

Nutrient Monitoring Council #16

Meeting Minutes

Thurs, June 10

10:00 a.m. – Noon



Chair: Trevor Sample, Illinois EPA

In attendance: Laura Keefer, Illinois State Water Survey; Kelly Warner, USGS; Brian Metzke, IDNR; Paul Davidson, University of Illinois; Gregg Good, Illinois EPA; Keith Richard, Sanitary District of Decatur; Gregory McIsaac, University of Illinois and Agricultural Watershed Institute; Laura Gentry, Illinois Corn Growers; Justin Vick, Metropolitan Water Reclamation District of Greater Chicago; Cindy Skrukud, Fox River Study Group, Sierra Club; Austin Omer, Illinois Farm Bureau; Jong Lee, NCSA, UIUC; Jim Lamer, Illinois Natural History Survey; Jim Duncker, USGS; Tim Hodson, USGS; Tim Straub, USGS; Megan Dwyer, Illinois Corn Growers; Eliana Brown, Illinois Extension; Kate Gardiner, Illinois Extension; Layne Knoche, Illinois Extension; Momcilo Markus, ISWS; Rabin Bhattarai, University of Illinois; Lauren Salvato, UMRBA; Daniel Kim, University of Illinois; Julie Hewitt, Illinois Nutrient Research & Education Council

Meeting Summary

Welcome and Introductions *Eliana Brown and Trevor Sample*

Eliana Brown and Trevor Sample welcomed everyone to the meeting.

Illinois River Basin Next Generation Water Observing Systems *Jim Duncker, USGS*

Jim Duncker of USGS shared an update on the Next Generation Water Observing Systems (NGWOS) for the Illinois River Basin. The NGWOS provides a high-fidelity, real-time data on water quantity, quality, and use to support modern water prediction and decision-support systems that are necessary for informing water operations on a daily basis and decision-making during water emergencies.

USGS is piloting the NGWOS on the Illinois River Basin because it is a system challenged by an overabundance of nutrients and associated harmful algal blooms. Their team is currently engaging stakeholders; cataloging existing data, networks, and models; identifying data and knowledge gaps that may limit model accuracy; and developing the basin science plan. In FY21, USGS will be upgrading three locations for continuous nutrient monitoring, and they are looking at additional locations for continuous nutrient monitoring for FY22.

USGS Super Gage Alternatives *Tim Straub and Tim Hodson, USGS*

Tim Hodson and Tim Straub provided an update on the five-year perspective of the Illinois Continuous Monitoring Network. During the 2016-20 water years, the USGS, in cooperation with Illinois EPA, instrumented eight major rivers in Illinois to better quantify nutrient and sediment loads from the State of Illinois to the Mississippi River.

Tim Hodson shared the takeaways: fixed-interval sampling with linear interpolation is effective for estimating statewide loading but ineffective for most individual watersheds, and loads estimated by

discrete sampling were biased low or high depending on the method and those biases are not stationary. In economizing the Illinois monitoring network, there is a tradeoff between measuring how load is changing statewide and measuring where it is changing.

Tim Straub showed trends in turbidity and nitrate for the Illinois and Embarras Rivers, pointing out the peaks in nitrate that were caught by discrete sampling. He also shared annual alternatives for discrete sampling.

Future of Illinois Statewide Loading *Trevor Sample, Illinois EPA*

Dr. Greg Mclsaac has calculated statewide nutrient loads and provided water quality analysis to the Nutrient Loss Reduction Strategy effort. He has asked to be relieved of his duties. The NLRs Steering Committee thanked Dr. Mclsaac for his efforts and is currently looking for partners to assist in continuing his work.

Rock River Study with Consultant *Megan Dwyer, Illinois Corn Growers Assoc.*

Megan Dwyer shared an update on the Rock River Study. This study is being conducted to investigate the great increase in flow in the watershed. Phase I of the study identified six key areas that may be of concern and found flow was directly correlated. Phase II brought in additional partners to review data on a monthly scale, temperature, and physical inspections including GIS work. They feel that this area still requires attention to understand these numbers. In between Phases I and II, they have partnered with GROWMARK to offer low-cost cover crop seed for first-time adopters to farmers in Ogle, Lee, and Whiteside counties.

