Advancing Environmental Solutions

2019 – 2020 Harmful Cyanobacterial Bloom Team

BY: BEN HOLCOMB, UTAH DIVISION OF WQ

Great Plains and Midwest HABs Workshop
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What is ITRC?

- ITRC is a **state-led coalition** working to advance the use of innovative environmental technologies and approaches. ITRC’s work translates good science into better decision making.
Purpose and Mission

- **ITRC Purpose**
  
  To advance innovative environmental decision making

- **ITRC Mission**
  
  To develop information resources and processes to break down barriers to the use of technically sound innovative solutions for healthy communities, economy and environment
Our Unique Network
How We Achieve Our Mission

1. Select Projects
2. Form Team
3. Develop Documents, Training, and Other Tools
4. Conduct Training and Outreach
5. Implement Solutions
ITRC Focus Areas

Remediation

Water

Land

Air
Reducing Barriers

- Providing guidance and training developed for state regulators by our Teams
- Increasing understanding and confidence in innovative technologies
- Fostering integration of new technical developments
- Creating networks of technical experts
Training: 1997 to 2018

ITRC Training Participation (By Group Type)

- State/Local Government
- Private Sector
- Federal Government
- Academia
- Public and Tribal Stakeholders
- Other

Number of Participants

0 10000 20000 30000 40000 50000 60000 70000

Group Type
2019 Teams

- 1,4-Dioxane (NEW)
- Harmful Cyanobacterial Blooms (NEW)
- Incremental Sampling Methodology Update (NEW)
- Per- and Polyfluoroalkyl Substances (PFAS)
- Advanced Site Characterization Tools (ASCT)
- In Situ Optimization
2019 Teams: Harmful Cyanobacterial Blooms

- January – December 2019
- >200 total members, 90 state members
- Will produce a web document (portal), strategy selection tools, training curricula, and fact sheets

What are Harmful Cyanobacterial Blooms (HCB)?
A complex ecological phenomenon that occurs when cyanobacteria proliferate and dominate an aquatic ecosystem. Triggers for increased HCBs include a rapidly warming climate and increased levels of nutrients in surface waters.

Team Leaders

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The purpose of this guidance and interactive strategy selections tools is to: provide basic and current information on cyanobacteria ecology; summarize key strategies to prevent HCBs from occurring; summarize validated HCB management strategies; outline key elements of successful risk communication; and direct readers to case studies, online resources and other information that support the development of HCB prevention, management and communications plans.
Cyanobacteria, also known as blue-green algae, are photosynthetic prokaryotic organisms that live in a wide range of environments, from the poles to the equator, both in the water and on the land.

2 Using this Guidance
The purpose of this guidance document and the interactive strategy selection tool is to:
- Provide basic, current information about cyanobacteria ecology.
- Summarize key strategies to prevent HCBs.
- Summarize validated HCB control strategies.
- Outline key elements of successful risk communication.
- Direct readers to case studies, online resources and other information that support the development of HCB prevention, management and communication plans.

3 Introduction
3.1 What are cyanobacteria?
Cyanobacteria, also known as blue-green algae, are not true algae but a normal component of the water and bottom-dwelling biological communities.
3 Selection Tool
Welcome to the Prevention Selection Tool!
Select a scenario that best describes your current situation and waterbody.
### Management Strategies for your Waterbody

| Waterbody type: | select waterbody type |
| Trophic state: | select trophic state |
| Mixing regime: | select mixing regime |
| Primary nutrient loading: | select nutrient loading |
| Salinity: | select salinity |
| Watershed to waterbody area: | select area |
| Residence time: | select residence time |
| Waterbody uses: | select waterbody uses |
| Surrounding land use: | select land use |
| Bloom frequency: | select bloom frequency |

**Management strategy:** [name and link to management strategy]
1 Communication and Response Planning
A strategic communication and response plan should serve to coordinate communication between the agency staff responding to HCBs, the staff in partner agencies, and the public before, during and after a HCB.

2 Immediate Communication and Response Tasks
- Verifying a cyanobacterial bloom
- Evaluate and document HCB-related illnesses
- Coordinate with drinking water
- Post advisories and communicate results
- Continue monitoring and coordination

3 Short-term Tasks as Time Allows
- Maintain and improve reporting system
- Optimize data management
- Improve sampling and laboratory resources
- Evaluate and improve communication

4 Long-term Tasks as Time Allows
- Develop/improve informational resources
- Explore remote sensing opportunities
- Build/improve relationships
- Develop/improve plans
- Develop/refine plans for recreational waters and drinking water sources
- Improve sampling resources
### Key Concepts

#### Monitoring and Assessment

**Table 1. Monitoring methods used to assess cyanobacteria conditions.**

<table>
<thead>
<tr>
<th>Types of Analysis</th>
<th>Description</th>
<th>Type of Result</th>
<th>Relative Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Visual assessments</strong></td>
<td>Field determination of cyanobacteria presence / absence based on bloom appearance and characteristics</td>
<td>Qualitative</td>
<td>$</td>
</tr>
<tr>
<td><strong>Jar and Stick Tests</strong></td>
<td>Field determination of cyanobacteria presence / absence based on bloom material floating in a jar or attaching to a stick</td>
<td>Qualitative</td>
<td>$</td>
</tr>
<tr>
<td><strong>Remote sensing</strong></td>
<td>Satellite or aerial imagery that quantifies cyanobacteria density in water based on reflectance of cyanobacterial pigments</td>
<td>Quantitative</td>
<td>$</td>
</tr>
<tr>
<td><strong>Microscopy</strong></td>
<td>Lab determination of cyanobacteria presence / absence and percent composition using a microscope</td>
<td>Qualitative / Semi-Quantitative</td>
<td>$$</td>
</tr>
<tr>
<td></td>
<td>Manual identification and enumeration of cyanobacteria taxa using a lab microscope</td>
<td>Quantitative</td>
<td>$$</td>
</tr>
<tr>
<td><strong>Genomic</strong></td>
<td>Field or lab identification and enumeration of cyanobacteria using DNA analyses like qPCR.</td>
<td>Quantitative</td>
<td>$$ (?)</td>
</tr>
<tr>
<td><strong>Pigments</strong></td>
<td>Field or lab quantification of cyanobacteria based on the relative concentration of chlorophyll-a, phycoerythrin or phycoerythrin pigments</td>
<td>Quantitative</td>
<td>$$ (?)</td>
</tr>
</tbody>
</table>
Looking Ahead to 2020

► Finalize Document Layout
► Finalize Text, Selection Guidance, and Factsheets
► Design Graphics and Web-based Tools
► Develop Training Approach and Materials

Training Should be Underway by 2021
You Can

► Join the Team
  ► We need writers, editors, and reviewers
► Help us design our trainings
  ► Share your thoughts with us!

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To join – visit: ltrcweb.org
I USED TO HATE ALGAE

BUT IT'S STARTING TO GROW ON ME