

Nutrient Monitoring Council (NMC) #15

June 18, 2020

NMC meeting #15 was originally scheduled for March 31, 2020 but had to be cancelled due to COVID-19. This meeting was rescheduled as a ZOOM conference call on June 18, 2020.

In attendance: Gregg Good (Chair), Illinois EPA; Trevor Sample (NLRs Coordinator), Illinois EPA; Svetlana Taylor, Current Innovation, NFP; Laura Gentry, Illinois Corn Growers Association; Rick Cobb, Illinois EPA; Ann Holtrop, Illinois DNR; Brian Metzke, Illinois DNR; Jim Lamer, Illinois Natural History Survey; Elias Getahun, Illinois State Water Survey; Laura Keefer, Illinois State Water Survey; Walt Kelly, Illinois State Water Survey; Justin Vick, MWRD; Jong Lee, NCSA; Ted Kratschmer, National Great Rivers Research and Education Council (NGRREC); Keith Richard, Sanitary District of Decatur; Cindy Skrukud, Sierra Club; George Czapar, University of Illinois; Paul Davidson, University of Illinois; Greg Mclsaac, University of Illinois and Agricultural Watershed Institute; Nicole Manasco, U.S. Army Corps of Engineers - Rock Island; Tim Straub, USGS; Kelly Warner, USGS; Eliana Brown, Illinois Extension; Kate Gardiner, Illinois Extension; and Layne Knoche, Illinois Extension

Summary

Welcome – *Gregg Good, Trevor Sample, and Eliana Brown*

Gregg Good, Trevor Sample, and Eliana Brown welcomes everyone to the meeting. Gregg Good reviewed the Nutrient Monitoring Council charges.

NMC Membership – *Dr. James Lamer, INHS Illinois River Biological Station*

Gregg Good welcomed James Lamer and Brian Metzke to the NMC.

Members discussed how they are adapting monitoring practices to minimize spread of COVID-19.

September 10 and October 22 Meeting Review and Minutes – *Gregg Good*

Gregg Good reviewed the most recent meetings on September 10 and October 22, 2019. Gregg presented meeting minutes, which the group approved. Meeting minutes are found on the Illinois EPA's NLRs website.

Statewide and Major River Nitrate (and maybe Total Phosphorus) Load Updates – *Dr. Greg Mclsaac*

Greg Mclsaac provided an update to the statewide riverine flow and loads. Total phosphorus (TP) loads in 2013-17 are slightly lower in the update than in the 2019 Biennial Report because WRTDS calculates loads based on relationships over a 7-year window. Adding new observations can shift these relationships.

For 2014-18, statewide average water yield and TP load estimates were 9% and 21% greater than the 1980-96 baseline, respectively, while the estimated nitrate load was 4% below the baseline. For 2015-19, the statewide average water flow, nitrate and TP load estimates were, respectively, 25%, 13% and 37% greater than the baseline period.

Nitrate-N yield from the Rock River downstream of Rockton and Perryville was low in 1980-96. Potential reasons for this include delayed arrival of nitrate leaching from previous decades through a long groundwater flow pathway, high in-stream denitrification that was later reduced due to higher flows, especially in June and July, changes in agriculture practices, and lack of tile drainage that was later added, especially in conjunction with irrigation. New irrigated acres and an increase in corn acres may have produced about 3 million lb N/yr of new load, though this is small compared to the 19 million lb N/yr increase in river load since 1996. Annual average water yield in the Rock River downstream of Rockton and Perryville was 48% greater during 2013-17 compared to the baseline period. Much of this increase occurred from April through July and corresponds to higher precipitation during those months. High precipitation in the growing season promotes nitrate leaching loss from cropland. Higher river flows in warmer months (May, June, and July) probably reduce in-stream denitrification losses and thereby increase riverine loads.

If there is a large reservoir of groundwater nitrate discharging into the Rock River, there will probably be long lag times between reductions in leaching losses from cropland and reduced loads in the river. Practices that reduce nitrate concentrations in the river (e.g., side channel wetlands) may reduce loads more quickly. Irrigation water management efficiency is critical to efficient use of N fertilizer under irrigation.

