Upper Mississippi River Basin Association
Water Quality Task Force Meeting

February 1, 2024
Highlights and Action Items Summary

Approval of the WQTF September 20-21, 2023 Meeting Summary

The UMRBA Water Quality Task Force (WQTF) approved the September 20-21, 2023 draft highlights and action items summary.

UMRBA Updates

How Clean is the River? Report

On January 9, 2024, UMRBA officially released the *How Clean is the River?* (HCR) report, an analysis of water quality trends on the Upper Mississippi and Illinois Rivers using data collected from 1989 to 2018. UMRBA staff developed and sent out an embargoed press release to its media contacts in advance and sent an email announcement to its existing partnership and a broader list of stakeholder organizations within the basin that may be interested in the report. Lauren Salvato put together a list of media and partner organizations that published information about the HCR report. Some included live interviews on Wisconsin and Minnesota Public Radio, a press release from Missouri DNR, and newsletter posts from the Minnesota Clean Water Council, the Confluence for Watershed Leaders, and the League of Women Voters. The Milwaukee Journal Sentinel published an article on the report and many affiliated newsrooms picked up the article. Salvato received queries about when the next report would occur. The WQTF suggested the potential for 10-year cycles of the report. Robert Voss said all the R code has been saved and future efforts should be faster.

Gulf Hypoxia Program

As of January 30, 2024, UMRBA received the official agreement with USEPA to receive funding through the Bipartisan Infrastructure Law's Gulf Hypoxia Program. During summer 2023, UMRBA was invited to submit a workplan as the Hypoxia Task Force Sub-Basin Committee for the Upper Mississippi River Basin (UMRB). Some of the workplan priorities include the creation of an Upper Mississippi River (UMR) Nutrient Reduction Strategy, an interstate system for continuous learning (also known as adaptive management), and an interstate communications strategy. UMRBA will participate in the Hypoxia Task Force and integrate the Sub-Basin Committee's actions into other interstate water planning.

UMR Interstate Water Quality Monitoring Plan – Fixed Site Implementation

On January 31, 2023, the UMRBA WQTF met for a working session to plan out details of implementing its fixed site network, a portion of its UMR Interstate Water Quality Monitoring Plan, from October 2025 to September 2026. Most of the meeting was spent comparing state laboratory methodologies. The WQTF decided that each state agency will process its own samples and will convene multiple discussions to ensure that results are comparable across state agencies.

Potential UMR Recreation Survey

During December 2023, UMRBA staff met with USEPA Region 5's Micah Bennett and Mike Paul, the USEPA national HAB lead, about ways USEPA could support a UMR recreation survey. The N-STEP program is a mechanism to provide technical support (from Tetra Tech, USEPA's contractor). The program has rolling proposal submissions, and the average project is funded in the tens of thousands of dollars. N-STEP can be used to fund two of three phases of the project. First, use funding to develop a sampling assessment and protocol. The second is to implement the survey, although USEPA cannot by law survey the public. The third phase can be funded by N-STEP for assistance with analyzing and synthesizing the results in a report.

USEPA's interest is in states adopting numeric nutrient criteria that come from efforts like a recreation survey, and in the application, the WQTF will have to write how the information will be used. There does not need to be a commitment to adopt criteria, but the use of the information will have to be explicitly included. Salvato asked the WQTF their thoughts on whether N-STEP was a good funding option to pursue.

Voss said for the southern UMR states that developing numeric nutrient criteria would be challenging. He suggested that general narrative criteria would be more palatable for most states as they have more flexibility in how narrative criteria are applied. The conversation would be more approachable with Missouri's stakeholders if the data indicated that levels of turbidity are preventing recreation use. Kendall agreed with Voss and added that Iowa would likely use the information for its waters in need of further investigation list. The waterbody could be added to the 303(d) list but not necessarily be designated as impaired. Shawn Giblin emphasized the power of pairing water data with user perception data. Kim Laing and Erica Becker agreed.

