Is Mapping Water Quality via Satellite Viable?
(for NH lakes)

Bill Gassman
Email: gassman@aspi.net
Twitter: @bgassman
Conservation Commission
Moultonborough, NH
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Topics:
• Science
• Technology
• Proof of concept
• Summary
• Questions
Ratios of reflected light intensity is “fingerprint” for the element
Technology – Bluewater Satellite, Inc.

- [www.bluewatersatellite.com](http://www.bluewatersatellite.com)
- Uses Landsat and other satellites (Landsat 8 launched 2/11/13)
- Funding from NASA and NOAA
- Peer reviewed science (algorithms and calibration)
- Exclusive patent license from Bowling Green State University
- 5 samples/acre (30x30 meter pixel) GIS format
- Historical data available back to 1984
## Range and Accuracy

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Range</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyanobacteria (Phycocyanin)</td>
<td>0-17 ppb</td>
<td>±2 ppb</td>
</tr>
<tr>
<td>Cyanobacteria (Phycocyanin)</td>
<td>17-60 ppb&lt;sup&gt;A&lt;/sup&gt;</td>
<td>±17 ppb</td>
</tr>
<tr>
<td>Total Phosphorus Water (TPW)</td>
<td>0-20 ppb</td>
<td>±6 ppb</td>
</tr>
<tr>
<td>Total Phosphorus Water (TPW)</td>
<td>20-100 ppb</td>
<td>±11 ppb</td>
</tr>
<tr>
<td>Total Phosphorus Land (TPL)</td>
<td>0-4000 ppm</td>
<td>±530 ppm</td>
</tr>
<tr>
<td>Chlorophyll-a</td>
<td>1-155 ppb</td>
<td>±22 ppb</td>
</tr>
<tr>
<td>Temperature</td>
<td>1.9 - 27.6&lt;sup&gt;⁰C&lt;/sup&gt;</td>
<td>± 1.52&lt;sup&gt;⁰C&lt;/sup&gt;</td>
</tr>
<tr>
<td>Aquatic Vegetation</td>
<td>Relative</td>
<td>Presence/Absence</td>
</tr>
</tbody>
</table>

Note: ppb = parts per billion

Note: ppm = parts per million
Proof of Concept #1
Landsat 5
Raw Image
August 30, 2010
Path 12  Row 30
Source:
earthexplorer.usgs.gov/
Total Phosphorus Measurements within Moultonborough Sub-Watersheds

Site | UNH | Sat | Δ
---|---|---|---
1 | 5.6 | 4.7 | -0.9
2 | 6.9 | 11.3 | +4.4
3 | 8.5 | 9.3 | +0.8
4 | 8.6 | 6.5 | -2.1
5 | 9.0 | 2.6 | -8.4
6 | 11.0 | 13.4 | +2.4
7 | 8.5 | 8.8 | +0.3

July 16, 2011
The Landsat Data Continuity Mission collects data from several regions of the electromagnetic spectrum. This is the first data from the mission.

Three wavelengths are colored red, green, and blue, and then combined to make a single image.

Different features of the landscape can be highlighted by combining different wavelengths. The burned area after a wildfire reflects strongly in the shortwave infrared, therefore the fire scar in the image is a strong red color.

Source: NASA
Summary

- Today’s Value: Identify new areas of concern
  - Noisy data, but “heat” signatures show up
- Masking (6x50) & GIS work required
- Costs: Full Winnipesaukee analysis $6500
- Low level “P” accuracy is evolving (and needs to)
- Landsat 8 offers hope (commercial data in May)
- Future Projects:
  - Sub-watershed averages, ID septic failures and inlet loading
Is Mapping Water Quality via Satellite Viable?
<Soon, maybe>

Questions?

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