USGS Super Gage Network – Gregg Good/Trevor Sample

The current agreement between USGS and Illinois EPA has monitoring ending on Sept 30, 2020. Illinois EPA have approval from Bureau of Water Chief Sanjay Sofat to extend the USGS agreement by one additional year until Sept 30, 2021. However, we need to consider contingency plans for if the network can't be extended beyond that.

The New Hypoxia Task Force Water Quality Monitoring Workgroup – Trevor Sample

Trevor and Kristi Jones of the Illinois Department of Agriculture represent Illinois on the Hypoxia Task Force (HTF). During the HTF meeting held in Washington D.C. in February, there was a discussion on a letter sent by State's to the Federal Water Subcabinet outlining topics that State's would like to see addressed to assist in implementing their State nutrient strategies. As a result, the HTF set up several temporary working groups, including the Water Quality Monitoring Work Group, where Trevor is the Co-Chair. The goal is to write a pre-proposal and subsequent business case for establishing a Mississippi River Basin monitoring network that would capture annual nutrient loads from each HTF state. They are currently working with NGRREC and Tetra Tech to determine existing water quality stations and to identify sites where new stations could be added. A pre-proposal is due this fall before the next HTF meeting (date TBD).

UMR Nutrient Progress Tracking Summit and UMR WQ Improvement Act – Trevor Sample/Gregg Good

The Upper Mississippi River Basin Assoc (UMRBA) is a regional interstate organization formed in 1981 by the governors of IL, WI, MN, IA, and MO. They facilitate dialogue and cooperative action regarding water/land resource issues (i.e. clean water, ecosystem health, commercial navigation, hazardous spills, flooding, and aquatic nuisance species). Gregg Good is a member of UMRBA's Water Quality Task Force and Water Quality Executive Committee. The UMR Watershed has several large challenges to nutrient

reduction. UMRBA believes a federal and state investment must be substantially increased to meet nutrient reduction and resource monitoring goals.

The UMRBA Water Quality Improvement Act proposes solutions, including the creation of an (Upper?) Mississippi River Program Office administered by NRCS and USEPA, funding for implementing state nutrient reduction strategies – primarily Ag and Urban NPS components, more comprehensive and coordinated monitoring, modeling, and research, and better communication between parties via development of a communication strategy. Bill sponsors include Rodney Davis (R-IL) and Angie Craig (D-MN) in the House of Representatives and Roy Blunt (R-MO) and Amy Klobuchar (D-MN) in the Senate.

UMRBA Nutrient Strategy Progress Tracking Summit is a way for members states to discuss successes and challenges in tracking progress of implementing state nutrient reduction strategies. It was originally scheduled for July 22-23 in Dubuque, IA but has been postponed to 2021 due to COVID-19 concerns. In the meantime, UMRBA is planning to offer a few webinars in 2020 with priority topics chosen by the planning committee.

Current and H2NOW - Svetlana Taylor, *Current Innovation, NFP*

Current was launched in 2016 as a nonprofit water innovation hub and is headquartered in Chicago, IL. They are a collaborative that leverages partnerships with the state's world class utilities, research institutions, industries, and innovation community for global environmental and economic impacts. Current's mission is to grow Chicago's and Illinois' blue economy to build solutions that will solve the world's water challenges. The blue economy consists of the companies developing innovative water technologies and industries that use them. Current connects stakeholders with distinct but common interests in water innovation.

H2NOW is one of Current's waterway monitoring initiatives. H2NOW was started to obtain real-time information about the microbial quality of the Chicago River, educate and engage the public about improvements to river health and water quality, observe how river water quality changes in response to conditions and events (CSOs), and evaluate novel technologies for real-time microbial water quality assessment. H2NOW's goals for 2020 are to improve data, achieve higher accuracy and precision, understand and communicate the limitations of data, streamline data collection and integration, and continue to engage volunteer networks in collecting river samples.

