GREAT PLAINS AND MIDWEST HARMFUL ALGAL BLOOMS WORKSHOP

PROCEEDINGS REPORT

October 2020

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Acknowledgements

The successful development and implementation of this workshop could not have been possible without a dedicated and knowledgeable team. Thank you to the steering committee for your indispensable energy and creativity:

- Katherine Foreman – EPA Office of Water, Office of Groundwater and Drinking Water
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- Steve Schaff – EPA Region 7
- Lisa Dunning – EPA Region 7
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- Mark Jakubauskas – University of Kansas Edwards Campus

In addition, this report is the outcome of three days of presentations, discussions and the sharing of technical expertise. We'd like to acknowledge the valuable input from all the workshop presenters and participants and their interest in addressing harmful algal blooms throughout the Great Plains and the Midwest.

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Message from the Region 7 Administrator

On behalf of US Environmental Protection Agency Region 7, I want to thank the more than 170 participants in the Great Plains and Midwest Harmful Algal Bloom Conference. Your contributions of expertise, ideas, and energy at the workshop were essential to its success.

Addressing the impact of nutrients on water quality is one of the top EPA Region 7 environmental priorities. Excess nutrients lead to harmful algal blooms (HABs) in all states, which are increasing in their frequency and magnitude. These toxic algal blooms can cause severe illness or even death in people, pets, livestock, and wildlife by releasing toxins into the aquatic environment that affect liver, kidney and nervous system functions. Drinking water can also be impacted by HABs, leading to expensive water treatment, taste, and odor problems, and possible adverse health effects.

EPA scientists have developed the capability to respond rapidly to state and tribal requests for assistance, including the use of next-generation techniques to assess cyanobacterial communities and quantify the toxins they produce. EPA has partnered with states, tribes, and other federal agencies to develop an early warning monitoring tool to detect blooms based on remote-sensing data, a capability that has proven extremely useful in the midst of the global COVID-19 pandemic. Additionally, EPA continues to reach out to our youth using innovative approaches that engage students and empowers them to be tomorrow's environmental leaders**.**

However, much work remains. While many workshops focus on the state of science, this workshop also focused on actions for the future. Those actions, compiled in this proceedings document, are meant to focus our efforts as we continue to work together addressing HABs in freshwater systems throughout the Heartland. I thank you for the work you have already done, and I challenge you to build on the relationships you formed during this workshop. Embrace these actions as we address the challenges that HABs pose to the environment and our quality of life.

Finally, I want to convey my special thanks to the HABs workshop committee for their leadership in coordinating this event. In addition to EPA Region 7 staff, EPA Region 8, the EPA Office of Water, the EPA Office of Research and Development, and the University of Kansas-Edwards stepped up to make this workshop a success.

- Jim Gulliford

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Executive Summary

The U.S. EPA Office of Research and Development, Regions 5, 7 and 8 and EPA Office of Water hosted a multi-regional harmful algal bloom (HABs) workshop on February 4 - 6, 2020 at the University of Kansas Edwards Campus in Overland Park, Kansas. The workshop brought together States, Tribes and agricultural partners from the Great Plains and Midwest, as well as experts on HABs prevention, mitigation and control; this fostered discussion and strengthened connections in water quality programs on challenges, research needs and opportunities for the prevention and control of HABs. The Region 7 Regional Administrator, Jim Gulliford, was the leadership champion for this effort. The first two days of the workshop included short presentations by experts on approaches to prevent, control and mitigate HABs as well as research and funding efforts currently under way to help strengthen our understanding of HABs and effective approaches for managing them. Workshop participants also broke into small and large group discussion sessions during each day to discuss their experiences with successful prevention and control strategies for nutrients and HABs, funding opportunities, coordination and collaboration strategies and research needs.

