

A detailed map of the Mississippi River Basin, showing the main river and its numerous tributaries. Major cities are marked with white dots and labeled. The map includes state boundaries and names for states such as North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Texas, Minnesota, Iowa, Missouri, Arkansas, Louisiana, Wisconsin, Illinois, Indiana, Kentucky, Tennessee, Alabama, Georgia, and Florida. The title is overlaid on a semi-transparent blue box in the upper right.

American Agriculture's State, Regional, and National Initiatives to Reduce Nutrient Losses in the Mississippi River Basin

Prepared by the
Agricultural Nutrient Policy Council
December 2021

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About the Agricultural Nutrient Policy Council and this Report

The Agricultural Nutrient Policy Council (ANPC) was formed in 2010 as a standing organization to quickly assemble, marshal and sustain the legal, technical and policy expertise American agriculture has needed to effectively engage on federal Clean Water Act (CWA) issues and related issues of utmost importance to farming, nutrients and water quality. ANPC membership includes approximately 40 national and state agricultural trade associations and companies. In creating this report, the ANPC conducted a series of in-depth interviews with state agricultural trade associations in sixteen states; Iowa, Illinois, Indiana, Missouri, Minnesota, Ohio, Kentucky, Kansas, Nebraska, South Dakota, Arkansas, Louisiana, Michigan, Mississippi, Tennessee and Wisconsin. The ANPC is grateful to the state association staff that supplied us with much of information that we have recounted below. The ANPC also thanks its consultants, Geosyntec Consultants and Wright Water Engineers, for assisting with the interviews and providing supplemental material and interpretation. The ANPC has sought to accurately recount that information and any errors are the ANPC's responsibility alone.

The ANPC membership includes the following organizations:

- American Farm Bureau Federation
- Illinois Corn Growers Association
- Illinois Farm Bureau
- Iowa Farm Bureau Federation
- MidAmerica Croplife Association
- Minnesota Agricultural Water Resource Center
- Missouri Corn Growers Association
- Missouri Soybean Association
- National Council of Farmer Cooperatives
- National Corn Growers Association
- National Milk Producers Federation
- National Pork Producers Council
- The Fertilizer Institute

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A. Background and Purpose

Under President Obama, the United States Environmental Protection Agency (US EPA) established and advanced innovative and new Clean Water Act (CWA) guidance under a March 2011 memorandum entitled “Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions” and reaffirmed the guidance in a 2016 companion memorandum. Those memoranda solidified “EPA’s commitment to partnering with states and collaborating with stakeholders to make greater progress in accelerating the reduction of nitrogen and phosphorus loadings to our nation’s waters.” The framework discussed in the memoranda recognized the essential leadership role that state agencies and the private sector must play to successfully meet the CWA’s goals related to reducing the loss of nutrients to surface water in order to restore and protect water quality. The framework called upon state, municipal and private sector leadership to bring agriculture, municipalities and other stakeholders together to devise and begin the implementation of strategies to reduce nutrient losses to protect water quality.

Those policies were promoted by US EPA and the United States Department of Agriculture (USDA) jointly through many avenues, but in particular, through the federal-state agency partnership under the Gulf of Mexico Hypoxia Task Force (HTF). Although the HTF preexisted the framework guidance, the framework was grounded in principles long advocated by the HTF, and the HTF and the participating states have invested heavily in developing sound state Nutrient Loss Reduction Strategies (NLRs) and their implementation. The level of effort undertaken in response has been and continues to be extremely impressive and has led to an unprecedented explosion of aggressive, forward-thinking and welcomed efforts in the Mississippi Atchafalaya River Basin (MARB or the MRB) states. That work has been executed by the federal and state agencies, university extension and researcher faculty, municipal water utilities, state agricultural trade associations, and most importantly by farmers and ranchers themselves. All of this work has been guided and shaped by the states’ NLRs, which were all a direct response to the guidance and approach advocated for in the framework. The federal and state agency efforts, as well as those of the universities involved under the auspices of the HTF, have rightly received considerable attention and documentation. That work has been outstanding.

State agricultural trade associations throughout the entire MRB representing farmers and ranchers, and the agribusinesses that support them, have welcomed the framework and enthusiastically embraced the role agriculture must play in making state NLRs a success. Those efforts are being undertaken with the support and endorsement of the farmers and ranchers themselves, who are actively implementing nutrient-management and resource-conserving practices consistent with the NLRs across the MRB.

Much of this work is being undertaken by the farmer and agribusiness groups’ own volition and funding, with major private investments being made by the farmers themselves without public assistance to make the needed changes. Other efforts are being done in close collaboration with state agencies and universities, as well as non-governmental organizations (NGOs). Still others are being done in direct response to federal agencies’ financial assistance programming. In each state, all of this, or some subset of this, is taking place.

The most critical and essential key to success of the state NLRs is successfully empowering farmers and ranchers and supplying them with good options in terms of technologies and practices so they can figure out how to best solve these challenges on their own operations. Our greatest resource in this effort is the enormous pool of problem-solving expertise and capability among the farmers themselves, who, if given cost-effective and practical options to address challenges that really matter, will implement practices on their own operations. Over the past decade, enormous investments of resources, primarily time and funding, have occurred on agricultural land across the MRB. That investment starts at the farm level, with farmers and ranchers installing practices field by field and year by year. In doing so, farmers and ranchers have been supported by their state agricultural trade associations.

Thanks to the approach of the US EPA and USDA, all stakeholders, including agricultural trade associations, were able to be part of a solution that was crafted for individual states. That work continues and manifests itself in the form of new state programs, new state funding, as well as new collaborations outside of the state and federal government. All that work is meaningful and will help reach the goals of the Hypoxia Task Force, but it does not make for a simple story. No single compilation of all the data exists – practices installed, funding commitments made by all participants and estimates of the benefits of all these practices and continued investment. There is, however, enough accurate and documentable information available to fully demonstrate just how extensive the efforts are in the MRB to reduce nutrient losses from farm fields as to protect local water quality and downstream water quality in the receiving rivers of the basin and ultimately the Gulf of Mexico. This report collects data that is available from multiple states, with a special focus on the work within the agricultural trade associations and industry partners.

American agriculture knows, though, that the job is far from complete and that a great deal more must be accomplished. This will require further adoption by farmers and ranchers of existing technologies and practices. It also will require innovative research and development efforts to create and adapt technologies that can be targeted for maximum impact on farms. Great progress can be made with today's tools, but additional and effective tools are possible and need to be developed and made available. Our hope is that the coming efforts to refine and implement state NLRs will be even more successful in that regard, and therefore more effective in reducing nutrient losses to protect water quality in our communities, states, the MRB and the Gulf of Mexico.

The primary purpose of this report is to draw attention to the work of farmers across the MRB in implementing nutrient-reduction strategies field by field and season by season and highlight the sustained efforts of the agricultural trade associations that support them in doing so. American agriculture is deeply committed to the success of the NLR process in the MRB and very much wants to work with our federal and state partners and stakeholders to sustain this amount of effort.

B. Key Findings from Individual Surveyed States

This section of the report includes a number of the most important and recent initiatives in each of the sixteen surveyed states. For ten of these states, we were able to gather additional data used to generate one-page graphical representations that are included below. Without question, in each of these sixteen states there are multiple valuable and important efforts in watersheds, local and other areas that are not reflected here. Doing so was beyond the scope of this project, although ANPC welcomes information on additional initiatives for inclusion in subsequent versions of this report. What ANPC has attempted to do is provide a snapshot of the agricultural trade associations' efforts to reduce nutrient losses within each state and ultimately contributing to the Gulf of Mexico. Some of these efforts are being done solely by the associations at their own expense. Others are supported with public funding from state or federal agencies or private funding from NGOs and industry partners. Others are in close partnership with universities or municipalities. Yet each of the states' efforts generally share an important quality; the state agricultural trade associations are working as active participants and supporters, if not leaders, of the efforts in their states.

1. IOWA

Information regarding the Iowa Nutrient Reduction Strategy can be found [here](#).

a. Iowa Nutrient Research & Education Council (INREC)

INREC was formed by Iowa agricultural trade associations and agribusiness groups explicitly for the purpose of supporting Iowa's implementation of its NLRs. INREC brings together major farm and commodity organizations, major fertilizer and crop-production companies, agricultural retailers and crop advisers in a formal organization to do this work. It is focused on measuring and demonstrating environmental progress, fostering innovation and developing new environmental technologies scientifically validated to reduce nutrient losses and conducting outreach and education dedicated to enhancing the impact crop advisers and agronomy retailers have in their roles as "change agents" working with Iowa farmers. A list of its extensive projects in this arena can be found [here](#) and [here](#).

These efforts include:

- A farm-level survey based on a statistically representative sample of the entire state. Working with Iowa State University (ISU), the purpose of the survey is to generate an accurate understanding of the extent and nature of nutrient loss reduction practices in use by Iowa's farmers. The results can be found [here](#).
- An Iowa Structural Best Management Practice (BMP) Mapping Project. Led by ISU, the purpose of the project is to conduct statewide LiDAR mapping of six types of conservation practices (terraces, ponds, grassed waterways, water and sediment control basins, contour strip cropping and contour buffer strips/prairie strips). More about the project and its findings can be found [here](#).
 - Between the 1980s and 2018, the total number of terraces in the corn-soy production areas of the state increased by 61%, and the land area treated by the practice increased by 81%. For pond dams, these increases were 37% and 47%, respectively, and, for water-sediment-control basins by 232% and 156%, respectively.

- Partial analysis of the findings in terms of the amount of structural BMP adoption and their implications for phosphorus loss reductions have been conducted and can be found [here](#). This project estimates that these practices alone reduced phosphorus-loss by approximately 3-4% relative 1980s levels.
- In discussing these findings with ISU in the context of the management practices that the INREC survey has found are in place, Iowa agriculture working with Iowa State University and others estimate that phosphorus losses to date have been reduced by 25-26%, and likely greater, compared to the 29% goal in the NLRS.
- One of its newer projects under development involves working with a precision ag provider to conduct on-farm trials across the entire state to help farmers understand how different management choices and weather scenarios impact yields and optimum nitrogen fertilizer rates and therefore minimize the potential for nitrogen loss from farm fields.

b. Iowa Agriculture Water Alliance (IAWA)

IAWA was formed in 2014 by the Iowa Corn Growers Association, Iowa Soybean Association and Iowa Pork Producers Association with the primary purpose of improving Iowa's water quality. IAWA works with farmers and partners in priority watersheds to drive the adoption of conservation practices and other innovations that will improve water quality. They work to increase resources for these efforts from federal and state programs and from private stakeholders that share common goals. They also intend to introduce new, innovative farm business planning tools that have the potential to improve water quality and help farmers maintain or increase profitability. IAWA has facilitated intense levels of agricultural work in eight priority watersheds. It has also cooperated with the Iowa Department of Agriculture to leverage \$33 million worth of private sector efforts in these watersheds with \$4.75 million in state funding and \$9.5 million from USDA Natural Resources Conservation Service's (NRCS's) Regional Conservation Partnership Program (RCPP).

c. Agriculture's Clean Water Alliance (ACWA)

While ACWA, an alliance of ag retailers and support companies, was formed in 1999, it has been actively working with farmers to help them achieve the Iowa NLRS' goals, particularly in the Raccoon River and Des Moines River watersheds. ACWA members agree to help farmers reach optimal crop yield and profitability while implementing the best environmental practices to preserve and protect Iowa's water and soil. From 2018-2020, ACWA's Farm to River Partnership in the North Raccoon River Watershed helped farmers implement in-field and edge-of-field practices that keep nitrogen and phosphorus out of Iowa waters. Those practices included the installation of bioreactors, saturated buffers, targeted wetlands and new acres of cover crops. Other aspects of the project included tile and stream water monitoring and collection of in-field data on nitrogen behavior in manure systems. ACWA is now planning to take its programming statewide.

