**Upper Mississippi River Basin Association**

**Water Quality Task Force Virtual Meeting**

**January 25-26, 2022**

**Draft Highlights and Action Items Summary**

**Tuesday, January 25**

**Approval of the WQEC-WQTF Draft September 28-29, 2021 Meeting Summary**

The UMRBA Water Quality Task Force (WQTF) approved the September 28-29, 2021 draft highlights and action items summary.

**UMRBA WQ Task Force Updates**

*How Clean is the River? Report*

Lauren Salvato shared information about the investigation into lead trends calculated in the *How Clean is the River?* (HCR) Report update. Lead has a statistically significant increase in UMR Pools 15 and 17. Although the increase is relatively small (approximately 3 ppb), it will likely draw attention, and the WQTF has been discussing how to communicate the information to the public.

UMRBA staff have been conducting research to understand potential sources and contributions on the mainstem such as historic or on-going remediation projects near the UMR. The research has included outreach and conversations with USEPA regions, Army Corps Rock Island District staff, and USGS.

There was historic zinc and lead mining near Dubuque, Iowa and southwest Wisconsin (e.g., Platteville in Grant County), but it is unlikely that the historic mining is affecting Pools 15 and 17 because the metals are relatively immobile. The lead is potentially dissolved, rather than particulate given that the suspended sediments are not statistically significant in Pools 15 and 17. UMRBA staff also talked to Professor Colin Belby from UW La Crosse about his research, which has demonstrated that increasing discharge and climate change impacts are flushing historical metal contamination in sediment to the UMR mainstem. Belby’s research is focused on historic mining areas, but his research can perhaps inform studies in other parts of the UMR.

Ultimately, the process has underscored the importance of the HCR report update and having the UMR Interstate WQ Monitoring Plan to provide more routine monitoring of metals on the river. Next steps include another report review before finalizing the report and GIS maps. Communications experts are also consulting UMRBA on messaging around the HCR report.

Karen Hagerty suggested evaluating the metals as percent change per year as a different way of presenting the information, rather than a percent increase across the time period. Albert Ettinger noted the 44 percent increase in arsenic in Pool 26 and said as a member of the public, he is concerned with the increase.

*Reaches 8-9 Pilot*

Salvato said the Reaches 8-9 planning committee is still working through data management before turning it over to John Olson (retired Iowa DNR) to write the condition assessment. The condition assessment will describe river conditions for each reach for the four use assessments: recreation, aquatic life, fish consumption, and drinking water. Salvato added that she has begun working on the evaluation report, which is a set of lessons learned from the pilot and outlines next steps.

**Contaminants**

*Radium in Aquifers of North-Central Illinois*

Walt Kelly introduced the two species of radium (Ra-226 and Ra-228) that come from thorium and uranium. Radium has relatively short half-lives of 1,600 years for Ra-226 and 5.75 years for Ra-228, which Kelly noted is quite short relative to the cycling of groundwater. A high concentration of Ra-228 requires a high amount of Thorium-222 because it will decay quickly. The two types of radium are different emitters –alpha and beta– which impact the health risks from ingestion. Radon is one of the elements produced from decayed Ra-228 which can be dissolved in water and has a half-life of only 4 days. The primary concern from Ra-226 and Ra-228 is ingestion, not exposure. Kelly notes that radium is deposited in tissues because it behaves similarly to calcium and has been linked to cancer, kidney damage and birth defects. Given these concerns, the maximum contaminant level for both radium species is 5 picocuries per liter. Kelly explained that elevated levels of radium in groundwater depends on having a supply of uranium and thorium mobile in the water and limited mechanisms by which uranium and thorium drop out of solution. These mechanisms include mineral precipitation, adsorption, and cation exchange.

Kelly noted that radium is only concerning in the deep bedrock aquifers in the northern part of the state. The deep bedrock aquifers are confined aquifers primarily in sandstone separated by low-permeability shale and carbonate which limit the flow between the layers. Early research indicated that all the deep bedrock aquifer units contributed to the radium concentrations.

Kelly explained how the underlying geology influences and complicates groundwater in the region. Bedrock layers get deeper heading south, which limits the amount of drilling into the aquifers in the central and southern portions of the state. All the water in the aquifers started as brines. During the last ice age, as glaciers advanced and retreated, melt water from the glaciers recharged and mixed and diluted the brine in the St. Peter aquifer.

Kelly and researchers have shown that the brines in the aquifer layers are not the main source of radium because high concentrations occur where the St. Peter aquifer is close to the surface and is being recharged. If the brines were the source of radium, one would not expect to see radium because of its short half-life. Because radium is present, the source must be in the geologic layers the water is passing through. Both Ra-226 and Ra-228 are present in the aquifers. The presence of Ra-228 indicates that the water is relatively close to the source. The radium is likely coming from shales rather than the St. Peter Sandstone unit which is very pure quartz. The shale units tend to have thorium and uranium, though there is not good sampling of those layers. Kelly noted the challenge of drawing conclusions from the water chemistry when water from different aquifers and geologies are mixed in the well.

The total dissolved solids (TDS) affect the capacity for adsorption and cation exchange which are two geochemical processes that remove radium from the water. At lower TDS concentrations, it is likely that radium is lower. Radium concentrations may also be controlled by adsorption to iron or manganese oxyhydroxides in the recharge zones where the St. Peters sandstone is close to the surface. He concluded that radium will continue to be a challenge in our water resources as it is found in many deep aquifers. Treatment is very expensive and often blending will be the most cost-effective method to use high-radium water.

