2022 Illinois NLRS Partnership Workshop

Meeting Minutes

Tuesday, November 1, 2022 9:00 – 3:15 p.m.

Hosted by Todd Gleason, University of Illinois Extension

Morning Session 9:00 – 11:45 AM

Welcome *Todd Gleason and Lisa Merrifield, University of Illinois Extension*

The Illinois NLRS Partnership took place as a hybrid event, online via Zoom and in person at the hybrid-equipped John Block Building Auditorium, Illinois Department of Agriculture on the Illinois State Fairgrounds in Springfield, Illinois. Lisa Merrifield welcomed virtual and in person participants as in-person facilitator while Eliana Brown was the virtual facilitator. Layne Knoche was the hybrid technology support, and Joan Cox and Noah Bell recorded minutes. The meeting livestreamed on twitter at #NLRS2022. Participants were encouraged to sign in via an attendance sheet or via the chat. Geosyntec sponsored beverages for this meeting. Lunch was sponsored by The Nature Conservancy and the Illinois Farm Bureau.

Opening Comments *Director Kim, Illinois Environmental Protection Agency*

John Kim, the Director of the Illinois Environmental Protection Agency, thanked everyone for joining, either virtually or in-person. He was appreciative of the capability to host a hybrid event. He emphasized the importance of collaboration between the multitude of stakeholders and the major strides that have been made as a result. He stressed that there is still much work ahead, particularly in partnerships, to secure adequate funding for the nutrient loss reduction efforts.

U.S. EPA Gulf Hypoxia Program Grants *Bruno Pigott, Deputy Assistant Administrator, Office of Water, U.S. Environmental Protection Agency*

Bruno Pigott, from the U.S. Environmental Protection Agency, outlined the impacts of the new Bipartisan Infrastructure Law (P.L. 117-58), detailing how it applied to the Gulf Hypoxia Task Force by designating new funding in the amount of $12 million/fiscal year from 2022-2026. The intention is to distribute funds evenly between states through cooperative agreements, with a modest amount being directed for support in specific disadvantaged communities and for tribes. There will be $50,000,000 of the Gulf Hypoxia Program funds intended for state work plans and staff, for nonpoint source nutrient pollution reduction, for priority watersheds, and for interstate collaboration. The additional benefits of these funds were outlined as the investment in disadvantaged communities through the Justice40 Program, which designates 10% of funds specifically for tribal efforts and 30% of funds for HUC12 watersheds and their disadvantaged communities, totaling 40% of the designation of overall funds. Furthermore, the water quality actions will hold climate co-benefits that support adaptation and mitigation of climate change. Funds will target practices with water quality and climate co-benefits. Overall, Pigott stressed the unique possibilities that this funding will bring to further HTF interstate engagement and to improve HTF states' nutrient pollution reductions. He cited Illinois as a model for state EPA and DOA and stakeholder partnerships.

Question (Max Webster): Currently the state's Nonpoint Source Management Program has not been updated since 2013. Will any of these funds be used to update that program? If not, how will practices which focus on climate and nutrient loss be prioritized going forward with programs like the 319 grant?

Answer (Bruno Pigott): Funds will help states to update and improve strategies based on lessons learned across the HTF states. The 319 dollars and SRF dollars can be leveraged with these funds to make greater strides in nutrient pollution reduction. We are looking for the development of robust NLRSs to take advantage of lessons

learned. We are also asking states to prioritize watersheds where efforts will be most effective and will have the greatest impact.

Answer (Christine Davis): Hypoxia Grant funds will not be used to update the 319 Program. We have funding through the section 319 program to update the Nonpoint Source Management Program Plan. The grant funding which Mr. Pigott discusses will focus on actual implementation of the strategy and not on the existing work plan.

Question (Cindy Skrukrud): Regarding Max's question, are there plans to prioritize nonpoint pollution projects that address nutrient loss in Illinois's SRF program? Will USEPA be providing guidance on this?

Answer (Bruno Pigott): We encourage use of SRF dollars by the states where appropriate to make loans or grants for non-point source issues. Each state's SRF program can direct funds to reflect needs of the states because states have different needs. I'm not specifically aware of how much of SRF funds go towards non-point pollution in Illinois, but certainly Illinois is eligible.

Question (Todd Gleason): You talked about the HTF in your presentation quite a bit, can you give us an example of how it functions at this point and what your hopes might be?

Answer (Bruno Pigott): Gulf Hypoxia Task Force is a collection of representatives from states along the Mississippi and Ohio Rivers. These are states that contribute nutrient loadings to those rivers. Each state has put together nutrient reduction strategies that put in place best practices. The states and the US EPA meet regularly to talk about the strategies, progress, and best practices to reduce the loading and reduce the hypoxic zone. The zone is smaller this year, recent readings have shown it is smaller this year than in past years. Part of the reason is the reduced rain events, not necessarily the reduced loadings. The task force also discusses collaboration and work among ag partners in each state to leverage funding from NRCS, as one example. This can build on dollars devoted from the Bipartisan Infrastructure Law to leverage dollars the arise from the Inflation Reduction Act.

Question (Todd Gleason): What is a concrete example of states communicating and implementing best practices?

Answer (Bruno Pigott): Documenting progress on BMPs is difficult. Monitoring is in place to track benefits and reductions made. Iowa has a good dashboard for documenting how progress is made, which is a good example of how we collaborate across states to talk about the collection of data. The Illinois EPA engages in information-sharing sessions with the Tennessee Nutrient Task Force. Survey methodology to collect nutrient management practice implementation data has been shared by Iowa. Ohio has learned from Iowa about constructed wetland implementation strategies, now a key feature in the H2O program in the OH NLRS that is aiding reductions into the Lake Erie Basin in one part of the state and to the Gulf in another part of the state.

Illinois River Watershed Study Group Update *Lisa Merrifield, University of Illinois Extension*

Lisa Merrifield presented on the Illinois River Watershed Study Group establishment. She provided new details on the progress and decisions that have been made, including the formation of a steering committee which plans to meet twice annually. The Group relies on funding from the IEPA and facilitation from Illinois Extension to bring stakeholders together with the overall mission of improving long-term water quality. The current focus is to reduce phosphorus loads and eutrophication. Merrifield outlined the current efforts underway to achieve these goals, which include monitoring and science, collaboration with adjacent watershed groups, identification of data gaps, and searches for funding. The next scheduled meeting will take place on November 9th, 2022. The study group is intentional about equitable stakeholder inclusion and is open to all those who wish to participate in these efforts.

