH</td>
<td>7.5</td>
<td>8.1</td>
<td>7.6</td>
</tr>
<tr>
<td>Cond (µmho/cm)</td>
<td>138.3</td>
<td>132.3</td>
<td>128.5</td>
</tr>
<tr>
<td>Surf Temp (°C)</td>
<td>17</td>
<td>24</td>
<td>23</td>
</tr>
<tr>
<td>Bott Temp (°C)</td>
<td>16</td>
<td>23</td>
<td>21</td>
</tr>
<tr>
<td>TN (mg/L)</td>
<td>.383</td>
<td>.447</td>
<td>.758</td>
</tr>
<tr>
<td>TP (mg/L)</td>
<td>.009</td>
<td>.016</td>
<td>.018</td>
</tr>
<tr>
<td>Deep TP (mg/L)</td>
<td>.062</td>
<td>.012</td>
<td>.041</td>
</tr>
<tr>
<td>N:P Ratio</td>
<td>43</td>
<td>28</td>
<td>42</td>
</tr>
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</table>

Shoreline bloom and HABs notifications

<table>
<thead>
<tr>
<th>Date of first listing</th>
<th>Date of last listing</th>
<th># of weeks on DEC notification list</th>
<th># of weeks with updates</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
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</tbody>
</table>

Shoreline HAB Sample Dates 2017

<table>
<thead>
<tr>
<th>HAB Indicators</th>
<th>HAB Criteria</th>
<th>6/3</th>
<th>6/19</th>
<th>7/5</th>
<th>7/17</th>
<th>7/29</th>
<th>8/13</th>
<th>8/26</th>
<th>9/11</th>
<th>Seasonal Change</th>
<th>Long Term Avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGA</td>
<td>25 µg/L</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microcystin</td>
<td>20 µg/L</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anatoxin-a</td>
<td></td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
HAB Status

2017 Open Water Algae Samples

2017 Shoreline Algae Samples

2017 Open Water Toxin Levels

2017 Shoreline Toxin Levels

Loon Lake Long Term Trend Analysis

Clarity

Chlorophyll a

Surface and Deep Phosphorus

Lake Perception
Loon Lake Long Term Trend Analysis

Nitrogen

- TN
- NOx
- NH4

pH

- Highly Alkaline (Above NYS WQ standard)
- Slightly Alkaline (Acceptable)
- Circumneutral (Acceptable)
- Acidic (Below NYS WQ standard)

Temperature

- Surface
- Bottom

Specific Conductance

- Hardwater
- Softwater

Loon Lake In-Season Analysis

In Season Temperature

- 2017 Surface
- Typical Surface
- 2017 Bottom
- Typical Bottom

In Season Water Clarity

- Secchi Disk Transparency (m)
### Scorecard

#### Lake Use

<table>
<thead>
<tr>
<th></th>
<th>PWL</th>
<th>Average Year</th>
<th>2017</th>
<th>Primary Issue</th>
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<tbody>
<tr>
<td><strong>Potable Water</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Swimming</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>No impacts</td>
</tr>
<tr>
<td><strong>Recreation</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>Algae levels</td>
</tr>
<tr>
<td><strong>Aquatic Life</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>No impacts</td>
</tr>
<tr>
<td><strong>Aesthetics</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>Poor perception</td>
</tr>
<tr>
<td><strong>Habitat</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>Invasive plants</td>
</tr>
<tr>
<td><strong>Fish Consumption</strong></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

- **Green Circle**: Supported/Good
- **Yellow Triangle**: Threatened/Fair
- **Red Diamond**: Stressed/Poor
- **Black Square**: Impaired
- **White Square**: Not Known

*Average Year: 2017*
Summary

2017 compared to prior years: Loon Lake is mesotrophic, or moderately productive, based on intermediate levels of water clarity, algae, and nutrients. Algae levels, as measured by chlorophyll a, was lower than usual in 2016 and 2017, but phosphorus and water clarity readings were close to normal (in 2017), suggesting that these changes represent normal variability. Total nitrogen and surface coverage of aquatic plants was higher than usual in 2017.