Illinois River Study *Greg Mclsaac, University of Illinois*

Dr. Gregory Mclsaac provided an update on an Illinois River Basin study, which is a collaboration between himself, Dr. Momcilo Markus, Dr. Rabin Bhattarai, and Daniel Kim and funded by Illinois NREC. At the time of the meeting, a cooperative agreement with USGS was pending, which has since been approved and will allow Dr. Timothy Hodson to contribute his expertise to the project based partially on USGS funding. The objective is to identify and quantify factors contributing to increased phosphorus loads in the Illinois River at Valley City. The general approach is to construct P load budgets for different time periods and watersheds and use attribution analysis to relate temporal and spatial variation to P sources.

Preliminary conclusions are that P loads in monitored tributaries below Marseilles all increased from 1989-96 to 2015-19, but not enough to account for a 39% increase at Valley City. Additionally, the phosphorus load at Marseilles has been relatively stable - phosphorus load reductions in some upstream watersheds have been offset by increases in others.

Hypoxia Task Force Monitoring Workgroup *Trevor Sample, Illinois EPA*

The workgroup met monthly March 2020 through April 2021 to focus on what a basin-wide nutrient monitoring network would look like, its funding needs, and existing water quality stations near state borders as well as identify sites where new stations could be established.

USEPA contracted with Tetra Tech to provide an inventory of monitoring data from multiple agencies in the Water Quality Portal and surveyed each state to verify the results from the inventory and share whether their agencies are likely to continue to support existing sites and help identify opportunities to establish new sites to meet the objective. The data inventory and state survey results were combined to identify and prioritize sites.

Priorities were based on whether the site was on a large river, proximity to state boundaries, confluence with a larger river, whether site met baseline monitoring criteria (minimum monthly), and historical record of data. The whitepaper informing the HTF that the workgroup had met objective can be found at: <https://www.epa.gov/ms-htf/monitoring-workgroup-network-evaluation>.

NMC Member Updates and Next Steps *Eliana Brown, Illinois Extension*

Eliana Brown welcomed NMC members to share updates. The 2021 Illinois NLRS Partnership Conference is Wednesday, November 10. See go.illinois.edu/nlrs for more information. Kate Gardiner shared that the Illinois Nutrient Explorer is released: <https://iiseagrant.org/education/land-to-water-nutrient-explorer/>. Cindy Skrukud shared that the state legislature added a new purpose to the Partners for Conservation program, stating that implementation of state's NLRS is a purpose.

Adjourn

Meeting Minutes

Welcome and Introductions *Eliana Brown and Trevor Sample*

Eliana Brown and Trevor Sample welcomed everyone to the meeting.

Illinois River Basin Next Generation Water Observing Systems *Jim Duncker, USGS*

Jim Duncker, Acting Basin Coordinator, provided an update on the Illinois River Basin Next Gen

The USGS Water Science Survey focuses on observing, understanding, predicting, and delivering water science to the nation. The USGS Water Science Survey has five goals: provide society the information it needs regarding the amount and quality of water in all components of the water cycle at high temporal and spatial resolution, nationwide; advance understanding of processes that determine water availability; predict changes in the quantity and quality of water resources in response to changing climate, population, land-use, and management scenarios; anticipate and respond to water-related emergencies and conflicts; and deliver timely hydrologic data, analyses, and decision-support tools seamlessly across the Nation to support water-resource decisions.

USGS looked to the National Academies of Science 2018 Consensus Study Report on the Future Water Priorities for the Nation. The report gave ten recommendations: enhance data collection; coordinate on data delivery; increase focus on relationships between human activities and water; develop a robust water accounting system; collaborate on water use data standards; ensure monitoring networks are adequate to assess changing conditions; focus on long-term prediction and risk assessment of extreme

water conditions; develop multi-scale, integrated, dynamic models that encompass the full water cycle; collaborate within and outside of USGS; and build a workforce ready to take on new water challenges.

USGS Integrated Water Science focuses on the loop of observe, understand, predict, and deliver. There are groups of modelers at different levels within USGS that work to better understand the processes that are happening and better improve the modeling. We're bringing that to the Illinois River Basin with NGWOS. One of the key components that we're working with is engaging stakeholders, so we want to speak with all the groups in the basin, including traditional and new partners.