Perspectives on Nutrient Assessment Reduction Plans *Karoline Qasem and Rishab Mahajan, Geosyntec Consultants*

Karoline Qasem, a water resources engineer with Geosyntec Consultants, presented an overview of the origins of Nutrient Assessment Reduction Plan (NARP) and the current Illinois regulations. Karoline explained that national work in nutrient pollution reduction has resulted in the U.S. EPA's efforts to develop a Numeric Nutrient Criteria to limit phosphorus levels. She mentioned the difficulties establishing such a set standard since nutrient chemistry is complicated and correlations with other water quality parameters remain unclear. While the Nutrient Advisory Science Committee in Illinois developed a nutrient criterion, it was not approved by the Illinois Pollution Control Board. Environmental groups had been pushing for 0.1 mg/L Total Phosphorus standard. Finally, in a 2018 an agreement between the IEPA, the Illinois Association of Wastewater Agencies, and environmental groups set a limit of 0.5 mg/L TP for major wastewater treatment plants (WWTPs) by 2030. The National Pollutant Discharge Elimination System (NPDES) permits of *some* majors WWTPs stipulated the development of a NARP. This included major WWTPs discharging into 303(d)-listed streams having phosphorus related impairment due to dissolved oxygen, and nuisance algae. A NARP is also required for facilities discharging to streams "at risk of eutrophication" as determined by plant, algal, or cyanobacterial growth causing, or *potentially causing,* violations in pH, dissolved oxygen, and chlorophyll-a thresholds. Karoline clarified that a facility can assess whether it will be assigned a NARP if they discharge into an impaired waterway, or if IEPA determines that there is a risk of eutrophication in the watershed that the facility discharges into. The NARP WebMap shows which facilities received the NARP permit language and the regional watershed groups. To address the NARP, a major WWTP may combine efforts with other facilities or with a watershed group, or it may address it alone. The Rock River watershed group was formed to address a NARP, for example. While watershed targets and efforts can be unique for each NARP, all NARPs are required to specify a schedule, cost, action items list, and timeline as final deliverables. Karoline highlighted potential NARP outcomes that could be incorporated into facilities' plans. Outcome examples include 1) point source P-reductions not needed, 2) point source P-reductions needed, 3) both point and nonpoint source P-reductions needed, or 4) other/additional measures needed.

Rishab Mahajan, a Senior Engineer with Geosyntec Consultants, shared examples of five different NARPs in Illinois. He provided details of the methodology and findings of the NARPs in the Fox River, Chicago Area Waterway System (CAWS)s, City of Princeton, Lower Sangamon River, and Kankakee River. The mainstem Fox River NARP findings recommend dam removals to improve water quality. It also recommends WWTP effluent limits of 0.5 mg/L TP. The City of Princeton NARP finds that dissolve oxygen impairment may not be related to phosphorus. Further data collection is recommended to better understand the causes of the impairment in downstream reaches of Epperson Run and Big Bureau Creek. The Lower Sangamon River has two WWTPs with NARPS, and they are collaborating. Findings indicate overlap of data collection and modeling. More reporting on this is anticipated. The Kankakee River Metropolitan Agency and City of Wilmington NARPS also have NARPs. Findings indicate that KRMA serves as the upstream boundary for the City of Wilmington NARP and may inform its findings. Rishab finished by highlighting the uniqueness of each NARP. He reiterated that facilities must engage with stakeholders and can pool resources in a watershed to address phosphorus-related water quality impairments.

Question (Rachel Siegel): What percentage of WWTPs in Illinois are too small for a NARP?

Answer (Karoline): A NARP is required for any WWTP with a design average flow of greater than one million gallons per day (MGD).

Question (Todd Gleason): It was stated that the low-head dams on the Fox River serve no purpose. What was their original purpose? And why are they no longer useful?

Answer (Rishab Mahajan): Ten low-head dams originally served navigation and sawmills. They now have some recreational use. Low-head dams cause water quality impacts and safety issues. Several deaths have occurred due to low-head dams.

Question (Todd Gleason): Is there an environmental issue related to erosion if those were removed?

Answer (Rishab Mahajan): U.S. Army Corps of Engineers is performing a feasibility study on dam removal to investigate potential erosion issues related to dam removal. There is some opposition related to the process of removal. One dam is already slated for removal.

Answer (Cindy Skrukrud): Erosion will likely not increase, but the pooling effects will be removed, and it will return the river to free flow.

Comment/Question (Albert Ettinger): To clarify the environmental group's position (Sierra Club), the Nutrient Science Advisory Committee report was never presented to Illinois Pollution Control Board. Second, Environmental groups believe that 0.1 is too high in many cases, but they are suggesting using 0.1 mg/L as a default for NARPs because that is what the Nutrient Science Advisory Committee suggested. Do we know of NPDES permit holders with a NARP requirement that have not started their work on the NARP?

Answer (Karoline Qasem): This information is not publicly available. Also, every NARP is different and may have different requirements. Some may suggest less than 0.1 mg/L depending on conditions. The NARP is an opportunity for a WWTP to study and explore meaningful, practical limits to improving streams with phosphorus impairments.

Comment (Jim Duncker): Will the hydropower generation dams on the Fox River, such as the Dayton Dam, be removed?

Answer (Rishab Mahajan): The three hydro dams are not suggested for removal. Only the low-head dams are being suggested for removal.

Question (Greg McIsaac): Is Wisconsin actively involved in the Fox River NARP?

Answer (Rishab Mahajan): The Fox River Study Group starts at Stratton dam in Illinois and collaborates with the Wisconsin groups through the Fox River Summit. USGS installed Next-Generation Observation System gage at the Wisconsin border on the Fox River, to understand what is coming from Wisconsin. The FRIP will say that we do need reduction from the Chain of Lakes in Illinois and from Wisconsin.

Answer (Cindy Skrukrud): Wisconsin DNR is working on TMDL on the Wisconsin portion of the Fox River. Wisconsin is different in that they have adopted nutrient water quality standards for their waterways. In the area upstream of the Fox River Study Group, but still within Illinois, there is a new watershed-based plan being developed. A bistate coalition has been meeting for the past ten years at the Fox River Summit.

Comment (Todd Gleason): Cindy Skrukrud, please introduce yourself.

Comment (Cindy Skrukrud): I am retired from Sierra Club and lead the Fox River Study Group.

Comment (Holly Hudson): The Fox River Study Group Annual Meeting is 9:30 a.m., Wednesday, November 2, 2022. Rishab will present *FRIP 2022 Overview: Findings and Next Steps*. USACE will present *Status Update on the Fox River Connectivity and Habitat Study,* which will look at the dams from Algonquin to Montgomery.

Observation from the Next Generation Water Observing System Gauges *Jim Dunker, U.S. Geological Survey*

Jim Duncker reviewed the process and progress of the USGS Integrated Water Science Initiative's 10-year project to study the Illinois River Basin. The process consists of extensive sampling of the watershed, development of predictive models, data processing, and public communications. Duncker outlined the specific approach to sampling, including test beds for technology, intensive sub-basin monitoring, basin-wide monitoring, and use of remote sensing data and other instrumentation. Goals include transferability of research to other basins, a focus on urban and agricultural nutrient sources and legacy nutrients, and increased understanding harmful algal blooms (HABs). The first two years of the study worked on increasing spatial resolution of data by expanding monitoring through new instrumentation, and increased sampling. This will fill in data gaps for the NLRS. They have been testing instrumentation to increase understanding of toxicity generation and to monitor for early detection of HABs. This has been done through increasing the number of super gages, synoptic sampling, and the use of continuous water quality survey (FLAME) of the Illinois River from Lake Michigan to the mouth at Grafton. Other instrumentation includes multispectral cameras, real time DNA instrumentation for HABs early warning system, aerial electromagnetic (AEM) surveys, and satellite imagery. THE AEM surveys collect imagery up to 100 meters subsurface and provide high resolution mapping of underlying geology that can be used in groundwater models, which are used for TMDLs. They have looked at Long Term Resources Monitoring (LTRM) data from the 1990s to see if there have been changes over time. From these data they have been conducting rapid testing of models to develop an early detection model for HABs. They have been using a fail fast approach, so modeling happens sooner, not 6-7 years behind the data collection. Duncker concluded by outlining that the next steps for the study which include aerial electromagnetic surveys of the northern half of the basin and continued development of the predictive models.

