Talk to Me

Generating Interest in Water Quality Through Better Reporting

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Volunteer Lake Assessment Program
NH Dept. of Environmental Services
Talk to Me:

Can you swim and recreate?
Can aquatic life survive?

Seen something fishy?
Want answers about that lake’s water quality?
Join the New Hampshire Department of Environmental Services (DES) Volunteer Lake Assessment Program (VLAP) and find out!

Is NH lake water quality getting better, worse or staying the same?

25 for 25: Tackling Phosphorus in our Lakes. Great progress has been made in 25 years.
OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from Angle Pond, Sandown, the program coordinators have made the following observations and recommendations.

Thank you for your continued hard work sampling the pond this year! Your monitoring group sampled the deep spot three times this year and has done so for many years. As you know, conducting multiple sampling events each year enables DES to more accurately detect water quality changes. Keep up the good work!

FIGURE INTERPRETATION

CHLOROPHYLL-A

Figure 1 and Table 1 in Appendix A depicts the historical and current year chlorophyll-a concentration in the water column. Table 1 in Appendix B lists the minimum, maximum, and mean concentration for each year that the pond has been monitored through VLAP.

Chlorophyll-a, a pigment found in plants, is an indicator of the algal abundance. Algae (also known as phytoplankton) are typically microscopic, chlorophyll-producing plants that naturally occur in lake ecosystems. The chlorophyll-a concentration measured in the water gives biologists an estimate of the algal concentration or lake productivity. The median summer chlorophyll-a concentration for New Hampshire’s lakes and ponds is 4.58 mg/m³.

The current year data (the top graph) show that the chlorophyll-a concentration increased slightly from June to July, and then decreased from July to August.

The historical data (the bottom graph) show that the 2010 chlorophyll-a mean is less than the state and similar lake medians, and was the lowest mean chlorophyll-a concentration measured since monitoring began. For more information on the similar lake median, refer to Appendix F.
VLAP Reports

Number of VLAP Lakes Monitored 1985-2013

Lakes Participating in VLAP

Years


0 20 40 60 80 100 120 140 160 180 200


1 2 5 16 29 70 103 108 114 112 117 123 126 127 131 141 148 154 155 161 164 178 178 178 178 178 170 171 171 182 178 178 178 178
New VLAP Reports

- Review of New England state program reports.
- Meet audience needs?
- One report for all lakes.
  - Regional Reports (2012)
- Individual reports for all lakes.
  - Individual lake reports (2013)
- Staff requirements.
Regional Reports

- 7 Geographical Regions
  - HUC 8 Watersheds (18)
- Looking at regional water quality.
  - Trends specific to regions.
  - Regional influences.
Regional Reports

- Land Use
- Exotic Species
- Geology
- Climate
- Water Quality Trends

Figure 8. MV Region Average Annual Transparency
Individual Lake Reports

- Two Page
- User-Friendly
- Distribute widely
- Curb Appeal
Individual Lake Reports

- Land Use
- Lake Trophic Surveys
- Waterbody Assessment
- Exotic Species
- Beaches
<table>
<thead>
<tr>
<th>Designated Use</th>
<th>Parameter</th>
<th>Category</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic Life</td>
<td>Phosphorus (Total)</td>
<td>Good</td>
<td>&gt;/= 5 samples and median is &lt; threshold but &gt; 1/2 threshold value.</td>
</tr>
<tr>
<td></td>
<td>pH</td>
<td>Slightly Bad</td>
<td>&gt;10% of samples exceed criteria by a small margin (minimum of 2 exceedances).</td>
</tr>
<tr>
<td></td>
<td>D.O. (mg/L)</td>
<td>Encouraging</td>
<td>&lt; 10 samples and no exceedance of criteria. More data needed.</td>
</tr>
<tr>
<td></td>
<td>D.O. (% sat)</td>
<td>Slightly Bad</td>
<td>&gt;10% of samples exceed criteria by a small margin (minimum of 2 exceedances).</td>
</tr>
<tr>
<td></td>
<td>Chlorophyll-a</td>
<td>Good</td>
<td>&gt;/= 5 samples and median is &lt; threshold but &gt; 1/2 threshold value.</td>
</tr>
<tr>
<td>Primary Contact Recreation</td>
<td>E. coli</td>
<td>Very Good</td>
<td>All bacteria samples &lt; 75% of geometric mean criteria, but not enough to calculate geometric means. Or, all bacteria samples are &lt; single sample criteria and calculated geometric means are less than geometric mean criteria.</td>
</tr>
<tr>
<td></td>
<td>Chlorophyll-a</td>
<td>Very Good</td>
<td>At least 30 samples with no exceedances of criteria.</td>
</tr>
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</table>
WATERSHED LAND USE SUMMARY


ROCKBOUND POND

Legend
- Water Bodies
- Other U.S. Wetlands
- Land Use Classes
- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Forest Land
- Coniferous Forest
- Mixed Forest
- Alkaline Crops
- Gravel/Cobble
turf/Grass
- Emergent Vegetation