NGRREC and NCSA's Work - Ted Kratschmer, *NGRREC*

The Great Lakes to Gulf (GLTG) Virtual Observatory is a web-based geospatial application that provides users with tools to explore, analyze, and compare water quality data from the Mississippi River and its tributaries. Based on GLTG application, the NGRREC team provides an interactive data portal for the Illinois NLRs. There have been some data portal enhancements recently, including a new interface to explore raw data, additional visualization and interactive exploration of data outputs from the Biennial Report, narrative storyboards, and an updated link: ilnlrs.ncsa.illinois.edu.

They are working on several new initiatives to improve the application. Future enhancements include progress tracking through visualization/interpretation of water quality trends by watershed, state, or for

the entire MRB, and a side project of a water quality data inventory of the lower Mississippi River mainstem. They are also working with Dr. Reid Christianson on a data repository and visualization capacity to describe inventory of agriculture best management practices for each of the 12 MRB mainstem states and with Dr. Kaiyu Guan on innovative remote monitoring of cover crops and the relationship to water quality.

Next Steps – Gregg Good, Trevor Sample, and Eliana Brown

Trevor Sample will succeed Gregg Good as the next Chair of the Nutrient Monitoring Council. Trevor will work with others to set up the next meetings for September/October 2020 and March 2021.

Meeting Minutes

Welcome – Gregg Good, Trevor Sample, and Eliana Brown

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Statewide and Major River Nitrate (and maybe Total Phosphorus) Load Updates – Dr. Greg Mclsaac

River loads were calculated using the following methods. Load (lb/yr) equals water flow (volume/time) times concentration (mass/volume). Yield (lb/ac-yr) equals load divided by drainage area. USGS provides the daily water flow and Illinois EPA and USGS provide sampling concentrations approximately monthly. Daily load equals daily water flow times estimated daily concentration. Daily concentration is calculated using nitrate as the linear interpolation over time between measured samples and phosphorus as the weighted regressions on time, discharge, and seasonality (WRTDS).

Greg Mclsaac provided an update to the statewide riverine flow and loads. Total phosphorus (TP) loads in 2013-17 are slightly lower in the update than in the 2019 Biennial Report because WRTDS calculates loads based on relationships over a 7-year window. Adding new observations can shift these relationships. Greg Mclsaac showed updated graphs on statewide annual water yield, statewide annual precipitation and water yield from 1980-2019, and statewide estimates of annual nitrate and TP loads compared with water yield, the 1980-96 baseline average, and five year moving average values. He also showed graphs for changes in water yield from the 1980-96 baseline, TP and Nitrate-N load estimates for major rivers in Illinois 1980-96, 2013-17, 2014-18, and 2015-19, as well as changes in riverine TP and Nitrate-N loads from 1980-96 to 2013-17 and 2014-18 for major rivers in Illinois.

For 2014-18, statewide average water yield and TP load estimates were 9% and 21% greater than the 1980-96 baseline, respectively, while the estimated nitrate load was 4% below the baseline. For 2015-19, the statewide average water flow, nitrate and TP load estimates were, respectively, 25%, 13% and 37% greater than the baseline period.

Nitrate-N yield from the Rock River downstream of Rockton and Perryville was low in 1980-96. Potential reasons for this include delayed arrival of nitrate leaching from previous decades through a long groundwater flow pathway, high in-stream denitrification that was later reduced due to higher flows, especially in June and July, changes in agriculture practices, and lack of tile drainage that was later added, especially in conjunction with irrigation. New irrigated acres and an increase in corn acres may have produced about 3 million lb N/yr of new load, though this is small compared to the 19 million lb N/yr increase in river load since 1996. Annual average water yield in the Rock River downstream of Rockton and Perryville was 48% greater during 2013-17 compared to the baseline period. Much of this increase occurred from April through July and corresponds to higher precipitation during those months. High precipitation in the growing season promotes nitrate leaching loss from cropland. Higher river flows in warmer months (May, June, and July) probably reduce in-stream denitrification losses and thereby increase riverine loads.