Albert Ettinger acknowledged the reluctance to adopt numeric nutrient criteria, including in Illinois. He asked because state agencies still have to write permits, are there formulas to write permits in the absence of criteria? Can the narrative criteria be translated to permit limits? Voss replied that Missouri DNR uses narrative conditions such as color changes. DNR conducts waste allocation studies to look at up and downstream facilities to see effects on a stream – e.g., diurnal pH swings and dissolved oxygen (DO) changes over 24- and 48-hour periods. Often where DO or algal issues are observed, modeling is done to see what limits permitted facilities need to obtain water quality standards or narrative criteria. Ettinger has observed that once effects are measured, there is already a huge problem – e.g., a stream bed has too much phosphorus and it becomes too challenging to remove. Voss replied that streams have bounced back when facilities reduce nutrients entering waterways. Ettinger asked if the data is publicly available and can be shared. He has not observed such examples in Illinois. Voss said the examples provided are from smaller streams (headwaters up to size three). It is challenging in large streams that have more point source and nonpoint source influences. There is too much noise in the data. Mike Kruse said Missouri also has total phosphorus effluent regulations applicable to major facilities, and nitrogen-related limits applicable to water bodies having a drinking water supply designated use.

Emerging Contaminants

Burrowing Mayfly Status and Trends

Giblin compared burrowing mayflies to canaries in the coal mine, as the species can serve as a strong indication of the UMR's health. Since the 1980s many have observed mayfly hatch declines, and it has been documented in the literature - e.g., Stepanian et al., 2020. A recent paper by Nowell et al. 2024, made the following conclusions:

— There are multiple lines of evidence indicating pesticides affect stream invertebrate communities

— Bifenthrin, chlordane, fipronil and imidacloprid were observed to be important regional stressors

— The weight of evidence suggests that insecticides are a probable cause of stream invertebrate impairment

Giblin has talked to many experts about the top contaminants of emerging concern, including USGS's Steve Corsi. The experts all generally feel like these are the most problematic for aquatic ecosystems:

— Bifenthrin in sediment

— Neonicotinoids, fipronils, and pyrethroid degradates in water

— PFAS

— Newer seed coatings that change quickly (insecticides and fungicides)

Neonics are the most widely applied insecticides globally. Bifenthrin has been ramping up in use over time in the U.S., particularly concentrated in the Midwest.

Benthic macroinvertebrate sampling was brought back to LTRM after a lapse of funding between 2004 and 2023. The plotted results indicate that many of the pools have all-time lows of mayfly abundance. A lot of silt in the backwater areas has washed away, and there is likely a habitat shift driving the mayfly decline.

Wisconsin DNR stream ecologist Mike Miller and Giblin developed studies to study neonicotinoid concentrations. Giblin selected sites on the UMR at major tributaries (from the St. Croix River to the Platt River) and sampled at L&Ds 3 through 11. Sampling occurred during summer 2021, fall 2021, and spring 2022. The USEPA chronic benchmark is 50 ng/L. However, Giblin used different benchmarks found in the literature when comparing his results. At all sites sampled for total neonicotinoids, none of the sites exceeded the Morrissey et al., 2015 35 ng/L chronic benchmark. Total neonicotinoids include clothianidin, imidacloprid, dinotefuran, acetamiprid, and thiamethoxam.

Miller's portion of the study was a land use stratification design of urban, vegetated crops, row crops, and other land use types (i.e., everything that outside of urban and crop land use types). He produced

box plots of total neonicotinoid concentrations and found that the mean for vegetable production was above the acute toxicity level (≥ 200 ppt according to Morrissey et al., 2015). The row crop and urban box plot means were right about the chronic toxicity level (≥ 35 ppt ≤ 199 ppt, Morrissey et al., 2015). Of 122 sites sampled, one or more neonicotinoids were detected at 63 sites, and clothianidin was detected at 61 sites. For vegetable production, 95% of the time total neonicotinoid concentrations exceeded the 35 ppt-199 ppt benchmark and 45% of the time the total neonic concentrations were ≥ 200 ppt.

Giblin partnered with the USEPA ORD laboratory to do a wider screening of 31 chemicals in water and sediment. In June 2022, Giblin sampled the same tributary and L&D sites. Based on detections, the top five most detected chemicals were atrazine, metolachlor, acetochlor, sulfentrazone, and clothianidin. The sediment data are still being finalized.

Giblin concluded that this research and others previously cited allow to develop a prioritized list of emerging contaminants. Dan Kendall is the current water quality tech section chair of UMRCC and is working to develop a prioritized list.