Iowa

Goals and Targets

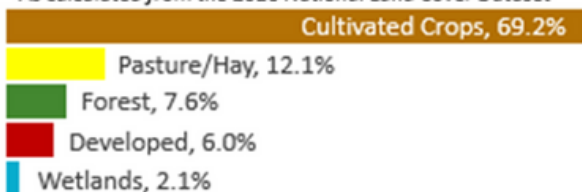
Reduce statewide inputs of both total nitrogen and total phosphorus by 45%. Non-point source target load reductions are 41% for total nitrogen and 29% for total phosphorus.

Inputs

Initial phosphorus control was largely funded by farmers and landowners. Recent years have seen increases in funding from public-private funders, Senate File 512, and the state revolving loan fund.

Predominant Land Use

As calculated from the 2016 National Land Cover Dataset



Land

The current in-field practices to reduce phosphorus loss are focused on retaining sediment on the fields. These practices are primarily conservation tillage, terraces, pond dams, and sediment basins. Iowa agriculture has achieved at least a 22% reduction in total phosphorus. The most effective practices to reduce nitrogen loss have not yet been determined. Cover cropping is the only on-field practice currently promoted to address nitrogen. It is anticipated that the practices currently in place achieve a 10 to 15% reduction in nitrogen.

Water

Available data, while uncertain, indicates 29.4 pounds per acre of nitrogen were exported in 2016 and 17.7 pounds per acre were exported in 2017. Efforts are currently underway to develop a methodology to quantify phosphorus loads leaving the state.

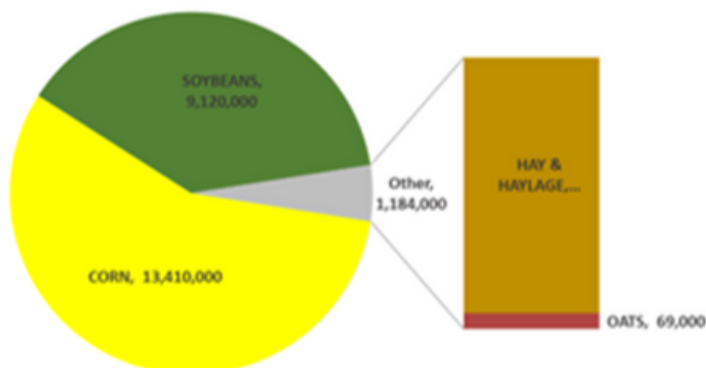


According to the 2012 SPARROW Mapper for the Midwest; Iowa delivers **19% of the agricultural nitrogen** and **13% of the agricultural phosphorus** from **56,257 square miles** to the Gulf of Mexico.

Human

Iowa farmers are taking steps to improve conservation practices on the land they farm to help meet Iowa Nutrient Reduction Strategy (INRS) goals. Outreach efforts by partner agencies have increased throughout the state.

Harvested Acres



Estimated from 2019 USDA State Agriculture Overview
quickstats.nass.usda.gov, accessed 08/31/2020

2. ILLINOIS

The Illinois Nutrient Loss Reduction Strategy can be found [here](#).

a. Illinois Nutrient Research & Education Council (Illinois NREC)

Illinois NREC is a direct response to the need to coordinate and support agriculture's efforts under Illinois' NLRS to support better nutrient management to protect water quality. The state legislature, with the support and urging of agriculture, provided authority whereby the funds collected from a state levy on the sales of commercial fertilizer in the state would be used to develop the research and educational programming needed to help farmers who utilize fertilizer products adopt and implement best practices to optimize nutrient efficiency, maximize crop yields and protect water quality by minimizing nutrient loss. Illinois NREC is led and directed by farmers representing the Farm Bureau and commodity organizations, with an advisory board comprised of stakeholders from the environmental community, as well as the university and private industry science communities. Ongoing research projects include extensive work on various fundamental and practical cover crop applications, 4R nutrient stewardship practices, edge-of-field practices and phosphorus management. Since 2013, Illinois NREC has provided approximately \$23 million in research funding, including approximately \$3.1 million in 2020. The research funded by NREC provides updates to the list of BMPs included in the NLRS, and education and outreach efforts of NREC are bolstered by the state's agricultural organizations.

b. Precision Conservation Management (PCM)

PCM is a conservation program of the Illinois Corn Growers Association that was initiated through funding under the USDA NRCS RCPP. PCM provides direct technical assistance to farmers through private technical service providers, with the goal of helping these farmers combine the capabilities of precision technology and data management with farm business and financial information and data. The end result helps farmers make agronomically and financially sound conservation decisions for their farms. PCM integrates data about the costs of conservation practices with authoritative financial data to help farmers understand how specific management changes can impact both their environmental impact and their bottom line. PCM is specifically designed to take on the complexity of bringing this information together to ensure farmers can make effective risk-management decisions associated with these practices and to offer farmers turnkey solutions to applying for and securing financial assistance from USDA's conservation programs. See PCM's recent publication, [The Business Case for Conservation](#), for a discussion of recent findings and programming.

c. Keep it 4R Crop

The Illinois Fertilizer and Chemical Association's (IFCA's) Keep it 4R Crop program has multiple aspects directed expressly at better nutrient management to protect water quality. For example, IFCA is leading a strip-till demonstration program, in which it purchased a strip-till bar to conduct on-farm trials and also at a farmer-owned research farm in Piatt County, Illinois. The research farm is evaluating strip-till and nutrient-loss pathways through subsurface (tile drainage) and surface runoff from edge-of-field water-quality-monitoring stations. The goal is to educate ag retailers and farmers on the value of fertilizer placement and reduced tillage via strip-till. This practice reduces soil erosion, minimizes phosphorus and nitrogen losses and provides a solution to reduce the number of passes in the field, thus reducing greenhouse gas emissions.

After many years of significant work dedicated to updating the “Maximum Return to Nitrogen (MRTN) Calculator,” IFCA is also launching a new effort in the fall of 2021 with the University of Illinois to evaluate and update the MRTN Calculator recommendations. The effort is designed to help ag retailers and farmers apply nitrogen at the correct agronomic rate relative to crop yield potential and market economics, thereby minimizing the potential for losses due to leaching or runoff. IFCA will be identifying 50 farmers and their ag retailers to conduct side-by-side trials in fields to compare MRTN recommendations and retailer-specific nitrogen rates that are based on yield goals, soil sampling and proprietary retailer nutrient-rate trials.

d. “Fall Covers for Spring Savings” Cover Crop Premium Discount

This program provides farmers with a \$5/acre insurance premium discount on the following year’s crop insurance invoice for every acre of cover crop enrolled and verified in the program. It is offered for cover crops installed outside of state and federal incentive programs. It is administered by the Illinois Department of Agriculture and is the product of the efforts of the agricultural organizations working with key NGOs, the state’s soil and water conservation districts and others in the state to secure the necessary funding from the Illinois State Legislature. The program is so popular among farmers, funds are typically exhausted in a matter of hours after the application period opens. This program is modelled after a successful version of this already in operation in Iowa.

e. Illinois Sustainable Ag Partnership (ISAP)

ISAP was formed in 2020 for the explicit purpose of helping Illinois agriculture meet the goals and challenges of the state’s NLRS while also benefitting from being part of the climate solution. Members include agricultural trade associations, NGOs, the University of Illinois, soil and water conservation districts and professional associations dedicated to this work. ISAP’s programming is centered around serving as a platform for disseminating relevant research, coordinating field days and/or other events, providing expertise through collaborative partnerships and providing resources for soil-health networks, outreach and education.

One of ISAP’s recent efforts is the **Advanced Soil Health Training program**. Based on American Farmland Trust’s 2017 intensive program of the same name, this program conducted six two-day sessions over 18 months to train cadres of conservation practitioners and farmer advisers. The topics covered included soil structure; chemistry and biology; cover crop selection, management and termination; planting and tillage equipment; field day demonstrations training; and communications and outreach strategies. Cadres have been developed for work in central Illinois and another in southern Illinois. The roughly 60 graduates from the program are serving as trainers for others in the state and are hosting field days and educational sessions for farmers and other local practitioners, as well as working with farmers one-on-one.

f. Illinois Farm Bureau (IFB) Nutrient Stewardship Efforts

Since 2015, the Board of Directors of IFB has committed over \$2.3 million to implement the NLRS in four priority areas:

1. Education and outreach to farmers, landowners and the general public.
2. Supporting research of best management practices to reduce nutrient loss from agricultural fields.
3. Supporting farmer implementation efforts across the state.
4. Demonstrating progress toward the long-term goals of the NLRS.

IFB's Nutrient Stewardship Grant Program is a cornerstone of that work, featuring a wide range of projects that provide farmers with the opportunity to develop grassroots efforts in their local communities. Since 2015, the program has funded 100 projects across 70 counties in Illinois, all led by farmers and their local partners. In 2021 alone, projects included test plots of cover crops, installation and research of woodchip bioreactors, watershed planning and implementation through financial and in-kind support of Section 319 and RCPP projects, strengthened partnerships with drinking water and wastewater-treatment plants, water and soil testing, and hosting education and outreach activities and field days. Much of the NREC-funded research is featured throughout the grant projects.

The 2021 projects included 12 field days, where over 800 individuals were reached in person and thousands more were reached virtually through a combination of print and digital platforms, including social media posting. All videos, data booklets and other information can be found at www.ilfb.org/FieldDays.

Illinois

Goals and Targets

The Illinois Nutrient Loss Reduction Strategy (NLRs), calls for a 45% reduction in both total phosphorus and total nitrogen to the Gulf of Mexico. This includes interim milestones of 15% for total nitrogen and 25% for total phosphorus by 2025. The NLRs was developed by the Illinois EPA, Illinois Department of Agriculture (IDOA), the University of Illinois, and a multi-stakeholder Policy Work Group.

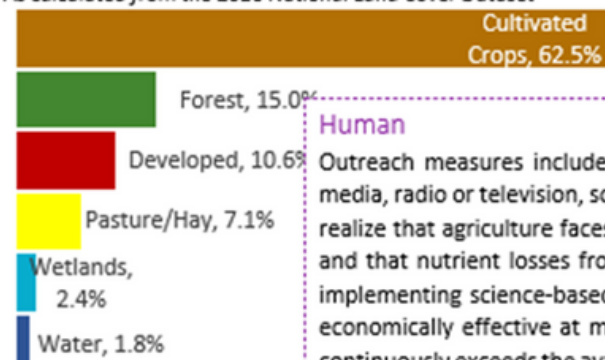


Inputs

The NLRs implementation is supported by a mixture of public funds at the federal and state level, and private funds. USDA conservation program funding provides the bulk of the public funds. State level funding also comes from the Partners for Conservation Program, wherein the Illinois Department of Agriculture (IDOA), with assistance from Illinois SWCDs, administers a cost-share program. State level funding also is provided at the watershed level through Illinois EPA's Section 319 program. Private (NGO, farmer group, etc) investment ranges from approximately \$4.5 to 7 million on an annual basis. The amounts do not include the private dollars spent by farmers on the farm scale.

Predominant Land Use

As calculated from the 2016 National Land Cover Dataset



According to 2012 SPARROW Mapper for the Midwest, Illinois delivers 17% of the agricultural nitrogen and 12% of the agricultural phosphorus from 56,2001 square miles to the Gulf of Mexico.