Hagerty recalled there was a watch manufacturer in Ottawa, Illinois and asked if that industry was responsible for some of the radium. Kelly replied that in the aquifers his team studied, the watch industry was not the source. The water sampled is older than 100 years, away from the recharge area. John Hoke said the St. Francis Mountains in Missouri have Precambrian volcanic rock with high levels of radium in the groundwater. A prison was located on the rim of the igneous intrusion. The water had to be transferred to a larger surface water body with a NPDES permit or discharged to a bigger river that has a larger dilutional capacity. Would that be an issue in Bloomington-Normal, or are flows high enough to meet water quality standards? Kelly is unsure but believes that they don’t have to treat the water as radioactive waste. Salvato asked what the use of the water is being actively dewatered. Kelly replied in the Joliet region, the St. Peter aquifer is actively being dewatered and new wells are being put in the Ironton-Galesville aquifer which cannot support the demand of the growing urban area. The City of Joliet decided to move away from the deep sandstone aquifer and to Lake Michigan water. The water will be transported via pipeline and purchased from the City of Chicago. The pipeline will not be ready until 2030, and in the meantime, some of the wells will fail.

Salvato asked whether it is feasible for small PWS to take on the cost of treating water for radium, or whether small PWS are able to actively mix with another source of water. Is there an outreach component to the research? Kelly replied that a lot of small PWS blend the water. Radium can be removed via ion exchange but the waste byproduct must be disposed of. Small communities do not want to deal with that. Many small communities are moving to a regional system because of issues like this and are losing their independence. Ettinger recalled about 20 years ago he was looking at this in the wastewater context, which was impacting wildlife like otters, that were getting high exposure. There were two procedures being used: one procedure took the radium from a process and sent it to a low-level radioactive waste site and the second took the radium out of the drinking water and put it back in the surface water. Have there been any updates on radium once it is taken out of the drinking water? Kelly didn’t have a clear answer but thought it was likely just being returned to the surface water.

*Prioritizing Chemicals of Ecological Concern in the Great Lakes Tributaries*

Steve Corsi said this work derived from the Great Lakes Focus Area 1 Goal 5 to identify emerging contaminants. Data were collected through passive samples as well as water and sediment samples from 354 sampling locations. The team monitored 629 compounds from 2010 to 2018. Some of the parameters monitored included plastics additives, flame retardants, pesticides, pharmaceuticals, and polycyclic aromatic hydrocarbons (PAHs). Of the 683 chemicals monitored, 444 were detected. Pharmaceuticals and pesticides were the bulk of the chemicals monitored due to the results of preliminary monitoring.

Corsi explained some of the challenges with environmental chemistry assessments. With the huge amount of chemicals detected there needs to be prioritization of chemicals. Researchers prioritized which chemicals to monitor by trying to understand the biological effects of the chemical compound and compared the sampled concentrations with the concentrations of concern. The team gathered biological effect information from water quality guidelines and screen values from agencies. Many of these chemicals do not have water quality guidelines or screening values. Where there are no guidelines or screening values, the team completed an extensive literature review and used USEPA’s EcoTox to derive their own concentrations of concern. They also used the ToxCast database to understand the bio-active chemicals. An on-going effort is understanding pharmaceutical potency. The group also analyzed the toxicological effect of chemical mixtures based on the information on the biological pathway described in ToxCast.

Corsi explained the three primary objectives of the research: prioritization of biologically relevant chemicals (potency and human and ecological health), site prioritization that identifies where chemicals are occurring and if there are added effects from co-occurrence of multiple chemicals, and understanding the biological relevance. Bioeffect predictions are found using the Exposure Activity Ratio (EAR). This value can be used to prioritize chemicals and sites, predict mixture effects, and provide information on biological targets. This approach can help understand taxonomic relevance and help identify endpoints for targeted monitoring. He noted that these are screening level tests that can help guide but that field or lab tests will be needed to understand if the effect is observed.

Preliminary results of the water samples indicate that of the 629 chemicals monitored, 64 were identified as priority chemicals. The chemical classes that were determined to have the highest effect in the largest number of sites are fire retardants, herbicides, insecticides, PAHs, pharmaceuticals, and plastics components. Corsi noted that many of these like PAHs or pharmaceuticals come from similar sources, which can help with management (e.g., most pharmaceuticals come from wastewater and most PAHs come from coal-tar sealant on pavement). Corsi noted that these are screening-level assessments but there needs to be verification of the effects of these priority chemicals.

Similar sampling and prioritization occurred for sediment samples. The group sampled 71 stream sites in 26 tributaries to the Great Lakes. Of the 87 chemicals monitored, 21 were identified as level one or two chemicals and 38 percent could not be evaluated. Fourteen of the 21 chemicals were part of the PAHs chemical class. Corsi notes that like the water samples, there are a number of chemical classes that seem to be the most important. However, these screening-level assessments need validation. Corsi concluded that the effect of these chemicals is not well studied yet and that this work can guide future assessments beyond initial screening work to more definitive information about which of these chemicals really have effects. He outlined key questions for the future about where these chemicals are coming from, the timing of their presence in the water bodies, and what remedial action could look like.