In response to a question from Coreen Fallat about any conversations with the Wisconsin DATCP's Bureau of Agrichemical Management, Giblin responded that he is planning future conversations. Nicole Manasco asked Giblin's thoughts on updating sediment quality guidelines. Giblin responded that the discussion and updates should happen more frequently, perhaps on a decadal basis. Wisconsin DNR reviews sediment parameters on a three-to-five-year basis. In response to a question from Salvato about the type of vegetable that has such high uses of clothianidin and imidacloprid, Giblin said that is primarily from potato production in the central sands region of the state. Voss reflected on Giblin's comment about mayfly densities being impacted by sediment and flow. Does Giblin think it is just the fine sediment washing out? Total suspended solids have also been reduced by improved land management practices. Could that be a factor or is it just flow and flushing? Giblin responded that he needs to take a closer look at habitat. It is clear there are substrate changes, but more focused studies will be needed. Voss observed that the location of burrowing species can be patchy. Were the same sites targeted every time? Giblin said they used a probabilistic sampling approach within targeted continuous backwaters. He selected 150 sites to ensure statistical confidence.

Investigating the Distribution and Value of Water Quality Benefits along the Mississippi River

Erin Niehoff works for Dr. Bonnie Keeler's laboratory at the University of Minnesota. She presented the importance of measuring the values considered for water. However, not all values can be quantified – e.g., religious values and historical roots. Studies that gather this information can help policy makers design programs and policies equitably.

Questions that motivate this study are as follows:

— Are policies designed to improve water quality in the Mississippi River efficient? Are they equitable?

— Are they attentive to issues of environmental justice?

— Whose values are valued in policy and programs?

The study includes several layers and approaches: 1) a non-market valuation survey, 2) geospatial data on water contaminants, 3) community engagement and qualitative data analysis, and 4) deploying mobile technologies and community science. The non-market valuation survey is an online contingent survey that will be administered across 2,000 households in counties and parishes bordering the Mississippi River. There will be a community engagement component as well. Keeler's laboratory is using environmental justice tours to explore other values about environmental concerns and how those concerns interact with water. Niehoff has attended tours in Minneapolis, St. Louis, Memphis with upcoming plans for Baton Rouge and New Orleans in 2024.

For the geospatial data on water contaminants, the approach utilizes the risk screening environmental indicator (RSEI) score, which takes into account the fate and transport of contaminants, the size and location of exposed populations, and the chemical's relative toxicity. The lower the RSEI score, the lower the risk. Niehoff commented that there is lot of variation in contaminants going into the river.

For the community engagement and qualitative data analysis, Keeler's former post-doctoral student used and coded over 600 interviews collected from Relay and Paddle Forwarded expeditions. The coding scheme focused on use, perceptions, and perceived threats to the river. This analysis can help reveal where gaps exist in local, state, and federal policies.

The mobile technology portion is a nontraditional survey method that consists of posting signs on the river and partnering with organizations and agencies to deploy the signs. Those interested in participating in the survey can answer questions via text message and stop answering questions whenever they want. As data come in, Keeler's laboratory can gather and synthesize the data. Right now, signs are posted in English but in future years, more signs will be available in other languages.

Niehoff is looking for more partnerships to spread the distribution of signs. Partners can add two of their own questions if they want to. Niehoff displayed an example of synthesized data at a chat bot deployed at Como Lake in St. Paul, Minnesota. The graph displays how water quality perceptions change with actual water quality measurements in a given year.

Salvato asked what Niehoff is looking for in a partner. Niehoff said it is primarily interest to participate. The study will pay for the post, signs, and shipment. They will even help with installation if it is near the Twin Cities Metro Area. Voss said Missouri doesn't have a lot of riverside parks but there are a number of boat ramps and access points. Missouri Department of Conservation (MDC) manages a lot of the boat ramps. Niehoff said those locations would work and would appreciate a connection to MDC staff. Overlook spots of the river are great too. Giblin also offered to connect Niehoff with local nonprofits in the La Crosse area. In response to a question from Salvato about the time period of data collection, Niehoff said that signs will be posted through spring 2024 and data collected through sometime in 2025.