Human

Outreach measures include field days, presentations, conferences, meetings, print or media, radio or television, social media, newsletters, awards and surveys. Illinois farmers realize that agriculture faces significant criticisms about nutrient losses from farm fields and that nutrient losses from some farm fields are occurring. Many are interested in implementing science-based practices that can be agronomically, environmentally and economically effective at minimizing losses. The demand for cost-share opportunities continuously exceeds the available cost share. Outreach efforts as part of the Illinois NLRs are succeeding in providing farmers additional information and resources.

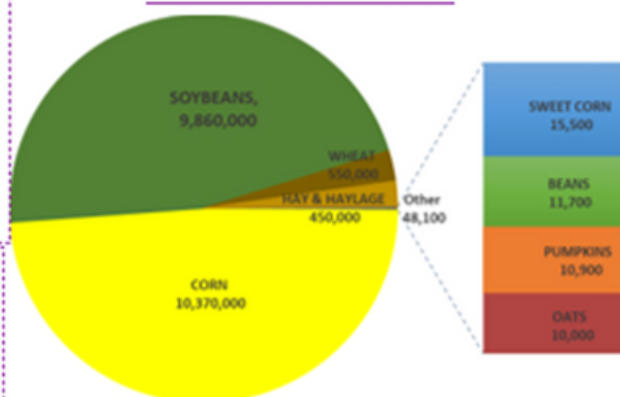
Land

Voluntary implementation of agricultural best management practices on the land will ultimately lead to a change in water quality. Efforts are in place in Illinois to attempt to track activity on the land and include state and federal conservation program expenditures and USDA NASS survey data for a NLRs specific survey.

Water

Data from all the major river systems in Illinois is collected to estimate the loads of nitrogen and phosphorus every two years. The 2013 to 2017 data show increases in flow (13%), nitrogen (7%), and total phosphorus (26%) from the 1980 to 1986 baseline period.

Harvested Acres



Estimated from 2019 USDA State Agriculture Overview
quickstats.nass.usda.gov, accessed 08/31/2020

3. INDIANA

The Indiana Reduction Strategy can be found [here](#).

a. Indiana Agriculture Nutrient Alliance (IANA)

To support, guide and facilitate Indiana agriculture's efforts to meet the NLRS' goals, Indiana agriculture created IANA. IANA consists of all the major agricultural organizations in the state, along with the Indiana Department of Agriculture, Purdue University and NRCS. The purpose of IANA is to promote the use of proactive nutrient-management and soil-health practices by Indiana's farmers that improve farm viability and, ultimately, reduce nutrient loss to water. Recognizing that a large number of public and private sector agencies and organizations are working to reduce nutrient loss and improve water quality, IANA is focused on bridging multi-partner efforts to create practical, cohesive and significant effect across Indiana.

IANA's efforts include the following:

- Through IANA, Indiana agriculture has established practice adoption **goals**. This has allowed Indiana agriculture to focus its efforts and communicate more clearly to farmers and their trusted advisors the type and scale of in-field practice adoption being discussed.
- IANA has been piloting **multiple programs** in the state's Upper White Watershed. These include a federal crop insurance discount program for cover crop adoption, privately-funded cost share for cover crop trials and a unified outreach campaign that includes mailers and targeted digital advertising. IANA is expanding the outreach component of this campaign into additional watersheds in 2021, and with sufficient resources, would bring these tools and resources to the entire state.
- IANA has joined with others in the **Indiana Conservation Partnership** (ICP), a collaboration of all state government agencies that work in the soil and water space. The ICP publishes an annual report of conservation accomplishments supported through its programs. It also conducts annual statewide tillage transect surveys measuring levels of tillage type and cover crop adoption.
- IANA partners have supported the completion of several watershed-specific and statewide farmer adoption surveys that have provided baselines of practice adoption, as well as insights to farmer attitudes and barriers and incentives to practice adoption. According to farmer survey data, farmers lacking the time, management expertise, equipment and training are among the largest barriers to adoption.
- Under the leadership of Purdue University and ISDA, IANA and the ICP are undertaking the **Indiana Science Assessment** to improve the process of how nutrient load reductions are determined for best management practices. The assessment is comprised of two main components. Component 1 is aggregating and analyzing historical water quality trends based on existing gauge data. Component 2 is identifying various practice efficiencies for nutrient and sediment loss as well as development of a tool to better estimate and aggregate those nutrient-loss reductions.
- The Agribusiness Council of Indiana (ACI), a member of IANA, launched its statewide **4R Certification Program** for nutrient service providers in 2020. This program allows participating agribusinesses to verify their adherence to 4R principles through a third-party audit and facilitates and enhances farmer education and outreach about the principles of 4R nutrient management. Indiana 4R Certification tracks both the number of locations and total acres under 4R nutrient management that have been certified. The 2020 pilot of this effort evaluated and certified over 110,000 acres in four locations around the state.

Indiana

Goals and Targets

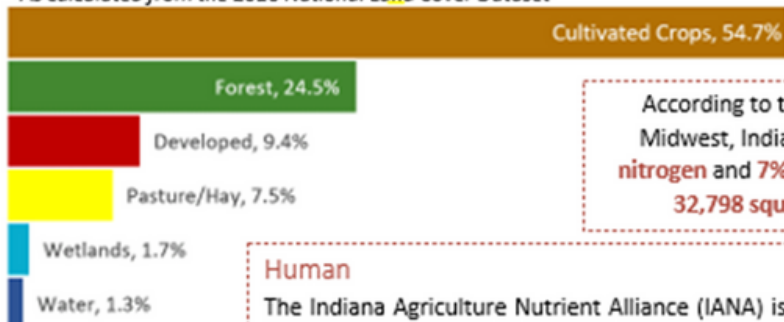
Indiana has narrative water quality standards that prohibit the discharge of substances that will cause or contribute to the growth of aquatic plants or algae to such degree as to create a nuisance, be unsightly or otherwise impair the designated uses. The state is using nutrient benchmarks to comply with this narrative criterion that includes a total phosphorus benchmark of 0.3 milligrams per liter (mg/L).

Inputs

The Clean Water Indiana (CWI) program supports local match requirements for grant programs and provides grants for conservation programs.

Predominant Land Use

As calculated from the 2016 National Land Cover Dataset



According to the 2012 SPARROW Mapper for the Midwest, Indiana delivers **14% of the agricultural nitrogen** and **7% of the agricultural phosphorus** from **32,798 square miles** to the Gulf of Mexico.

Human

The Indiana Agriculture Nutrient Alliance (IANA) is working to support farm viability and improve soils health while reducing the nutrient load across the state.

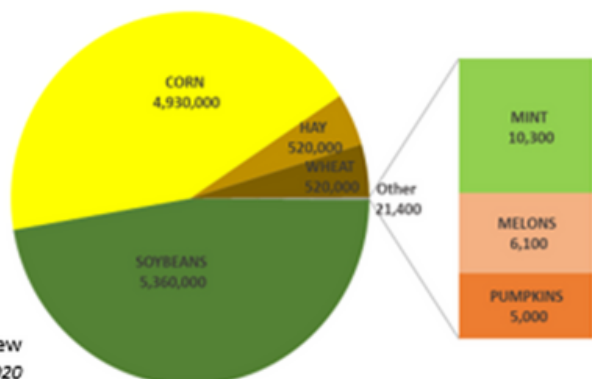
Land

Practices that improve soil health are promoted statewide. Overall improvements in soil health are encouraged with specific practices to result in reductions in nutrient and sediment loading to streams and rivers. Annual spring tillage surveys are conducted to evaluate conservation practices throughout the state, with recent data indicating approximately 1 million acres of cover crops annually.

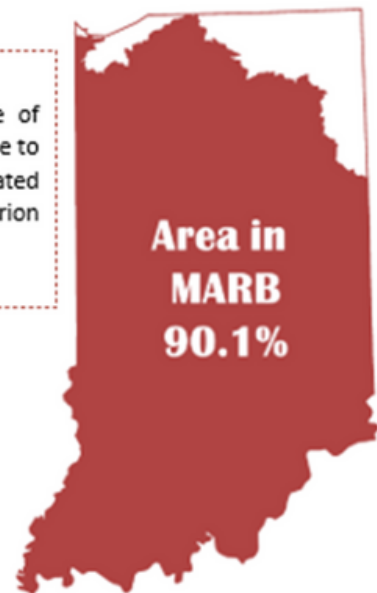
Water

The available water quality data, outside of the Western Lake Erie Basin is limited. A USGS super gauge was recently installed on the Wabash River, but to date the data available does not provide for adequate estimations of nutrient loads in the Indiana portion of the MARB.

Harvested Acres



Estimated from 2019 USDA State Agriculture Overview
quickstats.nass.usda.gov, accessed 08/31/2020



4. MISSOURI

The Missouri Nutrient Loss Reduction Strategy is located [here](#).

a. **Missouri Nutrient Loss Reduction Strategy**

The Missouri NLRS adaptive approach reduces nutrient pollution from both point and nonpoint sources. The NLRS recommends actions aimed to improve Missouri's water quality while also reducing nutrients transported downstream to the Gulf of Mexico. Through 2018 and 2019, the NLRS prioritized nutrient-monitoring program development and implementation, conducting a study to determine technology-based nutrient reduction values and updating the state cost-share program to include edge-of-field practices. Work is underway to prepare a thorough NLRS progress report, but the 2020 progress report is available [here](#).

Numeric nutrient criteria are now in place for lakes and reservoirs. These criteria include screening values for phosphorus, nitrogen and chlorophyll-a concentrations, as well as specific criteria for chlorophyll-a. The screening values and criteria are specific to the three lake ecoregions in the state, with the values for the Ozark Highlands being the most stringent. While these criteria apply to lakes and reservoirs, they will likely have impacts on streams and rivers to reduce loads to the lake or reservoir.

b. **Soil and Water Conservation State Cost Share**

The Soil and Water Conservation State Cost Share program uses a dedicated sales tax (the Missouri Parks, Soils and Water Sales Tax (1/10th of 1%)) that produces approximately \$40 million dollars per year for on-the-ground agricultural cost shares and to staff the state program in every county. Since 1984, the program has invested over \$800 million on Missouri agricultural land to implement conservation practices to protect soil and water resources. In FY 2019 alone, Missouri landowners covered 286,685 acres (448 square miles) in cover crops. In addition, revenue from the sales tax allowed Missouri to have the highest reduction in its rate of soil erosion when compared to other states with more than 10 million acres of cultivated cropland. The state's agricultural organizations are supporters of the program.

c. **Section 319 Grant Program**

A significant source of funding for non-point source projects outside of the Soil and Water Conservation State Cost Share Program is the Missouri Department of Natural Resources' Section 319 grant program. From Fiscal Years 2003 to 2009, \$9,471,462 in grants was provided to eligible projects in the state.

d. **Missouri Fertilizer Control Board**

In 2016, Missouri created the Missouri Fertilizer Control Board (MoFCB) as an agency of the state. Members of the MoFCB include five farmers, five fertilizer manufacturers or distributors and three at-large members. The primary purpose of the MoFCB is to administer Missouri Fertilizer Law. As part of its non-regulatory duties, the MoFCB also pursues nutrient research, educational and outreach programs to ensure the adoption and implementation of practices that optimize nutrient-use efficiency, ensure soil fertility and address environmental concerns. One of the goals is to coordinate the 4R program called "Show Me Nutrient Stewardship." Work is underway to further develop that program.