Ettinger noted a lot of emerging pollutants have been around a while and asked if they are being observed in dredge spoils. Mercury settles to the bottom, and are there other contaminants that are being stirred up? What factors are causing the increase in emerging contaminants? Corsi said that his research has not measured contaminants in dredge material. Hagerty commented that dredged sand is tested and is generally not found to be contaminated. Shawn Giblin stated a study like Corsi’s would be valuable for the Upper Mississippi River Basin. What are the recommendations of where to get started on a large river system to monitor emerging contaminants, given limited resources? Corsi said that UMRBA would want to distribute some sites in a logical fashion e.g., where there are major inputs or tributaries. There are a few chemical analysis schedules that various laboratories have that would cover multiple chemical classes. Corsi’s study included over 600 compounds, with 5 to 7 chemical schedules, ~~and that~~which is very expensive. There are some catch-all chemical schedules that you can choose that would flag primary issues for the UMRB. Hoke appreciated Shawn’s question and added that USEPA is recognizing emerging contaminants in the latest Bipartisan Infrastructure Law and looking at making CWSRF monies available for remediating emerging contaminants.

**Ecological Risk Assessments**

*Aquatic Life Water Quality Criteria for Toxics*

Dr. Kathryn Gallagher’s Ecological Risk Assessment Branch (ERAB) in the Office of Water/Office of Science and Technology at USEPA is responsible for developing 304(a) water quality criteria for toxic pollutants, developing and updating science, and developing tools and approaches to develop these criteria. Draft criteria are determined from the existing literature, which is then peer-reviewed and released to the public for scientific views before publishing the final criteria. Gallagher noted the length and complexity of the process, which means that the office needs to prioritize criteria.

ERAB considers input from states, tribes, and USEPA Regions to understand which criteria should be prioritized. The branch also considers the occurrence, toxicity, persistence, bioaccumulation, and the age of existing criteria when prioritizing which criteria to work on. Gallagher added that 48 criteria date to before the year 2000.

ERAB released the updated aluminum freshwater aquatic life criteria in 2018. The criteria were prioritized to incorporate new research to reflect the local water conditions that can influence the toxicity of aluminum, and the old criteria were published in the 1980’s. ERAB has also been focusing on drafting PFOA and PFOS criteria for aquatic life, which has been a big lift because ERAB had to conduct a literature review of existing studies. The draft criteria have been peer reviewed and are currently undergoing USEPA review, with an anticipated release of the draft in the spring 2022. The ERAB is looking at developing more aquatic life/aquatic-dependent wildlife values for other more data-limited PFAS chemicals that do not have enough peer-reviewed studies for ERAB to conduct their review.

The ERAB has also been working on updating criteria for ions such as chloride and sulfate. Gallagher noted that it has been complicated because the ions interact with each other to determine the toxicity so they cannot be isolated when developing criteria. The criteria have been prioritized because of the interest from states where road salt usage is prevalent during winter.

Gallagher noted that the chloride and sulfate criteria update has involved review of over 7,000 records and 509 references in the EcoTox database to understand elevated chloride and sulfate levels. USEPA Office of Research and Development is helping develop the model. The ERAB is considering what the criteria will look like but has not yet determined if it will be a combined chloride-sulfate criteria, as it will depend on the outcome of the modeling. She noted that the cations are causing the toxicity not the anion which is one complicating factor. ERAB is briefing the Association of Clean Water Agencies Monitoring Subcommittee in a few weeks about the work and the states are invited.

ERAB is working on gathering co-measured water chemistry data through a GIS mapping exercise to support modeling for water chemistry criteria like aluminum and copper in places that don’t have water chemistry data. The development of this tool has been prioritized based on state demand for water chemistry in their modeling. Modeling occurs at the site, ecoregion, and ecoregion stream order level. The tool may also be able to display aluminum and copper criteria at the same scale for users that need assistance developing criteria that don’t have ambient water quality data.

Gallagher also shared that the USEPA has entered into a cooperative agreement with eight metals organizations to accelerate the use of bioavailability approaches and update and develop metals criteria, including toxicity data. There is currently a phase one report that has already undergone external peer review. The report examines a regression model with three parameters rather than the existing ten parameter model. ERAB is interested in developing criteria that could be more user-friendly for states. The report will be released on the USEPA website with the external peer review. USEPA prioritized this action to update old criteria with the best available science e.g., metals criteria.

Gallagher reported that ERAB are also working on improving and expediting the systematic review process by creating a tool that will be an easily accessible database of toxicity data. The tool will help USEPA develop new criteria, and Gallagher is hopeful that the tool is useful to other USEPA offices and regions. The automated process has reduced the average time reviewing each study from approximately seven hours to approximately two and a half hours, which has been particularly useful in the most recent PFOS and PFAS work.

Other key prioritized projects are updating methods using pilot studies with the New Approach Methods for data-limited projects like PFAS. They are also working on updating criteria including nickel, zinc, and lead simultaneously.

Ettinger asked if USEPA is going to update the arsenic human health standard. He is aware that many states do not use the criterion, and arsenic is problematic with coal combustion waste. Gallagher replied that her group focuses only on aquatic life criteria.