Toxic Cyanobacteria/Harmful Algal Blooms

2023 Beach Monitoring: Analyzing Multiple Cyanotoxins (Anatoxin, Saxitoxin, Microcystin)

Kendall presented the history of Iowa's beach sampling program, which consists of routine water quality monitoring at state owned parks and beaches from Memorial Day through Labor Day. Since 2000, *E. coli* has been monitored. Microcystin sampling was added in 2006. In 2023, anatoxin and saxitoxin sampling were added, with the goal of understanding concentrations of both toxins in the state and whether they

correlate with microcystin blooms or are produced independently. Clean Water Act Section 106 funding was used to pay for the analysis.

USEPA does not have recommended recreational advisory levels for anatoxin and saxitoxin. Iowa DNR utilized the World Health Organization's (WHO) values for advisory triggers - 60 ppb for anatoxin and 30 ppb for saxitoxin. Some states have developed their own advisory levels and those vary widely from the WHO's recommended advisory levels.

Anatoxin detections were found in a few Iowa lakes, but they did not correlate with microcystin levels. Saxitoxin levels were below even the lowest advisory level, developed by New Jersey – 0.6 ppb. Saxitoxin levels did not correlated with microcystin levels. Based on these results, Kendall said only anatoxin will be added to Iowa's beach monitoring program. Kendall added there will be future discussion in Iowa about formalizing anatoxin recreational advisory levels.

Salvato asked Kendall how Iowa DNR will pay for anatoxin monitoring moving forward. Kendall said Section 106 money was used to build laboratory capacity, which reduces the cost of processing samples. Giblin appreciated seeing the algal toxin results. Wisconsin is experiencing issues with microcystin and anatoxin as well. There is a wide range of guidance, and it would be nice to have USEPA's values developed. Salvato recalled from Mike Paul's presentation during the WQTF's fall 2023 meeting that there was not a timeline. Bennett said that staff turnover and lack of expertise have contributed to the delay. As USEPA regions get questions about the recreational advisory levels, the regions continue to make requests to headquarters. Bennett also shared that there is a version of the latest Harmful Algal Bloom and Hypoxia Research and Control Act language that includes directed funding to USEPA for the first time. There is no certainty, but if the language passes then much of the funding would likely be passed to states.

Upper Mississippi River Monitoring

Summer 2024 Monitoring Plans

U.S. Geological Survey – Dr. Luke Loken shared that the purpose of the study "Spatial patterns in water quality and cyanobacteria across connectivity gradients and flow regimes in the Upper Mississippi River" is to increase understanding in how water quality varies across connectivity gradients – e.g., from main channel to isolated slough and backwater habitats. Chlorophyll-a may differ in magnitude, which affects the availability of organic matter. Organic matter likely settles more in backwater areas and is transported faster within the main channel. This has a variety of other consequences as it relates to carbon dioxide, oxygen, and methane concentrations. Tributary inputs make this all even more dynamic and variable based on flow.

The Upper Mississippi River Long Term Resource Monitoring (LTRM) has a rich dataset, but this study can build understanding of how other pools function similarly to those well studied and consistently studied LTRM pools.

The research questions are as follows:

— How do lateral connectivity, flow regimes, and tributaries jointly influence spatial patterns in water quality within the Upper Mississippi River?

— How variable are concentrations of chlorophyll-a and phycocyanin within the river?

— What hydrologic and geomorphic features overlap with elevated densities of total and potentially toxic phytoplankton?

The data are collected using Fast Limnology Automated Measurements (FLAMe), a mobile sampling platform designed to measure surface conditions across individual rivers and lakes. Traditional sensor technology is coupled with a global positioning system (GPS) to produce high resolution maps of surface water chemistry. The maps generated identify point source locations, infer processing rates, and produce distributions of surface water conditions. Sensors that will be used in this study are temperature, conductivity, pH, dissolved oxygen, turbidity, chlorophyll, blue green algae, dissolved methane, dissolved carbon dioxide and nitrate. There is potential to add more sensors in the future.

During May through October 2024, Loken and collaborators will conduct multiple latitudinal surveys of connectivity gradients in six pools across the hydrograph. The timeframe is approximately the first full week of each month in Pools 10, 13, 18-21. The second portion of the study is conducting one longitudinal survey from Pool 10 to 26 during "peak" algal biomass in late July or early August 2024. Loken is looking for additional collaborators. They will be in the field and can add additional samples to this effort.

