



2021 NLRS Partnership Conference

November 10, 2021

Online via Zoom

#NLRS2021

Morning Sessions: Nutrient Loss Reduction Strategy Update

Welcome

The conference began with a welcome address via video from Jerry Costello, Director of the Illinois Department of Agriculture. Director Costello reiterated Illinois' approach to nutrient loss reduction as a coordinated effort and emphasized an increase in voluntary efforts as key to continued success.

Keynote

The keynote address was delivered by Robert Bonnie, Deputy Chief of Staff for Policy and Senior Advisor for Climate in the Office of the Secretary, U.S. Department of Agriculture. Deputy Chief Bonnie discussed similarities between his collaborative work on forest management to prevent catastrophic wildfire in Arizona to Illinois' work to reduce nutrient loss. He lauded the proven effectiveness of collaborative, locally-led efforts where the federal government acts as a partner, facilitator, and provider of financial resources, but not the driver. Bonnie recognized Illinois as having been at the forefront of many of these types of efforts: soil health, precision agriculture, better use of data, and others. Bonnie discussed the importance of aligning efforts with federal policies on climate change and outlined some new and forthcoming bills and programs that will look for ways to put smart climate practices on the ground and provide financial incentives for producers. He mentioned the importance of measuring, monitoring, and enhancing understanding of best practices and making information accessible to producers of all sizes, producers of color, and producers from historically underserved populations. The USDA hopes to continue supporting locally-led initiatives, encouraging creativity and relying on existing relationships to identify solutions that benefit both producers and the environment.

Keynote Q&A

Q: What is the current state of the Conserving and Restoring America the Beautiful 2021 initiative and what impact will it have on future USDA conservation efforts?

A: Working lands are critical to this initiative. It cannot succeed without the voluntary participation of private landowners. USDA will seek to support incentive-based, locally-led conservation efforts in alignment with this initiative.

Q: Illinois' nutrient loss reduction strategy is voluntary, meaning there's no statutory requirement that farmers and others participate. But as USDA and individual states take more serious action to alleviate the effects of and prevent climate change, at what point should a strategy, either at the state or federal level, become mandatory?

A: No, I do not think that would ever be useful. It doesn't work politically or practically. Look at the success of an initiative like the protection of endangered species on private land. The cases that have worked best included financial incentives and voluntary conservation participation. USDA will apply those lessons to the implementation of their climate smart practices.

Q: Will farmers who have already adopted practices voluntarily benefit from new incentive programs?

A: Yes, it will be important to design tools for early adopters to be rewarded. For example, the USDA Farm Bill and Climate Smart Partnership Program will both create incentives for new practices, as well as reward early adopters for gains already achieved.

Q: How can these climate initiatives which are important in and of themselves also maximize nutrient reduction benefits, as efforts to date by USDA have yet to result in significant water quality improvements?

A: USDA believes there are substantial opportunities for significant gains to the climate and water quality around, for example, nitrous oxide. These efforts will require new technology and new incentives.

Q: On October 7, 2021, USDA released its Action Plan for Climate Adaptation and Resilience, a framework for how USDA will prepare American farmers, ranchers, and land managers for the current and anticipated impacts of climate change. Could you share more on how these will be established to build the climate change adaptation capacity across the country?

A: Efforts must include voluntary, incentive-based, locally-led, flexible tools that can be deployed in different parts of the country. USDA hopes to capitalize on alignment between things that reduce greenhouse gas emissions, while also improving crop resilience and adaptation and increasing crop production. They will look at suites of tools that contribute to these things and address challenges related to climate change (like drought).

Agricultural Sector Overview

Brian Rennecker from the Illinois Department of Agriculture summarized several significant takeaways from the agricultural sector in the 2021 Biennial Report, including more than \$25 million spent implementing agricultural best practices, a large number of participants who attended various in-person and online outreach efforts, an increase in farmer knowledge of strategy recommendations, and a decrease in the application of phosphorus fertilizer. Rennecker emphasized the ag sector's commitment to outreach in 2019 and 2020, despite pandemic-related restrictions and the proven impact of those efforts. Looking ahead, Rennecker said that new management strategies may be required in order to combat evolving climate change.