Salvato asked if the criteria that are not being used by the states are prioritized by Gallagher’s branch to be updated? Gallagher replied that they typically ask states for the information, but her branch must also balance emerging contaminants and older criteria. Bob Miltner commented that there is a considerable list of parameters and there have been significant strides in terms of biological recovery through the CWA and agriculture BMPs implemented on the landscape. One of the things that would help is being able to assess communities and watersheds on its trajectory of improvement. This could help identify where an improvement is expected but is not occurring. Is there a way to narrow down and assess which are having an impact? Gallagher said it is a complicated question. For some taxa, the chemicals are the driver, for others its land-use e.g., urbanization or construction. It would take a lot of monitoring to understand the drivers. Steve Corsi echoed Gallagher’s comment that the question is complicated. Corsi has seen some studies that have a range of potential influences e.g., habitat, flow, DO, or chloride, but they all only explain a certain amount of the variability in biological responses. Miltner clarified that there is more in the biology that can lead practitioners to a direct and focused way of looking at a suite of contaminants that are potentially important. Some species in Ohio are declining and others are doing well. This is not necessarily enough to impair water, but there are some concerns. It seems that the absence of evidence lies in the areas not being monitored. PFAS, for example, has been around a while but yet biological improvements are still occurring. Gallagher said that she hopes that USEPA can continue to develop criteria that limit releases, instead of waiting until there is a biological effect. Gallagher said she would hear whether the participants have additional criteria to suggest. Suggestions included manganese, cobalt, and, Hoke reiterated, sulfate and chloride. Corsi thanked Gallagher for her work at USEPA.

**Chloride**

*Impacts of Chloride and Sulfate Ions on Macroinvertebrate Communities*

Robert Miltner with the Ohio EPA presented on the impacts of chloride and sulfate ions on biological monitoring. Increasing chloride concentrations are well-documented, nationwide trends by several notable organizations and peer-reviewed articles.   
  
Chloride has both direct and indirect effects on biological organisms in streams. Direct effects arise from the toxicity of the chloride ion on biological organisms while indirect effects result from mobilization of nutrients and metals in the bed sediments. He noted that there are existing water quality criteria for chloride and sulfate, but they are being reexamined because the chronic level of 230 mg/L can be considered under-protective in many cases. Illinois developed a hardness-based standard for chloride and sulfate that Iowa and Indiana have also adopted. Michigan proposed a chronic level of 370 mg/L. There is not a national criterion for sulfate.

Milter’s work examined the question of developing thresholds using a field-based approach. He modeled his approach after Cormier et al. who used field observed sensitivity measurement of conductivity and its impact on steam taxa. There is a similar approach used for toxicity studies but applies it to field data. The outcome identifies a Hazard Effect concentration. The other mechanism to identify thresholds is using biological attainment, with a passing or failing. This strategy is well suited to logistic regression and machine learning.

Miltner shared the chloride extirpation concentrations for different classes of macroinvertebrates. The hazard effect concentration (HC5) is about 54 mg/L but that is several orders of magnitude below the existing chronic criteria of 230 mg/L. He questions whether a permit level of 54 mg/L is a reasonable standard for a permitted facility like a wastewater treatment plant.

He also shared the individual taxon response graphs which displayed the taxa with increasing and decreasing responses as chloride concentrations increase. Using this data, Miltner generated heat maps from chloride concentrations and chloride tolerance values as expressed through macroinvertebrate species. The literature shows evidence that macroinvertebrates can adapt to increasing chloride concentrations as long as the change is slow. That is reflected in the individual taxon response graphs for chloride. That behavior is not seen in the individual taxon response graphs for sulfate. He noted that it models more similarly to a “traditional” toxicant than chloride.   
  
Miltner also examined the data through a Bayesian logistic regression. Bayesian has an improved ability to visualize uncertainty in the predictions. This is important because there are many factors that impact macroinvertebrate response to chloride or sulfate.

Miltner shared the first difference, which identified the factors that have an impact when you hold each of the other stressors at its respective median. Chloride, TKN, sulfate, and manganese had a negative impact while habitat had a positive. He noted that TKN and Chloride had collinearity that showed in the results. The effect from TKN appears to be more evident in the eastern corn belt. One explanation is the challenge of collinearity. The eastern corn belt also has poorer habitat quality which may also be one reason for chloride trends and TKN to show the changes.   
  
Miltner shared the relationship between chloride concentrations, manganese, and effect. As manganese concentrations and chloride concentrations increase, the effect increases. Even with a fairly high level of sulfate, the water can be attaining if manganese concentrations are low. The importance of these results is that treatment can be environmentally relevant since salt enrichment can exacerbate nutrient enrichment and release metals from the sediment. These factors all interact in a stream.

The average effects over the population help the user understand the range with confidence. For chloride, the range is roughly 51-83 mg/L and for sulfate is 140-500 mg/L. The sulfate appears to be in range with the Illinois model based on the average hardness of the stream.

Miltner discussed the importance of considering the environmental disturbance gradients and what different “endpoints” can tell us when applying water quality criteria. Many of the toxicity endpoints seem to prevent over-intensification while field-derived ones seem to fall at a less impacted part of the disturbance gradient. Miltner noted that there should be an awareness and paradigm shift away from a single value because the field-derived values may not be appropriate for all types of water.