Question (Todd Gleason): Are there expectations of a super gage network being able to provide enough information for policy related to blooms?

Answer (Jim Duncker): Potentially. The science is immature at this point. For example, in 2021 data was collected just as a bloom was happening. We had similar conditions in June 2022 and were prepared to sample, but no bloom occurred. There are many unknowns, and data could lead to better monitoring and improved policy in the future.

Question (Rishab Mahajan) Is it possible to find the location of a super gage?

Answer (Jim Duncker) Yes, contact me. Synoptic sampling is more flexible throughout the HUC 8 basin.

Question (Lindsay Birt): Who will lead predictive modeling approaches moving forward?

Answer (Jim Duncker): USGS is partnering with state agencies on Integrated Water Availability Assessments which will examine the supply, use and availability of the Basin's water. We are working with existing models and working with local groups. The Integrated Water Prediction portion hasn't really been established but will build modeling tools to predict the quality of surface and groundwater resources.

10 Years of Farm Funded Nutrient Research *Julie Hewitt, Illinois Nutrient & Education Council*

Julie Hewitt, NREC's Executive Director, began with a brief history and description of Illinois Nutrient & Education Council (NREC). It began in 2012 by state statute that placed a $0.75/ton assessment on fertilizer sold in Illinois to fund NREC. The Council's focus is to prompt nutrient research and education programs, to foster collaboration among stakeholders related to agricultural nutrient loss, and to promote adoption of agricultural best management practices. Julie reviewed the Council's structure, key areas of work, and research topics. NREC

has invested $30 million in research since inception. It produces publications (e.g., cover crop guide, MRTN guide, annual reports, etc.) and a research forum. It also cultivates peer reviewed research, scientific collaboration, and new researchers. The next forum will take place on February 9, 2023 at the I-Hotel in Champaign. Next year NREC will fund twenty-seven projects, five of which are new, totaling investments at approximately $3.9 million. Some new projects include Dr. Andrew Margenot's update to phosphorus and potassium recommendations in the *Illinois Agronomy Handbook*, his investigation of streambank erosion as it relates to phosphorus losses and the NLRS, and his continued research on nutrient use efficiency in corn-soybean rotations. Dr. Yu's research on tillage, fertilizer placement, and winter cover crops practices as they relate to nutrient losses via soil macropore flow will also be funded. Another project will be Dr. Rhykerd's research on nitrogen and phosphorus efficiencies, carbon sequestration, and economic impacts of diverse cover crops in crop rotations. Julie concluded with a summary of main findings from NREC-funded research on 4R nutrient management, cover crops, edge of field practices, and phosphorus findings.

The NREC 2021 Annual Report was made available at the meeting and is online at https://www.illinoisnrec.org/resources/annual-reports/.

Comment (Todd Gleason): Agriculture has become far more accepting of many of these research areas. During my 40 years at in agriculture, cover crops have trended toward mainstream. If you attend a cover crop meeting now, you'll see many farmers in attendance. This level of acceptance is due, in no small part, to the work of Illinois NREC.

Comment/Questions (Rachel Siegel): I think I have read that something like 6% of Illinois farmers use cover crops. Is any social science research being done to determine why that number is so low?

Developing Phosphorus Assessment and Reduction to Address Unnatural Growth in an Urbanized Unnatural Waterway – Interim Findings and Next Steps *Jennifer Wasik, Metropolitan Water Reclamation District and Rishab Mahajan, Geosyntec Consultants*

Jennifer Wasik provided background information on the Chicago Area Waterway System (CAWS) and the origin of its Phosphorus Assessment and Reduction Plan (PARP). The CAWS serves 129 communities with nine waste water treatment plants (WWTPs). Four water reclamation plants (WRPs) discharge into the CAWS: O'Brien, Stickney, Lemont, and Calumet. The CAWs is comprised of eighty miles of waterways which are manmade or natural channels which have been dredged, straightened, widened, and/or channelized. Over 80% of CAWs flow is from the WWTPs/WRPs. Other discharge sources include 255 Combined sewer overflows (CSOs), industrial discharges, and runoff from approximately 750 square mile area. Monitoring along the CAWS collects ambient and continuous water quality monitoring at dozens of locations. In recent years, two reservoirs have gone online, which helped lessen the CSOs contributions and improved dissolved oxygen in the system. Data showed that during March through September 2020 80% of P loading was from the four WRPs, 8% from CSOs, 8% from the Cal-Sag channel and tributaries, and 4% from upstream sources (North Branch of the Chicago River and Grand Calumet River). Jennifer explained that MWRD hired a Phosphorus Assessment Reduction Plan (PARP) consultant, Geosyntec, to identify CAWS reaches with unnatural plant or algal growth, and to find measures that would be expected to eliminate growth(s). Part of the consultant's work with the PARP would be to develop an implementation plan and schedule for those improvement measures and plan stakeholder engagement. The PARP started March 2020. A Nutrient Oversight Committee was convened. It includes one representative from MWRD (Jennifer Wasik), one from IEPA (Scott Twait), and one from an environmental group (Cindy Skrukrud). Geosyntec's final conclusions for the PARP are due to the Committee in 2023.

Rishab Mahajan, the Senior Engineer and Geosyntec Consultant explained the PARP methods, interim results and next steps. First, to define unnatural growth, they used discrete and continuous data from nineteen

monitoring stations over multiple years, a period during which construction of two WRPs occurred. If dissolved oxygen (DO) standard was exceeded pre-dawn, or DO oversaturation occurred during the day coupled with relatively high chlorophyll-a, then that CAWs reach was identified as having unnatural growth, or unnatural growth likely. Several reaches in the CAWS, mostly in the Calumet system met these conditions. Bubbly Creek and the very upper reach of North Shore Channel also met these conditions for unnatural growth likely. Additional studies are recommended for those areas outside of the Calumet System. High chl-a values during winter occurred in Upper NSC and will require more study. The Grand Calumet River, coming from Indiana, is a very slow-moving water body. It was determined that chl-a is coming from upstream. This is apparent from pictures as well. Cal-Sag channel does not appear impaired from a visual standpoint, but based on data, there is something happening. Data from USGS NGWOS gage on the Grand Calumet provided continuous total algae measurements, and discrete chl-a measurements were overlaid onto those. These data align well with one another and revealed large pulses of chlorophyll coming into Grand Calumet from Indiana. It is unknown how much impact this has on unnatural growth. Algae has a long residence time in this system, and upstream growth causes unnatural growth in the rest of system downstream. The PARP will next be modeling the CAWS data and various scenarios. A simulation of this complicated system is useful. MWRD had previously invested in modelling with assistance from Marquette University and University of Illinois at Urbana Champaign. Preliminary estimates show loading was 1.8 million Kg TP (May through Oct. 2020) and that future WWTP discharge reductions to 0.5 mg/L TP annual geomean by 2030 can be anticipated to reduce loading in the CAWS to 0.75 million Kg TP. Once those WWTP reductions occur, the relative contributions of the CSOs, tributaries, and upstream nonpoint contributions to the CAWS will increase. Therefore, nonpoint source contributions will need to be addressed in the future to continue work on CAWS PARP. Following modeling of scenarios, Geosyntec will come up with a conceptual design for implementing the recommended measures.

The PARP includes a process for stakeholder engagement that will continue over the next year. The plan includes informing the general public. Outreach includes a project factsheet on MWRD's website, a stakeholder survey, and a series of meetings with stakeholders from both Illinois and Indiana.