Ag Sector Policy Working Group Member Perspective

Jean Brokish and Jill Kostel from the Illinois Sustainable Ag Partnership provided member perspective on the sector's accomplishments and challenges in 2019 and 2020. ISAP is a coalition among 13 organizations. They have developed a theory of change as a means to address farmer barriers to meeting NLRS goals, such as limited program funds, a high percentage of rented land, fluctuating

commodity prices, and thin profit margins. Looking ahead, ISAP hopes to expand their programs with an emphasis on climate and tracking outcomes of recommended practices. They plan to enhance their website and expand their membership to include mission-aligned partners and business organizations. They also hope to increase practice awareness and engagement by supporting innovative programs and solutions with financial incentives for producers.

Ag Sector Q&A

Q: One website I saw indicates that there are about 1.3 million cattle and 4.5 million hogs in Illinois. Does the manure from these animals enter into the figures for nitrogen and phosphorus in the study? Have we studied P or N coming from manure spray fields at all?

A: We are not monitoring field by field, but for those operating under a CAFO permit, there are reporting requirements.

Q: Can we obtain information about acres in cover crops per year by county?

A: The 1.4 million acres reported comes from FSA or NASS stats. We reflected just what the Department of Ag did in our own programs (e.g., Partners for Conservation, Fall Covers for Spring Savings).

FSA has the following public site that provides county acreage data reported to FSA:

<https://www.fsa.usda.gov/news-room/efoia/electronic-reading-room/frequently-requested-information/crop-acreage-data/index/>

If the link above doesn't work, go to <https://www.fsa.usda.gov/>. In the search bar type, "crop acreage data."

Q: Given the 2019 weather induced spike and the continued, then, uptrend in Illinois cover crop acres - is there a reasonable expectation these acres will continue to grow? Are there goals?

A: There continues to be interest and support for more cover crops and the hope is that acreage will continue to increase. The NLRS outlines different scenarios for cover crop acreages.

Point Source Sector Overview

Trevor Sample, NLRS Coordinator, Illinois EPA, provided an overview of point source sector data detailed in chapter 5 of the 2021 NLRS Biennial Report.

Point Source Sector Policy Working Group Member Perspective

Albert Cox of the Metropolitan Water Reclamation District provided perspective on this data from the Illinois Association of Wastewater Agencies. Cox outlined progress in several areas, including resources, outreach, facilities, and water quality. Cox clarified that only some utilities reported cost information in 2019 and 2020, so the actual costs of wastewater agencies are likely much higher than those reflected in the 2021 Biennial Report. Biological P removal requires capital improvements and other unplanned expenses, such as backup chemical P removal systems, in addition to staffing costs for optimization, pilots, research, etc. There are also high membership costs associated with watershed groups. Cox detailed several challenges facing wastewater plants. Fluctuating conditions in flows and varying amounts of P loads coming in make biological removal of P difficult, especially for larger facilities. At all

plants there is a learning curve for staff who must learn how to operate without a chemical backup. New facilities provide opportunities for quicker adaptation and flexibility. As optimization plans are implemented, some additional N removal may occur, even though P is the emphasis for point source plans and permits right now. Despite an increase in 2020, the point source sector has still achieved the 2025 NLRS goal (25% reduction from the 2011 baseline). If all major facilities decreased 1 mg/L, the sector would be far ahead of the long-term goal (45% reduction from 2011 baseline). Looking ahead, Cox noted two large plants (Calumet and O'Brien) with 1 mg/L permits kicking in soon (in 2024 and 2027, respectively). Across the sector, reductions are being achieved, but at significant cost. Bio-P is a challenge for the sector. There is no one-size-fits-all approach and some plants will continue to need a chemical P backup.

Point Source Q&A

Q: What's with the Decatur phosphorus concentration shown in report?

A: They receive influent from industry in this area. Their NPDES permit was reissued earlier this year and includes a schedule for meeting a 1.0 mg/L total phosphorus limit.