Miltner advocates for a more comprehensive approach to managing ions because once they are in the waste stream, they are very difficult to remove. In an evaluation of 190 wastewater treatment plans, most plants would be able to meet a criterion of 230 mg/L and many more could be successful if there was a tiered approach to the criteria. Miltner finished by emphasizing that there should be a paradigm shift for the development of water quality standards. He advocates for field-derived endpoints to manage pollution from diffuse sources and emphasized the management of a non-traditional approach across a gradient of bio-conditions. One of the immediate focuses for chloride should be recently suburbanized but currently unenriched sources where there is an opportunity to get ahead of the problem.

Mike Shupryt asked what is the change in the probability of presence for the mixed-effects model? Miltner replied it is effectively the probability of attainment. Ettinger asked whether Miltner’s research looked at the quality of biota below coal mines. He is aware that some waterbodies have high chloride levels. Miltner said in Ohio where coal mining occurred in rock bearing formations, sulfate and metals is a bigger problem. Ion levels in coal discharge are high. Treatment options to precipitate out the metals do tend to work when sulfate is the ion that is dominant in the water. Miltner acknowledged coal mining has an enormous impact and cited that Raccoon Creek watershed has recovered considerably from coal mining impacts. Robert Voss echoed the concerns about sulfate for Missouri. Sulfate concentrations have by far been higher than chloride. Voss has also seen some research on net alkaline mine drainage, which is in the realm of coal mining, describing the fixation of nitrogen and seeing increased nitrates in the water after the net alkaline mine drainage. Net alkaline drainage is usually a result of treating the acid mine drainage from the coal mines. Miltner said that they do see TKN in formerly mined areas.

Stephen McCracken commented on whether the model considers the summer condition, trying to detangle winter peak chloride with the summer conditions. We would be comparing summer concentrations with summer macro populations. Miltner said both the water quality and macroinvertebrate samples were collected in the summer. That said, the streams are still salt enriched into the summer. The data are still meaningful and effective for use, but we should understand how winter concentrations carry into the following seasons. McCracken did not mean to suggest they are not related but notes that there might be an important management consideration from high winter peaks compared to summer peaks. McCracken noted that standards set for summer conditions may be challenging to meet in winter and that while there is a residual effect in the summer, peak winter concentrations may not be as harmful as summer concentrations. He noted that will be a management challenge.

*UMRBA Resolution*

Salvato said that the UMRBA Chloride Resolution was recently reviewed by the WQTF and WQEC. She appreciates everyone that provided input. The most notable recent changes were made to the language recommending that USEPA update its chloride criteria. UMRBA staff will be requesting endorsement of the resolution by the UMRBA Board at its upcoming February 22, 2022 quarterly meeting. Kirsten Wallace added that the completion of the resolution is timely with the How Clean is the River? report update and results showing increasing chloride trends on the UMR mainstem. The resolution can be used to guide the work of UMRBA WQ committees and continue to have the focus on chloride. The resolution underscores partnerships with UMRR and the UMRCC. Both groups have an interest in this work including outreach and science. We have the ability to expand efforts beyond the WQTF.

**Wednesday, January 26**

**Citizen Science**

*Plastic Pollution Campaign*

Jennifer Wendt shared that the Mississippi River Plastic Pollution Campaign is a joint effort with the Mississippi River Cities and Towns Initiative, University of Georgia, and United Nations Environment Programme with funding provided by National Geographic. In 2018, MRCTI committed to reducing plastic waste from land-based sources.

Many partners and local organizations made the pilot projects a success. The first pilot occurred in April 2021 in St. Paul, MN, St. Louis, MO and Baton Rouge, LA. About 100 organizations were involved and over 75,000 items collected. The top items collected were cigarette butts, food wrappers and beverage bottles. The volunteers collected trash in their own backyard, while some were asked to complete specified transects. Graduate students from Louisiana State University removed debris from trash traps and inventoried what was collected.

The second phase of pilot included the Quad Cities Area in October 2021. The top items of the 25,000 collected were cigarette butts, food wrappers, and paper and cardboard. One of the organizations involved was Partners of Scott County Watershed. Steve Gustafson, Vice Chair, said that the members of his organization promoted and recruited volunteers for the pilot. He is excited about the momentum and interest garnered and said that Partners of Scott County will be meeting in February 2022 to discuss next steps.

Wendt said that MRCTI’s next steps for this initiative are to expand to the entire Mississippi River, with a focus on the delta area, explore funding opportunities, and expand partnerships e.g., manufacturers.

Salvato asked if trash traps are common in storm water systems? Wendt replied that trash traps are becoming more common and are effective if maintained consistently. Maintaining the traps is labor intensive and costly. The material is removed with heavy machinery, drained overnight, and transported to the landfill. Sorting the debris is labor intensive, as half of it is organic waste. Wendt thinks the focus should be on pollution reduction and prevention, however, trash traps serve a purpose. There is a project sponsored by the Commission for Cooperation installing trash traps in the Quad Cities, Canada and Mexico and pairing it with an educational campaign. Steve Schaff recalled that trash traps were placed in St. Louis as part of the Urban Waters program. Hoke confirmed that the Missouri Confluence Waterkeeper has placed traps in Deer Creek, Mackenzie Creek, and River Des Peres.

Nicole Vidales asked if the graduate students that sorted and counted trash trap materials in Baton Rouge will be a part of ongoing program? Wendt replied that the group at LSU was from the Coastal Sciences school. They are continuing the work and hiring a graduate student with the grant money. MRCTI is always eager to partner with universities.