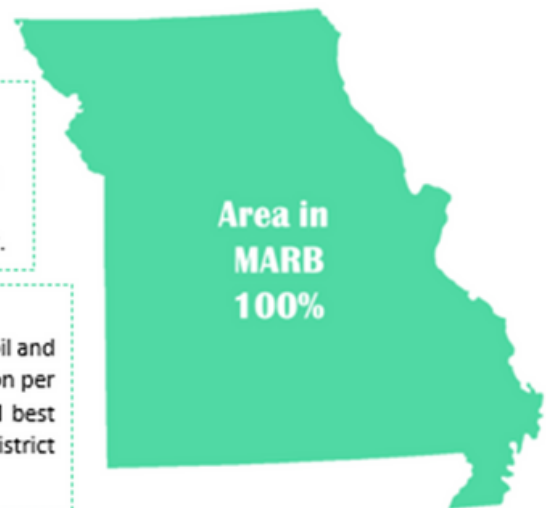
Missouri

Goals and Targets

Missouri has numeric nutrient criteria (NNC) for lakes and reservoirs that include screening values for phosphorus, nitrogen and chlorophyll-a and specific criteria for chlorophyll-a. NNC for streams, based on multiple lines of evidence, are in development.

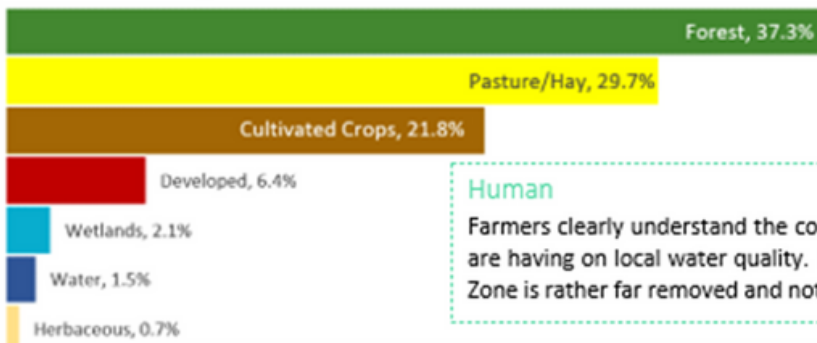
Inputs

A dedicated state "Parks and Soils Sales Tax" funds the Missouri Soil and Water Conservation Program, producing approximately \$40 million per year. The tax revenue is used to fund cost-share for agricultural best management practices, research and to staff soil and water district offices in every county.



Predominant Land Use

As calculated from the 2016 National Land Cover Dataset



According to the 2012 SPARROW Mapper for the Midwest, Missouri delivers 8% of the agricultural nitrogen and 11% of the agricultural phosphorus to the Gulf of Mexico.

Human

Farmers clearly understand the connection that the farms and practices are having on local water quality. However, the Gulf of Mexico Hypoxic Zone is rather far removed and not a predominant driver for change.

Land

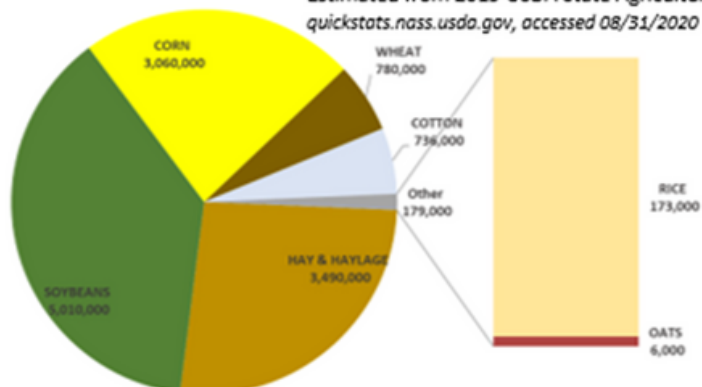
Load reductions from practices funded through 319 grant programs are estimated to be in excess of 1,124,934 lbs/year of total nitrogen and 373,026 lbs/year of total phosphorus. It is the general belief that the state cost-share programs only account for about half of the installed practices. Terraces, cover crops and grass waterways are frequently being implemented and funded outside of the cost-share programs. Cover crops are also often funded at the farmer level.

Water

The Missouri Department of Natural Resources (MDNR) is conducting instream monitoring and has continuous monitoring and stream gauges to track nutrient levels, trends, etc. However, it does not seem that this data is readily available to the public.

Harvested Acres

Estimated from 2019 USDA State Agriculture Overview quickstats.nass.usda.gov, accessed 08/31/2020



5. MINNESOTA

The Minnesota Nutrient Reduction Strategy is located [here](#).

a. Minnesota Agriculture Water Resources Center (MAWRC)

Twenty-four of the state's agricultural organizations formed MAWRC in 2008. MAWRC is a research and education organization where the agriculture groups work together to identify and address water issues. MAWRC and the groups are committed to providing useful information to Minnesota farmers and ranchers on how to protect water quality. A major emphasis of its programming is to help advance nutrient loss reduction practices by Minnesota farmers. MAWRC does this through:

- Active **watershed council programming** in 19 MN counties,
- Operation of **Minnesota Discovery Farms** in order to gather field-scale water quality information with the goal of providing practical, credible, site-specific information to enable better farm management. MN Discovery Farms:
 - Is a farmer-led water quality research and educational program including a variety of farming systems across greater Minnesota. When combined with farm management and economic data, this water quality research will aid in the identification and implementation of appropriate management practices.
 - Provides education and improved communications among the agricultural community, consumers, researchers, and policy-makers.
 - Works in close coordination with the Minnesota Department of Agriculture, who manages the establishment and operation of monitoring equipment that provides high quality, water quality data for the program.

b. Farmers Investing in their Future (FIF)

The Minnesota Corn Growers Association (MCGA) and Minnesota Corn Research & Promotion Council (MCR&PC) conduct independent corn research paid for by corn farmers themselves through the state corn checkoff to, among other things, help farmers reduce nutrient losses to protect water quality.

FIF has eight ongoing research projects focused on nutrient management and related practices to for this purpose. See, for example:

- **Vegetative Cover Crops as a Nitrate Reduction Strategy for Tile Drainage**
- **Reducing Nitrogen Losses in a Changing Climate**
- **Nitrogen Smart Seminars**

FIF also carries out an Innovation Grants Program (IGP), which funds on-farm research and demonstration of innovative practices, with primary emphasis on practices related to nutrients and water quality.

- See the 2021 RFP [here](#).
- Ten of its current fourteen projects relate to matters involving nutrients and water quality. See, for example:
 - **Reducing nutrient loss and protecting water quality on vulnerable soils**
 - **Establishing a paired watershed to prepare for conservation practice assessment**
 - **Wilkin County Soil Health Demonstration Site**

c. The Agricultural Fertilizer Research & Education Council (AFREC)

AFREC is a farmer-led program under the auspices of the Minnesota Department of Agriculture that advances soil fertility research, technology development and education. Using funds generated by fertilizer sales in the state, it supports studies and educational programming on agricultural fertility practices that are environmentally and economically sound. The council consists of 12 members that direct its research programming and are either farmers, crop retailers or consultants providing agricultural professional services. It has funded dozens of these studies and projects over its existence (see [here](#) and [here](#)) and in 2021 is looking to allocate almost \$1 million for this work.

d. Minnesota 4R Nutrient Stewardship Certification Program

Led by the Minnesota Crop Production Retailers Association (MCPR), several Minnesota agricultural organizations came together in 2020 to create a 4R Nutrient Stewardship Certification Program for agricultural retailers. The certification program is governed by the Minnesota Nutrient Stewardship Council (MNSC) and is guided by an advisory committee comprised of 26 companies and organizations.

e. Minnesota Irrigation Partnership to Protect Groundwater

In 2021, the Minnesota Department of Agriculture, working with 30 partners in the state, secured a \$3.5 million RCPP grant for a 5-year effort. Taking place in approximately 20 counties in **central Minnesota** covering more than 75% of the irrigated acres in the state, the project involves working directly with farmers using irrigation systems to implement conservation practices that protect groundwater quality and quantity, promote expanded precision-irrigation practices, build professional capacity to guide farmers in applying conservation practices, promote and organize farmer-to-farmer learning opportunities, utilize partners' expertise to design innovative approaches to expand conservation efforts and to quantify the environmental, economic and social impacts of the implemented practices. The first enrollment of 30 farmers is planned for fiscal year 2022.

f. Tillage and Erosion Survey Project

One of Minnesota's newest efforts in this arena, the Minnesota Board of Soil and Water Resources, with the assistance of the University of Minnesota, is using funds from the state's Clean Water Fund to systematically collect data and produce county, watershed and statewide estimates of soil erosion caused by water and wind, along with tracking farmer adoption of conservation measures, to address erosion. This program is designed to operate over the long term to be able to generate meaningful estimates of the trends in agricultural soil and water management over a 67-county area with greater than 30% of land dedicated to row-crop production.

Minnesota

Goals and Targets

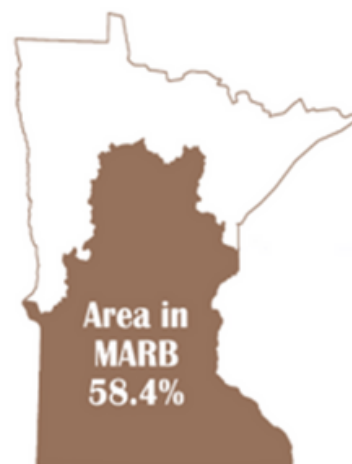
The Mississippi River drainage basin 45% reduction goal is directly from the Gulf Hypoxia Action Plan. The nitrogen milestone is set at a 20% reduction by 2025, with a target of reaching the goal by 2045. The phosphorus-reduction milestone is a 35% drop by 2025.

Inputs

The 2008 Legacy Amendment increased the statewide sales tax by three-eighths of one percent until 2034. Thirty-three percent of this increase is allocated to the Clean Water Fund, to protect, enhance and restore water quality in lakes, rivers and streams and to protect groundwater from degradation. Farmers are frustrated that a larger portion of the available funding was not dedicated for the implementation of best management practices (BMPs).

Human

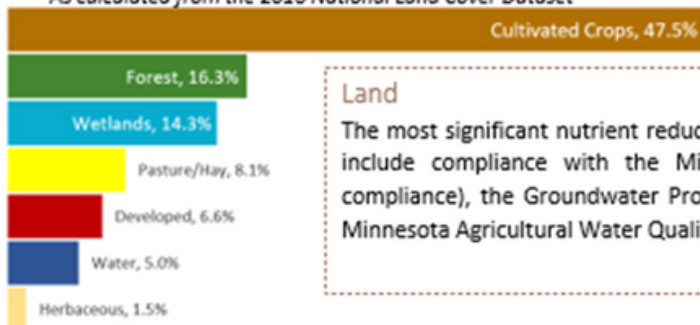
There are many groups working in Minnesota to research water quality issues and provide education to the agriculture community and the public. Active agriculture associations have joined together to provide consistent education for both the agriculture community and the public.



According to the 2012 SPARROW Mapper for the Midwest, Minnesota delivers 7% of the agricultural nitrogen and 5% of the agricultural phosphorus from 49,384 square miles to the Gulf of Mexico.