The NGWOS provides a high-fidelity, real-time data on water quantity, quality, and use to support modern water prediction and decision-support systems that are necessary for informing water operations on a daily basis and decision-making during water emergencies. The Illinois River Basin provides an opportunity to implement the NGWOS in a system challenged by an overabundance of nutrients – primarily nitrogen and phosphorus – and associated harmful algal blooms. The steps are to identify water monitoring gaps and data needs related to integrated water modeling and stakeholder decision-making; establish integrated set of fixed and mobile monitoring assets in the water, ground, and air; integrate delivery of water quantity, quality, and use data; and work with partners and stakeholders to inform modern water prediction and decision-support systems. There is a changing scene in the monitoring world and part of that is the Internet of Things.

The pyramid shape of the framework represents the relative density of observations, with “few intensive sights measuring multiple parameters at a high frequency at the top and many survey points or remotely sensed pixels measured less frequently and for fewer parameters at the base” (Murdoch et al., 2014). The pyramid levels, starting from the bottom and going up to the top, are Inventories and Remote Sensing Data, Basin-Wide Monitoring and Surveys, Intensive Sub-Basin Monitoring, and then Test Beds.

As for the timeline, the project is between years zero and one. They are currently engaging stakeholders; cataloging existing data, networks, and models; identifying data and knowledge gaps that may limit model accuracy; and developing the basin science plan. Starting in February 2021, they spoke with the UMRBA and have since followed up with a meeting with the Corps of Engineers, MWRD, State water planning task force, and lots of NGO groups. We want to roll this out and get feedback, so we are trying to speak with as many folks as possible.

Illinois River Basin priorities are stakeholder input, data gaps, and transferability of NGWOS information. This includes information on sediment, nutrients, harmful algal blooms, water availability, stormwater, flooding, irrigation, municipal water supplies, navigation hazards, chlorides, interbasin transfers, emerging contaminants, PFAHs, and invasive species.

Illinois River basin identified as major contributor to Gulf Hypoxia. The Illinois EPA-led Nutrient Loss Reduction Strategy has the long-term goal of reducing loads from Illinois for total phosphorus and total nitrogen by 45%, with interim reduction goals of 15% nitrate-nitrogen and 25% total phosphorus by 2025. The state is monitoring 3 sectors: agriculture, point source, and urban stormwater. In the ag

sector, stakeholder interest remains high. Point source reductions are due to improvements in wastewater treatment facilities. Urban stormwater nutrient loss can be addressed by adding green infrastructure. Additional continuous monitoring “supergages” provide more sub-basin resolution.

Statewide Q, nitrate-N and TP estimated at 13%, 7%, and 26% above the baseline period. Point source TN at 75 million lb/yr is a 14% decrease from 2011. Point source TP at 14 million lb/yr is a 22% decrease. Reductions in TP yield from Des Plaines and Chicago HUCs of 15% and 27% correspond to reductions in point source discharges. There were increases in TP for Upper Sangamon, Macoupin, and several other HUCs. More frequent river sampling is needed, especially for phosphorus at high flows.

In FY21, we are upgrading three locations for continuous nutrient monitoring: Fox River at New Munster, WI; Grand Calumet River at Hammond, IN; and Illinois River at Starved Rock Lock and Dam. In FY22, we are looking at additional locations for continuous nutrient monitoring. There will be new continuous N and P instrument testing, new sub-basin continuous nutrient monitoring, groundwater-surface water interactions, and intensive synoptic monitoring. This will provide lots of hands-on information.

Discussion:

Cindy Skrukud: I chair a group that works on the Fox River in Illinois, so I am excited to hear about this. I got a call from a friend who works in Wisconsin, and he shared a survey link. Is that something that we should use?

Jim Duncker: I can drop the link to that. It is a short questionnaire, and we welcome feedback.

Cindy Skrukud: Is this effort going to be compiling data that USGS collects? I know you are already monitoring for us at Stratton Dam, but we also collect data, so I was wondering if you are interested in looking at that.

Jim Duncker: This is just the NGWOS presentation, but IWAS and Integrated Water Predictions are the modelers working at another level. What we are doing is collecting data needed for some basin-scale modeling to improve those predictions. Some of the data needed to run those models is collected by partners. We are doing some data mining for data that we do not collect. As Basin Coordinator, one of the challenges is that we are not hearing much from the modelers yet on what they need.