*WQ Citizen Science Programs*

*Minnesota –* Shannon Martin, Volunteer Water Monitoring Program coordinator, said Minnesota PCA has had volunteer collected data for the past 49 years. The volunteer opportunities are monitoring lakes, streams, and lake ice. For lake and stream monitoring, volunteers are asked to monitor twice per month between May and September. They collect basic water quality parameters. The lake ice reporting program is a partnership with the State Climatology Office to collect ice on and off dates for monitoring climate change impacts on lakes. There is a specialized Boundary Waters Canoe Area volunteer monitoring option that can be completed on any lake when weather conditions are right.

Volunteer training is conducted online and hard copy materials are provided as well. Volunteers submit data at the end of the season, which is evaluated by program staff before being finalized in the state WQ database. Volunteers are important data collectors and local water advocates. The data are used to inform water management about water quality trends and whether the waterbody is meeting state standards.

One challenge Martin highlighted was recruiting the next generation of volunteers, after the majority of volunteers, retirees, age out.

*Missouri –* Laura Richardson said the volunteering monitoring program is a component of the Missouri Stream Team, which provides education and avenues for advocacy for improving water quality within Missouri. Physical, biological and chemical data are collected in streams. All data and resources can be found online at <http://mostreamteam.org>. Richardson and her colleagues QA/QC the data.

Richardson said DNR staff are working on a database upgrade to automate QA/QC procedures, automate site locations, and make the data more viewable for users. The data are used to provide information and education for the pubic, bridge monitoring gaps, provide baseline data on local streams, screen for potential problems, identify long-term trends, and assess changes in watersheds.

Cooperative Stream Investigation is a higher level of training to be useable by a Missouri State Agency and can be used in TMDLs, Clean Water Act/Integrated report Assessments, and permit evaluations. Finally, Richardson hopes to use macroinvertebrate data to qualify streams as assessed for aquatic life use designation.

*Wisconsin –* Shupryt said Wisconsin runs two programs separately for lake and stream monitoring. The first is the older Citizen Lake Monitoring Network (CLMN) and the Water Action Volunteers (WAV). Both DNR and UW Extension support the programs. CLMN monitor over 800 lakes per year for Secchi depth. Over 500 lakes are sampled for water chemistry from one to three visits per year. Secchi depth, phosphorus, and chl-a are collected and samples are analyzed by the Wisconsin State Hygienic Laboratory. Shupryt believes nitrogen series will be collected starting in 2022. Because Wisconsin DNR pays for the analyses out of the state monitoring budget, there is a limited amount of money for CLMN and a long wait list for volunteers to monitor water chemistry. The data are used for assessments if the index period is met (three visits over two years). The data collected by volunteers and DNR staff are treated the same. A user perception survey is used for CLMN to pair the survey with chl-a concentration data. Both were used to put together a rule package for chl-a criteria for recreation uses, currently being presented to the Wisconsin Natural Resources Board.

Lake volunteers also do AIS early detection surveys and ice on/ice off records. The ice program is more popular in the City of Madison lakes.

The WAV program has tiered volunteering for stream monitoring. There is introductory, focused on education and outreach. This component is solely run by UW Extension. The next level is chemistry sampling, which include six monthly visits between May and October for TP, TSS, and eventually N series sampling. A year of introductory monitoring work is required before moving up to the next tier. For this level, there is a program-specific quality assurance project plan (QAPP) and required trainings. These data are also analyzed by the Wisconsin State Hygienic Lab. Funds are also available for volunteers living in TMDL watersheds. WAV will request volunteer participation at specific locations for stream assessments. Shupryt said there is a 90-95 percent success rate for collecting planned samples with volunteers. The data are also used in 303(d) assessments. WAV piloted a family level IBI for macroinvertebrates. The time requirement is high and this program has begun to see less participation. WAV still has a coarse-level survey with simple math.

WAV also has a long-term temperature monitoring component, in which a temperature logger is placed in the stream. Sometimes the data are used for impaired waters, but there are challenges with justifying the use of the data when results are variable.

Finally, there was a winter road salt program that existed about six years ago. Sampling was focused in urban areas and four to five samples were collected in a 30-day period.

Shupryt shared the following links for participants to learn more: <https://www.uwsp.edu/cnr-ap/UWEXLakes/Pages/programs/clmn/default.aspx> and <https://wateractionvolunteers.org/>. At the request of Richardson, Shupryt shared the IBI example: <https://wateractionvolunteers.org/files/2019/10/Biotic-Index-Calculation.pdf>.

Richardson said a PhD student ran a chloride monitoring program utilizing Missouri Stream Team volunteers. There was a lot of interest in the St. Louis area to understand how road salting techniques have influenced WQ.

*Iowa –* Kendall said that Iowa had a program to train volunteers. However, Iowa’s credible data law has made it difficult to use volunteer data for regulatory purposes. The program shifted to local entities and counties and informing the public on what is happening with water quality in their backyard. Iowa DNR sent supplies to groups like the Izaak Walton League to conduct monitoring but does not have a staff person dedicated to working with volunteer monitoring groups. The volunteer monitoring program has to have a monitoring and QA/QC plan and be audited by Iowa DNR for the data to be used for regulatory purposes.