Greg offered some concluding thoughts about the Rock River nitrate-N loads. If there is a large reservoir of groundwater nitrate discharging into the Rock River, there will probably be long lag times between reductions in leaching losses from cropland and reduced loads in the river. Practices that reduce nitrate concentrations in the river (e.g., side channel wetlands) may reduce loads more quickly. Irrigation water management efficiency is critical to efficient use of N fertilizer under irrigation.

Discussion:

Cindy Skrukrud: Do you have plans to dig into the IL River phosphorus loads further?

Greg McIsaac: Momcilo Markus, an Agricultural and Biological Engineering professor, and I put together an NREC proposal to develop a phosphorus budget for the Illinois River, so we are planning to look at that. Ted was asking me some questions about this, and even though the statewide load and Illinois River loads have increased, there has been a downward trend in phosphorus in the Illinois River since about 2011. Despite the increase from the baseline load, there has been a downward trend since 2011.

Kelly Warner: The trend analysis that Tim Hodson presented last time is now published. Here is the link: <https://pubs.usgs.gov/sir/2020/5041/sir20205041.pdf>.

USGS Super Gage Network – Gregg Good and Trevor Sample

The current agreement between USGS and Illinois EPA has monitoring ending on Sept 30, 2020. Illinois EPA have approval from Bureau of Water Chief Sanjay Sofat to extend the USGS agreement by one additional year until Sept 30, 2021. However, we need to consider contingency plans for if the network can't be extended beyond that.

Discussion:

Cindy Skrukud: It is so great that Illinois EPA made funding available for another year. I think we can talk to the state legislature next year to try to get funding through 2026. We worked on a bill that would extend the Partners for Conservation program and cover the super gages, but the legislature had a short session this year.

Greg McIsaac encourages some cost-benefit analysis on the super gages.

The New Hypoxia Task Force Water Quality Monitoring Workgroup – Trevor Sample

Trevor and Kristi Jones of the Illinois Department of Agriculture represent Illinois on the Hypoxia Task Force. After the May 2019 meeting in Baton Rouge, twelve HTF states sent a letter to the Federal Water Sub-Cabinet detailing a list of items for federal agencies to address to assist states in implementing their state nutrient strategies. The letter was discussed at the HTF meeting held February 3-5, 2020 in Washington D.C. As a result, the HTF set up several temporary working groups on Water Quality Monitoring, Ecosystem/Social Metrics, Adoption of Innovative BMPs, Research, Communications, Traditional and Non-Traditional Funding, and Challenges Faced on Mitigation.

Trevor is the co-chair on the Water Quality Monitoring Work Group. The goal is to write a pre-proposal and subsequent business case for establishing a Mississippi River Basin monitoring network that would capture annual nutrient loads from each HTF state. They have had three monthly calls so far and are currently working with NGRREC and Tetra Tech to determine existing water quality stations and identify sites where new stations could be added. Some of this work has already been completed by NGRREC for the HTF Trends Working Group. Tetra Tech will review and compile the NGRREC data and identify sites for new stations. States will be surveyed to obtain data that may not be housed in federal databases. The pre-proposal is due this fall before the next HTF meeting (date TBD).

Discussion:

Kelly Warner: Is NGRREC doing the trends analysis for the whole basin?

Ted Kratschmer: We're working with Laurie and NCSA to do an inventory of sites where those long-term trends can be run and then do the analysis. As they're doing that, we will ask state agency folks for additional data they might have missed. As Trevor mentioned, Tetra Tech will work in parallel on analysis.

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The Upper Mississippi River Basin Assoc (UMRBA) is a regional interstate organization formed in 1981 by the governors of IL, WI, MN, IA, and MO. They facilitate dialogue and cooperative action regarding water/land resource issues (i.e. clean water, ecosystem health, commercial navigation, hazardous spills, flooding, and aquatic nuisance species). Gregg Good sits on the Board and the UMR Watershed has several large challenges to nutrient reduction, including differences in state monitoring programs, data systems incompatibilities, spatial gaps, estimating costs of conservation practices, and a lack of major

investment in reduction. UMRBA believes a federal and state investment must be substantially increased to meet nutrient reduction and resource monitoring goals.

