



Biennial Report 2021 Summary

The Illinois Nutrient Loss Reduction Strategy 2021 Biennial Report is the third report to provide the public with updates on the implementation of the Illinois Nutrient Loss Reduction Strategy, released in 2015. The strategy continues to be guided by Illinois Environmental Protection Agency, Illinois Department of Agriculture, and University of Illinois Extension, with input and feedback from the Policy Working Group and several other stakeholder groups and councils. This biennial report provides a 2019-20 overview of the efforts and investments made in reducing nutrient loss to Illinois waterways from source sectors: agriculture, point sources, and urban stormwater.



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An aerial satellite-style photograph of the Mississippi River basin. The river is highlighted with a bright red overlay, winding from the top center down to the Gulf of Mexico. The surrounding land is green, indicating vegetation, with some brownish areas suggesting agricultural or developed land. The Gulf of Mexico is visible at the bottom, with a dark blue color gradient. The top of the image shows a dark blue sky with stars, suggesting a night view from space.

The overall objective of the strategy is to improve water quality in Illinois and downstream to reduce the hypoxic zone in the Gulf of Mexico. The strategy sets a long-term goal of reducing loads from Illinois for total phosphorus and total nitrogen by 45%, with interim reduction goals of 15% nitrate-nitrogen and 25% total phosphorus by 2025.

This report is based on the premise that human and capital resources, which fund and support outreach and educational efforts, lead to the implementation of best management practices on the land and in facilities, resulting in water quality improvement. Over the past two years, many partner organizations, working both collaboratively and independently, remained engaged in this process despite unprecedented challenges, including extreme flooding in 2019 and the global pandemic of 2020.

Agriculture

The strategy identified 65 agriculture-related programs, initiatives, and projects developed by agencies and non-governmental organizations to help producers establish practices and strategies to reduce nutrient losses. Agriculture partner organizations reported more than 130 full-time staff members engaged in activities related to implementing the strategy. Between 2019 and 2020, agriculture sector partners reported spending almost \$27 million implementing the strategy, outside of state and federal cost-share program funds. The Nutrient Research Education Council, a public-private partnership that ensures a sustainable source of funding for nutrient research and education programs, invested \$6.9 million in 59 projects.

The agricultural sector invests in outreach and education to foster voluntary implementation of conservation practices that reduce nutrient loss from farm fields, while balancing production goals. During 2019 and 2020, more than 1,020 outreach events focused on nutrient loss reached over 72,000 attendees. In 2020, most of these events were held online to conform to mandatory social distancing guidelines established by state government. Agriculture and conservation organizations utilized remote technology to reach farmers, Certified Crop Advisers, and others to conveniently provide content on nutrient loss and conservation practices. University of Illinois Extension watershed outreach associates continued producing the Nutrient Loss Reduction Podcast series. By the end of 2020, 32 episodes had been streamed more than 8,000 times. The podcast covers topics from in-field practices, such as cover crops and reduced tillage, to edge-of-field practices that include constructed wetlands and buffers.

To better understand outreach and education efforts and their correlation to practice implementation, the Illinois Nutrient Loss Reduction Strategy survey conducted by National Agricultural Statistics Service was undertaken for a third time in 2020. It provides the following insights into knowledge



Photo courtesy of Soils Lab, University of Illinois

NREC invested **\$6.9 million** to support **59 research projects**.



Photo courtesy of AISWCD

More than **1,020 outreach events** focused on nutrient loss reached over **72,000 attendees** in person and online.



The Nutrient Loss Reduction Podcast series had **32 episodes** that were streamed more than **8,000 times**.



Photo courtesy of IFCA

and strategy practice implementation: 43% of farmers reported being somewhat to very knowledgeable about the strategy; 66% of farmers reported being somewhat to very knowledgeable about cover crops; 1.4 million acres of cover crops were planted in 2019, representing a 135% increase from 2011. Farmers also reported that 11.2 million acres of cropland received reduced phosphorus fertilizer application rates in 2019 compared to 2011.

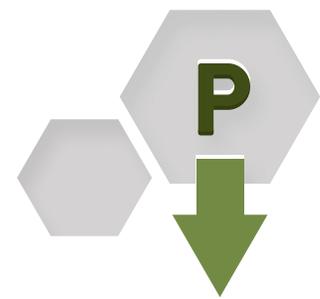
A large number of prevented plant acres were reported in 2019, which may explain the significant increase in cover crops. To assist farmers after a historical amount of flooding in 2019, Illinois Department of Agriculture redirected funds to implement an additional 93,750 acres of cover crops specifically for prevented planting coverage through its Partners for Conservation cost-share program. Illinois Department of Agriculture's Fall Covers for Spring Savings program supported an additional 50,000 acres of cover crops in 2019.