Predominant Land Use

As calculated from the 2016 National Land Cover Dataset



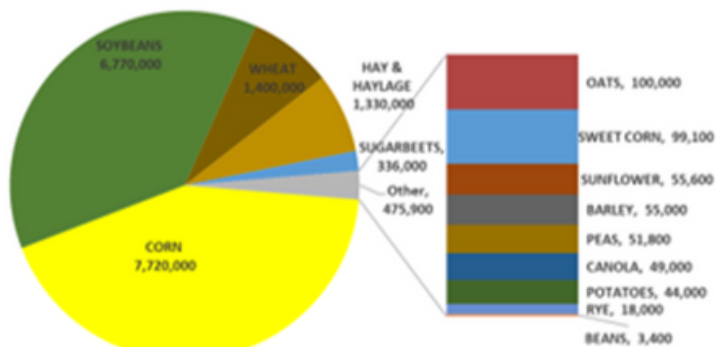
Land

The most significant nutrient reduction activities currently occurring in Minnesota include compliance with the Minnesota Buffer Law (at approximately 98% compliance), the Groundwater Protection Rule that focuses on nitrogen and the Minnesota Agricultural Water Quality Certification (MAWQCP) program.

Water

The state has an extensive monitoring system in place, in which each watershed is monitored for a two-year period, every 10 years. This data collection does not address changes in climate and is therefore thought to not be particularly reliable to determine nutrient-reduction trends. More progress has been made to reduce phosphorus loads, but that is due to point source reductions.

Harvested Acres



Estimated from 2019 USDA State Agriculture Overview: quickstats.nass.usda.gov, accessed 08/31/2020

6. OHIO

The Ohio Nutrient Reduction Strategy is located [here](#).

a. 4R Nutrient Stewardship Certification Program

The 4R Nutrient Stewardship Certification Program encourages agricultural retailers, service providers and other certified professionals to adopt proven best practices through the 4Rs, which refers to using the Right Source of Nutrients at the Right Rate and Right Time in the Right Place. This approach provides a science-based framework for plant nutrition management and sustained crop production, while considering specific individual farms' needs. Currently, 61 retailer facilities are 4R certified, servicing over 2.8 million acres across Ohio.

b. Ohio Agricultural Conservation Initiative (OACI)

OACI is a partnership among agriculture, conservation, environmental and research communities to recognize farmers for their dedication to advancing methods that improve water quality in Ohio and increasing the number of best management practices being implemented on farms. OACI offers resources and education that farmers need to proactively employ modern, science-based practices on their farms and better demonstrate how those efforts are improving water quality over time. By collaboratively learning and sharing information across environmental and agricultural communities, Ohio's water quality advocates stand as united, committed to identifying nutrient-management and water-quality solutions and helping farmers execute them.

OACI was formed to accomplish two key goals:

- Create a universally recognized farmer certification program, which will help increase adoption of best management practices and recognize farmers who demonstrate a commitment to continuous improvement. A pilot program began in 2020.
- Create a confidential farm practices assessment that will benchmark best management practice adoption and track progress toward water-quality goals.

c. H2Ohio

Due to the nutrient-management and water-quality challenges in the Western Lake Erie Basin (WLEB), the overarching focus of the nutrient-reduction activities currently taking place in Ohio are centered there. Governor Mike DeWine's robust H2Ohio Water Quality Initiative is intended to address nutrient-management and water-quality issues in an initial focus area of 14 counties that make up the Maumee River Basin in northwest Ohio. The second phase is intended to expand to the remaining counties that make up the WLEB. After that, the intention is to expand the program statewide. When that happens, it is envisioned that the promoted practice list might be modified to address nitrogen loss reduction as well as phosphorus loss reduction.

The H2Ohio Program currently focuses on promoting the following 10 best practices that are cost effective and proven to reduce phosphorus delivery into Lake Erie. These are:

1. Soil testing
2. Variable-rate fertilization
3. Subsurface nutrient application
4. Manure incorporation
5. Conservation crop rotation
6. Cover crops
7. Drainage-water management
8. Two-stage construction
9. Edge-of-field buffers
10. Wetlands

To date, over 1,800 farmers have participated in the H2Ohio Program, covering 1.1 million acres and representing 44% of cropland in 10 counties. In addition, the Ohio State University has conducted several surveys of farmers in the WLEB in order to document the extent of farmer adoption of nutrient-management and soil-conservation practices.

d. Updating Tri-State Agronomic Rates

Additionally, through efforts led by Ohio State University, the Ohio portion of the Tri-State Fertilizer Recommendations (Indiana, Michigan, Ohio) have been updated.

Some of the findings include:

- Yield responses to phosphorus and potassium fertilizer in soils at or above the current maintenance range were very rare.
- Long-term data shows that when Ohio soils are in the current maintenance range, they supply sufficient phosphorus and potassium to meet corn and soybean demand for many growing seasons without annual fertilization.
- Recommended corn nitrogen rates were updated and are based on maximizing farmer profitability, not maximizing yields.
- Corn, soybean and wheat today each yield more grain with less nutrients.

Ohio

Goals and Targets

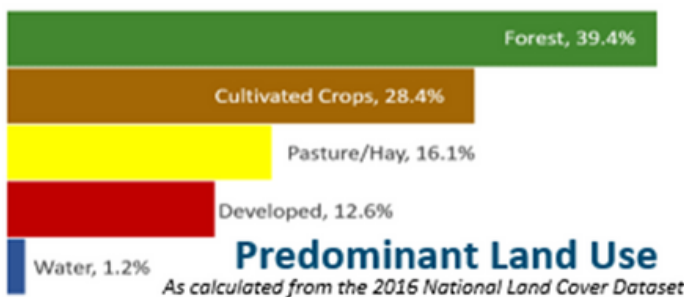
Ohio has narrative nutrient criteria that in some places have been interpreted numerically, using a reference stream approach for the development of nutrient total maximum daily loads. The development of numeric nutrient criteria using a stream nutrient assessment procedure for streams and rivers is on hold.

Inputs

Ohio has not historically had dedicated funding sources to address agricultural nutrient issues besides normal cost-share programs. The inception of the H2Ohio Program is changing that for the Western Lake Erie Basin and may eventually be expanded statewide.



According to the 2012 SPARROW Mapper, Ohio delivers **6% of the agricultural nitrogen** and **3% of the agricultural phosphorus** from 29,612 square miles to the Gulf of Mexico.

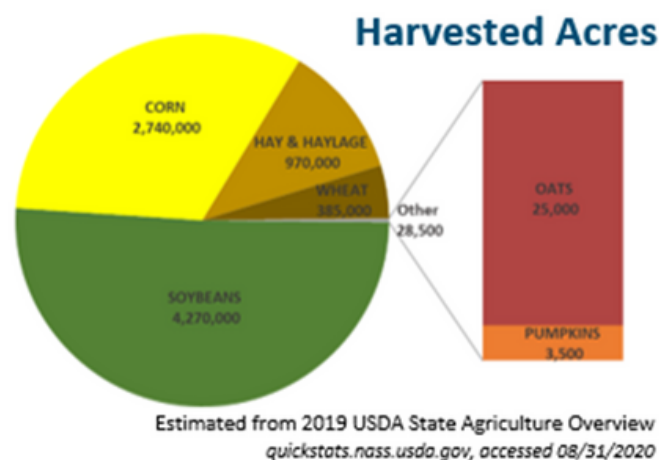


Land

Ohio's Nutrient Reduction Strategy includes highly targeted nutrient-reduction strategies intended to promote practices such as the 4Rs, soil testing, reduced tillage, grassed waterways, cover crops on at least 50% of the acres and manure-management plans for livestock. The H2Ohio program includes 10 specific practices with financial incentives that may eventually be expanded to the Ohio River Basin.

Human

The overarching focus of nutrient-reduction activities in Ohio is centered on the WLEB. The 4R program has expanded statewide and is slowly ramping up outside of the WLEB. Farmers are looking for assurances that their efforts are making a difference. Ohio's commodity organizations are very active in sharing information and the results of funded research with the farmers. The Ohio Agriculture Conservation Initiative is a partnership between agriculture, conservation, environmental and research communities to recognize farmers for their dedication to use established methods to improve water quality in Ohio and to increase the number of best management practices being implemented on farms.



Water

Water quality monitoring takes place at the edge-of-field and instream scales. The Ohio EPA uses the instream data to compute the annual nitrogen and phosphorus loads from Ohio to Lake Erie and the Ohio River in a Nutrient Mass Balance Study for Ohio's Major Rivers, to meet the requirements of Senate Bill 1.

7. KENTUCKY

The Kentucky Nutrient Reduction Strategy is located [here](#).

a. Kentucky's Agriculture Water Quality Act

The Agriculture Water Quality Act was passed in 1994 to protect surface and groundwater resources from non-point source pollution. Any landowner with 10 or more acres of farmland is required to develop and implement a water-quality plan. Technical and financial assistance is available for farmers seeking best management practice assistance to address any water quality concerns. The landowner's plan is kept by the owner and must be shared with the state if a pollution event occurs that is traced back to that specific landowner's farmland.

b. Agriculture Water Quality Authority

The Authority was established following the passing of the Kentucky Agriculture Water Quality Act. Members are appointed by the governor and represent agricultural and environmental interests. Using additional funds made available from the state's Agricultural Development program, the Authority implemented additional monitoring stations in rivers and streams to increase the state's capacity to measure water quality. Agricultural trade associations work closely with state agencies and the University of Kentucky to fill research gaps, improve farmers' water-quality plans and increase funding and support of additional water-quality monitoring gauges.

Kentucky

Goals and Targets

Kentucky has a narrative water quality criterion that states nutrients shall not be elevated to a level that causes eutrophication. The state is close to setting numeric nutrient criteria for wadable streams and reservoirs.



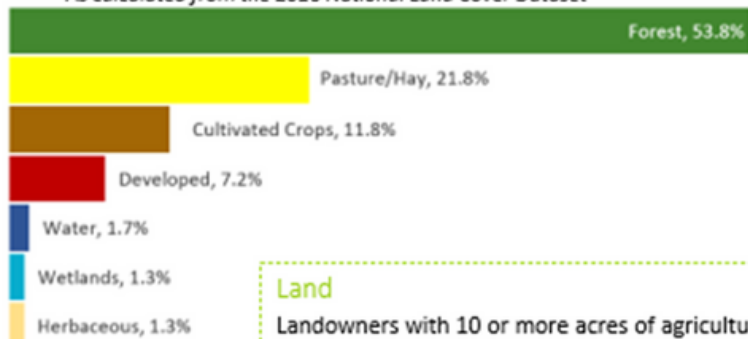
Inputs

Landowners with 10 or more acres of agricultural land are required to have a water-quality plan that includes best management practices (BMPs). Funding has largely been used to promote updating of water-quality plans.

According to the 2012 SPARROW Mapper for the Midwest, Kentucky delivers **5% of the agricultural nitrogen** and **8% of the agricultural phosphorus** from **40,319 square miles** to the Gulf of Mexico.

Predominant Land Use

As calculated from the 2016 National Land Cover Dataset



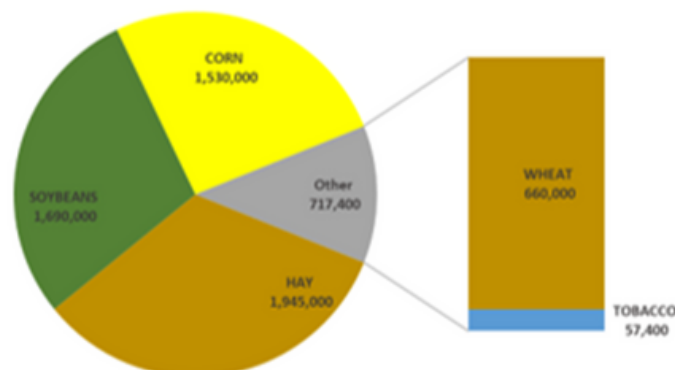
Human

The agriculture extension with the University of Kentucky is working with farmers to research water quality and other nutrient loss related issues. There is a lot of effort from various groups to promote sustainable farming and the associated healthy environment.