Compared to nearby lakes: Loon Lake has higher water clarity, and lower nutrient and algae levels, than the typical nearby (Western region) lake. Aquatic plant coverage is usually slightly lower than in these other lakes, although plant coverage was more extensive in 2016 and 2017. Chloride levels are near the 50th percentile for New York lakes, suggesting a low to moderate potential for aquatic life impacts from road salt. However, no impacts have been measured or reported.

Trends: pH has increased in Loon Lake over the last 20 years, and calcium levels have decreased over the last fifteen years. Water clarity peaked in the mid-2000s and has been lower since then, despite a steady decrease in phosphorus since the late 1990s. However, these latter changes have not been statistically significant.

Algal blooms and HABS: Shoreline blooms have been documented on Loon Lake, with blooms comprised of Anabaena and other cyanobacteria species. Toxin levels have been low, and no blooms were reported in 2016 or 2017. Open water algae and toxin levels are usually low and the algae community is comprised of a mix of algae species.

Aquatic invasive species: Eurasian watermilfoil and curly leafed pondweed have been documented in Loon Lake. This indicates a high susceptibility to new introductions of AIS. It is not known if zebra mussels are present, as are found in many other lakes with periodic HABs but relatively low open water nutrient and algae levels. However, calcium levels are probably too low to support these invasive mussels.

Indicated Actions: Individual stewardship activities such as pumping your septic system, growing a buffer of native plants next to the water bodies, and reducing erosion from shoreline properties and runoff into the lake will help to improve lake health by reducing nutrient and sediment loading to the lake. Visiting boats should be inspected to reduce the risk of new invasive species, and continued monitoring for invasive species is warranted. Continued algae bloom education and monitoring is recommended. Shoreline blooms should be avoided, particularly since shoreline blooms are periodically reported in Loon Lake.
How to Read the Report

This guide provides a description of the CSLAP report by section and a glossary. The sampling site is indicated in the header for lakes with more than one routine sampling site.

**Physical Characteristics influence lake quality:**
- Surface area is the lake’s surface in acres and hectares.
- Max depth is the water depth measured at the deepest part of the lake in feet and meters.
- Mean depth is either known from lake bathymetry or is 0.46 of the maximum depth.
- Retention time is the time it takes for water to pass through a lake in years. This indicates the influence of the watershed on lake conditions.
- Lake classification describes the “best uses” for this lake. Class AA, AAspec, and A lakes may be used as sources of potable water. Class B lakes are suitable for contact recreational activities, like swimming. Class C lakes are suitable for non-contact recreational activities, including fishing, although they may still support swimming. The addition of a T or TS to any of these classes indicates the ability of a lake to support trout populations and/or trout spawning.
- Dam classification defines the hazard class of a dam. Class A, B, C, and D dams are defined as low, intermediate, high, or negligible/no hazard dams in that order. “0” indicates that no class has been assigned to a particular dam, or that no dam exists.

**Watershed characteristics influence lake water quality:**
- Watershed area in acres and hectares
- Land use data come from the most recent (2011) US Geological Survey National Land Use Cover dataset

**CSLAP Participation** lists the sampling years and the current year volunteers.

**Key lake status indicators summarize lake conditions:**
- Trophic state of a lake refers to its nutrient loading and productivity, measured by phosphorus, algae, and clarity. An oligotrophic lake has low nutrient and algae levels (low productivity) and high clarity while a eutrophic lake has high nutrient and algae levels (high productivity) and low clarity. Mesotrophic lakes fall in the middle.
- Harmful algal bloom susceptibility summarizes the available historical HAB data and indicates the potential for future HAB events.
- Invasive vulnerability indicates whether aquatic invasive species are found in this lake or in nearby lakes, indicating the potential for further introductions.
- Priority waterbody list (PWL) assessment is based on the assessment of use categories and summarized as fully supported, threatened, stressed,
impaired, or precluded. Aesthetics and habitat are evaluated as good, fair, or poor. The cited PWL assessment reflects the “worst” assessment for the lake. The full PWL assessment can be found at http://www.dec.ny.gov/chemical/36730.html#WIPWL.