Gregg Good: I wanted to share our response to what is going on at Starved Rock. Yesterday, while on a call with UMRBA, Nicole Manasco shared that her folks in the field found green water at Starved Rock again. My staff are meeting others from Peoria and the Army Corps to collect samples there today. Because we got a USEPA grant in October, we have been able to work with our lab to do different collections. After that, USGS called and is interested in doing something. The cooperation yesterday was just fantastic. With NGWOS, getting new high-tech equipment at Starved Rock will be great to get more information. We will keep people informed with what we find out about the toxin levels.

USGS Super Gage Alternatives *Tim Straub and Tim Hodson, USGS*

Tim Hodson and Tim Straub provided an update on the five-year perspective of the Illinois Continuous Monitoring Network.

During the 2016-20 water years, the USGS, in cooperation with Illinois EPA, instrumented eight major rivers in Illinois to better quantify nutrient and sediment loads from the State of Illinois to the Mississippi River. Any time you put instrumentation into a harsh environment, things can go wrong. How you deal with these missing periods is very important. We developed our own approach using Bayesian machine-learning. In short, the model estimates the probability distribution of missing data given imperfect observations. Tim Hodson showed the imputation model at work for the nitrate load from the Green River based on discrete sampling with surrogate regression (C5), continuous data imputed with the C5 model, and continuous data with Bayesian imputation.

In measuring loads, we saw an improvement in precision and bias in using continuous monitoring. Most of our uncertainty is coming from Kaskaskia and Illinois River. We have invested resources to address this and hope to improve our estimations. With turbidity, it might not be that helpful to monitor in the Rock River, but with Embarras and Little Wabash, it would help to reduce our statewide uncertainty. There was a large improvement in continuous modeling as opposed to discrete monitoring for suspended sediment.

Looking at Illinois load uncertainty over five years, Tim found that with linear interpolation, the model often underpredicts the load. We are interested in looking at loads at two different times. At a 20-day sampling period, uncertainty can be below 5%. Linear interpolation works pretty well for estimating statewide load.

Looking at load uncertainty over five years for the Embarras, linear interpolation caused the model to overpredict the load. At a 20-day sampling period, uncertainty was over 20%.

Takeaways are that fixed-interval sampling with linear interpolation is effective for estimating statewide loading, but ineffective for most individual watersheds. Loads estimated by discrete sampling were biased low or high depending on the method and those biases are not stationary. They change with changes in flow, changes in watershed management over time. While we may be able to correct for them to an extent, that will never be perfect. Finally, in economizing the Illinois monitoring network, there is a tradeoff between measuring how load is changing statewide and measuring where it is changing. The former they can do pretty easily, but will lose the ability to discern what's going on at the local or HUC-8 scale.

Tim Straub showed gage height, turbidity, and nitrate for the Illinois River at Florence. The peak of the turbidity often occurs at the rising limb of the hydrograph, not at the peak. The Illinois River turbidity peaks within 24 hours and that is not uncommon. There are similar trends with nitrate at the Embarras – the nitrate is more pronounced, which may come into play with what Tim Hodson was discussing. This peak was within a day of the Illinois River peak, so it is often hard to get to the sites for sampling. The

surrogates tell us when to sample. Without the surrogates, I would never have guessed we needed to get there so quickly. These peaks also often happen over holidays, on the weekends, or at night.

Annual alternatives include existing without second turbidity probe (range for cooperator share 350,000 – 375,000 annually); existing without second turbidity probe, pH, temperature, Spec Cond (250,000 – 275,000); subtract two sites (190,000 – 215,000); subtract four sites (130,000 – 155,000); discrete sampling only (8 sites and 15 samples each site) (80,000 – 100,000); and modeling (WRTDs and Linear Interpolation plus reporting) (30,000 – 38,000). Wanted to provide some ballpark numbers.

Discussion:

Gregg Good: The current eight-station super gage network agreement goes through collection date of September 30.

Trevor Sample: Whether we continue what we are doing or alter it at a lower cost.

Austin Omer: Is there going to be a white paper or report of Tim's analyses? Is there a larger USGS report for the US of the comparison of "super" gauges vs. discrete monitoring?