Shupryt asked what is credible data? Kendall replied that credible data have to meet certain standards, collected in a certain way and analyzed at a certified laboratory. The best way to be able to submit data is for the volunteer monitoring group to partner with Iowa DNR, rather than running independently. Before the impaired waters list is put together, volunteers can submit data for “waters in need of further investigation.” If additional funding becomes available, Kendall said that DNR can target those locations for monitoring. Voss said Missouri has similar challenges when it comes to listing waters based on citizen science data. The CSI program has specific QAPPs and uses a certified laboratory. This increases confidence in the data if it is used to impair waters (i.e., proof negative). There is not usually much scrutiny to delist a water or demonstrate that a water is meeting a particular use (i.e., proof positive). Adding listings is open to more scrutiny.

Salvato asked if other states use their data for impairments. Kim Laing said that Minnesota PCA uses volunteer data in conjunction with the data PCA collects. There are protocols for the use of data in assessments, and often the data does not stand on its own. The agency is discussing new data collection methods and safeguards to ensure the data collected is accurate. For example, volunteer monitoring is limited to one person per site. PCA staff are considering opening it up to more volunteers per site but the agency would need to develop an app to accommodate more data.

*Illinois –* Vidales said Illinois EPA had a volunteer lake monitoring program from 1981 to 2018. With staff retirements, the positions were not backfilled. Vidales would like to bring back volunteer monitoring efforts and expand beyond lakes.

Gustafson shared a few comments about citizen science:

1. There are concerns about access and safety for sampling on the UMR. In the Quad Cities area, a good boat is needed
2. If the state does not consider volunteer data valid, it makes it harder to justify collecting data
3. Partners of Scott County Watershed (PSCW) can get many volunteers, but they are getting frustrated that despite having plenty of data, PSCW (and other organizations) cannot get any landowners or municipalities to act on the data or implement BMPs
4. PCSW publishes data on ArcGIS online: <https://scottcountyiowa.maps.arcgis.com/apps/webappviewer/index.html?id=d84fd8ff83f249439599fc23d246df4d>
5. The PSCW website can be found at the following link: <https://www.partnersofscottcountywatersheds.org/>

**Clean Water Act Program Updates**

*State Updates*

*Minnesota* – Laing reminded participants that Minnesota PCA goes through assessments every year based on the agency’s watershed-based monitoring approach. Staff are currently working on the 2022 303(d) list. There are 66 delistings that are out for public comment. There are delistings on the UMR for ionized ammonia. From the 2020 list, USEPA Region 5 added sulfate. Minnesota PCA staff are using the USEPA methodology to select impairments and add more sites for monitoring. There are new PFAS impairments for fish tissue. In response to a question from Salvato, Laing replied that the 11 previous PFAS fish tissue listings were in the Twin Cities Metro Areas lakes and the UMR. The new listings are in the east Twin Cities, one on Lake St. Croix, and four other waterbodies outside of the metro area. Voss asked if the listings are based on particular congeners. Laing said there is site-specific criteria for PFOS, and more information can be found at the following link: <https://www.pca.state.mn.us/water/site-specific-water-quality-criteria>. She added that the HH-WQS was recently adopted, and PCA will move away from the Minnesota Department of Health fish consumption guidelines, which were 0.37 ng/g PFOS in fish tissue.

For TMDLs, two are on public notice and three are with USEPA Region 5 as drafts. A handful were approved by Region 5 in 2021. Laing added she would be interested to learn how states delist waters, whether it is due to corrective action or for other reasons.

*Illinois*– Vidales said the 2018 list was submitted in February 2021. Illinois EPA staff are currently working on the combined 2020-2022 integrated report. Staff are hoping to make the deadline of Friday, January 28, 2022 to put the list on public notice. Vidales added that a lot of senior staff are retiring. Additionally, of the two staff working on the integrated report, one is leaving at the end of January 2022.

*Iowa* – Dan Kendall said Iowa DNR staff are finished with assessments for the 2022 cycle. He hopes the list will be out for public comment by the end of February 2022. Kendall tracked the percent change from integrated report categories 4 and 5, and this is the first year where there is a zero percent change i.e., the same number of waters are being delisted and listed. Kendall hopes DNR can hit the April 1, 2023 deadline. The top pollutants for river segments are indicator bacteria, biological impairments, fish kills, fish consumption advisories, and DO.

*Wisconsin* – Giblin said the 2020 303(d) list was approved in October 2021, and the 2022 list will be submitted by April 1, 2022. He hopes that Region 5 approves the list in May 2022.

For the UMRB there are 64 new pollutants listed. The majority are for phosphorus and most of the impairment will be addressed in the Wisconsin River TMDL. The commend period for the TDML recently ended on January 7, 2022.

The 305(b) will also be submitted by April 1, 2022. In addition to the 50th anniversary of the CWA, the report will highlight Water Action Volunteer program’s 25th anniversary in October 2022. In specificMississippi River sections of the 305(b) report will highlight HABs and cyanobacteria research and monitoring, chloride and sodium freshwater salinization work, and new research related to aquatic vegetation and monitoring. Giblin added that DNR staff contributed to a chapter of the climate change status and adaption report for the Wisconsin climate change initiative.