Q: Why is there less nutrient reduction in 2020 as compared to 2019? Is the reduced rate in 2020 from 18 to 16% for point source nitrogen due to population growth, or are there other factors at play increasing this load?

A: There was a higher P load in 2020 than in 2019.

Q: Was Stickney the cause of the big win by PS in the 2019 report? Or is PS still carrying the big win from that cycle?

A: The Stickney plant was a large source of reduction, but other majors contributed, as well.

Q: Is IEPA monitoring phosphorus loadings from CAFOs in any way?

A: No, but the CAFO permit does not allow for a discharge.

Q: How many CAFOs in Illinois do NOT operate under a NPDES permit?

A: There are 536 permitted and non-permitted large CAFOs in the state as of the the end of 2020. Fourteen of those are currently permitted.

Q: Based on the schedules in major WWTP's NPDES permits, when will all the majors in the state be required to meet the 1 mg/L TP limit?

A: Not sure. We can look at existing permits that include schedules for meeting a total phosphorus limit, but this may not include all facilities to date. The outcomes of NARPs may also affect this.

Other audience discussion:

Trevor, thanks very much for reviewing the reasons for the temporary regression. It was very necessary. Unfortunately, this crowded out the substantial reductions from other facilities. Since they discharge much lower concentrations, large communities like Fox Metro (Aurora area) and North Shore (eastern Lake County) are no longer in the table listing the largest sources of pounds.

Some good news: the Infrastructure bill just passed in Congress includes new money for the Clean Water and Drinking Water State Revolving Funds (\$11.7 billion each).

Zero discharge from CAFOs does not mean zero pollution.

Urban Stormwater Sector Overview

An overview of the Urban Stormwater sector's biennial report information was provided by Eliana Brown, University of Illinois Extension. Brown and Lisa Merrifield, also of Illinois Extension, undertook a concentrated analysis of MS4 reports from 2019 and 2020 seeking implementation data. These reports are completely narrative and, therefore, time consuming to read through. They found high participation in activities required by permits (such as community outreach and erosion control), which was positive, but not surprising. They also found a promising rate of participation in non-mandatory activities, like leaf collection and street sweeping. The Urban Stormwater Working Group recommends implementing a statewide inventory for ongoing tracking. This was discussed further in the afternoon.

Mary Beth Falsey, DuPage County, provided perspective from the DuPage County Stormwater Management organization. Falsey summarized several watershed plans that DPCSM has completed and moved into some stage of implementation over the past five to six years. Some of the challenges facing this sector include getting access to load reduction information from projects that were not grant-funded, or that received grants before a certain time; identifying private projects, like residential rain gardens; and accurately measuring the effect of education and outreach efforts on practice.

Urban Stormwater Q&A

Q: Statewide, is there anyone looking at the nutrient contribution that may be being made by septic waste - either through failed or poorly maintained septic systems, hydrogeology in karst areas that may be transmitting septic nutrients to waterways, and the land-application of septic waste on agricultural fields?

A: We are not aware of statewide studies documenting nutrient loads from failing septic systems. However, as discussed in Chapter 5 of the Biennial Report, Illinois EPA is making \$100 million in construction grants available over five years through the Rebuild Illinois Capital Plan. Communities can apply for a construction grant to implement wastewater collection and/or treatment solutions in areas where they are presently inadequate or nonexistent.

Q: What models are you using to determine P and N reductions from the urban practices?

A: The 319 Grant spreadsheet tool. Many projects applying for DuPage County funding are also applying for 319 grants, so the process is streamlined by mirroring those application tools.

Q: Are septic systems clustered in certain portions of DuPage County or it's distributed throughout the area?

A: They are both clustered and distributed. Within larger cities, some older neighborhoods are still on septic. There is a project underway to map sanitary sewer systems, which would help with understanding this.

Q: Do either of the presenters know if there are any plans to expand construction site NPDES reviews to more Soil and Water Conservation Districts? IEPA limited how many SWCDs could participate in the NPDES Permit program several years ago. Are there plans to increase SWCD participation in the future?