The third day of the workshop was attended by a sub-set of workshop participants and was organized into small break-out group discussions to identify successes, challenges, and opportunities for addressing HABs in freshwater systems for each of the workshop's three main themes:

- Best Practices for the Prevention, Control and Mitigation of HABs
- Funding Opportunities, Coordination and Collaboration
- Research on Nutrient Reduction, HABs Mitigation and HABs Management

This proceedings document highlights the successes and challenges the Great Plains and Midwest workshop participants identified in managing nutrients and HABs. Although most of the proceedings document summarizes discussions on the third day of the workshop, many themes identified were similar to those identified during the first two days. This document also provides a summary of key opportunities that are actionable over short- and long-term timeframes to prevent, control and manage HABs. Additional information on the workshop agenda can be found in the Appendix A.

Short- and Long-term Opportunities

The short- and long-term opportunities identified by the workshop participants are listed below, organized into the three main workshop themes. Successful implementation of these opportunities will require a combination of local, state, regional and national-level activities and actions, necessitating coordination and partnership across the country and by many different agencies. The identified research needs are listed without timeframes, as research may be ongoing and often is longer-term in nature.

Best Practices for the Prevention, Control and Mitigation of HABs

Short-term Opportunities

- Encourage coordination and collaboration among agricultural partners and waterbody managers;

- Develop a Regional or National network of experts on mitigation of HABs to improve the selection and implementation of in-lake management practices
- Proactively incorporate HABs into other existing program planning documents, such as 319 watershed-based plans, Hazard Mitigation Plans, Clean Water and Drinking Water State Revolving Fund (SRF) planning and other relevant State and Tribal response action plans; and
- Compile and document stories of successful HABs mitigation practices.

Long-term Opportunities

- Develop tools to facilitate the selection of appropriate prevention and control practices based on local conditions;
- Develop tools to assist waterbody managers manage legacy nutrients; and
- Enhance and improve monitoring and laboratory analytical programs for HABs.

Funding Opportunities, Coordination and Collaboration

Short-term Opportunities

- Develop HABs-related educational materials and tools to aid in building multi-sector partnerships; and
- Develop strategies for building organizational capacity for leveraging funding sources.

Long-term Opportunities

- Increase cross-regional collaboration to improve HABs management
- Highlight funding opportunities and enhance grant writing and management skills;
- Develop HABs workshops and materials specific to Tribal communities; and
- Improve access to funding for HABs programs and enhance flexibilities in those programs.

Research Needs on Nutrient Reduction, HABs Mitigation and HABs Management

The identified research needs are listed without timeframes, as research may be ongoing and often is longer-term in nature.

- Conduct health assessments for additional cyanotoxins of concern;
- Develop and test new technologies for mitigating HABs at a variety of cost-scales;
- Assess the economic impacts of HABs at the local and regional level; and
- Develop and enhance new tools to be incorporated into monitoring programs.

Great Plains and Midwest HABs Workshop Findings

The information below summarizes the successes, challenges and opportunities on the three key themes of the workshop identified by participants during the breakout sessions during the third day. The summary attempts to synthesize the responses provided by participants and does not reflect the universe of successes, challenges and opportunities discussed.

Best Management Practices for the Prevention, Control and Mitigation of HABs

Successes

Leveraging 319 funding to implement best practices that successfully reduce nutrients and sediment to waterbodies

Addressing HABs using a watershed approach by implementing a comprehensive watershed-based plan has demonstrated some success; participants identified that they have observed some reductions in the frequency and duration of HABs in waterbodies after the implementation of 319 projects focused on nutrient/sediment reduction. Participants expressed that waterbody managers have been able to de-list nutrient impacted waterbodies from state 303(d) lists due to the implementation of 319 funding in these watersheds.

Utilizing low-cost and accessible tools to reduce bloom occurrence and monitoring costs

Participants in the workshop discussed benefiting from cost-effective interventions and newly developed tools such as the use of the Cyanobacteria Assessment Network (CyAN) as an early warning monitoring tool to detect blooms based on remote-sensing data. Participants also discussed the use of barley straw as an effective and low-cost intervention technique in small waterbodies, such as ponds, to control HABs occurrences. However, there were also clarifications that this mitigation strategy has limitations. For example, the use of barley straw in large lakes and during an active bloom has very little effect on mitigating the bloom.