Current year sampling results

- Results for each of the sampling sessions in the year are in tabular form. The seasonal change graphically shows the current year results. Red shading indicates eutrophic readings.
- HAB notification periods on the DEC website, updated weekly http://www.dec.ny.gov/chemical/83310.html
- Shoreline HAB sample dates and results. Samples are collected from the area that appears to have the worst bloom. Red shading indicates a confirmed HAB.
- HAB sample algae analysis. Algae types typically change during the season. These charts show the amount of the different types of algae found in each mid-lake or shoreline sample. Samples with high levels of BGA are HABs. The second set of charts show the level of toxins found in open water and shoreline samples compared to the World Health Organization (WHO) guidelines.
- If there are more than ten shoreline bloom samples collected in a year, bloom sample information is instead summarized by month (May-Oct.) as minimum, average, and maximum values for blue-green algae and microcystin.

Long Term Trend Analysis puts the current year findings in context. Summer averages (mid-June thru mid-September) for each of the CSLAP years show trends in key water quality indicators. The graphs include relevant criteria (trophic categories, water quality standards, etc.) and boundaries separating these criteria.

In-Season Analysis shows water temperature and water clarity during the sampling season. These indicate seasonal changes and show the sample year results compared to the typical historical readings for those dates.

The Lake Use Scorecard presents the results of the existing Priority Waterbody List assessment for this lake in a graphical form and compares it to information from the current year and average values from CSLAP data and other lake information. Primary issues that could impact specific use categories are identified, although more issues could also affect each designated use.

The Lake Summary reviews and encapsulates the data in the lake report, and provides suggested actions for lake management.
Glossary of water quality and HAB indicators

**Clarity (m):** The depth to which a Secchi disk lowered into the water is visible, measured in meters. Water clarity is one of the trophic indicators for each lake.

**TP (mg/L):** Total phosphorus, measured in milligrams per liter at the lake surface (1.5 meters below the surface). TP includes all dissolved and particulate forms of phosphorus.

**Deep TP:** Total phosphorus measured in milligrams per liter at depth (1-2 meters above the lake bottom at the deepest part of the lake)

**TN:** Total nitrogen, measured in milligrams per liter at the lake surface. TN includes all forms of nitrogen, including NOx (nitrite and nitrate) and NH4 (ammonia).

**N:P Ratio:** The ratio of total nitrogen to total phosphorus, unitless (mass ratio). This ratio helps determine if a lake is phosphorous or nitrogen limited.

**Chl.a (µg/L):** Chlorophyll a, measured in micrograms per liter. Indicates the amount of algae in the water column.

**pH:** A range from 0 to 14, with 0 being the most acidic and 14 being the most basic or alkaline. A healthy lake generally ranges between 6.5 and 8.5.

**Cond (µmho/cm):** Specific conductance is a measure of the conductivity of water. A higher value indicates the presence of more dissolved ions. High ion concentrations indicate hardwater, and low show softwater.

**Upper Temp (°C):** Surface temperature, measured in degrees Celsius

**Deep Temp (°C):** Bottom temperature, measured in degrees Celsius

**BG Chl.a (µg/L):** Chlorophyll a from blue-green algae, measured in micrograms per liter

**HABs:** Harmful Algal Blooms. Algal blooms that have the appearance of cyanobacteria (BGA)

**BGA:** Blue-green algae, also known as cyanobacteria

**Microcystin (µg/L):** The most common HAB liver toxin; total microcystin above 20 micrograms per liter indicates a “high toxin” bloom. However, ALL BGA blooms should be avoided, even if toxin levels are low.

**Anatoxin-a (µg/L):** A toxin that may be produced in a HAB which targets the central nervous system. Neither EPA nor NYS has developed a risk threshold for anatoxin-a, although readings above 4 micrograms per liter are believed to represent an elevated risk.