Question (Albert Ettinger): Are there point sources to Grand Calumet we should consider?

Answer (Rishab Mahajan): Yes, there is one at Gary, another at Hammond, and possibly others. We have a meeting planned with the Nutrient Oversight Committee to discuss how to reach out to these stakeholders. Also, USGS is studying which species of algae exist in the Grand Calumet, information that may help clarify next steps as well.

Rishab explained that the NGWOS gage data are critical for coming up with overall strategy toward the Illinois River, as also mentioned by Jim Dunker of USGS. We need to assess upstream sources of P and algae in the CAWS, but this is true for any watershed in Illinois, as some of these talks mentioned earlier in reference to sources from WI and IN. The lessons we have learned through this PARP are to involve stakeholders early in the process, to use a Nutrient Oversight Committee, and to complete stakeholder surveys and interviews. As Illinois River Watershed workgroup emerges to develop a strategy for the whole Illinois Basin, these approaches and tools may be useful to consider.

Questions (Greg McIsaac): Could the unusually high water temperatures coming from wastewater or other sources explain the unusually high chlorophyll in winter?

Answer (Jennifer Wasik): This segment is upstream of the WRP. It shows unusual chlorophyll between Lake Michigan and the O'Brian WRP. It may not be related to temperature.

Comment (Albert Ettinger): I respectfully disagree with Ms. Wasik. There is no upstream there.

Comment (Jennifer Wasik): The temperature in the reach with the winter chlorophyll spikes is lower than the temperature in the downstream North Shore Channel reach.

Closing Comments *Director Costello, Illinois Department of Agriculture*

The morning session closed with remarks from the Director Costello of the Illinois Department of Agriculture. He thanked everyone for taking the time to participate in the NLRS Workshop and applauded the new investments and initiatives for the Strategy. Director Costello expressed gratitude for the various new funding sources, referencing the $3.5 million, and its match totaling $13 million in Illinois, as well as new investments from the Gulf Hypoxia Program Grant. These funds will strengthen Illinois technical assistance and cost-share support to farmers and will accelerate implementation of conservation best practices across the state. Director Costello remarked on various challenges that Illinois faces (e.g., climate change, populations, monitoring of natural resources), and commended NLRS Partners' commitments to collaboration in Illinois and beyond. He recognized Ivan Dozier, NRCS State Conservationist, for his collaboration with IDOA and the NLRS, congratulating him in his retirement. He also thanked Trevor Sample and the IEPA for the strong NLRS steering partnership.

Lunch

Lunch was sponsored by the Illinois Farm Bureau, The Nature Conservancy, and Geosyntec Consultants. NLRS Partners expressed their appreciation for these contributions to the meeting.

Policy Working Group Meeting 12:20 – 3:15 PM

Welcome *Director Shelly Nickols-Richardson, University of Illinois Extension*

To begin the afternoon session, Illinois Extension Director Nickols-Richardson expressed pride at the NLRS partnerships within Illinois and at Extension's role in facilitating and coordinating the partners, producing the Biennial Reporting, and serving the priority watershed through the Watershed Outreach Associates. She looks forward to the continued relationships and successes. Director Nickols-Richardson expressed thanks for the partnership contributions to the Biennial Reports. She gave special recognition to the Extension student interns serving the NLRS efforts (Noah Bell, Gabe Harper, Maddy Craft, and Piper Siblik). She underlined Extension programs that support NLRS, such as the Rainscaping program, which will improve knowledge about stormwater best practices and water quality. She mentioned Extension's collaboration grants, which bridge university research and extension outreach. One of these grants has produced the Illinois GroundWork website which launches spring 2023 and provides research, tools, and resources about green stormwater infrastructure to Illinois communities. She concluded by expressing gratitude for NLRS Partners' continued interests, partnerships, and collaboration to meet the goals of the Strategy and to improve water quality throughout Illinois.

Update on Nutrient Loads *Tim Hodson, U.S. Geological Survey*

Tim Hodson has compiled data from IEPA and USGS monitoring networks and interpreted it for NLRS. The baseline loads (1980-1996) were compared to the current 5-year average (2017-2021) and were flow-adjusted. Tim shared statewide nitrate and phosphorus yields as well as changes among the eight major river basins relative to baseline. He also shared changes in streamflow relative to baseline. Nitrate load has increased 8%, which is in line with past updates. Due to large interannual variability, he is not confident in the trend, but sees a clearer picture when looking at the eight sub-basins. Most of the increased statewide N loads can be attributed to the Rock River loads. He talked briefly about nutrient saturation in the surficial aquifer in the Rock watershed and the resulting lag time for aquifer inflow to the river. Phosphorus loads, while near baseline through the early 2000s, have increased dramatically in the past fifteen years, approximately 40% over baseline. Looking at sub-basins, the Little Wabash, the Kaskaskia, and the Illinois Rivers are contributing to this trend, with the Illinois River as the largest contributor. Tim referenced Greg McIsaac's recently publication showing the lower

mainstem of the Illinois River as appearing to be a large contributor, and the Sanitary District of Decatur as an identifiable contributor. The hypothesis for the lower mainstem of the Illinois is that sediment accumulation has served as a legacy P buffer and mobilized P and shown up in downstream loads. Streamflow has increased 23% over baseline, and Tim discussed varies methods to account for changes in stream flow. He mentioned the flow adjustment method may be diminishing the effects of streamflow compared to flow normalization method. Comparing on a yield basis, Illinois' nitrate trend is consistent with other major Mississippi River watersheds. Illinois' phosphorus trend is the second largest among Mississippi River watersheds. The data show large interannual variability, which can impact the 5-year average. Tim mentioned that the 45% reduction goal has been difficult to meet and that nutrient loads are increasing across the MRB. The increases may be attributed to combined causes of management, climate, and legacy effects, but it is unclear. There is a lot of good work happening across the MRB, and he mentions that the knowledge gained through the Next Generation Water Availability Assessments (NGWAS) by USGS will be linking to the nutrient reduction efforts.

Comment (Eliana Brown): For those interested Greg McIsaac's publication that Tim mentioned is at https://onlinelibrary.wiley.com/doi/10.1111/1752-1688.13054.

Comment (Albert Ettinger): The Ohio River point sources are controlled very poorly.

Question (Todd Gleason): How good are the benchmarks, should they be rolling?

Answer (Tim Hodson): In the interim we are making progress on the portions of the contributions that are manageable.

Question (Albert Ettinger): Have you looked at chloride? It is known that chloride has gone up and there is science suggesting chloride brings P out of sediment.

Answer (Tim Hodson): Greg McIsaac discusses it in his paper. I haven't personally researched it. I have approached this project as an accounting task to make the dataset useful for others. This is true the chloride and P are both increasing. While the mechanism is known, we don't yet understand the role it plays.

Question (Rachel Siegel) What are the best estimates for each segment's contribution to the nutrient load, including the "legacy segment"?

Answer (Tim Hodson): We don't know yet. Much of the increase from the N is coming from the lower Rock River, and much of the increase in P is coming from the Sangamon River (via Sanitary District of Decatur), and from the lower mainstem of the Illinois River. The IEPA Ambient network has many sites along the mainstem, but historically streamflow is difficult to measure due to dams for barge navigation. There is a long stretch of the Illinois River for which we don't have information. There is more data to compile and the Illinois Next Generation Water Observing System (NGWOS) may help to answer this.

Question (Steve Jurgens): In the early presentation by Jim on the NGWOS, phosphorus was not listed as being monitored by super gages. Why not?