Applying a holistic approach to bloom mitigation and management

Participants recognized that implementing a holistic, systems approach to managing watersheds is the most effective way to address blooms. Discussions ranged from whole farm planning to riparian corridor management to in-lake management of sediment and legacy nutrients as examples of the components of effective watershed management. In one example, to effectively reduce recurring blooms in an artificial pond, a systems approach was required to address each of the components responsible for the poor health of the waterbody. The system of interventions included increasing water turnover, culling the fish population, reducing the amount of fish food used, and scaling back fertilizer application in the area immediately surrounding the pond.

Creating partnerships and using communication tools to increase HABs awareness

Developing communication tools and utilizing partnership networks yielded success in building and increasing awareness of HABs. For example, in September 2019, EPA Regions 7 and 8 hosted a Harmful Algal Bloom Video Challenge for high school students. Entrants were asked to create videos that help people understand how to identify harmful algal blooms and decrease public safety risks associated with the blooms. Students were encouraged to be creative, have fun and be a part of an environmental solution. A grand prize winner from each EPA region, along with winners from each state and each region's combined group of tribal nations, was selected and awarded cash prizes. These winning videos were highlighted as part of the

Harmful Algal Bloom workshop and will be used by EPA, State and Tribal environmental agencies in public outreach initiatives. Reaching out to students in new and innovative ways increases community HABs awareness as information spreads from students to their parents and other community members.

Challenges

Spatial disconnect between best practices in critical implementation areas and the impacted waterbodies

The physical distance between many agricultural producers and the waterbodies affected by their conservation practices make it hard for some to understand their role in HABs prevention and mitigation. While education can help reveal the interconnectedness of the watershed, spatial disconnect has proven to be a persistent barrier.

High entry cost of best practices implementation

Fluctuations in the farm economy may prevent agricultural producers from investing in prevention efforts. For example, in years when commodity prices are down producers may feel pressure to farm every acre, and when prices are up, they want maximize profits. Thus, the idea that conservation may impact farm profitability is a significant challenge in the adoption rate of conservation practices/prevention efforts.

Additionally, HABs mitigation, control and prevention practices often have high start-up costs preventing their adoption. With a lack of dedicated funding, financial restraints limit what types of practices waterbody managers can adopt. Many best practices are long-term, high-investment solutions which can make implementation difficult especially when watershed improvements may not be measured for decades.

Lack of knowledge on HABs in-lake control and mitigation efforts

Participants highlighted that the lack of guidance and consensus on effectiveness of in-lake management efforts is particularly challenging. Without this knowledge, it is hard to select the appropriate approach without knowing if these practices are equally effective when applied across a diverse spectrum of lake conditions. Additionally, not knowing the lag time between implementation and measured results amplifies the concerns created by the lack of effectiveness information.

Short-term Opportunities

Encourage coordination and collaboration among agricultural partners and waterbody managers

Enhancing regional HABs program coordination with agricultural partners (United States Department of Agriculture (USDA), University Extension, local COOPs, certified crop consultants, etc.) to assist with HABs messaging and management is crucial for addressing HABs. EPA, working with USDA, state, tribal and local agricultural partners could continue to look for opportunities to establish effective communication with local agricultural producers that reinforces the importance of on-farm management in preventing HABs and provides agricultural producer support from start to finish of the implementation process. Coordinating and collaborating with local champions increases producer trust, which can lead to supporting the adoption of best practices.

Develop a Regional or National network of experts on mitigation of HABs to improve the selection and implementation of in-lake management practices

Participants recommended the development of a network of experts on mitigation of HABs in lakes modeled after a science advisory consortium and directed by a steering committee. Upon request, this network of experts would provide science-based input at the regional and state levels on issues pertaining to HABs management and mitigation. In particular, participants noted the need for technical expertise in selecting appropriate mitigation strategies, tools for effectively implementing those strategies based on lake-specific constraints, and aid in assessing and documenting the effectiveness of mitigation technologies. In development of this network, coordination will continue with other HABs efforts such as the Interstate Regulatory and Technology Council (ITRC) and other partners.