Another indication of implementation was sought by the Illinois Fertilizer & Chemical Association, which conducted a 4R survey of agriculture fertilizer retailers to gain an understanding of fertilizer management. This survey found that of those corn acres receiving fall ammonia nitrogen fertilizer, 89% was applied in accordance with the University of Illinois' recommended application date based on soil temperature. Additionally, 87% of the fall ammonia fertilizer was applied with a nitrification inhibitor and 74% of the total nitrogen fertilizer rate was within the recommended range.



Photo courtesy of Jennifer Jones, Illinois Extension

In 2019, **1.4 million acres** of cover crops were installed, representing a **135%** increase from 2011.



11.2 million acres of cropland were reported to have **reduced phosphorus** fertilizer application rates compared to 2011.



Photo courtesy of Kishwaukee Water Reclamation District

Point Sources

The point source sector has directed substantial resources to capital improvements and nutrient reduction studies that identify capital needs. Data provided by the Illinois Association of Wastewater Agencies showed that total spending by the point source sector nearly tripled between 2019 and 2020 — from \$65.1 million in 2019 to \$185.2 million in 2020. Most of this spending was on capital improvements. Further, Illinois Environmental Protection Agency provides low-interest loans through the Water Pollution Control Loan Program, which funded wastewater treatment plant upgrades to improve nutrient removal, green infrastructure, urban stormwater treatment, and control of combined and sanitary sewer overflows. In 2019 and 2020, over \$200.2 million was invested in a dozen projects to reduce nutrient loss through treatment plant improvements.

The point source sector implements the strategy largely through the regulated system administered by Illinois Environmental Protection Agency. The National Pollutant Discharge Elimination System permits contain requirements for publicly owned treatment plants and industrial plants to reduce nutrient loss in their wastewater discharges. Currently, 36% of major municipal wastewater treatment facilities have permits containing total phosphorus limits. Facilities have also developed and submitted 71 nutrient reduction optimization studies and 59 nutrient reduction feasibility studies since 2018.

The requirement to develop Nutrient Assessment Reduction Plans is being incorporated in many Illinois permits for major municipal facilities that discharge into a receiving waterbody



Photo courtesy of Fox Metro Water Reclamation District

36% of major municipal wastewater treatment facilities have permits containing total phosphorus limits.



53 facilities are developing Nutrient Assessment Reduction Plans.



Photo courtesy of MWRDGC

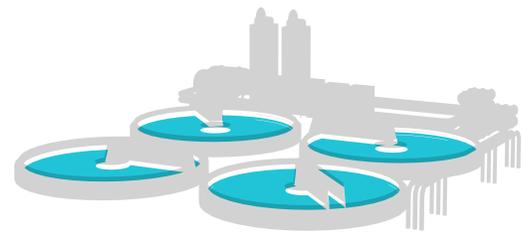
that has been determined impaired or at risk of eutrophication. Currently, 53 major municipal facilities are developing Nutrient Assessment Reduction Plans. These plans will identify phosphorus input reductions and other measures needed to ensure waterbodies contain adequate amounts of dissolved oxygen and reduced offensive conditions from algae and aquatic plant growth.

The 2020 statewide total phosphorus load from the point source sector decreased by 16% compared to 2011 baseline levels. More facilities have reduced their annual average nutrient concentrations during the past two-year period, as well. In 2020, 90 major municipal facilities had an annual average total phosphorus concentration of 1 mg/L or less, while 31 of those averaged 0.5 mg/L or less. Significant total phosphorus load reductions are still anticipated in the long-term, due to large wastewater treatment facilities that are scheduled to become compliant with permit requirements over the next several years. Improvements in the development and successful operation of technology that enhances nutrient removal is also key to achieving nutrient loss reduction goals.

In addition to permit requirements, the point source sector conducted outreach and education activities related to nutrient loss reduction. Data provided by the Illinois Association of Wastewater Agencies showed that in 2019-20, 13 events, consisting of field days, presentations, and workshops, reached a total attendance of over 2,600 stakeholders, including wastewater professionals.