The UMRBA Water Quality Improvement Act proposes solutions, including the creation of an (Upper?) Mississippi River Program Office administered by NRCS and USEPA, funding for implementing state nutrient reduction strategies – primarily Ag and Urban NPS components, more comprehensive and coordinated monitoring, modeling, and research, and better communication between parties via development of a communication strategy. Bill sponsors include Rodney Davis (R-IL) and Angie Craig (D-MN) in the House of Representatives and Roy Blunt (R-MO) and Amy Klobuchar (D-MN) in the Senate.

UMRBA Nutrient Strategy Progress Tracking Summit is a way for members states to discuss successes and challenges in tracking progress of implementing state nutrient reduction strategies. Between three to six members from each state will be allowed, along with staff from USEPA and NRCS. It was originally scheduled for July 22-23 in Dubuque, IA but has been postponed to 2021 due to COVID-19 concerns. In the meantime, UMRBA is planning to offer a few webinars in 2020 with priority topics chosen by the planning committee.

Current and H2NOW - Svetlana Taylor, *Current Innovation, NFP*

Current was launched in 2016 as a nonprofit water innovation hub and is headquartered in Chicago, IL. They are a collaborative that leverages partnerships with the state's world class utilities, research institutions, industries, and innovation community for global environmental and economic impacts. Current's mission is to grow Chicago and Illinois' blue economy – the companies developing innovative water technologies and industries that use them – to build solutions that will solve the world's water challenges. As a cross-sector connector of local and global water sector stakeholders, Current builds networks, organizes events and convenings, and helps develop pilot projects in real-world settings to solve persistent local water challenges. Current connects stakeholders with distinct but common interests in water innovation.

H2NOW is one of Current's waterway monitoring initiatives. The H2NOW initiative was started to obtain real-time information about the microbial quality of the Chicago River, educate and engage the public about improvements to river health and water quality, observe how river water quality changes in response to conditions and events (CSOs), and evaluate novel technologies for real-time microbial water quality assessment.

The initiative uses two sensing and testing technologies: Proteus probe and Tecta-PDS. Proteus Probe provides real-time estimates of fecal coliform concentrations, its sensor detects tryptophan fluorescence, and its algorithm adjusts the signal to account for temperature and estimates microbial levels based on the temperature correlated tryptophan reading and turbidity. Results are statistically correlated to test results obtained with a traditional method. Tecta-PDS is easy to use and results are delivered in 2-16 hours, typically 6-10 hours for river water. Its sensor monitors response in fluorescence and registers time-to-detection (TTD) and there is a linear correlation between TTD and log-transformed microbial count – this correlation can be developed by conducting traditional lab testing in parallel

H2NOW uses a few communication technologies as well, including Outpost Central cellular network, which picks up data from the sensors, as well as Ayyeka and Comcast, which they use to transmit data to the visualization platforms and visualize the raw data. They also use IOSight for data standardization, validation, processing for assessment purposes, correlating to other data, and as a data visualization and sharing program. They use Green Diamond for best practices in data collection and presentation, user-centered design and data presentation, and for website and data visualization tools.

H2NOW's goals for 2020 are to improve data availability (consistent power source, reliable communication network), achieve higher accuracy and precision (via additional sampling), understand and communicate the limitations of data in terms of accuracy and inference on the entire river, streamline data collection and integration from other sources to build a more comprehensive picture of water quality, and continue to engage volunteer networks in collecting river samples for improved calibration accuracy.

H2NOW partners with a variety of agencies. Partners include Mekorot and IOSight for data analysis, Proteus and Tecta-PDS for sensing, Green Diamond, ESRI, and Ayyeka for data visualization and transfer, North River Commission, Sierra Club, South Loop Chamber of Commerce, Urban Rivers, Friends of the Chicago River, Forest Preserves of Cook County, Shedd Aquarium, and Metropolitan Planning Council for community engagement, The Chicago Community Trust and Comcast for funding, University of Illinois for research, and the Department of Water Management and MWRD for utilities. To engage with H2NOW, you can take the survey, volunteer to collect water samples and survey community members, follow and promote the project on social media, join the H2NOW Chicago Advisory Committee, or become a partner or sponsor.