Proactively incorporate HABs into other existing program planning documents, such as 319 watershed-based plans, Hazard Mitigation Plans, Clean Water and Drinking Water State Revolving Fund (SRF) planning and other relevant State and Tribal response action plans

Participants suggested that watershed action plans as well as HABs management goals be established for each HAB-impacted waterbody to better assess, coordinate and manage HABs. Once this information is developed those management objectives, assessments, etc. can be incorporated into Watershed Action Plans, State Emergency Response Plans, EPA's §319 Watershed based plans, FEMA's Hazard Mitigation Plans, etc. These plans allow watershed managers to utilize resources and leverage funds to implement protection and management measures needed to improve waterbodies impacted by blooms.

Compile and document stories of successful HAB mitigation practices

To inform successful implementation of mitigation practices, documenting success stories for managing HABs would be beneficial. Monitoring the effectiveness of site-specific management practices employed would be critical for summarizing successes as well as lessons learned about effectiveness of mitigation practices. The participants suggested developing a database to collect the information on existing best practices and the success or failure of interventions within waterbodies This resource will contribute to a better understanding of effectiveness of those practices.

Long-term Opportunities

Develop tools to facilitate the selection of appropriate prevention and control practices based on local conditions

To assist in the best practice selection and decision process, the participants suggested developing a HABs action flowchart or decision tree to help users identify the best practices to control and manage HABs that are most applicable to their waterbody conditions.

Develop tools to assist waterbody managers manage legacy nutrients

Developing a framework for in-lake nutrient management mitigation in order to manage legacy nutrients is essential. While it is important to also consider upstream pollutants, there is an opportunity to address nutrients already stored in lakes from decades of nutrient pollution.

Enhance and improve monitoring and laboratory analytical programs for HABs

Improving the extent and capacity of HABs monitoring programs is important for understanding their impact. Enhancing monitoring programs could include dedicated funding to improve the frequency of HABs monitoring and use of state-of-the-art technologies. Additionally, participants emphasized the need for enhanced laboratory analytical capacities to measure HABs within the states, tribes and regions.

Funding Opportunities, Coordination and Collaboration

Successes

Utilizing SRF funding for non-point source pollution reduction

Participants shared examples of leveraging Clean Water SRF (CWSRF) for HABs prevention. For example, Kansas purchased high-boy cover crop interseeders using CWSRF funds to promote incorporation of cover crops into row crop agricultural systems as a tool for HABs prevention. The interseeders were made available for use by four agricultural co-ops, provided that the co-ops hired personnel to drive and maintain the interseeders and to market the cover crop service to their clients. After 3 years, the co-op could purchase the interseeder or let it move on to another interested service provider. These interseeders contribute to HABs prevention because cover crops reduce nutrient loss by building soil organic matter and enhancing soil health. In addition, Iowa, Oregon and Ohio have funded nonpoint source pollution and point source projects using a sponsorship option in their CWSRF programs. This option leverages funding allowing for concurrent implementation of both point and nonpoint source projects by reducing the overall interest rate for the loan. Finally, a portion of the Drinking Water SRF (DWSRF) can be set aside by States to be used to ensure the delivery of safe drinking water. In cases where the source of drinking water is impacted by a HAB, these funds can be utilized for prevention and mitigation efforts.

Promoting soil health using 319 funding

In 2018, the State of Kansas utilized 319 funding to provide a grant to an agricultural producer to lease a no-till planter outfitted with precision technology and a dry fertilizer cart to deliver nutrients in the optimal location for plant uptake. In return, the producer maintained the drill, converted his 7,000 row crop acres to no-till, and was required to recruit 3,000 acres of neighboring lands per year to implement similar practices. The project has been so successful that the producer decided to purchase the planter outright and between 30,000 and 50,000 acres are expected to be converted to no-till after 5 years. This change in land management will result in substantially increased soil organic matter, reduction in irrigation, reduction in nutrient loss due to runoff and enhanced producer profit.