Answer (Jim Dunker): Continuous P is being measured at ten super gages. Continuous P monitoring is very labor intensive for operation and maintenance.

Answer (Tim Hodson): We have tested sensors for dissolved P but they were too sensitive to sediment and they were not reliable. The technology has improved, so we have larger analyzers installed at certain sites with dedicated power. In many of the ag watersheds, measurements for turbidity and water quality sampling serve as a good proxy for P. This is not so true for DP coming out of the urban areas, and those measurements are not good proxies for P in those streams. We look at both DP and particulate P. The Sanitary District of Decatur is

primarily dissolved P. The trend from the Illinois River lower mainstems is mixed. It is safe to say that P has historically been sequestered in this portion of the river, and now it is happening to a lesser degree.

Question (Todd Gleason): Are other legacy nutrients sequestered by sediment? And if so, are they showing similar trends?

Answer (Tim Hodson): Yes, but we don't understand the magnitude of this yet.

Comment (Greg McIsaac): Tim did a good job explaining the complexities. There are multiple correlations that are difficult to separate for causal connections.

2021 Point Source Nutrient Loads *Trevor Sample, Illinois Environmental Protection Agency*

Since 2018 IEPA has been working to calculate municipal and industrial point sources loads in Illinois. The information was originally for Congress for the Hypoxia Task Force efforts, and IEPA elected to add it to the Illinois NLRS Biennial reports. The next Biennial Report will cover 2021 and 2022 loads for Total Nitrogen and Total Phosphorus. Today's presentation covers 2021 loads.

Methodology

IEPA calculates total statewide points source loads using major municipal facilities' discharge monitoring report data from the IEPA's Network Discharge Monitoring Report (NetDMR) website, the major and minor industrial facilities' data using the USEPA Pollutant Loading tool, and load estimates from minor municipal facilities. A major facility is defined as discharging >1 million gallons/day. We have 211 of these in Illinois. Each is required to submit monthly data to the publicly available NetDMR website. Those not required to submit nutrient data voluntarily submit these data to IEPA for the NLRS. Illinois Association of Wastewater Agencies also submits some data. Therefore, IEPA has actual monthly data from all major municipal facilities from which it calculates monthly and annual TN and TP loads. The data is screened for outliers. Human error is possible, and outliers are verified with facilities. If a mistake has been found it is changed in DMR to be rigorous and to keep the public data accurate. USEPA has a Water Pollutant Loading tool which auto-calculates loads for industrial facilities. There are 19 majors and 298 minor industrial facilities with nitrogen loads and 12 majors and 49 minors with phosphorus loads. Large loads and large load changes across years trigger a QA/QC process to double check data accuracy.

Total Phosphorus

The 2021 data show that there has been a 24.9% reduction for the point source TP loads in Illinois since the 2011 baseline (4.5 million lb./year reduction). The contribution of the minor facilities has been estimated to be 2.4 million lb./year since the original 2015 Science Assessment. IEPA has re-evaluated how this estimate was calculated. Going forward minors will be estimated using actual flow data and an industry standard of 4 mg/L. This new method results in a load of 1.3 million lb./year, less than the original estimate for minors. Going forward IEPA anticipates using this method since it uses actual flow data. There are over 640 minors in Illinois. Some report TP, and such reports show concentrations between 2-3 mg/L.

In the 2019 Biennial Report, we published approximately 25% TP reduction from point sources. In 2020 alone, we reported 16% TP reduction from point sources from the baseline and had 90 major municipal facilities with 1mg/L or less TP (31 of these were at 0.5 mg/L or less). In 2021 we added 4 majors at 1 mg/L or less TP and 8 more at 0.5 mg/L or less TP. Comparing 2020 to 2021, 97 facilities increased TP loads and 114 facilities decreased TP loads, for a net decrease of 1.5 M lbs. Flows from these facilities over the same period decreased 9.75%.

There is a disconnect between the very large facilities and the rest of the large facilities in Illinois, since 110 of the 210 facilities (approximately half) discharge less than 10,000 lbs. The top ten major municipal facilities for P loads discharged approximately 60% of statewide point source P loads. Stickney and Fox River Pagorski facilities are the only two that are currently meeting P limits of 1.0 mg/L currently. We anticipate large TP reductions once the 0.5 or 1.0 mg/L limits are in effect for these other top ten facilities. MWRDGC is the one of the largest sewage treatment plant complexes in the world, serving 182 sq. miles that includes Chicago and 128 suburban communities. They operate seven wastewater treatment plants which combined contribute 42% of Illinois' 2021 TP point source load. The Stickney facility has fluctuated, recently installing more P removal equipment. This brought TP close to their 2018 levels, with the largest decrease happing during 2020-2021. Most of the point source reductions we see for Illinois for 2021 are a results of this single Stickney facility.

Total Nitrogen

2021 data show that there has been a 12.2% reduction of statewide TN loads for point sources from the 2011 baseline (10.7 million lb./year reduction). Twenty facilities have TN goals in their permits.

NARPs

There are currently 66 individual facilities in Illinois developing NARPs. Eight-six additional facilities are completing NARPs as part of a watershed group. Fifty-seven are not required to complete NARPs, and five are yet to be determined. IEPA made an interactive map to show which discharges must develop a NARP and why. Most NARPs are due December 2023 or 2024.

Optimization & Feasibility Studies

Facility optimization and feasibility studies are also tracked and summarized in the NLRS Biennial Reports.

Conclusion

We expect to see long-term reductions from the point source sector since most municipal facilities are required to meet the lower TP requirements by 2025 or 2030 depending on the chosen treatment method.

Questions (Albert Ettinger): What is Decatur's excuse?

Answer (Greg McIsaac): Decatur has not had a P limit in their NPDES until recently. Also, industrial wastewater from ADM has increased P concentrations.

Question/Comment (Albert Ettinger): What is causing ADM to have so much P?

Answer (Greg McIsaac): ADM has not been cooperative. We think it is processing soybeans into protein isolates.

Question (Albert Ettinger): Is the Embarras work coordinated with a NARP?

Update from Watershed Coordinators *Rachel Curry and Nicole Haverback, University of Illinois Extension*

Rachel Curry, University of Illinois Extension Watershed Outreach Associate works in two NLRS nitrogen-priority watersheds, the Lower Rock River and Flint-Henderson Watersheds. She has worked on multiple projects within those watersheds and throughout the state over the past year. Accomplishments include launching a watershed group within the Pine Creek Watershed in Ogle County and collaborating with the Rock Island Soil and Water Conservation District and Northwater Consulting on the Mill Creek Watershed Plan. She worked with Illinois Farm Bureau, county Farm Bureaus, Mercer County Soil and Water Conservation District, and Northwater Consulting on a Watershed Screening of the Flint-Henderson Watershed. Additional meetings within the Flint-

Henderson Watershed will be held in February and March 2023 and will include updates on the watershed screening process and educational opportunities. Curry has also worked on other projects including a stormwater education presentation series with an Illinois Extension Horticulture Educator, the Henry, Mercer, Rock Island, and Stark County Extension Farm Series on Carbon Markets, Bi-State Advanced Soil Health Training, and the Certified Livestock Managers Training.