Manasco shared two future projects she was aware of in Pool 19. One will be funded under the Section 204 authority and another one under the Navigation Ecosystem Sustainability Program. Salvato asked how Loken anticipates low flow will impact excursions during summer 2024. Loken said he and collaborators tried to pick a range of flow conditions, but they have to lock in some dates to plan their sampling schedule. Salvato recalled during the kickoff meeting a discussion about adding an intensive analysis in one more pool. Has the pool been selected yet? Loken said they would like to add a pool next to 10 or 13 to have continuity between pools. Kathi Jo Jankowski added that she and collaborators have been trying to choose pools based on the location of ongoing or future restoration projects, location of major tributaries, and having a good span of that region of the UMR, for additional context. If anyone has additional thoughts, Jankowski would be happy to hear them. Giblin suggested pool 11. It is the final pool in Wisconsin waters where islands have not been restored in the lower third of the pool. Lower Pool 11 will likely be a future restoration project location, and some pre-project data would be useful.

Minnesota – Laing said in 2023, Minnesota PCA began monitoring the headwaters of the Mississippi River to St. Anthony Falls. Previous sampling efforts took place in 2017: https://www.pca.state.mn.us/sites/default/files/wq-iw8-08ab.pdf. In 2024, monitoring will be conducted on the great river portion of the UMR (south of St. Anthony Falls to the border with Iowa). About a year ago a workgroup was formed to define the scope and what needed to be sampled. While the details are being ironed out, Laing said PCA will leverage existing chemistry data collected by partners. Additional monitoring will be brought on to supplement existing datasets. In total, PCA will add fifteen biological sites and seven chemistry sites and utilize its large river sampling approach.

Additionally, with some of Minnesota's 604b funds, PFAS monitoring will be conducted longitudinally at 45 sites from Lake Itasca and downriver five times during summer 2024. Both a communication strategy and monitoring strategy are in development.

USEPA Region 7 – Region 7 is developing a monitoring strategy for both the Missouri and Mississippi Rivers as part of its regional water monitoring strategy and to stand up a longer-term monitoring effort.

This would allow Region 7 to go out and routinely sample big river samples. The monitoring plan is near completion.

Missouri DNR and UMRBA asked for analytical partnership to increase the understanding of PFAS on the UMR and to sample at three sites on behalf of Missouri DNR. David Pratt said he will have more information next week once he meets with staff from USEPA Region 7's laboratory. He will ask about their capacity to analyze samples for the UMR and the field service branch's capacity to do field collection.

Region 7's laboratory will have the equipment up and running for the 1633 PFAS method in April or May 2024. Salvato asked if the plans for monitoring in summer 2024 include PFAS? Pratt responded that PFAS data collection is the primary focus for 2024.

Shared Water Quality Assessments for the Upper Mississippi River

Salvato recalled that during the fall 2023 meeting, the WQTF prioritized work for the next two fiscal years. One of those priority topics was how to approach developing shared water quality (WQ) standards and beneficial uses on the UMR. To host an initial conversation, a short survey was designed for each state agency to complete in advance. The questions were as follows:

— Please describe (very broadly) the process of WQ standards development in your state.

— What is working well (e.g., scientific development process) and what is not working well in the development and approval of water quality standards (e.g., administrative law process)?

— Has your state adopted the CWA reaches for the UMR since they were developed in 2003 (**link** to report)? Please describe why or why not.

— During its last triennial review of WQ standards with USEPA what major changes occurred?

— Would updating any of the report or figures and tables from State's Approaches to Clean Water Act Monitoring, Assessment, and Impairment Decisions be helpful in future conversations with the WQEC and/or the WQTF? Please elaborate which figures and tables.

— What do you view as a potential path forward for UMRBA's members states developing shared water quality standards e.g., focus on recreational use as a pilot for managing interstate waters?

Reviewing the responses, Salvato observed some similarities:

— Most states adopted the CWA reaches in some form

— The rule making process sounds similar across states

— Challenges associated with the rulemaking process included the labor-intensive nature of standards development, having a backlog of rules to update (also related to staff capacity), and administrative law review.