A: IEPA will not be expanding NPDES construction site inspections to additional SWCDs. IEPA is planning to have all inspections once again conducted by IEPA field staff.

Other Audience Discussion:

Great projects and outreach and education at the county level!

Really neat stuff - I'm a DuPage County resident and appreciate all of these projects!

This is amazing! So much has been accomplished

Closing Comments

The morning was closed by John Kim, Director of Illinois EPA. Director Kim observed that attendance of this conference served as proof of understanding the importance of NLRs. He iterated that the strategy only works with participation of all stakeholders and partners and even then, the task before us is probably bigger than it was when the strategy was first developed. Kim acknowledged that the effects of climate change are significant, but that the offsetting impacts of our collective efforts have been important and there is no doubt that the situation would be worse without them. He closed by stating that Illinois EPA remains committed to the long-term goals of NLRs. He thanked all attendees for their efforts and said that Illinois EPA looks forward to continuing in their role as a strategy partner.

Afternoon Sessions: Policy Working Group Meeting

Welcome and Introduction

Afternoon sessions began with introductory remarks by Shelly Nickols-Richardson, Director of University of Illinois Extension. Nickols-Richardson confirmed Extension's continued commitment to facilitating working group meetings, producing biennial reports, and contributing to watershed approaches. She discussed recent leadership changes within Illinois Extension, segmenting Natural Resources, Environment, and Energy from Agriculture and Agribusiness and creating two new Program Leader positions for increased capacity. Nickols-Richardson emphasized that the two areas would continue to work closely with each other and with community development in Extension.

Session 1

Greg McIsaac, Associate Professor Emeritus, Natural Resources and Environmental Sciences, University of Illinois, provided an overview of the Illinois River Phosphorus Study and the Rock River Nitrate Study. Since the 1980-96 baseline period, there has been a 30% increase in total phosphorus (TP) load in the Illinois River at Valley City. The highest TP yields (load per area) occur in the subwatersheds around the most densely populated areas of the state in northeastern Illinois. An area downstream from Marseilles

had negative yields during the baseline period which meant TP was accumulating in that flat portion of the watershed. In more recent years, this portion of the watershed has shifted from being a sink to being a source of TP and this accounts for most of the increased TP load at Valley City. Researchers identified factors correlated with this change, but additional research is needed to determine causes and whether the correlations reveal actual causes.

In the Rock River, a large increase in nitrate-N yield has been observed in the section between Rockton and Joslin, excluding the Kishwaukee River. The nitrate-N yields in recent years are similar to neighboring watersheds, but during the baseline period nitrate-N yields from the lower Rock watershed were much lower than the neighboring watersheds. Researchers are pursuing possible explanations for this change, including drainage from cropland going to groundwater instead of directly to the river, and/or an increase in irrigated acres since the baseline. In the Vermilion River at Pontiac, a reduction in Nitrate-N has been recorded despite increased water flow in the watershed. Watersheds like the Vermilion could help shed light on N reductions in other Illinois watersheds.

Mclsaac Q&A

Q: Are these TP yields values based on SPARROW model?

A: No, they are from monitoring data and the WRTDS_K model.

Q: I've seen some data across the Rock River and it shows high chlorophyll-a concentrations throughout the river. However, didn't see corresponding high phosphorus concentrations. Do you think nitrate is a potential cause?

A: I am not an expert on chlorophyll, but I doubt that nitrate concentrations would stimulate chlorophyll, in part because nitrate concentrations have not changed much in the Rock River depending on the time period of interest. The increased load has occurred primarily through increased flow and relatively constant concentrations.

Q: How could increased flow be the answer for increase of P when N can go down despite increased flow?

A: Increased flow is often an important factor in increased nutrient loads, but it is not the only factor. Conservation practices and watershed characteristics can shift the relationship between flow and nutrient load. In the Vermilion River at Pontiac, and other rivers in the tile drained region, it seems that a larger percentage of the N fertilizer has been getting into the corn crop and less is draining to the rivers. The relationship between riverine nutrient load and flow can be different for N and P and vary in different watersheds.

