Building Successful Partnerships – Rowing the Same Direction

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Presentation roadmap

• HAB research coordination in KS
  – KU Field Station – Aquatic Facility

• 2 collaborative projects at KUFS
  – 2018 Tank Project Overview
  – High-frequency monitoring at Cross Reservoir
    • Vertical profiling
    • Sub-hour nutrient data
HAB research coordination in KS

- Started in 2017 by Kansas Water Office

- Working group with Federal, State, & University

- 31 members from 10 KS universities or agencies

- Primary goal to identify research gaps for KS
HAB research coordination in KS

• Identified short- and long-term priorities

• Short-term
  – What is the historical context for HABs?
  – Terrestrial-aquatic interactions (Nutrients)

• Long-term
  – Are there HAB early-warning signs?
    • High-Frequency WQ monitoring
Experimentally Studying Management

Manage causes to better control effects

- Experimental Reservoir and Watershed
  - 50 ha.
  - 3 ha. 12 m deep

- Experimental Ponds and Tanks
  - 100 ponds

- 80 10 m³ tanks

1977 to Present

deNoyelles, Kettle and Sinn 1982
deNoyelles et al. 2016
2018 Tank Experiment

• Does nutrient form control HAB toxins?

• Goal:
  – Examine how nutrient limit regimes (N and P) and forms (NO₃ and NH₃) affect cyano + toxins

• Funded by KS Water Resource Institute

• Collab. with KBS, Mizzou, EPA R7, EPA ORD
### Milford 2017 → KUFS storage + 2018 Milford inoculum w/ 6 Treatments

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Target N:P</th>
<th>N-limited?</th>
<th>P-limited?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Ambient</td>
<td>Ambient</td>
<td>Ambient</td>
</tr>
<tr>
<td>+ Nitrate</td>
<td>20:1</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>+ P &amp; Nitrate</td>
<td>4:1</td>
<td>Yes</td>
<td>No</td>
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<td>+ Ammonium</td>
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</tbody>
</table>
Algae/water from Milford
Stir to homogenize while dosing
Put Milford water in tanks
Dose tanks with nutrients
13-Aug-2018 - Same tanks as previous picture after 21 days. Note surface scums on N-limit tanks.
Sample water column for:

* MultiProbe Parameters
* Nutrients / Light
* Algae
* Zoops

Microbes, toxins, & genes
• On-site filter processing for qPCR and Phylochip Samples in EPA Mobile Lab
• Analysis of Phycocyanin and Chlorophyll
• Aliquot collected for EPA laboratory analysis of NO3/NO2
• Aliquot collected for EPA ORD analysis of Microcystin congeners by Dr. Heath Mash
• Processing in EPA lab for qPCR
  – Looking for genetic markers indicating cyanobacteria
  – Toxin producing gene sequences for MC, CYL, and SAX
• Phylochip for bacterial community analysis
Profiling Prototype

Building a platform to float “BOB”
Who needs floats, we’ve got boats!

A couple of batteries, a solar panel, and BOB.
Tying it up.

Cross has three central buoys for this sort of thing.
You can lead a STĒPH to water

Region 7 and Kansas Biological Survey moving the platform.
The other brains of the operation

Stephen Krabbe doing some final checks before deployment.
Pretty much the worst paddler ever.

Regina Klepikow – Region 7
STĒPH, Stephen, and Steve

The Steves.
WIZ – Water Insitu AnalyZer
Thank You!