Developing Innovative Partnerships and Funding Sources

Local municipalities, utilities, water providers and other local entities such as watershed districts with taxing authority represent an underutilized opportunity for partnership and a new source of funding. For example, WaterOne is one of Kansas City's largest water providers and a leader in the development and implementation of a Regional Conservation Partnership Program effort awarded by the Natural Resources Conservation Service. The focus of this project was prevention of HABs in an upstream reservoir that empties into a river that serves as one of their primary sources of untreated water. Along with their partners, they were able to invest several million dollars in conservation to keep nutrients out of the reservoir.

Challenges

Funding and personnel shortages

Funding and personnel shortages were common challenges identified by many workshop participants. Consequently, many participants shared that their states are limited to small-scale rather than state-wide monitoring and HABs mitigation efforts; programs tend to be almost entirely reactive to individual HAB incidents rather than strategically proactive in both their monitoring and mitigation efforts. Furthermore, with limited personnel, states and tribes are more vulnerable to losing crucial capacity needed to implement all aspects of their HABs programs.

Obtaining and utilizing funding

Extramural funding opportunities to address HABs are limited, and when identified application requirements can be disjointed and complex. Securing extramural funding with complex application requirements necessitates resources and programmatic capacity that is often limited or nonexistent. Additionally, programs often have state or locally mandated limitations on the use of funding, preventing a consistent holistic approach to addressing HABs.

Multiple funding priorities and little or no consistent funding

Prioritizing and allocating HABs funding can be challenging, especially when several activities need to be executed, such as monitoring, developing outreach materials or a HABs response plan. Without consistent, readily available funding, it is difficult to sustain partnerships and leverage external funding sources when they become available. These multi-agency, multi-interest collaborations are required if waterbody managers wish to effectively address HABs issues.

Short-term Opportunities

Develop HABs-related educational materials and tools to aid in building multi-sector partnerships

Coalitions that cover drinking water providers and utilities, agricultural interests, tourism, health care and recreational users help build and sustain the momentum necessary to address the breadth of harmful algal bloom impacts and issues. To leverage these partnerships, clear and informative outreach campaigns are needed to educate this diverse group of users and the general public and engage them in becoming part of the solution. Participants recommended creating a document that details the factors driving the formation of HABs within a watershed and connecting the impact of blooms to all water users. This document could serve as an outreach tool for watershed groups.

Develop strategies for building organizational capacity for leveraging funding sources

Participants noted the need for case studies that illustrate how organizations have expanded partnerships and leveraged funding opportunities to obtain sustained funding for HABs-related activities.

Long-term Opportunities

Increase cross-regional collaboration to improve HABs management

Participants proposed several methods to educate stakeholders and program managers on funding opportunities. One suggestion was to hold more in-person workshops that brought all parties involved in the funding process together. Bringing local partners into contact with state funding personnel could help identify partnerships for future funding.

Highlight funding opportunities and enhance grant writing and management skills

To reach an even broader audience, participants suggested developing a funding webinar series or educational video. Additional suggestions highlighted the need to provide training on grant-writing and other grant management skills.

Develop HABs workshops and materials specific to Tribal communities

Holding HABs workshops with a specific focus on the unique challenges and opportunities of Tribal communities is an important step to providing tribal programs with the necessary tools to monitor, track, respond to and mitigate HABs.

Improve access to funding for HABs programs and enhance flexibilities in those programs

Several participants from state agencies said that dedicated, discretionary HABs funding would be very beneficial, allowing them to expand their programs to be proactive rather than purely reactive in managing HABs. Additionally, there is a need to analyze existing funding restrictions and look for opportunities to increase flexibility in programs that fund HAB-related activities. For example, it is not uncommon to identify grant funds to buy advanced monitoring equipment, however, the same grant does not allow the funding to pay for the labor of trained staff to use the equipment in the field.