Q: Thanks for the excellent and essential work! Regarding the increase in N from the Rock, I think it would be easier to determine the cause if you look at year by year changes. Finding a correlation would be easier if you are not only looking at two data points. Is that being looked at?

A: I think the question refers to the graph I showed that compared the 1980-96 average nitrate yields to the 2015-19 average for three different locations in the Rock and Green River basins. We have calculated and analyzed annual and monthly values for all the years between 1980 and 2019. The slide comparing two time periods was a way of summarizing the large change that occurred in the lower Rock River and not in the Kishwaukee or the Green River.

Q: Are concentrations going up in some places as well as loads? Have we looked at concentrations as well as loadings?

A: Concentrations are part of the load calculations, and the trends in concentrations are often, but not always, similar to the trends in load. The focus of the NLRS is load, not concentration, so in short presentations we need to focus on loads. But we have compiled the concentration data and can respond to questions about that as the need arises.

Additional Audience Discussion:

I'll repeat the thanks to Prof. McIsaac and to add a thanks to whoever has been approving the funding to keep moving the science forward in Illinois. This is a multi-layered problem and good science is needed to solve it.

Session 2

Tim Straub, Supervising Hydrologist, Center for Midwest Water Science, U.S. Geological Survey, provided an update on the USGS Super Gage Network. These gages reduce uncertainty over discrete sampling alone and help researchers target the best times to sample sources. Illinois was the third basin selected in a competitive national process for funding through the Integrated Water Science basins.

Straub Q&A

Q: Can you explain again why nitrate had peaks before and after the peak flow?

A: We can speculate that N peaking before is related to it being readily available in the system/tributaries. After could be tile drainage and other slower moving things. Sometimes it could be a dilution effect. This is definitely an area for additional study.

Q: Is the NGWOS station on the Fox R in WI now installed?

A: The Fox River gage is still being upgraded, and the new data are not available.

Q: How well do you feel the phosphate sensors worked?

A: The old ones - not so well. The new ones worked a lot better. There is a forthcoming paper on this.

Q: Regarding the analyzers that you don't have confidence in, were any of these used to produce statewide data? Do we need to note any added uncertainty with some data sets?

A: Any questionable data was removed in the publication process, so USGS numbers can be trusted.

Q: Should we be concerned about the growing calls to dredge rivers across Illinois (especially the Mississippi) in the name of economic gains? What impact could this restoration practice have on the release of accumulated legacy, or historical, phosphorus sources into downstream waters, at least in the short-term?

A: This question is beyond the scope of the content and network being presented.

Additional Audience Discussion:

Surface runoff dilution of nitrate has been seen elsewhere during peak runoff.

Session 3

Extension Watershed Associates, Rachel Curry and Jennifer Jones, provided an overview of their work across the state in 2019 and 2020.

No questions from the audience.

Additional Audience Discussion:

The CLM trainings are a great venue for you all to share this information. Great work.

Links to the NLRs Podcast on various players/platforms:

Apple Podcasts: https://go.illinois.edu/NLRS_Apple

Google Podcasts: https://go.illinois.edu/NLRS_Google

Spotify: https://go.illinois.edu/NLRS_Spotify

SoundCloud: https://go.illinois.edu/NLRS_Soundcloud

Other resources:

Soil Health Check Up Rainfall

Simulator: <https://www.youtube.com/playlist?list=PLlq7XIT0e3alHZjAxofvY-7QNnfinWF5>

Grazing guide developed after the Embarras Grazing Partnership trainings:

<https://thelandconnection.org/resource/regenerative-grazing-guide/>

Session 4

Lauren Lurkins, Director of Environmental Policy, Illinois Farm Bureau, provided an organizational update. IFB is an active participant in and contributor to many aspects of the NLRs, including participation in the Policy Working Group and committees, development and submittal of proposed updates to the Science Team for consideration, and significant outreach efforts are organized by its farmer leaders and directed to its 74,000 farmer members. Their annual report, with more details about their activities in 2021, will be released soon.

