Mill Ponds Cyanobacteria Monitoring Update

July 5, 2018

Bryan Horsley, Restoration Technician
Association to Preserve Cape Cod
What’s been done so far

- Held training event for BPC volunteers on May 11, 2018
- Began collecting samples in Walkers, Upper Mill, and Lower Mill on May 4, 2018
- Been collecting and processing samples weekly for 10-weeks at all three ponds
- 270 samples processed and analyzed so far
- Working in Town NR garage – potentially moving to old fire station soon
- Work in Walkers and Upper Mill completed by APCC staff and interns (Bryan, Kevin, and Kathleen)
- Work in Lower Mill completed by APCC staff, interns, and Nancy Ortiz of BPC
- Met with Nancy Leland and Karen Malkus Tuesday this week for update and exchanged samples for toxin analysis at UNH.
What we’ve found so far (who’s there)

- Scope images weekly at each pond using gridded slide to measure cyanobacteria genera dominance (*Dolichospermum* vs. *Microcystis* so far)
- All three ponds are *Dolichospermum* dominant
What we’ve found so far (who’s there now)

- Recently noticed changes in morphology - initially very dense *Dolichospermum lemmermannii* clumps appear to be becoming less dense, breaking apart
- Recent appearance of new species *D. planctonicum*.
- Appearance of this new species appears to coincide with early season spike and crash in biomass of *D. lemmermannii*, possibly allowing for succession of new species, *D. planctonicum*. 
What we’ve found so far (how much is there)
What’s this mean

• Rise and fall of phycocyanin likely due to succession of species/genus.
• We likely have some level of toxicity in all three ponds.
• Based on last year’s data its not yet exceeding OHA dog standard for microcystis toxin (0.2ug/L), but close to it (expected at 500ug/L PC).
• If microcystis becomes dominant things could change quickly (higher toxicity per pigment concentration).
Estimating toxin concentration using 2017 results

\[
\text{Log MC} = (0.694 \times \text{Log PC}) + 0.445
\]
\[ \text{Log MC} = (1.078 \times \text{Log PC}) + 0.259 \]

**Microcystis dominated system**

<table>
<thead>
<tr>
<th>PC ((\mu\text{g l}^{-1}))</th>
<th>Total microcystins ((\mu\text{g l}^{-1}))</th>
<th>PC ((\mu\text{g l}^{-1}))</th>
<th>Total microcystins ((\mu\text{g l}^{-1}))</th>
<th>PC ((\mu\text{g l}^{-1}))</th>
<th>Total microcystins ((\mu\text{g l}^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>(&lt;50\mu\text{m})</td>
<td>Mean C.I.(−) C.I.(+)</td>
<td>(&lt;50\mu\text{m}) Mean C.I.(−) C.I.(+)</td>
<td>(&lt;50\mu\text{m}) Mean C.I.(−) C.I.(+)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>0.022 0.016 0.030</td>
<td>10</td>
<td>0.022 0.016 0.030</td>
<td>500</td>
<td>1.47 1.09 1.99</td>
</tr>
<tr>
<td>20</td>
<td>0.046 0.035 0.061</td>
<td>20</td>
<td>0.046 0.035 0.061</td>
<td>1000</td>
<td>3.11 2.19 4.42</td>
</tr>
<tr>
<td>30</td>
<td>0.071 0.055 0.092</td>
<td>25</td>
<td>0.058 0.045 0.076</td>
<td>2000</td>
<td>6.58 4.35 9.89</td>
</tr>
<tr>
<td>40</td>
<td>0.097 0.076 0.124</td>
<td>50</td>
<td>0.123 0.097 0.157</td>
<td>3000</td>
<td>10.16 6.50 15.88</td>
</tr>
<tr>
<td>50</td>
<td>0.123 0.097 0.157</td>
<td>75</td>
<td>0.191 0.151 0.241</td>
<td>5000</td>
<td>17.62 10.75 28.88</td>
</tr>
<tr>
<td>75</td>
<td>0.191 0.151 0.241</td>
<td>100</td>
<td>0.260 0.206 0.328</td>
<td>8000</td>
<td>29.31 17.06 50.13</td>
</tr>
<tr>
<td>100</td>
<td>0.260 0.206 0.328</td>
<td>125</td>
<td>0.330 0.261 0.419</td>
<td>10000</td>
<td>37.24 21.23 65.15</td>
</tr>
<tr>
<td>150</td>
<td>0.403 0.316 0.512</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
What happened in July 2017? Likely a spike in PC and bloom prior to August 1.
Next steps

• Stay the course (sampling, tracking data, alerting town when needed)
• Would like to have some more BPC involvement with sample collection, processing, analysis, perhaps photography
• Call for volunteers on Tuesdays 9am to 2pm (BH to reach out to group)
• Visual inspection of ponds in early morning (photograph scums on shore or surface of water, send to me and upload to Bloomwatch app).
• Updates on toxin analysis to Town and BPC asap
• End of season update

Bryan Horsley
bhorsley@apcc.org