Shupryt said staff are currently working on the modeling for a watershed outside of the UMRB. The Fox/Des Plaines River TMDL, in southeast Wisconsin is still in the monitoring phase until summer 2022. Staff will then move into the modeling phase. Shupryt updated participants that the Wisconsin Natural Resources Board approved the chl-a criteria. There are many steps to go. However, Shupryt believes this will be a powerful way to look at chl-a data.

*Missouri –* Voss reviewed that Missouri DNR’s 2020 list was contentious but are now able to use the lake nutrient criteria. That was completed in September 2021, and now staff have begun to work on the 2022 assessment. Missouri statute requires a 90-day public notice period after the list is complete. The Missouri Clean Water Commission has to approve the list as well. Voss noted there are a lot of moving parts before the 2022 assessment is submitted to USEPA Region 7.

The current list of TMDLs addresses 15 waterbody impairments. The focus has been revision of consent decree TMDLs. Missouri DNR staff are using models to derive new wasteload allocations and permits. The permitting team has become efficient at using the QUAL2k model if anyone has questions. TMDL updates also include metals. Staff have not revised metal TMDLs in over 10 years, so there will be a big learning curve. The TMDLs are from primarily historic mining, although some mining still occurs in the state.

Finally, the top pollutants for 303d list include bacteria, chl-a, DO, mercury in fish, metals, and chloride.

**UMRR Science Meeting**

Dr. Kathi Jo Jankowski said the Upper Mississippi River Restoration (UMRR) science meeting occurs every two years with the purpose of developing a set of research projects in support of the restoration and management of the UMRS. The intent is to have restoration professionals, scientists, and other participants with extensive river knowledge and experience participate in the development of the project proposals. The expected result of this collaborative approach is that the resulting projects will improve our understanding of the UMRS, inform and improve river restoration and management, and will effectively incorporate the UMRR program’s unique strengths. Jankowski coordinates the nutrients, phytoplankton, and harmful algal blooms WQ focal team. Some potential focal areas for this working group will include the following questions relevant to phytoplankton communities in the river:

* What is the current frequency of occurrence/risk of HABs? What factors are linked to risks for toxin production and how are they distributed across the river?
* How have phytoplankton communities responded to potential regime shifts in the UMRS, such as the invasion of bighead carp or the resurgence of submersed aquatic vegetation?
* What factors have affected long-term dynamics in phytoplankton communities in the UMRS and will they be sensitive to shifts in climate?

This working group will also include discussions of how LTRM can best utilize its 20+ year phytoplankton sample archive. Jankowski encouraged participants to reach out to her if they have research and management priorities for the WQ focal area to discuss.

**Administrative Items**

*Future Meetings*

* The next WQEC-WQTF meeting will be convened June 7-8, 2022 in Davenport, Iowa

**Attendance**

Ryan Sparks Illinois Environmental Protection Agency

Nicole Vidales Illinois Environmental Protection Agency

Daniel Kendall Iowa Department of Natural Resources

Kim Laing Minnesota Pollution Control Agency

Shannon Martin Minnesota Pollution Control Agency

Waverly Reibel Minnesota Pollution Control Agency

Ashley Grupe Missouri Department of Natural Resources

John Hoke Missouri Department of Natural Resources

Michael Kruse Missouri Department of Natural Resources

Erin Petty Missouri Department of Natural Resources

Laura Richardson Missouri Department of Natural Resources

Robert Voss Missouri Department of Natural Resources

Shawn Giblin Wisconsin Department of Natural Resources

Shannon Haydin Wisconsin Department of Natural Resources

Mike Shupryt Wisconsin Department of Natural Resources

Sara Strassman Wisconsin Department of Natural Resources

Bob Miltner Ohio Environmental Protection Agency

Karen Hagerty U.S. Army Corps of Engineers, Rock Island District

Leo Keller U.S. Army Corps of Engineers, Rock Island District

Nicole Manasco U.S. Army Corps of Engineers, Rock Island District

Micah Bennett U.S. Environmental Protection Agency, Region 5

Kathryn Gallagher U.S. Environmental Protection Agency, Office of Science and Technology

Jennifer Kissel U.S. Environmental Protection Agency, Region 7

Chelsea Paxson U.S. Environmental Protection Agency, Region 7

Steve Schaff U.S. Environmental Protection Agency, Region 7

Jared Schmalstieg U.S. Environmental Protection Agency, Region 7

Sydney Weiss U.S. Environmental Protection Agency, Region 5

Aleshia Kenney U.S. Fish and Wildlife Service, Iowa-Illinois Field Office

Steve Corsi U.S. Geological Survey, Upper Midwest Water Science Center

Jim Duncker U.S. Geological Survey, Central Midwest Water Science Center

Kelly Warner U.S. Geological Survey, Central Midwest Water Science Center

Kathi Jo Jankowski U.S. Geological Survey, Upper Midwest Environmental Science Center

Rebecca Kauten Iowa Lakeside Laboratory

Steve Gustafon Partners of Scott County Watershed

Jennifer Wendt Mississippi River Cities and Towns Initiative

Stephen McCracken The Conservation Foundation

Ingrid Gronstal Iowa Environmental Council

Albert Ettinger Mississippi River Collaborative

Doug Daigle Lower Mississippi River Sub-Basin Committee

Walt Kelly Illinois State Water Survey

Lauren Salvato Upper Mississippi River Basin Association

Kirsten Wallace Upper Mississippi River Basin Association