Lurkins Q&A

Q: Is Farm Bureau working with CAFOs?

A: Yes, we work alongside the Illinois Pork Producers Association, Illinois Milk Producers Association, and Illinois Beef Association to develop and disseminate resource guides for livestock farmers as they seek to understand CAFO regulations in Illinois.

Session 5

The proposed statewide Green Infrastructure Inventory was presented by Eliana Brown and Reid Christianson, University of Illinois. An Ag Conservation Inventory is underway, currently in the testing phase. It has been developed for the entire Hypoxic Task Force region, but users can zoom in to an individual state level of data. The Urban Stormwater Working Group began discussing a Green Infrastructure Inventory in 2018 as a way to measure state-wide stormwater implementation. The proposal, which has been submitted to the Illinois EPA, is to add an urban stormwater GIS overlay to the Ag Conservation Inventory in process. There are a very small number of existing local inventories that could be incorporated into this GIS layer and this new inventory can have an interface that could provide a way for communities to add data. This access would also allow MS4 communities to standardize data used in their narrative reports, as discussed earlier in the day.

There were no questions from the audience.

Session 6

Rick Manner, Executive Director, Urbana and Champaign Sanitary District, provided an overview of Nutrient Assessment Reduction Plans. He outlined many positives (shifted IEPA focus to watersheds, involved new stakeholders). There has been great proven success in northeastern Illinois. In contrast, though, the rest of the state will be more challenging. For example, east central Illinois will have far fewer dischargers, fewer resources and fewer big results. West central Illinois is in an even more difficult position. The most significant challenge will be too many watersheds and not enough help.

There were no questions from the audience.

Session 7

Julie Hewitt, Executive Director, Illinois Nutrient Research and Education Council, detailed NREC's 2021-22 research projects, including testing the impact of N management systems on efficiency of N use, statewide distribution of work on optimum N rate to meet the needs of the MRTN, cover crop systems to maximize production and minimize nutrient loss, and others. NREC is very interested in research projects that go beyond the "known" into more innovative areas. NREC's annual report will be released in February 2022.

There were no questions from the audience.

Additional Audience Discussion:

MRTN link: <http://cnrc.agron.iastate.edu>. This is the N-Rate Calculator for a multi-state region. Illinois, by far, has the most trial data in the series.

Here's a link to an article on the updated Cover Crops Decision Tool - Shalamar Armstrong from Purdue, along with several from Illinois penned it recently:

<https://farmdocdaily.illinois.edu/2021/10/introducing-further-updates-to-the-cover-crop-decision-support-tool.html>

The link to the tool is in the article.

Direct link to the tool: <https://covercrop.ncsa.illinois.edu/>

FYI - the NCSA in that link means the tool is running on the super computers here on campus - very cool stuff.

The conference was closed with housekeeping items from Lisa Merrifield, University of Illinois Extension, and heartfelt thanks to all presenters, staff, and attendees.

Final Audience Discussion/Questions

Q: When is the Policy Working Group meeting next to talk about the steps needed to meet the 2025 benchmarks?

A: *2022 meetings will be scheduled after the first of the year. Please send conflict dates to the NLRS gmail address.*

Q: I have learned that Illinois has received \$8.1 billion in American Rescue Plan Act Coronavirus State and Local Fiscal Recovery Funds. One of the ways these funds can be used is for water infrastructure. Will Illinois spend some of these funds to help meet the Strategy's 2025 targets? The funds need to be spent by 2026 so the timing fit is perfect.

A: *It is too early to know how these funds will be spent.*

Q: Can we figure out the implementation per year needed to get Illinois to our 2025 target? And get the state to provide cost-share to implement trackable practices: cover crops, buffers, wetlands, bioreactors. Funding can be flexible for these practices but could prioritize the least costly practices and reflect the past adoption rates as shown in Dr. Christianson's updated scenarios (pages 198-199 of 2021 biennial report).

This can be address during 2022 policy working group meetings.

Slides will be posted to go.illinois.edu/nlrs.