Land

Landowners with 10 or more acres of agricultural land must develop a water quality plan that focuses on the appropriate BMPs. Due to the sloping landscape, conservation tillage is highly promoted along with cover crops. Nutrient finger printing in the Red River Watershed indicates that the nutrients are primarily coming from wastewater-treatment plants, but the farmers are still implementing BMPs.

Harvested Acres



Water

Recent nutrient loads have been evaluated and the data has been used to develop baseline nutrient loads that will be used to measure progress once the state Nutrient Reduction Management Plan is adopted.

Estimated from 2019 USDA State Agriculture Overview quickstats.nass.usda.gov, accessed 08/31/2020

8. KANSAS

a. Kansas Watershed Restoration and Protection Strategy (WRAPS)

The WRAPS process offers a framework that engages citizens and other stakeholders in a teamwork environment aimed at protecting and restoring Kansas watersheds. The WRAPS consists of 4 stages:

1. Identifying the watershed restoration and protection needs.
2. Establishing watershed goals.
3. Creating actions steps/plans to achieve the established goals.
4. Implementing the plans.

The WRAPS program has existed in Kansas for approximately 20 years and has significant momentum and support of the state's agricultural organizations. Funding for the WRAPS program is through the EPA Section 319 and the Kansas State Water Plan and is administered by a program advisory board called the WRAPS Work Group. Through WRAPS, local, state and federal program resources are streamlined, and participation from stakeholders is essential to success. To date, 36 WRAPS have completed the first three steps of the process and are currently implementing the plans. Many plans include positive impacts for the Gulf of Mexico, as well as the state of Kansas.

b. The Kansas Water Plan and Kansas Water Office Projects

The Kansas Water Office, in coordination with local, state, federal and interstate partners, is developing a five-year update of the Kansas Water Plan. The Kansas Water Plan Update will incorporate the Vision for the Future of Water Supply in Kansas. During the development of the vision, four themes emerged:

1. Water conservation
2. Water management
3. Technology and crop variety
4. Additional sources of supply

Many projects serve to reduce nutrient loading to the Gulf of Mexico.

c. Milford Lake Regional Conservation Partnership Program (RCPP)

The focus of the Milford Lake RCPP is for farmers and landowners to implement best management practices within the watershed to decrease nutrient runoff, therefore decreasing the introduction of new loading contributing to the formation of harmful algal blooms in the lake. The effort includes 33 partners and is projected to continue until August 2022.

d. Kansas Reservoir Protection Initiative (KRPI)

The KPRI is aimed at protecting against water shortages and improving water quality in reservoirs across the state and ultimately the Gulf of Mexico. Specifically, the KPRI provides financial assistance to landowners in priority watersheds to implement sediment-reducing conservation practices to enhance sediment-reduction efforts above federal reservoirs where sedimentation impacts the water supply. Under the KPRI, the Kansas Department of Agriculture-Division of Conservation, the Kansas Department of Health and Environment, Kansas Water Office and regional advisory committees collaborate to prioritize projects for funding. KPRI funding is currently targeted above Kanopolis, Fall River, John Redmond and Tuttle Creek reservoirs, where 37, 38, 40 and 49 percent of water supply shortage has been lost to sedimentation, respectively.

e. Kansas Department of Agriculture-Division of Conservation Cost Share Programs

In addition to Kansas farmers' significant track record of USDA conservation program participation, Kansas farmers and agricultural organizations are supporters of state-level cost-share conservation programs. The Kansas Department of Agriculture's Division of Conservation administers four voluntary cost-share programs, including the Water Resources Cost Share Program, the Non-Point Source Pollution Control Program, Riparian and Wetland Protection Program and the Sediment and Nutrient Reduction Initiative. These programs provide financial assistance to eligible landowners for conservation practices. The program funds are paid out through conservation districts.

f. Kansas Soil Health Alliance

More recently, efforts to focus on soil health have also grown in popularity across Kansas. Founded in 2021, the Kansas Soil Health Alliance is a non-profit with a mission to improve and protect Kansas soils, while serving as a trusted partner and valuable soil health resource for Kansas farmers. The Alliance is led by a board of farmers and ranchers and is supported by five partner organizations, including the Kansas Department of Health and Environment, Kansas Grazing Lands Coalition, Kansas Soybean, No-till on the Plains and General Mills.

g. Cheney Reservoir Watershed Project

In 2020, General Mills launched a regenerative agriculture pilot in Kansas' Cheney Reservoir Watershed in conjunction with Kansas Department of Health and Environment. The three-year pilot is comprised of 24 wheat growers in and around the 650,000-acre watershed.

Kansas

Goals and Targets

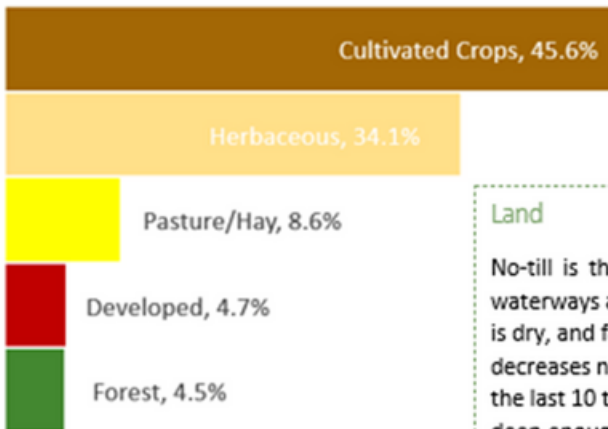
Overall, 30% reduction in total nitrogen and total phosphorus. For agriculture, a 24% reduction in total nitrogen and a 22% reduction in total phosphorus.

Inputs

Kansas has used reverse best management practice (BMP) auctions to fund conservation projects.

Predominant Land Use

As calculated from the 2016 National Land Cover Dataset.



Water

There is limited monitoring of nutrients in water.

Area in
MARB
100%

According to the 2012 SPARROW Mapper for the Midwest, Kansas delivers 2% of the agricultural nitrogen and 4% of the agricultural phosphorus from 82,197 square miles to the Gulf of Mexico.

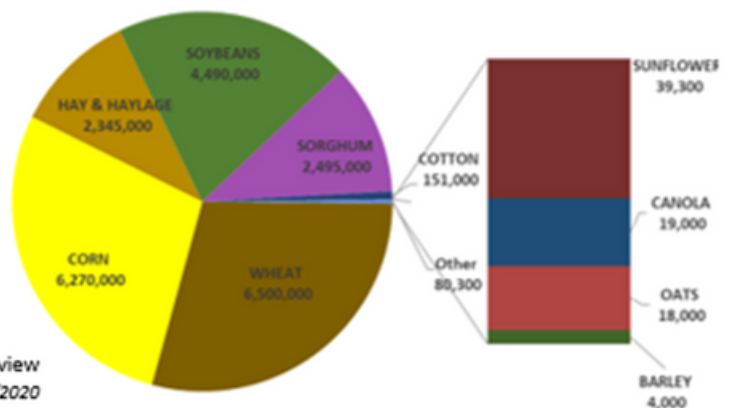
Human

Kansas State Agricultural Extension programming is strong in the state, and the extension conducts research, provides funding and provides online resources.

Land

No-till is the top nutrient-reduction action in the state. Grassed waterways are second, and many are currently being rebuilt. Kansas is dry, and farmers work hard to keep the water on the fields, which decreases nutrient loss. There have been big increases in no-till over the last 10 to 15 years. Kansas has very shallow soils. These soils are deep enough to grow good crops, but farmers cannot afford to lose the soil so they are very careful and can quickly see the benefits of no-till and erosion prevention.

Harvested Acres



Estimated from 2019 USDA State Agriculture Overview
quickstats.nass.usda.gov, accessed 08/31/2020

9. NEBRASKA

Since the 1980s, Nebraska has had a focused program to address nitrates in groundwater involving 54 special governmental units called Natural Resource Districts (NRDs), which were created from the state's Soil and Water Conservation Districts. Farmers and partner organizations in Nebraska have been implementing practices since that time to reduce high nitrate concentrations in water. Although these efforts have reduced problematic nitrate levels in some drinking water supplies, continued expansion of the scale and scope of the efforts is needed to address the state's nitrate challenges. As a result, the state has undertaken a collective effort, led by the University of Nebraska-Lincoln Extension program, to form the **Nitrate Working Group**, which includes participation from most ag groups, relevant state agencies and environmental groups. The working group has involved almost 40 participants and leaders from 25 organizations who are working to develop actionable projects of both short-term actions.

Simultaneously, Nebraska's agricultural organizations have started monthly meetings with the Nebraska Association of Resource Districts and several key NRD managers to draft a concept initiative around Nebraska water quality and soil health protection and improvement. The initiative currently has four objectives:

1. Develop and disseminate information.
2. Cost-share conservation practices.
3. Establish a matrix by which success can be measured.
4. Enhance economic profitability while maintaining conservation practices.

This is still very much in draft phase, and a clear path forward around implementation has not been developed. But this would be the first major initiative led by ag to collectively address this issue.

While not a nutrient-related project, the **Shell Creek Watershed Improvement Group** is a good example that many in Nebraska agriculture look to as an approach to achieving successful nitrate management. This was a grassroots effort by farmers and many partners focused on adoption of conservation practices, primarily to reduce possible herbicide-related problems from the watershed's surface waters. The effort was successful enough to remove the stream from the impaired waters list and is considered a major success story in Nebraska.

Nebraska

Goals and Targets

Nebraska has numeric nutrient criteria (NNC) for total phosphorus, total nitrogen and chlorophyll-a for the lakes and impounded waters; however, the primary concern is nitrate in groundwater.

Inputs

There are specific regulations governing the application of fertilizers or pesticides via irrigation systems; however, most nutrient-management planning is focused on livestock operations.

Predominant Land Use

As calculated from the 2016 National Land Cover Dataset



Human

Many farmers are looking for cost shares to decrease risk and ensure an economic benefit. Commodity prices influence adoption rates of practices, and right now, many farmers are focused on breaking even and need a clear return on investment.

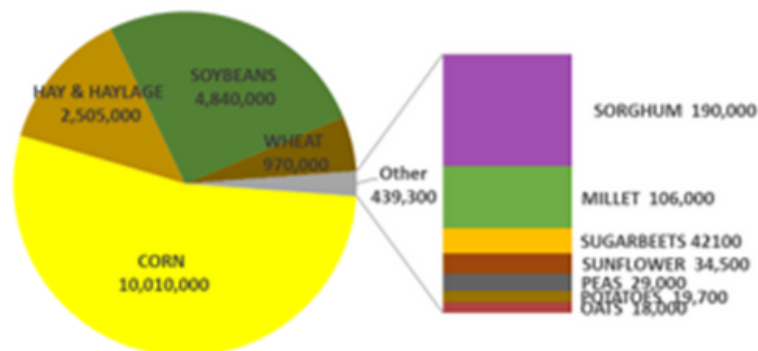
Land

Nebraska convened a Nitrate Strategy group in early 2020 that is still in the planning stages of looking at innovative solutions to the state's nutrient challenges. Conservation practices are being incentivized in various watersheds through programs with The Nature Conservancy, National Resources Conservation Service Regional Conservation Partnership Program and the Ecosystems Services Market Consortium. The majority of Nebraska's row crop acreage is irrigated. Irrigation management and efficiency are just as critical as nutrient management to long-term soil health and agricultural success.