Research on Nutrient Reduction, HABs Mitigation and HABs Management

Successes

HABs monitoring and assessment

Participants praised United States Geological Survey (USGS), other federal agencies, and nonprofit groups for conducting HABs monitoring and assessment work that state-level research could use as a foundation. Opportunities to have external parties conduct pilot studies on new monitoring, management, and mitigation techniques helps support state/tribal HABs efforts.

Innovations in monitoring technologies and monitoring programs

Participants noted successful innovations in monitoring techniques including CyAN and MBio Diagnostic's HABs Toxin System, a monitoring and detection system now implemented in Lake Erie to gather data that will be used to forecast future blooms.

Challenges

Funding cycles limit research programs at academic universities

Consistent funding is an issue for academic institutions. Universities often do not have the funding to run individual laboratory samples as they come in, so they run them in large batches

at the end of funding cycles or projects. This can significantly impact results and limit response activities and research, especially considering the sporadic nature of cyanotoxin detections in waterbodies.

Additional research on the impacts of cyanotoxins

Cyanotoxins have potential widespread impacts on our health, food and the environment. Although some health effects are known from ingesting cyanotoxins in water, critical research gaps from other exposure pathways remain unknown, as well as the adverse impacts to the environment and wildlife from exposure to cyanotoxins. Furthermore, the effects of specific cyanotoxins on food quality and safety and the effects on crops irrigated with water contaminated with these cyanotoxins largely remains unknown.

Research on emerging cyanotoxins

While valuable information is available for some cyanotoxins, little information has been published about emerging cyanotoxins and their metabolites. Specifically, development of analytical methods and investigation of the effects of these cyanotoxins on human health and the environment.

Lack of shared standards and practices

Participants highlighted the need for universal standards to aid in ecological and human health toxicity studies related to cyanotoxins and their congeners. Additionally, there continues to be a need for standardized analytical methods for many cyanotoxins.

Opportunities

Conduct health assessments for additional cyanotoxins of concern

Conducting new research into health assessments for emerging cyanotoxins to better understand their dynamics and effects on human and animal health is needed to improve understanding and protect public health.

Develop and test new technologies for mitigating HABs at a variety of cost-scales

Investing in research to evaluate the effectiveness of new and existing HABs mitigation techniques across various cost scales ensures that water body managers can compare mitigation technologies and select the option that best fits the physical characteristics of their water bodies and their operational constraints.

Assess the economic impacts of HABs at the local and regional level

Additional information on the economic impacts related to HABs is needed to assess the true consequences of a bloom across multiple sectors within the watershed.

Develop and enhance new tools to be incorporated into monitoring programs

Continue to develop easy to use, cost effective tools for monitoring and assessment of cyanotoxins in water and other media such as soil, plants and agricultural products. Developers should pay special attention to how users interface with these tools to ensure that they are accessible to a wide audience, from state and tribal agencies to water body managers.

Appendix A: Workshop Agenda

Day 1: Challenges and opportunities for preventing HABs

Welcome and opening remarks – **Jim Gulliford, United States Environmental Protection Agency (US EPA) Region 7 Administrator**

Welcome video – **Andrew Wheeler, US EPA Administrator**

Participant introductions – **Steve Schaff, US EPA Region 7**

Plenary speaker: *Cyanotoxin Occurrence in the United States - A 20 Year Retrospective* – **Jennifer Graham, United States Geological Survey (USGS)**

Nutrient reduction tools – **Session Lead: Hannah Riedl, Montana Department of Environmental Quality**

- *Water Quality Trading for Nutrients* – **Amelia Letnes, US EPA Office of Water (OW)**
- *Nutrient Tracking Tool (NTT)* – **Mindy Selman, United States Department of Agriculture (USDA)**
- *Soil Health: Why Should We Care?* – **Jimmy Emmons, USDA**
- *Water Quality Wetlands in Iowa* – **Shawn Richmond, Iowa Nutrient Research & Education Council (INREC)**
- Discussion