<table>
<thead>
<tr>
<th>Land Cover Category</th>
<th>% Cover</th>
<th>Land Cover Category</th>
<th>% Cover</th>
<th>Land Cover Category</th>
<th>% Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Water</td>
<td>14.2</td>
<td>Burnt Land</td>
<td>0</td>
<td>Grassland/Turfgrass</td>
<td>0</td>
</tr>
<tr>
<td>Developed, Open</td>
<td>19.7</td>
<td>Deciduous Forest</td>
<td>13.45</td>
<td>Pasture Hay</td>
<td>5.28</td>
</tr>
<tr>
<td>Developed, Low</td>
<td>6.34</td>
<td>Evergreen Forest</td>
<td>13.12</td>
<td>Cultivated Crops</td>
<td>0</td>
</tr>
<tr>
<td>Developed, Medium</td>
<td>0</td>
<td>Mixed Forest</td>
<td>46.04</td>
<td>Woody Wetlands</td>
<td>1.71</td>
</tr>
<tr>
<td>Developed, High</td>
<td>0</td>
<td>Shrub/Scrub</td>
<td>0</td>
<td>Emergent Wetlands</td>
<td>0</td>
</tr>
</tbody>
</table>
Individual Lake Reports – Page 2

Volunteer Lake Assessment Program Individual Lake Reports
Rockyound Pond, Croydon, NH
2013 Data Summary

Observations and Recommendations (Refer to Table 1 and Historical Deep Spot Data Graphic)

- **Chlorophyll-a**: Chlorophyll levels were low in June and August and below the state median.
- **Conductivity/Chloride**: Conductivity levels were slightly greater than the state median and historical trend analysis indicates significantly increasing (worsening) epilimnetic conductivity since monitoring began.
- **E. Coli**: E. coli levels were well below state standards for surface waters.
- **Total Phosphorus**: Deep spot and tributary phosphorus levels were low and stable throughout the sampling season. Hypolimnetic phosphorus was slightly elevated in August and the turbidity was also slightly elevated. Historical trend analysis indicates relatively stable epilimnetic phosphorus with moderate variability between years.
- **Transparency**: Transparency improved slightly from 2012 and was greater than the state median. Historical trend analysis indicates stable transparency with low variability between years.
- **Turbidity**: Hypolimnetic turbidity was slightly elevated in August.
- **pH**: pH decreased to undesirable levels in the hypolimnion.
- **Dissolved Oxygen**: Dissolved oxygen levels were depleted in the hypolimnion in June. As the summer progresses, decomposition of organic matter on the lake bottom uses up available oxygen in the hypolimnion. This could lead to the release of phosphorus from lake sediments.
- **Phytoplankton**: There was a healthy and diverse mix of phytoplankton.
- **Recommended Actions**: Conductivity has increased in the pond since monitoring began. Work with local road agents, lake and watershed residents to identify potential causes of the increased conductivity, including road, driveway and walkway salting, septic systems, and fertilizers. Keep up the great work!

Table 1: 2013 Average Water Quality Data for ROCKYBOUND POND

<table>
<thead>
<tr>
<th>Station</th>
<th>NYS</th>
<th>VS</th>
<th>VS</th>
<th>VS</th>
<th>VS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epilimnion</td>
<td>6.39</td>
<td>3.01</td>
<td>62.5</td>
<td>5</td>
<td>5.38</td>
</tr>
<tr>
<td>Metaplimnion</td>
<td>62.5</td>
<td>8</td>
<td>8</td>
<td>7.95</td>
<td>6.62</td>
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<tr>
<td>Hypolimnion</td>
<td>68.1</td>
<td>10</td>
<td>15</td>
<td>3.55</td>
<td>3.91</td>
</tr>
<tr>
<td>W1 Public Beach/Inlet</td>
<td>68.9</td>
<td>7</td>
<td>68.9</td>
<td>6.06</td>
<td></td>
</tr>
<tr>
<td>W3 Home</td>
<td>63.5</td>
<td>10</td>
<td>8</td>
<td>6.03</td>
<td>6.69</td>
</tr>
<tr>
<td>W5 Swisses</td>
<td>62.4</td>
<td>7</td>
<td>62.4</td>
<td>6.73</td>
<td></td>
</tr>
<tr>
<td>W6 Outlet</td>
<td>68.7</td>
<td>7</td>
<td>68.7</td>
<td>6.76</td>
<td></td>
</tr>
<tr>
<td>W8 Inlet Inlet</td>
<td>68.9</td>
<td>4</td>
<td>68.9</td>
<td>6.64</td>
<td></td>
</tr>
</tbody>
</table>

NH Water Quality Standards: Numeric criteria for specific parameters. Results exceeding criteria are considered a water quality violation.

- **Chloride**: < 2.30 mg/L (chronic)
- **E. Coli**: > 83 cts/100 mL – public beach
- **E. Coli**: > 406 cts/100 mL – surface waters
- **Turbidity**: > 39 NTU above natural level
- **pH**: 6.5-8.0 (unless naturally occurring)

NH Median Values: Median values for specific parameters generated from historic lake monitoring data.