Water

The state non-point source monitoring program consists of ambient stream, lake public beach, in-stream biological and fish tissue monitoring. Monitoring is conducted using a rotating basin approach.

Harvested Acres



Estimated from 2019 USDA State Agriculture Overview
quickstats.nass.usda.gov, accessed 08/31/2020



According to the 2012 SPARROW Mapper for the Midwest, Nebraska delivers **2% of the agricultural nitrogen** and **4% of the agricultural phosphorus** from **77,329 square miles** to the Gulf of Mexico.

10. SOUTH DAKOTA

South Dakota agriculture engaged with South Dakota State University (SDSU) and many other stakeholders to develop a statewide plan of action to develop and take the needed steps to implement a NLRs. The work took place during the 2017 Eastern South Dakota Water Conference and resulted in an action plan issued in June 2020. That stakeholder process arrived at three overarching objectives:

1. Use the existing South Dakota Non-point Source Task Force as a foundation to establish a statewide steering group to guide and promote water quality.
2. Create a comprehensive nutrient reduction strategy
3. Fund and commit additional personnel to expand research, monitoring and data analysis and increase public awareness and education programming on water-quality issues.

Significant reorganization of the state agencies involved in these matters has delayed action on this plan, but the stakeholders remain engaged and look to further progress. Much intensive work has taken place and continues to take place in the state on nutrients and water quality.

a. Every Acre Counts

Every Acre Counts is another valuable program of SDSU with the active support of agricultural trade associations, state NGOs and agricultural companies. The goal of this project is to improve farms' profitability, diversity and ecosystem benefits by using precision technologies to give farmers the information they need to make highly informed management decisions for every acre of their operations. Farmers working with and making decisions based on this information increase their return on investment and enhance land-management approaches that benefit the sustainability of land, water and all natural resources. The program conducts "return per acre" analytics for any farmer who wants them. The farmer is presented the information and offered alternatives for low-productivity lands. Often a good alternative is the establishment of perennial vegetation on low-production acres, commonly due to high salinity. To date, farmers managing about 50,000 acres have participated, resulting in over 2,000 acres of new management.

b. Soil Health Coalition

The South Dakota Soil Health Coalition is a farmer-led, non-profit, membership organization that was created in the spring of 2015. The coalition is governed by a nine-member board of farmers and ranchers from across the state and includes several staff members. Staff and board members strive to carry out the coalition's mission to "Promote Improved Soil Health" through education and research. The programming is guided by five major principles:

1. Keep the soil covered with crop residues to reduce erosion, reducing loss of soil and mineral forms of phosphorus to surface water.
2. Minimize tillage of the soil to retain as much crop residue as possible but also build soil aggregates, pore spaces, soil biology and soil organic matter.
3. Keep living plant roots in the soil year-round.
4. Use a diverse rotation of plants, including crop, broadleaf and grass (warm- and cool-season) species.
5. Integrate livestock into the production system to make economic use of the forages produced by the system.

d. Big Sioux River Watershed Project

The Big Sioux River Watershed Project is a multi-segment, multi-year TMDL implementation strategy designed to restore and/or maintain water quality in the Big Sioux River basin in eastern South Dakota. Both rural and urban communities are actively involved. Base funding is from the CWA Section 319 program and BMP adoption is supported by assistance from NRCS conservation programming and by other sources. The focus is on BMPs to support animal waste management and reducing erosion. Approximately 90 miles of buffers have been installed along the Sioux River in association with animal operations.

e. Other Section 319 Projects

In addition to the Big Sioux, South Dakota agriculture is actively working with the state's Department of Agriculture and Natural Resources on four other active watershed projects being supported through Section 319. The efforts include an information and education component, water-quality monitoring and installation of BMPs designed to reduce non-point source pollution. BMPs may include activities such as installing riparian buffer strips to filter water before it reaches the lake or stream, installing fencing and providing alternative sources of water to keep livestock out of water bodies and bank stability activities that reduce erosion, as well as other activities designed to directly reduce non-point source pollution. Each project has a local coordinator who works with various partner agencies to achieve project goals and develop local support and funds to bolster the project.

f. Raven Precision Agriculture Center (RPAC)

The development and adoption of precision agriculture techniques and technologies is one of the keys to agriculture achieving its nutrient loss reduction goals. South Dakota agriculture actively supported the development of the RPAC on SDSU's campus, and the new center opened in September. With it, SDSU will be the first land grant university to offer both a major and minor in precision agriculture. Precision agriculture involves the integration of computer technology with farm equipment, farm sensors, GPS navigation, satellite imagery and drone imagery and large, farm-level datasets.

g. South Dakota Nutrient Research and Education Council (SD NREC)

Agriculture played an active role in the creation of SD NREC, which receives state fertilizer sales checkoff funds to support nutrient research and educational programs. The goal is to ensure nutrient practices are adopted to optimize nutrient use efficiency, ensure soil fertility and address environmental concerns such as water quality. SD NREC is made up of representatives from organizations of the fertilizer industry, farmers, commodities, specialty fertilizer, environmental and certified agronomy as well as the Ag Experiment Station, the Department of Environment and Natural Resources and the Department of Agriculture. It is funding several active research projects and is currently soliciting proposals for new projects to start in 2022.

South Dakota

Goals and Targets

Nutrient standards are narrative and include a regional reference-based approach to determining potential nutrient impairments.

Inputs

The South Dakota Nutrient Research and Education Council (NREC) collects funds based on the tons of fertilizer sold and invests them in nutrient research, outreach programs and precision agriculture.

Human

Several partners are working together to identify the economic impacts and benefits of conservation measures for farmers. This helps farmers understand the power of everyone doing their part to improve nutrient management and the associated economic benefits for individual farms.

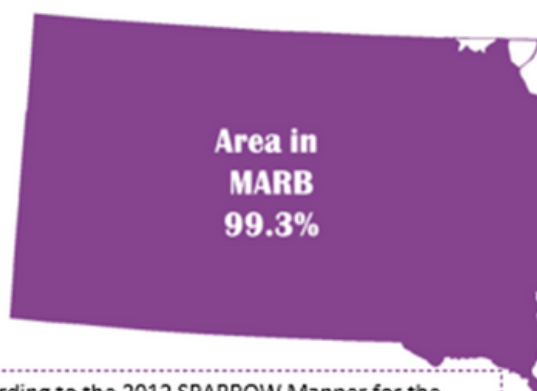
Land

To reduce nutrient loads in South Dakota, the efforts are largely focused on education and nutrient management with an emphasis on buffers and riparian areas. Encouraged best management practices (BMPs) include cover crops, no-till and other soil-health-based practices. Farmers, however, have differing definitions of soil health.

Water

There are a number of research projects occurring; however, there are no widespread monitoring or modeling efforts occurring to assess nutrient loss reductions.

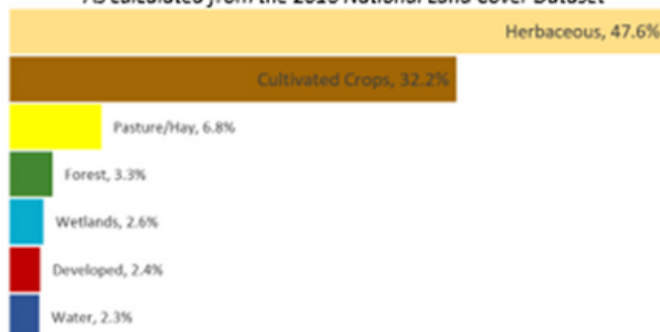
Estimated from 2019
USDA State Agriculture Overview
quickstats.nass.usda.gov, accessed 08/31/2020



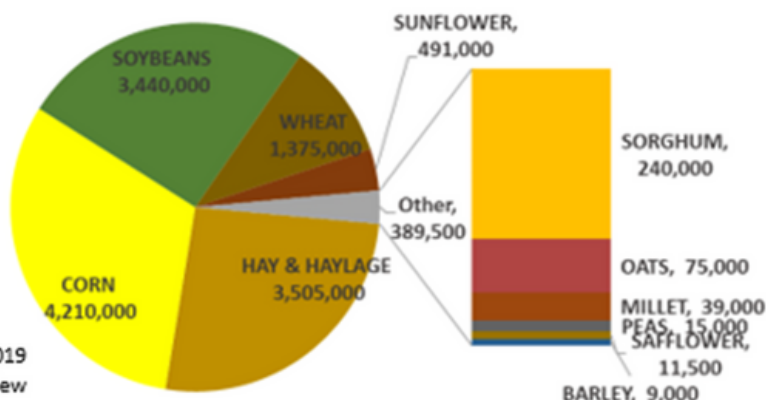
According to the 2012 SPARROW Mapper for the Midwest, South Dakota delivers **2% of the agricultural nitrogen** and **2% of the agricultural phosphorus** from **76,639 square miles** to the Gulf of Mexico.

Predominant Land Uses

As calculated from the 2016 National Land Cover Dataset



Harvested Acres



11. ARKANSAS

a. Arkansas Discovery Farms Program (ADF)

Arkansas agricultural trade associations actively support ADF, which is a program of the University of Arkansas. It is supported by a host of sponsors and industry stakeholders who ensure research addresses the needs of Arkansas farmers in a proactive manner. The overarching goal of ADF is to determine the effectiveness of water- and soil-conservation practices utilized on working farms. Working on 12 farms across the state, ADF is explicitly designed to support the objectives of the Mississippi River Basin Initiative (MRBI), using the MRBI's whole-field monitoring protocols. At each farm, conservation practices selected for evaluation are based upon the interests and wishes of the farm owner and may coincide with regional water or soil quality issues common to many farmers in the area. Research is coordinated by faculty from the University of Arkansas Division of Agriculture and is conducted in collaboration with federal and state agencies.

b. Arkansas Soil Health Alliance (ASHA)

The ASHA is a non-profit 501c3, led by farmers to drive adoption of soil health practices through educating farmers on the benefits of soil health. The alliance is supported by NRCS, Arkansas Association of Conservation Districts, Arkansas Grazing Lands Coalition, University of Arkansas, Arkansas State University and The Soil Health Institute.

c. Arkansas State Water Plan

The Arkansas Water Plan (AWP) is the state's policy for long-term water management. This dynamic policy framework is meant to keep state agencies and the public updated on what is needed to meet state needs. The water plan brings together science, data and public input to define and revise water demands across sectors to address issues.

12. LOUISIANA

The Louisiana Nutrient Reduction and Management Strategy is located [here](#).

a. Louisiana Nutrient Reduction and Management Strategy (NRMS)

Louisiana created an interagency team comprised of the Coastal Protection and Restoration Authority of Louisiana, Louisiana Department of Agriculture and Forestry, Louisiana Department of Environmental Quality, and the Louisiana Department of Natural Resources. The team developed and is currently implementing a statewide Nutrient Reduction and Management Strategy (NRMS). The Governor's Office of Coastal Activities joined the team in 2020. Stakeholder input was integral to the building of the NRMS, and input was sought from agricultural groups, businesses, industries, municipalities, academia, government, non-governmental organizations and homeowners. The state team also continues to participate in Hypoxia Task Force and Gulf of Mexico Alliance efforts.