Photo courtesy of Fox Metro Water Reclamation District



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Urban Stormwater

Efforts in the urban stormwater sector continue to expand. In 2020, Illinois Environmental Protection Agency began receiving project applications for the Green Infrastructure Grant Opportunities program. Qualifying projects improve water quality by decreasing the amount of stormwater that enters waterways. Forty-seven applications were received, indicating a keen interest in stormwater projects. Five million dollars, with a local match of \$4 million, have been awarded to support 11 green infrastructure projects.

Urban stormwater partners, like the agricultural sector, sponsored numerous events despite the many obstacles posed by the pandemic. They found new ways to reach a wide audience of 14,340 people by shifting to online platforms. Topics focused on educating the public about steps to reduce nutrient losses from their property. Public presentations and webinars encouraged homeowners to install rain gardens and use natural lawn care techniques.

Further, the urban stormwater sector engages with industry professionals; state, local, and county officials; and the general public to encourage best management practice implementation. An analysis of the state's Municipal Separate Storm Sewer System communities showed that 61% offered technical assistance to individuals and entities implementing recommended practices.

The analysis also showed that a majority of these communities have implemented street sweeping (77-78%) and leaf collecting (63-65%). A U.S. Geological Survey study shows that such practices are beneficial because leaves on city streets are one of the largest sources of urban phosphorus loads. These actions are important and underscore the role of stormwater managers in meeting the goals of the strategy.



Photo courtesy of CMAP

11 green infrastructure projects were awarded **\$9 million** in total investment.



Stormwater partners found new ways to reach a wide outreach audience of **14,340 people** by shifting to online platforms.



77% of MS4 communities have implemented street sweeping.

64% of MS4 communities have leaf collection.

Science Assessment Update

The science assessment, originally published as part of the Illinois Nutrient Loss Reduction Strategy, included an evaluation of Illinois' major river systems and provided implementation scenarios with recommended practices to achieve water quality goals. It is routinely updated with the latest information and research. This update contains new nitrate-nitrogen and total phosphorus river loads, supporting data from U.S. Geological Survey's monitoring network, new implementation scenarios, and additional recommended practices.

Statewide nitrate-nitrogen and total phosphorus loads have been highly correlated with river flow, which in turn is highly correlated with precipitation. For the five-year period of 2015-19, the statewide river flow, nitrate-nitrogen and total phosphorus average loads were estimated at 25%, 13%, and 35%, respectively, above the 1980-96 baseline period (Figure 1.1). The 2015-19 averages were influenced by unusually high precipitation in 2019. Further, five-year average river flows have been greater than the baseline since 2008. Greater runoff and drainage tend to increase nitrate-nitrogen and total phosphorus loads and, therefore, increase the difficulty of meeting the strategy's water quality goals. For some watersheds, however, nutrient loads remained constant or even declined despite increases in river flow. This indicates that other factors, such as nutrient management, may influence riverine nutrient loads.

Additional implementation scenarios were developed in 2020. One scenario represents the scale of implementation activities necessary to meet the strategy's interim water quality goals of 25% reduction in total phosphorus and 15% reduction in nitrate-nitrogen. Another scenario provides the implementation activities necessary to meet the final water quality goal of 45% reduction in total phosphorus and nitrate-nitrogen loadings. An interactive spreadsheet was developed and posted to the Illinois Environmental Protection Agency's website that allows citizens to develop their own implementation scenarios for educational purposes.