- **Alkalinity**: 4.9 mg/L
- **Chlorophyll-a**: 4.58 mg/m³
- **Conductivity**: 40.0 uS/cm
- **Chloride**: 4 mg/L
- **Total Phosphorus**: 12 ug/L
- **Transparency**: 3.2 m
- **pH**: 6.6
“I want to tell you how impressed I am with the DLS Regional Report I received last week. The idea of a regional report makes all sorts of good sense, providing useful comparisons within the common area. The report was obviously well researched and clearly and thoughtfully presented. The descriptions and analysis of trends was complete yet concise; I felt the accompanying graphs were particularly useful. It is evident that a good deal of time, care, and thought and effort went into this production. It is appreciated, and I thank you, Sara.”

“This is great! I’ll pass onto lake officers and fellow testers. I’ll also pass on Guide to Storm water management to see what we can do to curb run offs as indicated. After reading the article, I’ll ask if you think we need more testing in those areas.”

“I think the reports are excellent and the recent change to make comparisons by regions is great so that we have a baseline to compare.”

“I LOVE the 2012 individual lake reports. Great format to share with the association members and residents. nice job!”
The Waterbody Report Card tables are generated from the 2012 305(b) report on the status of N.H. waters, and are based on data collected from 2001-2011.

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<tr>
<td>Aquatic Life</td>
<td>Phosphorus (Total)</td>
<td>Very Good</td>
<td>&lt;1 ppm and median x ± 1/2 threshold.</td>
</tr>
<tr>
<td></td>
<td>pH</td>
<td>Slightly Bad</td>
<td>&gt;10% of samples exceed criteria by a small margin (minimum of 2 exceedances).</td>
</tr>
<tr>
<td></td>
<td>D.O. (mg/L)</td>
<td>Bad</td>
<td>&lt;60%, with a minimum of 2 samples exceed criteria, with 1 or more by a large margin.</td>
</tr>
<tr>
<td></td>
<td>Chlorophyll a</td>
<td>Slightly Bad</td>
<td>&gt;10% of samples exceed criteria by a small margin (minimum of 2 exceedances).</td>
</tr>
<tr>
<td>Primary Contact Recreation</td>
<td>E. coli</td>
<td>No Data</td>
<td>No Data for the parameter.</td>
</tr>
<tr>
<td></td>
<td>Chlorophyll a</td>
<td>Cautionsary</td>
<td>&gt;10 samples and median x ± 1/2 threshold.</td>
</tr>
</tbody>
</table>

HOW TO READ YOUR VLAP REPORT

1. Use the Waterbody Report Card to see if the lake is a good or bad for aquatic use. If it is good, check the map to see if there are any known harmful species or if there is a species-specific chemical sample.
2. The map shows the location of the lake and can affect the physical, chemical and biological properties of the lake. A lake's character can be best described by a bathymetric map.
3. The phosphorus retention coefficient can be used to estimate the amount of phosphorus that is not lost through surface and subsurface in the water body.
4. The phosphorus retention coefficient of a lake is calculated by dividing the volume at the surface of the lake by its volume at the bottom. This ratio gives an indication of the phosphorus retention capacity of the lake. A ratio of 1 means that the lake has a high phosphorus retention capacity and is more likely to be eutrophic. A ratio of 0.5 means that the lake has a low phosphorus retention capacity and is more likely to be oligotrophic.
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Water Quality Assessment Criteria

Water Quality Assessment Criteria (WQAC) are used to evaluate the quality of a specific water body. WQAC's are used to determine if a water body is achieving its designated use. WQAC's are divided into two categories: physical criteria and biological criteria.

Physical Criteria:

1. Conductivity: Conductivity is the ability of a water body to conduct electricity. Conductivity is measured in microsiemens per centimeter (μS/cm). The following conductivity levels are used:
   - <50 μS/cm: Very Good
   - 51-100 μS/cm: Good
   - 101-200 μS/cm: Slightly Good
   - 201-300 μS/cm: Slightly Bad
   - >300 μS/cm: Bad

2. pH: pH is a measure of the acidity or basicity of a water body. The following pH levels are used:
   - 6.5 - 8.5: Very Good
   - 8.6 - 9.5: Good
   - >9.5: Slightly Good
   - <6.5: Slightly Bad
   - <6.0: Bad

3. Chlorophyll a: Chlorophyll a is a pigment that is used to determine the amount of algae in a water body. The following chlorophyll a levels are used:
   - <2.0 μg/L: Very Good
   - 2.1-5.0 μg/L: Good
   - 5.1-10 μg/L: Slightly Good
   - 10.1-20 μg/L: Slightly Bad
   - >20 μg/L: Bad

4. Dissolved Oxygen (DO): Dissolved Oxygen is the amount of oxygen dissolved in a water body. The following DO levels are used:
   - >6.5 mg/L: Very Good
   - 6.6-9 mg/L: Good
   - 9.1-12 mg/L: Slightly Good
   - 12.1-15 mg/L: Slightly Bad
   - >15 mg/L: Bad
Continue to evolve and provide useful data to make informed decisions on local and state level.

Questions?

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(603) 271-2658