Tim Hodson: There will be a report for the Illinois Network, which is being copy-edited now. Casey Lee has published reports related to your other question, but he focused on larger rivers, and some of his findings are not representative of smaller rivers. Casey Lee and others 2019:

<https://pubs.er.usgs.gov/publication/sir20195084>

Austin Omer: Thank you, Tim. I look forward to reading both.

Future of Illinois Statewide Loading *Trevor Sample, Illinois EPA*

Trevor Sample shared an update on the future of Illinois statewide loading. Dr. Greg McIsaac has calculated statewide nutrient loads and provided water quality analysis to the Nutrient Loss Reduction Strategy effort. He has asked to be relieved of his duties, so we are currently looking for partners to assist in continuing his work, which includes annual statewide loads. We thank Dr. McIsaac for his work on this effort.

Rock River Study with Consultant *Megan Dwyer, Illinois Corn Growers Assoc.*

Megan Dwyer shared an update on the Rock River Study. This study is being conducted because it is a priority N watershed and has showed a great increase in flow. There is something going on there, they think flow is a driver but wanted to investigate it.

For Phase I, Illinois Corn Growers Association reached out to Dan Perkins and asked him to investigate this using existing data. They identified six key areas that may be of concern and flow, crop yield, land use change, and how tile drainage adoption was changing and could potentially impact some of this. Dan looked at existing data from Illinois EPA, USGS, NASS, agronomy retailers in the area, etc. After looking through the data that existed, the only thing that directly correlated was flow. That led to some more questions, and we wondered if something was missing. In some of the data, there are negative

nitrate loads, which do not make sense. Looking at these at an annual timetable might not make sense. We know that point source plays a part in nutrient loss, so we considered if it could play a part here. We did not see an increase in crop acres, taking nonproduction land into production, but we did see taking continuous corn into corn-soybean rotation.

Next, Phase II involved Dr. Greg Mclsaac and looking at a monthly timestamp rather than annual. They will also look at temperature. We will be working with USGS to do physical inspections at the different sites and dams, looking at groundwater for possible nitrate loading, and looking at what could exist from a point source contribution. We are also looking to work with SIU Edwardsville's GIS team. We feel that this area still requires attention to see why these numbers are what they are. In between Phases I and II, we have partnered with GROWMARK and farmers in Ogle, Lee, and Whiteside counties are eligible to apply through Illinois Corn Growers to receive low-cost cover crop seed for first-time adopters.

Discussion:

Greg Mclsaac: Those negative N loads all occur at low flow in the baseline period, so that could be a consequence of in-stream denitrification or of mixing groundwater with surface water. We will try to look into that. In terms of the change in practice, there was an expansion of irrigation from the 1970s to the mid-1990s, so that is another factor that could be having an influence.

Cindy Skrukrud: I think this is great that you guys are looking at this. Have you been in touch with the new Rock River Watershed group? That is led by wastewater facilities that have new requirements to do a nutrient reduction plan so that could be helpful for you to work together.

Megan Dwyer: We have not, but that sounds great to get some synergy going.

Cindy Skrukrud: I can get that contact to you.

Illinois River Study *Greg Mclsaac, University of Illinois*

Greg Mclsaac provided an update on phosphorus loads in the Illinois River Basin from 1978 to 2019, which is a collaboration between himself, Dr. Momcilo Markus, Dr. Rabin Bhattarai, and Daniel Kim with funding from NREC. The Illinois River total phosphorus loads at Valley City and Marseilles has seen an increase of 30-40% at Valley City. Marseilles gets all the wastewater from Chicago and MWRD has been pretty flat despite the fact that MWRD has reduced its loads in recent years. Project objectives are to identify and quantify factors contributing to increased P loads in the Illinois River at Valley City. The general approach will be to construct P load budgets for different time periods and watersheds and use attribution analysis to relate temporal and spatial variation to P sources.

Data will include USGS flow and concentrations where available, and the Illinois EPA ambient water quality monitoring network concentrations. Load estimations will use WRTDS-K new version of WRTDS loads of TP, DP, TSS, VSS, and chloride. Point source data will come from MWRD (early 1980s-2019), Sanitary District of Decatur (mid 1990s – 2019), USEPA ECHO system (2011-2019). Land cover, population, older point source data is from Falcone (2018).