Nicole Haverback, University of Illinois Extension Watershed Outreach Associate, works in two NLRS phosphorus-priority watersheds, the Embarras River and Little Wabash River Watersheds. She joined Extension in July 2022 and has participated in several projects this year working with Illinois Farm Bureau, county Farm Bureaus, Coles County Soil and Water Conservation District, and Northwater Consulting on updating the Embarras River Watershed plan and identifying two HUC 12 subwatersheds, Polecat Creek and Slough, for more detailed watershed plans. She has also been a part of the Embarras Regenerative Grazing Group which operates through a North Central Region Sustainable Agriculture and Research Education (SARE) grant. The group is planning a six-part webinar series that will start in mid-November, as well as a workshop on winter grazing. Nicole also collaborated on youth programming with an Illinois Extension Horticulture Educator to offer a youth drone program and with the Jasper County Extension and Jasper County Soil and Water Conservation on a county conservation day.

The Illinois Extension Watershed Outreach Associates have worked alongside Extension's Farm Broadcaster, Todd Gleason, on the Illinois Nutrient Loss Reduction Podcast which releases new episodes approximately every month. There have been 46 episodes to date on various conservation practices and updates. The podcast streams on multiple platforms including Apple Podcast, Google Podcast, and Spotify.

Working Group Updates – Urban Stormwater Working Group *Lisa Merrifield, U of I Ext.*

Lisa Merrifield reviewed the efforts underway and the plans regarding the Green Infrastructure Inventory in Illinois. Since 2018, the NLRS Urban Stormwater Working Group (USWG) has been working to improve measurement of the impact of Green Infrastructure Best Management Practices (BMPs) in Illinois. Funding from the Illinois EPA has been assisting with mapping practice implementation. The inventory has been primarily achieved through the review of MS4 reports, however this process has been cumbersome. Merrifield discussed a new partnership with the Great Lakes to Gulf Virtual Observatory (GLTG). The USWG plans to integrate their inventory data into the virtual observatory system, since that system already houses extensive water quality data within the Mississippi River Basin. These efforts will allow for improved processing of BMP impacts and for improved communication of impacts to stakeholders. Merrifield laid out the plan to finish initial data collection by January 2023 and to prepare visuals from the GLTG system by March 2023. She concluded with the anticipated communication plan to promote the inventory and data visuals to communities along with a new data collection form that will assist with maintenance of inventory and with the impact monitoring of Green Infrastructure in Illinois.

Working Group Updates – Performance Benchmark Committee *Trevor Sample, IEPA*

Trevor Sample reviewed the Sept. 28 NLRS Performance Benchmark Meeting (PBC) discussions, which focused on suggestions for improvement to the 2021 NLRS Biennial Report *CH 8: Adaptive Management And Measuring Progress* and on concerns over additional analysis. The Chapter will continue to:

- compare baseline to 5-year running average N and P loads and will continue to display these metrics in relation to the 25% interim and the 45% reduction goals.
- update ag practice implementation scenarios and display status toward goals
- update the total phosphorus point source loads from major and minor municipal facilities
- update a map showing areas with IEPA-funded watershed-based plans

- highlight future resource needs of IDOA Partners for Conservation, Operations funds for SWCDs, Wastewater Treatment facility upgrades, stormwater practice adoption, and water quality monitoring

The PCB members had suggested clarifying which organization(s) propose funding legislation, and requested the report express lessons learned, action items, and clearer conclusions.

The PCB members reviewed the Policy Working Group Survey results which suggested shortening the report, enhancing readability, drawing more conclusions, and providing additional analysis. PWG members had been invited to bring requests for additional analysis to this PBC meeting and to bring forth types of analysis desired, funding source, and clarification of who would perform additional analysis. During the meeting no suggestions were brought forth.

The PBC group anticipates meeting again after the spring legislative session, to discuss incorporation of legislative updates into the Chapter 8.

Question (Liz Stelk): What decision was made on a next step to clarify who proposes legislation?

Question (Robert Hirschfeld): According to the last report, the state is not just falling short of its 2025 NLRS goals, but nutrient loading is getting worse. Given that, what steps is the state considering to provide real accountability?

In person question (unknown): Has there been analysis that clarifies time until reduction goals are accomplished? For example, if we use cover crops at the present rate of adoption, how long will it take to get to the goal? and the same questions for reduced tillage?

Answer (Trevor Sample): This analysis can be done, and people could be doing this in non-biennial report years.

In person question (unknown): At present rate of adoption for cover crops, will there be enough cover crop seed to make possible the adoption rate we want? And are we looking at possibility that soil health and use of cover crops could release more dissolved reactive phosphorus.

Answer (Trevor Sample): These are good points. Future research by NREC may answer these questions. Your point gets straight at the intention of performing these scenarios analyses.

Comment/Question (Robert Hirschfeld): Extreme weather driven by climate change is increasingly seen as a driver of nutrient losses. The last report showed that water leaving the state increased in recent years. Large rain events are becoming more commonplace. Are there any goals for building additional climate considerations into the NLRS to prioritize investment in the most resilient practices?

Question (Todd Gleason): Have we defined the most resilient practices?

Answer (Michael Woods): IDOA was awarded and RCPP grant to establish IL climate-smart partnership to move attention to these questions forward, and specifically to address this information back to the NLRS.

Answer (Trevor Sample): Many BMPS recommend in the NLRS are in line with climate-smart practices. Synergy exists on these topics/efforts, and USDA understands this and has provided incentives for this purpose.

Comment/Question (Robert Hirschfeld): Illinois is a member of the US Climate Alliance but is one of only two states in that group that doesn't have a climate strategy for natural and working lands. Does Illinois have plans to create a natural and working lands climate strategy?

Answer (Michael Woods): Yes. Currently IDOA, IEPA, IDNR are discussing ways to move a plan forward.

2021 NASS Survey Results *Mark Schleusener, USDA – National Agricultural Statistics Service*

Mark Schleusener began by mentioning that the Illinois NLRS Survey of Illinois farmers, funded by NREC, was conducted for the 2021 crop year. Illinois Farm Bureau and the NASDA enumerators also contributed to this project. The 2021 reference year sampled 1,095 farmers by two mailings and some phone calls in February and March 2022. Farmers sampled were required to operate between 100 and 5,000 field crop acres, excluding fruit and vegetable production. There have been changes to the way a couple of questions have been asked with regards to MRTN and N inhibitors.

The MRTN question is difficult to ask since it is dynamic. We asked, "Considering all of your acres, how many are fertilized at the MRTN rate or less?" Answering this question is complicated, since the farmer needs the reference of the current MRTN rate, which depends on the changing cost of fertilizer and corn commodity. We tried to simplify it with the help of Emerson Nafziger. When ask about MRTN, a few things were different in the 2021 survey. First, a reference map and MRTN data table was provided. The farmer could reference an image showing MRTN rates in lbs./acre in each of three regions of Illinois: north, central, and south. The reference table also expressed rates by rotation: soy/corn or corn/corn. With this information, farmers could easily compare their own operation locations and rotations with the map and table, then see if their own rates were at or below the MRTN rate listed. Secondly, in 2021 we did not allow the undefined category of "other industry-approved techniques" as a possible answer category. We believe this language has been vague and open to interpretation. Therefore, it may have included acres that were indeed MRTN or lower. Many past comments have stated, "by what the fertilizer dealer recommended". While corn acres have remained stable near 11 million each time we survey, the MRTN acres changed in this survey. While it had previously been near 4 million "corn acres fertilized at MRTN or lower rate", which was approximately 1/3 of Illinois corn acres, it is now 8.35 million acres in the 2021 crop year survey. This significant increase is almost certainly due to the changes we made to the survey questions.