Regional Conservation Partnership Program (RCPP) in Milford Lake Watershed – case study of leveraging USDA Natural Resources Conservation Service (NRCS) programs – **Session Lead: Steve Schaff, US EPA Region 7**

- *Understanding the Science of Phosphorus Loading and Designing Programs to Affect Phosphorus Reduction* – **Andy Lyon, Kansas Department of Health and Environment (KDHE)**
- *Building Local Partnerships to Implement Collaborative Conservation Programs* – **Matt Unruh, Kansas Water Office**
- *Conservation Accomplishments and Opportunities in the Milford Watershed* – **Dean Krehbiel, USDA NRCS Kansas**
- Discussion

Funding source water protection initiatives for the reduction of excess nutrients and HABs – **Session Lead: Tina Laidlaw, US EPA Region 8**

- *Role of Section 319 and Opportunities for Partnership* – **Lynda Hall, US EPA OW**

- *Source Water Protection: New (and Old) Opportunities for Implementation* – **Kara Goodwin, US EPA OW**
- *South Dakota Seasonal Riparian Area Management (SRAM) Impacts on the Big Sioux River Watershed Project* – **Barry Berg, East Dakota Water Development District**
- *Wading Into an RCPP–Utilities Collaborating with Producers* – **Darci Meese and Michael Armstrong, Water One**
- Discussion

State roundtable – state experiences preventing nutrient enrichment and HABs – **Session Lead: Josh Strobel, South Dakota Department of Environment and Natural Resources**

- *Minnesota Efforts to Reduce Nutrient Enrichment* – **Pam Anderson, Minnesota Pollution Control Agency**
- *Scaling Up Conservation Using Section 319 Nonpoint Source Grant Program and the Clean Water Act State Revolving Fund (SRF)* – **Amanda Reed, KDHE**
- *Boysen Nutrient Initiative--Proactively Working to Reduce HCBs at a High-Priority Wyoming Reservoir* – **Jennifer Zygmunt, Wyoming Department of Environmental Quality**
- Discussion

Wrap-up and adjourn – **Steve Schaff, US EPA Region 7**

Day 2: Approaches to manage and mitigate HABs in an agricultural dominated landscape

Welcome – **Jeff Robichaud, US EPA Region 7 Water Division Director**

Mitigation Strategies for Harmful Cyanobacteria Blooms – **Kevin Sellner, Hood College**

Choosing Appropriate Approach(es) for HAB Mitigation: A Real-life Example – **David Caron, University of Southern California**

State case studies on best practices for HABs management and mitigation – **Session Lead: Sarah Erickson, Colorado Department of Public Health and Environment**

- *An Overview of the Interstate Technology and Regulatory Council (ITRC) HCB Project* – **Ben Holcomb, Utah Department of Environmental Quality (UT DEQ)**
- *United States Army Corps of Engineers (USACE) Kansas City District Regional Research Update* –**Marvin Boyer, USACE Kansas City District**
- *Source Water Management and Mitigation Strategies in Ohio* – **Ruth Briland, Ohio Environmental Protection Agency**
- Discussion

Partnerships in action – **Session Lead: Mike Archer, Nebraska Department of Environmental Quality**

- *Building Successful Partnerships - Rowing the Same Direction* – **Ted Harris, Kansas Biological Survey** and **Laura Webb, US EPA Region 7**
- *Cyanobacteria Assessment Network (CyAN) Project* – **Wilson Salls, US EPA/ORISE Research Fellow** and *Utah's Process to Integrate CyAN Project Data into their HAB Response Program* – **Ben Holcomb, UT DEQ**
- *The Lake Superior Collaborative's Algal Bloom Subgroup: Partnering for Nearshore Cyanobacterial Bloom Monitoring, Research, and Public Health Outreach* – **Gina LaLiberte, Wisconsin Department of Natural Resources**
- *Upper Mississippi River (UMR) HAB Response Resource Manual* – **Lauren Salvato, Upper Mississippi River Basin Association**
- Discussion