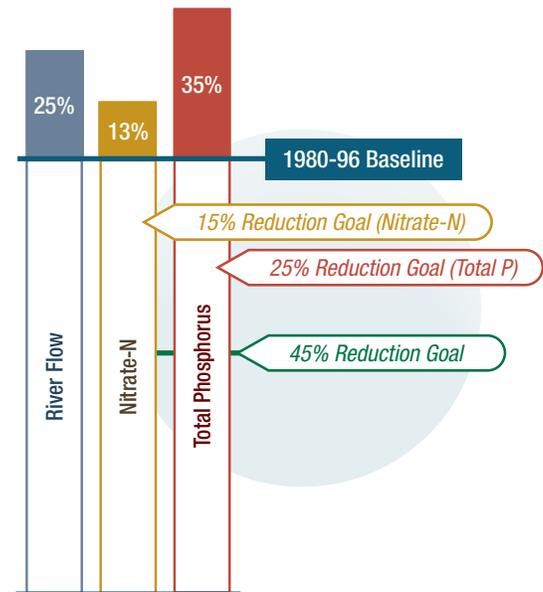


Figure 1.1. Percent increase from baseline to average 2015–19

The University of Illinois Nutrient Loss Reduction Strategy Science Team has an established process for adding new agricultural conservation practices and updating practice performance. In December 2020, two stakeholder organizations submitted proposals recommending several conservation practices. Two of those practices (saturated buffers and terraces) were approved and added to the strategy's recommended agricultural conservation practices to reduce nutrient loss. A saturated buffer consists of subsurface pipe used to divert and spread drainage discharge to a vegetated area to increase soil saturation. The science team estimates this practice has a nitrate-nitrogen loss reduction efficiency value of 40%. A terrace is defined as an earth embankment, channel, or combination of ridge and channel constructed across a slope to intercept runoff. Terraces were given a 40% total phosphorus loss reduction value in non-tiled fields.

Adaptive Management

Adaptive management is a process that promotes flexible decision making, which allows for adjustments based on new data and information with the goal of improving management decisions over time. It allows the Nutrient Loss Reduction Strategy to be a living document focused on both traditional and new technologies and practices.

While the strategy is focused on statewide water quality and best management practice implementation, locally led watershed-based planning remains a priority to help meet water quality goals on a smaller scale. A watershed-based plan provides an integrated, holistic framework to restore water quality effectively and efficiently in impaired waters and to protect water quality in other waters adversely affected or threatened by point source and non-point source pollution. While watershed-based plans may address a host of water quality concerns and have different water quality goals, they can be useful for meeting statewide nutrient loss reduction goals and are most effective when led locally. Illinois Environmental Protection Agency has provided grant funds for the development of 67 watershed-based plans since 2011.

This biennial report demonstrates the continued implementation of the strategy across agriculture, point source, and urban stormwater sectors. Despite these efforts, nutrient loads increased, driven primarily by increases in precipitation and storm events. While progress toward the implementation of certain practices is evident, the scale and pace of adoption of all practices needs to accelerate in order to meet the interim nutrient loss goals by 2025.

Illinois Environmental Protection Agency has provided grant funds for the development of **67 watershed-based plans** since 2011.

Conclusion

The implementation assessments outlined in this biennial report show successes, but also identify areas for improvement. While there were advancements in agricultural conservation practices, municipal and industry efforts, and government support at the community/watershed level, further efforts are required to achieve strategy goals, particularly amid shifting climate conditions. Agriculture, point source, and urban stormwater sectors each have important roles to play in reducing nutrient loss and each sector faces its own set of challenges. Much work remains, but as Illinois strives to achieve nutrient loss goals, these biennial reports continue to provide a valuable resource for influencing decision making and advancing collaboration that drives innovation.

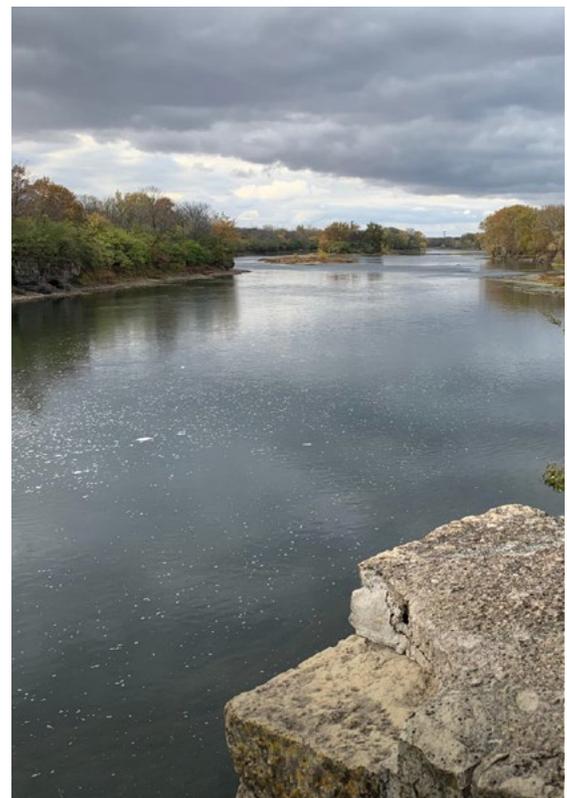


Photo courtesy of Jeff Turner



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Special Thanks

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And to our stakeholder partners who contributed content and photos.

Cover Photo: Vermillion River at Matthiessen State Park by Layne Knoche
Photo Left: Old Chain of Rocks Bridge over the Mississippi River by Layne Knoche