Rediscovering HABs in SC

Emily Bores
SC TASK GROUP ON HARMFUL ALGAE

- Organized in 1997 as a response to a *Pfiesteria* outbreak in Maryland
- Multi-institutional collaboration to monitor and study HABs
- Last published newsletter: Spring 2005
SC TASK GROUP ON HARMFUL ALGAE- Part 2??

- Lyngbya blooms on Wateree
- SC HABs workgroup
- NOAA, DNR, USGS, SC Sea Grant Consortium
- Freshwater AND Saltwater
Phytoplankton ID’s

• Trained by NOAA to ID freshwater toxic algae
• ID for potential toxic cyanobacteria:
  • Aphanizomenon- Saxitoxin
  • Dolichospermum- Anatoxin-a
  • Cylindrospermopsis- Cylindrospermopsin
  • Microcystis- Microcystin
  • Planktothrix- Anatoxin, Microcystin
• Receive confirmation from NOAA
• Toxin Analysis
Algal ID’s
Summer 2018 Background Study
Methodology: Enzyme Linked Immunosorbent Assay (ELISA)

• Why ELISA??
  • One of the most common techniques for screening
  • Relatively Inexpensive

• What toxins??
  • Why Microcystins and Cylindrospermopsin?
  • EPA Guidelines
EPA Drinking Water Health Advisory (10 day)

<table>
<thead>
<tr>
<th>Cyanotoxin</th>
<th>Bottle-fed infants and pre-school children</th>
<th>School-age children and adults</th>
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<tbody>
<tr>
<td>Microcystins</td>
<td>0.3 µg/L</td>
<td>1.6 µg/L</td>
</tr>
<tr>
<td>Cylindrospermopsin</td>
<td>0.7 µg/L</td>
<td>3 µg/L</td>
</tr>
</tbody>
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# EPA Recreational And Swimming Criteria

<table>
<thead>
<tr>
<th>Microcystins Magnitude (ug/L)</th>
<th>Cylindrospermopsin Magnitude (ug/L)</th>
<th>Duration</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>15</td>
<td>1 in 10 day assessment period across a recreational season</td>
<td>More than 3 excursions in a recreational season, not to be exceeded in more than one year</td>
</tr>
</tbody>
</table>
Methodology: ELISA

- 96-well microtiter plate-coated
- Standards, control, samples, LRB
  - Cell lysing (freeze and thaw)
  - Filter samples
- Antibody solution, enzyme conjugate solution, color solution, stop solution
- Read absorbance at 450nm in plate reader
Microtiter Plate (12x8 strips)
Cylindrospermopsin Results

• Out of the three months of sampling, only one routine station had a quantifiable amount of cylindrospermopsin

• A fish kill had presence of cylindrospermopsin- 0.060 ug/L
Conclusions

• Examined Nutrients, Chlorophyll, Ammonia, and Turbidity at the lakes
  • All below water quality parameters
  • No direct correlation

• Quantifiable results, but still low in terms of recreational criteria

• Potential for future toxic blooms
Random Algal Bloom: Microcystins Results

![Graph showing Microcystins concentration in different sites. The x-axis represents various sites including Water area 1, Water area 2, Goose Creek Reservoir, Fish Kill, Elms of Charleston, Walton Pond-Chapin, C1 Water area Cove, BCL 1, BCL 2, and BCL 3. The y-axis represents concentration in ug/L ranging from 0 to 0.35. The graph shows varying concentrations across different sites.](image-url)
What’s next???

• Relatively mild summer in terms of blooms
• Continue study in 2019: base and random lake sites and potential handpicked sites
  • Expand to Drinking Water intake locations
• Focus: Microcystins
• Phytoplankton nets
• Adopt EPA draft recreational standards once they become official
CONTACT US

QUESTIONS??

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