Greg showed preliminary results of TP yields at Marseilles, Kankakee at Wilmington and Fox River at Dayton using WRTDS-K. The Illinois River has been pretty flat at Marseilles. We are seeing some reductions in some of the upstream basins, but those are offset by some of the other basins. The Fox River at Dayton has been fairly flat, as well as the Kankakee at Wilmington. When you subtract off the Kankakee and isolate the more urban part of the river, the yields have been higher.

Greg showed the preliminary results of TP load downstream of Marseilles. Sum of TP loads from 78.2% of the upstream watershed is greater than TP load at Valley City. That means there is phosphorus accumulating above Valley City, possibly in the river sediments. There have been extensive studies of sediment budgets in the Illinois River. The change of Sangamon River at Oakford between 1989-96 to 2015-19 increased about 45%. It adds up to a 9% increase.

Preliminary conclusions and questions are that P loads in monitored tributaries below Marseilles all increased from 1989-96 to 2015-19, but not enough to account for a 39% increase at Valley City. Could this be mobilization of P stored in the river sediments, changes in river flow and chemistry (chloride and pH), greater mobility of dissolved P, or point sources? Additionally, the phosphorus load at Marseilles has been relatively stable - P load reductions in some upstream watersheds have been offset by increases in others.

Discussion:

Jim Duncker: Perhaps increasing chloride coming out of Chicago is mobilizing P?

Greg McIsaac: That's a possibility, I can't prove that. Because the loads, there will probably be different factors working at the same time to promote higher dissolved phosphorus. I'm not saying it's the only factor, but it could be a factor.

Trevor Sample: When Dr. McIsaac and Megan talked about the groundwater portion in the Rock River, we're hopeful that we can help fund that portion of the study.

Greg McIsaac: Through the groundwater section of the water survey, is that correct?

Trevor Sample: That's right.

Gregg Good: We've heard from UMRBA that chlorides are going up all over the Midwest. Any thoughts on why that is? Aren't we getting smarter with how much we are putting on roads, or is it water softening?

Greg McIsaac: I do not know, perhaps that is a good question for the group. I have seen that water softening is a possibility.

Laura Gentry: From a nonpoint source perspective, we talk about legacy P. It looks like two of your explanations relate directly to that issue. When do we get to the point where we directly address this? Have we concluded there is nothing to be done?

Greg Mclsaac: I have not concluded that. There is quite a number of practices for streambank restoration. Stream beds will be more challenging, but I think there is some interest in that. Going back to chloride increasing, from what I have seen most of the increase is coming from the Fox and Upper Illinois Rivers. Not as much of an increase from the ag areas. There could be a geological component too.

Laura Gentry: It is hard for us to convince farmers to change either P application strategy if they feel like the streambank P issue is insurmountable. I wish we could point to a way we are addressing it.

Greg Mclsaac: A big chunk of this P is ending up in river sediments, so it is not helping anyone there. If we are going to stop river sediment loads, we must stop putting things into the river.

Jim Duncker: The Chicago DOT loves road salt. I am sure you could go up in May or June and find remnant road salt and we would see pulses of chlorides in the spring, way after the last road salt application. It does not surprise me and could be something to look at.

Justin Vick: The increased chlorides could be due to increased precipitation.

Cindy Skrukrud: Yes, to both water softening and road salt. ISWS is going to perform trends analysis on chloride and conductivity on Fox River data.

Lauren Salvato: I believe the increasing chloride trends are because it is not easily removed from water bodies and the additive effects are further increasing toxicity.

Cindy Skrukrud: There is a collective Sensible Salting effort underway in NE IL.

Jim Duncker: We talked to the CDOT and requested a reduction in road salt in a two-mile study reach. They fully committed to it but the information never made it to the truck driver.

Cindy Skrukrud: I know the water quality specialist from McHenry County is interested in it and they're working on a manual now, which would be used to train private operators who put salt down in parking lots and such. Then there would be a certification program and ultimately, legislation that would give shopping center owners some liability coverage if they are using applicators who have been through this training.

Lauren Salvato: There's a Chloride Technical Management Workgroup coordinated by USEPA Region 5 and includes other New England states, for those who are interested.