The nitrification Inhibitors question was also modified in the 2021 survey. Previously, it asked about "corn acres fertilized in the fall and winter with N inhibitors". This past survey added categories of dry fertilizer blends and NH_3. Results showed that more than ¾ of the acres fertilized with anhydrous ammonia during fall and winter were accompanied by a nitrification inhibitor. This was similar in the spring. Results showing less usage in the spring may be explained in that in spring there is less time to apply.

When farmers were asked about timing of fertilization on corn planted acres, the fall only application was 25%, spring-fall split was 35%, and the rest was spring only.

In the 2021 Survey, it appears that there are fewer acres where the P application rates were reduced. This doesn't make sense, and I am not sure it is accurate. Previously the question was split by tile and non-tile, and it resulted in over 11 million. In 2021, it results show 6.2 million acres, which is a trend going the wrong way. I believe that we confused farmers since early on we asked about corn acres over and over. Then, we switched to asking about total cropland acres, and some may not have made the mental shift to thinking of all cropland acres. I believe some, or many, respondents were still thinking of their corn acres. Soil test info is the driving factor here. VRT (variable rate technology) is increasing and soil test information is informing P application.

Cover Crops acre figure is down a bit compared to 2019, almost 1.4 million in 2021. This may be highly weather-dependent.

The general knowledge questions show that NLRS is not well known. MRTN knowledge improved slightly from 2019, but both NLRS and MRTN knowledge base show room for improvement. Bioreactors knowledge declined. Constructed wetland knowledge declined. Also, knowledge of cover crops declined, which was a surprising finding.

In November the Census of Agriculture, which contacts every farm and ranch in the U.S., will provide county level information on cover crops, tillage practices, tiling, expenses for fertilizer, seed, and chemicals. It is an unbiased source of data at county-level resolution. Contact Mark or the website nass.usda.gov/AgCensus for more details if you would like to get involved in this Census.

Question (Julie Hewitt): On the phosphorus numbers, is it possible that they may have already reduced rates in 2019 and respondents feel like they already answered the question?

Answer (Mark Schleusener): We ask what they have done in the last 11 years, so some may be interpreting their recent actions. We want them to compare to 2011, which is a baseline year for NLRS, so you may be right.

Question (Todd Gleason): To clarify, in the question about the anhydrous ammonia rate in pounds, does the question actually ask about NH_3, which is 82% active ingredient?

Answer (Mark Schleusener): We aimed for active ingredients. For example, 200 lbs of anhydrous ammonia is 164 lbs nitrogen, or 82%. We ask the question as acres fertilized at MRTN rate or less. This should be an active ingredient rate.

Comment (Todd Gleason): They may have answered anhydrous ammonia almost for sure.

Comment (unknown): The MRTN recommends the total N rate, regardless of source.

Comment (Mark Schleusener): When you do a chemical use survey, the best way is a trained interviewer and face to face. The details Todd went into demonstrate how it is difficult to ask these questions.

Questions (Greg McIsaac): Does the survey ask about manure P and N?

Answer (Mark Schleusener): It is not itemized separately. This may be a way to ask it, “What did you use for manure?” and, “what were the active ingredient amounts?”

Question (Ryan Arch): Could declines in "general knowledge" of conservation practices by producers be indicating more reliance on farm managers/management companies/professionals?

Answer (Mark Schleusener): I don’t know. General knowledge questions ask an individual to evaluate him/herself. It can also vary day to day, and it can be gray. But with hundreds of responses together, you can spot trends.

Comment (Dick Lyons): I represent Illinois Association of Drainage Districts. The definition of tile is vague, from a single clay tile running to a wet spot, to grid tiling in different soils and at different intervals.

Comment (Mark Schleusener): IFB feedback has shown this is an issue. I agree it is a difficult question to answer.

Ag Water Quality BMP Evaluations and Performance Update *Laura Christianson, University of Illinois*

Each biennial cycle, the University of Illinois Ag Water Quality Science Team evaluates agricultural best management practices (BMPs) to decide whether to recommend them for inclusion in the list of NLRS-recommended practices in Illinois. Laura introduced the Science Team members that evaluated the 2022 proposals: Dr. Laura Christianson, Crop Sciences; Dr. Jonathan Coppess, Agriculture and Consumer Economics;

Dr. Paul Davidson, Agriculture and Biological Engineering; Mr. Dennis Bowman, Agriculture and Natural Resources; Dr. Maria Villamil, Crop Sciences; Dr. Andrew Margenot, Crop Sciences; Dr. George Czapar, Director of Extension Emeritus and Crop Sciences; and the invited expert, Mr. Lowell Gentry, Natural Resources & Environmental Sciences.

This year the Science Team received three practice submissions: WASCoB (Water And Sediment Control Basin), floodplain wetland, and the first ever-received proposal for a practice revision, a revision to the TP reduction efficiency for Constructed Wetlands.

WASCoB is an earthen embankment across the slope of a minor drainage way constructed to trap sediment. This conservation practice was originally submitted in last cycle and it was recommended for resubmission to allow incorporation of known active research on practice N and P removal efficiencies. It was resubmitted and the Science Team now recommends including it as an NLRS-recommended practice with 60% TP loss reduction efficiency and 0% TN reduction efficiency. For reference, Iowa includes WASCoB as and NLRS-recommended practice at 85% TP loss reduction. Illinois Science Team's more conservative figure was due to concern over dissolved phosphorus loss from the WASCoB during rain events. The 60% was the mean of the literature review. Since this is a sediment control practice and research lacks evidence at this time for TN loss reduction justification, the Team recommended 0% TN loss reduction efficiency.

Illinois NLRS Science Team asks proposals to provide a practice cost justification. They arrived at a cost of $64/acre/year for the 10-year lifespan of the practice. This figure reflects the cost of implementing the practice but does not account for maintenance. Currently, maintenance estimates are not available from the reviewed studies.

Floodplain Wetland is a low-lying area adjacent to river inundated regularly during high flows or floods and capable of supporting plant/animal communities. Surface-fed oxbow wetland restoration, restored and connected floodplain wetland restoration, and natural floodplains are all conservation practices with NRCS practice codes that are lumped into this category of Floodplain Wetland. The Science Team recommend not to include it and encouraged resubmission. While the Science Team wants to be moving practices forward and recommending practices to the Illinois NLRS, additional information is needed to make a scientifically based recommendation. The Science Team will request the following information be resubmitted in a floodplain wetlands proposal: 1) address that floodplain wetlands can also be a source of P loss, 2) provide more evidence and feasibility information for tracking a floodplain wetland practice that is separate from the current mechanism for tracking for general wetland category. To recommend a practice to the NLRS, we must have a reliable way to track it distinctly.

TP reduction efficiency revision for constructed wetlands is the third proposal submitted this cycle. This is the first time the Science Team received a proposal requesting a revision of a currently approved NLRS-recommended practice. This is an important practice only rated for N currently, and currently rated at 0 % TP loss reduction. This is consistent with IA and MN strategies as well. The Science Team decided to not include it at this time, and to encourage resubmission. Science Team concerns included: 1) an explanation and information about the conditions and length of time until constructed wetlands saturate with P, 2) an explanation of the impact of specific design criteria on the P loss reduction efficiency.

Question (Jeff Boeckler): Since the primary purpose of a WASCoB is to reduce gully erosion. And reducing gully erosion will also reduce loss of the [organic] nitrogen in the soil, how did the Science Team decide on 0% reduction efficiency for TN since you are holding the soil nitrogen in place?