— Most states were planning to focus on nutrients standards developments in the next five years

Some differences observed in the responses were as follows:

— How to approach shared standards for the UMRB states received a wide range of answers

— A range of responses were received about updating the 2002 Upper Mississippi River Water Quality: the States' Approaches to Clean Water Act Monitoring, Assessment, and Impairment Decisions report. Note I was asking this question to be able to assess UMRBA's resources to make the updates.

Salvato asked for general reflections on the survey results and what the WQTF envisions as next steps. Kendall understood that the CWA reaches were not adopted because Iowa DNR's existing reaches were similar enough. Kendall suggested reevaluating the reaches and uses each state has selected. He sees that as an easier next step. Getting to shared nutrient standards would be very difficult.

Voss suggested updating some tables and figures in the interim. More states are looking at how economic growth can be bolstered with improvements in water quality. That is why Voss suggested avenues of commercial sport and fishing. If there is any way to tie aquatic life use to economics that may be a path to pursue. Missouri also has a lot of public water suppliers that draw from the river. Many of the river's uses depend on the ability to provide potable water. Laing agreed it would be helpful to update some of the reports and figures to understand approaches of what is similar for monitoring, assessment, and impairment decisions.

Voss said his attention was drawn to the lack of staff capacity. An effort like this for UMRBA would be a struggle. Giblin and Becker agreed. Giblin said Wisconsin adopted the CWA reaches, and it has improved the state's assessment. He has observed that states have gotten better at pooling data sets over time. That should be a continual point of emphasis.

Administrative Items

Future Meeting Schedule

The WQEC-WQTF meeting is scheduled for September 25-26, 2024 in the Twin Cities, Minnesota.

Participants

Erica Becker	Illinois Environmental Protection Agency
Alex Terlep	Illinois Environmental Protection Agency
Dan Kendall	Iowa Department of Natural Resources
Kim Laing	Minnesota Pollution Control Agency
Mike Kruse	Missouri Department of Natural Resources
Robert Voss	Missouri Department of Natural Resources
Micah Bennett	U.S. Environmental Protection Agency, Region 5
Ed Hammer	U.S. Environmental Protection Agency, Region 5
Cary McElhinney	U.S. Environmental Protection Agency, Region 5
Kathy Roeder	U.S. Environmental Protection Agency, Region 5
Kathryn Vallis	U.S. Environmental Protection Agency, Region 5
Diane Tancl	U.S. Environmental Protection Agency, Region 5
Dane Boring	U.S. Environmental Protection Agency, Region 7
Todd Phillips	U.S. Environmental Protection Agency, Region 7
David Pratt	U.S. Environmental Protection Agency, Region 7
Jared Schmalstieg	U.S. Environmental Protection Agency, Region 7
Anna Hess	U.S. Environmental Protection Agency, Great Lakes Toxicology and Ecology Division
Lauren Salvato	Upper Mississippi River Basin Association
Coreen Fallat	Wisconsin Department of Agriculture, Trade, and Consumer Protection
Tim Asplund	Wisconsin Department of Natural Resources
Shawn Giblin	Wisconsin Department of Natural Resources
Gina Laliberte	Wisconsin Department of Natural Resources
Erin La Russe	U.S. Army Corps of Engineers, Rock Island District
Davi Michl	U.S. Army Corps of Engineers, Rock Island District
Nicole Manasco	U.S. Army Corps of Engineers, Rock Island District
Carl Schoenfield	U.S. Army Corps of Engineers, Rock Island District
Jim Duncker	U.S. Geological Survey, Central Midwest Water Science Center
Kenna Gierke	U.S. Geological Survey, Upper Midwest Environmental Science Center
Kathi Jo Jankowski	U.S. Geological Survey, Upper Midwest Environmental Science Center
Sophia Lafond-Hudson	U.S. Geological Survey, Upper Midwest Water Science Center
Luke Loken	U.S. Geological Survey, Upper Midwest Water Science Center
Paige Mettler	National Great Rivers Research Center
Erin Niehoff	University of Minnesota
Madeleine Castle	Office of Senator Hawley
Albert Ettinger	Mississippi River Collaborative
Doug Daigle	Louisiana Hypoxia Working Group
Debbie Neustadt	Sierra Club
Alicia Vasto	Iowa Environmental Council