Hypoxia Task Force Monitoring Workgroup *Trevor Sample, Illinois EPA*

Following the 2019 Hypoxia Task Force meeting in Louisiana, member states drafted a letter to the Federal partners requesting assistance to states on several issues. During the February 2020 Hypoxia Task Force meeting in Washington D.C., the letter was discussed, and the result was the formation of several working groups dedicated to addressing those issues. Workgroups include Monitoring, Funding, Research Needs, Adoption of Innovative BMPs, Communications, Ecosystem/Social Metrics,

Environmental Mitigation. These are in addition to previously established workgroups of WQ Trends, Point, Nonpoint, and the Coordinating Committee.

All meetings were hosted online by USEPA on Adobe Connects. First monthly meeting was held March 19, 2020. Meetings held monthly through April 2021. The objective is “To evaluate funding needs to support existing and potential new monitoring in the Mississippi-Atchafalaya River basin, particularly to track loads and trends in large rivers to help states evaluate progress toward meeting nutrient reduction goals and to support adaptive management of nutrient reduction strategies.” They were to focus on what a basin-wide nutrient monitoring network would look like and its funding needs and existing water quality stations near state borders and identify sites where new stations could be established. “Large” rivers defined as being Strahler stream order 6 or above.

USEPA contracted with Tetra Tech to provide an inventory of monitoring data from multiple agencies in the Water Quality Portal. They also worked with National Great Rivers Research and Education Center to coordinate some of the work they are doing for the Trends Workgroup. A survey was sent to each state asking them to verify the results from the inventory and asked whether their agencies are likely to continue to support existing sites and help identify opportunities to establish new sites to meet the objective. Both flow and nutrient concentration data was considered.

The data inventory and state survey results were combined to identify and prioritize sites. Sites were designated as Priority 1 and Priority 2. Priorities based on whether the site was on a large river, proximity to state boundaries/confluence with a larger river, whether site met baseline monitoring criteria (minimum monthly), and historical record of data. Additional monitoring sites proposed by states were also considered. [Trevor showed a map of priority sites for trend and load analysis identified by the Monitoring Workgroup.]

In Illinois, there are eight priority 1 sites (current USGS supergages) and one priority 2 site (potential flow gage on Cache River). Illinois identified four additional priority sites as important to characterize nutrient loads leaving State boundaries (Illinois EPA Ambient sites close to supergages used by U of I for calculating annual loads). The vast majority of the funding request is to fund continued operation of continuous water-quality sensors at eight sites on large rivers leaving State boundaries. A relatively small amount of funding (~\$10,000) was requested for additional sample collection at priority and State-identified priority sites, and \$25,000 for stream gaging at the lone priority 2.

The Monitoring Workgroup Chair and State Co-Chair sent a letter and whitepaper to the Hypoxia Task Force informing them that the workgroup had met our objective. Casey Lee presented the workgroup whitepaper during a Hypoxia Task Force Coordinating Committee meeting in May 2021. The whitepaper can be found at: <https://www.epa.gov/ms-htf/monitoring-workgroup-network-evaluation>.

Discussion:

Gregg Good: Would letters of support be useful?

Trevor: That wouldn't hurt, but I think that's up to those individual organizations if they want to do that.

Justin Vick: Gregg M, do you know if phosphate can also bump chloride off sediment? there could be a seasonal interplay there if so.

NMC Member Updates and Next Steps *Eliana Brown, Illinois Extension*

Eliana Brown welcomed NMC members to share updates. The 2021 Illinois NLRS Partnership Conference is Wednesday, November 10. See go.illinois.edu/nlrs for more information.

Kate Gardiner shared that the Illinois Nutrient Explorer is released! She shared the link in the chat:

<https://iiseagrant.org/education/land-to-water-nutrient-explorer/>

Cindy Skrukrud shared that the state legislature did add a new purpose to the PFC program stating that implementation of state's NLRS is a purpose. That's exciting! The legislature did put some more funds into it, about \$4 million more than a typical year. Hopefully we can continue that in coming years to put more resources into our collective work. We tried to get the conservation program extended for multiple years, but they just extended it for one year.

Trevor Sample shared that they have not heard much about that yet and it is on hold.

Adjourn