Answer (Laura Christianson): The TN loss credit is understandable. The challenge is that the recommendation must be based on studies. Yes, there is anecdotal evidence that in preventing soil erosion the soil N could also be captured. However, currently we don't have studies that prove it and give us numbers. We welcome studies on this.

Question (Jeff Boeckler): The WASCoBs I am familiar with are treating about 5-acre watersheds, how are the costs arrived at? The figure you cited is too cheap. They cost more than that.

Answer (Laura Christianson): In the studies cited in the proposal, the costs were based on NRCS information. Also, the average drainage area cited in the proposal was 10 acres, which is consistent with WASCoBs in Minnesota NLRS as well (11 acres). Using the figures presented in the proposal is how we arrived at dollar amount per treated acre.

Comment (Jeff Boeckler): The WASCoB berm is $2-3K, the tile is $5/ft for several hundred feet with a riser. I rarely see more than 5 acres drainage. Something is incorrect with the figure.

Comment in the room: The cost the Science Team provided of $64/year/treated acre covers the 10-year lifespan ($64 x 10 acres = $640 x 10 years = $6,400). So that makes sense financially.

Online chat from Kara Downin to everyone: My experience, we often build WASCOBs to carry 10-12 acres of drainage.

Question (Shani Golovay): Peer reviewed literature is the standard in science. However, the NLRS Practice Approval Process states that "gray literature may be considered." How does the Science Team interpret this?

Answer (Laura Christianson): Peer reviewed literature takes a lot of time and money. The time to publication can be long. Also, some very good field scale research never gets published for various reasons. If there *is* good research happening in Illinois relevant to the practice proposal, we want this information, even if it is not published. Good sites and site year study information in Illinois is important to Illinois NLRS-approved practices. It may be more relevant than something out of state or out of the country. We want to be able to weigh studies unique to Illinois. The Science Team needed some way to acknowledge the barriers to the time to publication, or other factors that keep data rich information from being published, since such studies may provide rich BMP Illinois-specific information.

Question (Shani Golovay): When I submitted a proposal, you took the numbers I provided in the proposal, correct?

Answer (Laura Christianson): Yes. All numbers the Science Team uses are in the proposals that are submitted to us. The Science Team does not use figures outside of the proposal. As a side note, Dr. Maria Villamil, an agronomist and statistician on the team, is very adamant about defensibility and consistency of the decisions made based on the mean or median of figures expressed in the proposal.

Question (Kris Reynolds): Does the 60% TP loss reduction apply to the drainage acres or to the entire field? For example, one WASCoB treating 5 acres of drainage area lies in a 40-acre field. Does the 60% reduction applies only to the 5 acres treated?

Answer (Laura Christianson): Yes. The reduction only applies to the acreage specifically drained to that WASCoB, or 5 acres in your example.

Question (Kris Reynolds): Is the Science Team looking at stacked BMPs loss efficiencies? For example, if we apply cover crops with no till on those WASCoB treatment acres, is that level of nutrient loss reduction efficiency being considered?

Answer (Laura Christianson): There is not a lot of research on stacked practices. The Science Team reviews studies completed and included in a proposal. The Science Team did have discussion about the fertilizer management on the WASCoB drainage acres. There are not a lot of these types of studies out there. Stacked practices may impact reduction efficiencies. The research hasn't been submitted to us. We hope there is more research in the future and that it is submitted in proposals.

Comment (Megan Baskerville): The Science Team reviews practices every two years, or if resubmission is requested, it would be every four years. If any adaptive management and additional resources are needed to speed up this process and let the Science Team meet and consider practices more often, it may better address the urgency of our Illinois NLRS.

Response (Laura Christianson): This is a fair point. The instances of the Science Team recommending resubmission has emerged as integral to the evaluation and approval process, more so than I believe we first anticipated when we started the evaluation process in Illinois. Resubmission request has happened with WASCoBs and now has happened again with two practices this year (Floodplain Wetland Restoration, and a revised P loss reduction value for constructed wetlands). Illinois deserves the best science and all the best possible data. On a biennial cycle this is slow. This is normal pace for research and the University, but it can seem slow for the rest of the world.

Question (Mila Marshall): How reliable is agent-based modeling? Has the state of Illinois created/crafted a research agenda that expresses the priority questions, regions and scale?

Answer (Laura Christianson): I don't have an answer. This is out of my wheelhouse.

Comment (Mila Marshall): I've noticed there is a lot of research talent within the state and the Great Lakes but when we hosted the *UIC Untrouble the Waters: Cities, Race and the Great Lakes*, research practitioners learned from policy makers what information gaps existed per this movement of science-based decision making. When at UIC Freshwater Lab it was clear there is curiosity and great work, but it isn't applicable to the decisions that need science. Absent of hiring consultants, our academics are the next population of "knowledge creators" for our needs.

2023 Biennial Report Survey Results and Due Dates *Joan Cox, University of Illinois Extension*

Joan Cox presented the Steering Committee conclusions for how to streamline the 2023 Biennial report. These conclusions were based on a survey and follow-up discussion with the Policy Working Group members in summer and fall of 2022. The uses, content, structure and style, and timing of the report were topics discussed. Conclusions were to: 1) use 2021 and 2022 data, 2) display data as a graph only in the main body, and move tables of repeated information to an appendix, 3) move partner narrative project/program updates to a Partners Appendix organized by sector, 4) use less photos overall, and 5) release the report Dec. 1, 2023 to give the production team two additional months for production. Moving Partner Narratives to an Appendix will allow space of up to 3 pages, giving each partner additional room compared to ½ - 1 page in the past. Copy editing of partner submissions will be minimal. Joan shared the following deadlines:

Photos and photo/talent release forms – Due Jan. 31, 2023

Resource and outreach spreadsheets – Due Jan. 31, 2023

Partner Narrative Program/Project Updates – Due March 1, 2023

All information can be sent to illinoinlrs@gmail.com.

Data and narratives for the CH 3 Science Assessment and for several of the state and federal cost-share programs in CH 4 Ag and CH 6 Stormwater will be due based on data availability and the production team will reach out to individual authors and agencies for that information during December of 2022. These data typically are available for analysis and submitted to the production team between Jan. 1 and June 30 of the report year.

In 2023, a Policy Working Group review of the report draft is anticipated near June 8th. An Urban Stormwater Working Group review of the CH 6 draft is anticipated near July 8.

Closing Comments *Trevor Sample, IEPA and Michael Woods, IDOA*

Trevor Sample thanked virtual and in person attendees and expressed thanks to IDOA for use of their hybrid facility. The Steering Committee looks forward to meeting with the NLRS Partners in 2023 to facilitate meetings and the production of the 2023 Biennial Report. Trevor recognized soon-to-be retiree, Ivan Dozier, Illinois USDA NRCS State Conservationist. Ivan served Illinois NRCS for approximately forty years, serving ten years as the State Conservationist. Ivan integrated the NLRS into NRCS' functions, operations, and State Technical Committee meetings. Ivan also shepherded the inclusion of NLRS priority watersheds in Illinois EQIP applications and set up a nutrient strategy sub-committee after the Illinois NLRS was launched. The Partners applauded Ivan's service and wish him well.

Michael Woods thanked all on behalf of IEPA, IDOA, and U of I Extension. He thanked Todd Gleason for moderating today's Partnership Workshop. He also thanked Trevor for guiding him during his first year as steering partner for Illinois NLRS.