In addition to the H2NOW initiative, Current is also working on a nutrients project, which came out of the effort to establish a phosphorus trading program in Illinois. They are producing a whitepaper/report with learnings and recommendations and are identifying a technology-related project for monitoring and/or reduction of nutrient concentrations in the Illinois River Basin, a workshop for which is coming in July. Current is also playing the role of convener and supporter for CoWERC, which is an international industry and research collaboration on the topics of emerging contaminants, energy efficiency, and water reuse. Ongoing events include the Brave Blue World Screening, innovator showcases, and focused workshops. Lastly, Current has a research site on SharePoint. It offers a database of researchers, funding opportunities, regional news and events, and resources on topics of regional importance.

NGRREC and NCSA's Work - Ted Kratschmer, NGRREC

The Great Lakes to Gulf (GLTG) Virtual Observatory is a web-based geospatial application that integrates water quality data and analytical tools from multiple sources allowing a user to visualize and understand nutrient pollution and water quality conditions in the Mississippi River watershed. The online interactive application provides users with tools to explore, analyze, and compare water quality data from the Mississippi River and its tributaries. The GLTG Virtual Observatory supports states and other stakeholders through narratives, visual tools, and analyses.

Based on GLTG application, the NGRREC team provides an interactive data portal for the Illinois NLRs. They are always looking for additional data for both this and the main site. There have been some data portal enhancements recently, including a new interact to explore raw data, additional visualization and interactive exploration of data outputs from the Biennial Report, and narrative storyboards. The new link ilnlrs.ncsa.illinois.edu is also helpful.

A new initiative is centered around tracking states' progress in context of basin. It is progress tracking through visualization/interpretation of water quality trends by watershed, state, or the entire MRB. It includes flow-normalized loads, concentrations and loads for nitrogen and phosphorus, and a new effort with HTF to establish MRB Trend Sites to better show progress on nutrient reductions. They are working with Reid Christianson at UIUC on data repository and visualization capacity to describe inventory of ag best management practices for each of the 12 MRB mainstem states in the MRB and with Kaiyu Guan at UIUC on innovative remote monitoring of cover crops and relationship to water quality.

Future enhancements include progress tracking through visualization/interpretation of water quality trends by watershed, state, or for the entire MRB, data repository and visualization capacity to describe inventory of ag best management practices for each of the 12 MRB mainstem states, innovative remote monitoring of cover crops and the relationship to water quality, and a side project of water quality data inventory of the lower Mississippi River mainstem.

Funding is provided from the McKnight Foundation, the Walton Family Foundation, NGRREC, and NCSA.

Discussion:

Kelly Warner: Did you say early on that you were going to look for gaps in the overall trends identifying where we might need more data?

Ted Kratschmer: Yes, that it separate from what we're doing. USEPA has contracted with Tetra Tech to do that work. My understanding is that they are basing their work on what we're doing, so it is in parallel.

Next Steps – Gregg Good, Trevor Sample, and Eliana Brown

A few members provided updates. Jim Lamer shared that his group is doing extensive monitoring on the Illinois River for fish and some on water quality to evaluate impacts of the Illinois River lock closure. Kelly Warner has been looking at the Lower Mississippi River Basin and noticed that whenever they give a talk or presentation, they reference back to Illinois' work, which is a nice pat on the back for Illinois. Cindy Skrukud said that the Salt Creek workgroup is working on removing a dam. The Kane County Forest Preserve District is working on removing a dam in Carpentersville, so the Fox River Study Group will do some pre- and post-removal sampling. Nicole Manasco shared a recent report of a HAB in Starved Rock and offered to share continuous monitoring data of that area when it is available.

The next meetings will be in September or October 2020 and March 2021. Please keep an eye out for the Doodle Poll. Lastly, Trevor Sample will be taking over as the next Chair of the Nutrient Monitoring Council, effective at the next meeting. Gregg Good will remain as a council member.

Adjourn