Science in action – **Session Lead: Aaron Parker, Michigan Department of Environmental Quality**

- *Updates and Insights from Monitoring CyanoHABs in Iowa's Lakes with Multi-wavelength Fluorescence* – **Betsy Swanner, Iowa State University**
- *Landscape Influences on Cyanobacteria Harmful Algal Blooms* – **Wilson Salls, US EPA ORD**

- *Dissolved Reactive Phosphorus Losses from Agricultural Fields in the Lake Erie Basin: A Synthesis*– **Yongping Yuan, US EPA ORD**
- *Do Landscape Water Storage Features Mediate Nutrient Loads in the Upper Mississippi River Basin?* – **Heather Golden, US EPA ORD**
- Discussion

Break into small groups for discussion – **Steve Schaff, US EPA Region 7**

- Topic 1: Best practices for HABs and nutrient reduction and management. **Discussion Leads: Joe Nett, North Dakota Department of Environmental Quality and Amy Shields, US EPA Region 7**
- Topic 2: Funding opportunities, coordination and collaboration. **Discussion Leads: Lynn Milberg, Missouri Department of Natural Resources and Kara Goodwin, US EPA OW**
- Topic 3: Nutrient reduction, HABs mitigation and HABs management research. **Discussion Leads: Elizabeth Smith, KDHE and Kassia Groszewski, Indiana Department of Environmental Management**

Small group discussion report out to the large group – **Steve Schaff, US EPA Region 7**

Wrap-up and adjourn – **Steve Schaff, US EPA Region 7**

Day 3 Synthesizing information from the first two days of the workshop

Overview of Day 3 goals – **Jim Gulliford, US EPA Region 7 Administrator** Summary of input from the last session of Day 2 – **Steve Schaff, US EPA Region 7**

- Topic 1: Best practices for HABs and nutrient reduction and management.
- Topic 2: Funding opportunities, coordination and collaboration.
- Topic 3: Nutrient reduction, HABs mitigation and HABs management research.

Day 3 Workshop Objectives and Goals

- Share information and build relationships among federal, state, and tribal water quality programs by making connections and identifying shared harmful algal bloom-related goals, needs, and barriers, particularly as they relate to harmful algal bloom prevention and source water protection in an agricultural dominated landscape.
- Develop a shared understanding of best practices for preventing HABs in an agricultural dominated landscape and protecting source water quality in the Midwest and Great Plains.
- Develop a proceedings document that highlights the next steps and key actions programs can take to address common HABs-related goals, needs, and barriers.
- Encourage the application of new science-based approaches by strengthening the network of HABs professionals in the Midwest and Great Plains

Break into small group discussions based on topics – **Session Lead: Steve Schaff, US EPA Region 7**

Session Goal: Synthesize information from the first two days of the workshop to identify successes, barriers, and opportunities for addressing HABs in the following three topic areas:

- Topic 1: Best practices for HABs and nutrient reduction and management. **Small group discussion lead: Amy Shields, US EPA Region 7**
- Topic 2: Funding opportunities, coordination and collaboration. **Small group discussion lead: Kara Goodwin, US EPA OW**
- Topic 3: Nutrient reduction, HABs mitigation and HABs management research. **Small group discussion lead: Katie Foreman, US EPA OW**

Report out from small group discussions – **Session Lead: Steve Schaff, US EPA Region 7**

Large group discussion: identifying immediate and long-term next steps – **Session Lead: Tina Laidlaw, US EPA Region 8**

Session Goal: Identify steps and key actions programs can take to address common HABs-related goals, needs, and barriers.

Wrap-up and adjourn – **Jeff Robichaud, US EPA Region 7 Water Division Director**

Midwest and Great Plains HABs Workshop materials can be found at:

https://www.epa.gov/ks/great-plains-and-midwest-harmful-algal-bloom-conference