Current programs include nonpoint source pollution prevention in inland and coastal waters, Master Farmer Certifications and coastal river diversions. Additionally, monitoring in association with these programs will provide valuable baseline information that will help to determine the appropriate levels of nutrients within Louisiana water bodies and identify priority areas where nutrient issues can be addressed for the most effective results.

b. Louisiana Master Farmer Program

The Louisiana Master Farmer Program was created in 2001 when the Louisiana State University AgCenter partnered with agricultural organizations to develop a proactive, voluntary certification program for farmers. The goal of the program is to assist farmers in addressing environmental concerns, while enhancing production and resource management skills. The program uses a comprehensive approach that includes classroom instruction (Phase 1), participation in a conservation-based field day or workshop (Phase 2) and implementation of a comprehensive conservation plan on the entire farming operation (Phase 3). To date, almost 4,000 farmers, landowners and agricultural industry leaders have participated in one or more phases of the program, with over 350 receiving the Master Farmer certification or re-certification. Program partners continue to meet bi-monthly to discuss program activities, as well as progress on farmer certifications.

13. MICHIGAN

While Michigan was not part of the original survey conducted by the ANPC, given how little of the state is in the MRB, it is certainly worth reporting on Michigan's efforts as an example of how states outside of the MRB are dealing with the need to reduce nutrient losses to protect water quality.

The primary focus of agriculture's efforts in Michigan to take part in nutrient loss reduction programming is the state's **Michigan Agriculture Environmental Assurance Program (MAEAP)**. MAEAP is a voluntary program that guides and then verifies farmers who are practicing a high level of stewardship on their farms. To date, approximately 3,500 farms are participating in the program. MAEAP helps farmers adopt cost-effective practices that reduce erosion and nutrient runoff. MAEAP works to reduce nutrient losses directly in both the livestock and cropping systems program areas. The water-quality aspects of MAEAP are under active consideration as the state considers how and in what way to extend the program.

Michigan agriculture has been very active in the Saginaw Bay watershed's soil health and water quality programming work, which are led by The Nature Conservancy and now also supported by an EPA grant of \$1 million to Michigan State University. The program today includes farmer-led peer networks.

In addition, Michigan agriculture is actively involved in the state's programming to reduce nutrient losses in the Western Lake Erie Basin. Federal funding is involved, the most recent being an \$8 million RCPP grant awarded to Michigan, Ohio and Indiana, with Michigan Farm Bureau being the MI partner.

Lastly, in an effort to track all of these efforts in the state, farmers in Michigan are encouraged to take part in the **Great Lakes Watershed Management System (GLWMS)**. GLWMS is an evolving mapping, analysis and reporting system used to improve water resources management across the Great Lakes. The system's capabilities result from the integration of several water-quality-modeling projects across the region, led by The Nature Conservancy, the U.S. Army Corps of Engineers Chicago District, the Institute of Water Research at Michigan State University and the Department of Agricultural and Biological Engineering at Purdue University.

The system allows users to:

- Estimate non-point source pollutant loadings at the field and watershed scales.
- Determine potential reduction in nonpoint source pollutants based on implemented BMPs.
- Assess potential increases in groundwater recharge based on implemented BMPs.
- Adjust input parameters for select analysis modules.
- Generate PDF reports containing field-scale analysis results and detailed maps.
- Track watershed improvements over time.

14. MISSISSIPPI

a. **The Mississippi Nutrient Reduction Strategy is located here.**

In 2010, Mississippi developed its Nutrient Reduction Strategy. Implementation included a Memorandum of Agreement (MOA) titled “Reduce Excessive Nutrient Loadings In-State and to the Gulf of Mexico” and signed by the following parties on October 1, 2010: Mississippi Department of Environmental Quality, NRCS, USGS Mississippi Water Science Center, US EPA Gulf of Mexico Program Office, Mississippi Soil and Water Conservation Commission, USDA Agricultural Research Service, USDA Farm Service Agency, Delta Farmers Advocating Resource Management, Mississippi State University, University of Southern Mississippi, Gulf of Mexico Alliance, Delta Council, Mississippi Levee Board, Mississippi Farm Bureau Federation, The Nature Conservancy, Delta Wildlife, Northern Gulf Institute, USDA Rural Development, Yazoo Mississippi Delta Joint Water Management District, Mississippi Department of Marine Resources, Mississippi Department of Agriculture and Commerce and the University of Mississippi. Watershed projects continue with a variety of partners in the upland, delta and coastal areas of the state. Continued USDA NRCS financial assistance, primarily the Conservation Stewardship Program, is critical for farmer implementation of the Nutrient Reduction Strategy.

b. **Mississippi State University Research & Education to Advance Conservation & Habitat (REACH)**

Mississippi State University’s REACH program was borne from the Mississippi Nutrient Reduction Strategy with the mission to integrate research and outreach on specific farms to demonstrate the benefits of conservation on agricultural lands. The goal of the REACH Program is to create a network of cooperative farms, and to date, 126,470 acres are enrolled in the program. Farmers and agricultural organizations are significant supporters of the REACH program, with farmer interest in enrollment continuing to grow.

The REACH program’s benefits include:

1. Illustrating the willingness and resolve of Mississippi farmers to proactively address natural resource concerns.
2. Providing scientifically defensible data and highly visible outreach materials to document resource improvements being made toward water resource conservation and landscape stewardship.
3. Quantifying and documenting resource benefits through science to provide sound justification for federal investments in conservation.
4. Furthering efforts that support the health of Mississippi’s water resources, both inland and downstream to the Gulf of Mexico.

15. TENNESSEE

Tennessee created its **Nutrient Reduction Framework** under the leadership of the Department of Environmental Quality in 2015. This was done as part of the states' efforts to accomplish long-term nutrient reduction in the state's water resources.

a. **Tennessee Nutrient Reduction Task Force**

Tennessee agricultural trade associations participate in the state's Task Force, which was established in 2019. The first meeting included discussions around creating an action plan. The task force includes the Tennessee Corn Promotion Council, Tennessee Soybean Association and Tennessee Farm Bureau, as well as academia, state and local agencies, wastewater-treatment plant operators and NGOs. The Task Force has four work groups:

1. Goals and Metrics
2. Monitoring and Data Analysis
3. Best Management Practices
4. Communication, Education and Outreach

The Task Force is working to:

- Prioritize watersheds
- Set watershed nutrient-load-reduction goals
- Ensure effectiveness of point source permits
- Develop implementable watershed plans that maximize the effectiveness of BMPs
- Encourage nutrient reductions from urban runoff
- Establish watershed-based monitoring programs to evaluate effectiveness

One of the goals of the Task Force is to provide up-to-date information on water quality efforts by the agricultural community to reduce nutrient losses.

- There is a need to assemble all available information into a summary report to tell what is happening on the ground to minimize nutrient impacts to Tennessee waters.
- Other issues under discussion include increasing the number of water-sampling stations to create a baseline, gathering of case studies from individual farmers and delivering that information to the public and farmers.

b. **Tennessee's Department of Agriculture's Land and Water Stewardship Programs**

LWSS administers the Agricultural Resources Conservation Fund, which provides cost-share assistance to landowners to reduce non-point source pollution through use of BMPs. This fund has been in existence for several decades and has led to significant progress in implementing BMPs on agricultural lands. The FY2021 Report to the Tennessee General Assembly is found [here](#). LWSS also manages the federal non-point source program funded by Section 319 of the CWA.

Some statistics in this regard relevant to agriculture's efforts are:

- No-Till: Tennessee has the highest percentage of no-tilled acres in the US, based on 2017 USDA Census of Agriculture.
- Cover Crops: Between 2012 and 2017, Tennessee acreage in cover crops increased 85.4%, with 340,525 acres and 4,377 farm operations reporting cover crop use in 2017.
- Other Conservation Practices: The Tennessee Department of Ag reported 72,000 acres of farmland benefit from conservation practices.
 - Efforts are underway to expand the agricultural data to include:
 - Percentage of acres that are fertilized using soil-testing recommendations.
 - Percentage of acres that are fertilized by variable rate technology.
 - Trends in fertilizer usage over time, including application and placement of fertilizers.

16. WISCONSIN

The Wisconsin Nutrient Reduction Strategy can be found [here](#).

a. Wisconsin Nutrient Reduction Strategy

Developed in response to the 2008 Gulf Hypoxia Action Plan, Wisconsin's Nutrient Reduction Strategy also incorporates intrastate needs for lakes, streams and groundwater. The strategy builds on existing programs and requirements. It does not call for new regulations to point and non-point source pollution. Historical implementation efforts have documented a 23% reduction of phosphorus to Mississippi River basin and a 27% reduction of phosphorus to Lake Michigan.

b. Administrative Rule NR 151

State administrative rules that set statewide performance standards and restrictions for all Wisconsin farms. Current standards includes that all farmers must:

- Meet tolerable soil loss on row crop and pasture lands.
- Develop annual Nutrient Management Plans (NMPs) on their own or by hiring a certified crop advisor.
- Include a phosphorus index in the NMP.
- Follow setbacks on tillage near streambanks or other water resources.

Wisconsin Department of Natural Resources initiated an additional revision to NR151, which is proposing new requirements for nitrate and groundwater protection. The draft rule will establish targeted agricultural non-point source performance standards to:

- Reduce groundwater nitrate pollution in targeted areas of the state that are susceptible to groundwater contamination.
- Achieve compliance with the nitrate groundwater standard of 10 mg/L.

c. Discovery Farms

The University of Wisconsin-Madison Agricultural Extension Division in partnership with U.S. Geological Survey, coordinates farmer-led research and outreach focused on gathering credible and unbiased water-quality information from on-farm monitoring stations. On-farm projects include research on watersheds, tile monitoring, nitrogen-use efficiency, edge-of-field research and nitrate leaching.

d. Sustainable 4R Wisconsin

Collaborative educational program between Wisconsin Farm Bureau and Insights FS to showcase 4Rs in action with on-farm demonstrations. These field day events are locally led by farmers to host policy makers and state officials.

e. SnapPlus – Soil Nutrient Application Planner

SnapPlus is a decision tool that calculates potential soil and phosphorus runoff losses from a specific field to inform farmers on nutrient-management decisions. The program also assists with economic planning of manure and fertilizer applications.

f. Wisconsin's Runoff Risk Advisory System

Real-time monitoring of soil characteristics and forecasted weather patterns to reduce environmental impacts of manure applications. Farmers can use the map to determine if applying manure on a particular day has a high or low risk of loss potential.

g. Wisconsin's Agricultural Retail Sector

Wisconsin leads the U.S. in non-mandatory NMPs. Agronomy members have been increasing acres utilizing non-mandatory NMPs over the last decade. As of 2021, 37 percent of Wisconsin farmland acres is using a NMP (in 2016, 28% of acres had an NMP). Most of the acres cover sensitive regions in the state that are vulnerable to nutrient loss based on soil characteristics, proximity to surface or ground water resources.

Wisconsin's Agri-Business Association and The University of Wisconsin host an annual conference in January, called the **Wisconsin Agribusiness Classic**. The purpose of the conference is to provide educational training for the agricultural industry. One of the main components of the conference is education on SnapPlus program and nutrient-management planning. This event has supported expanded use of non-mandatory NMPs and incorporation of SnapPlus into nutrient recommendations between the agronomist and farmer customer.

h. Producer-led Watershed Groups

Since 2016, the Wisconsin Department of Agriculture, Trade and Consumer Protection has supported 31 producer-led watershed groups across the state. This collaborative approach allows for farmers to focus on a specific water-quality issue by implementing best management practices or conservation infrastructure to address the issue at scale. These producer-led watershed groups are demonstrating success in reducing nutrient losses.

i. Other efforts

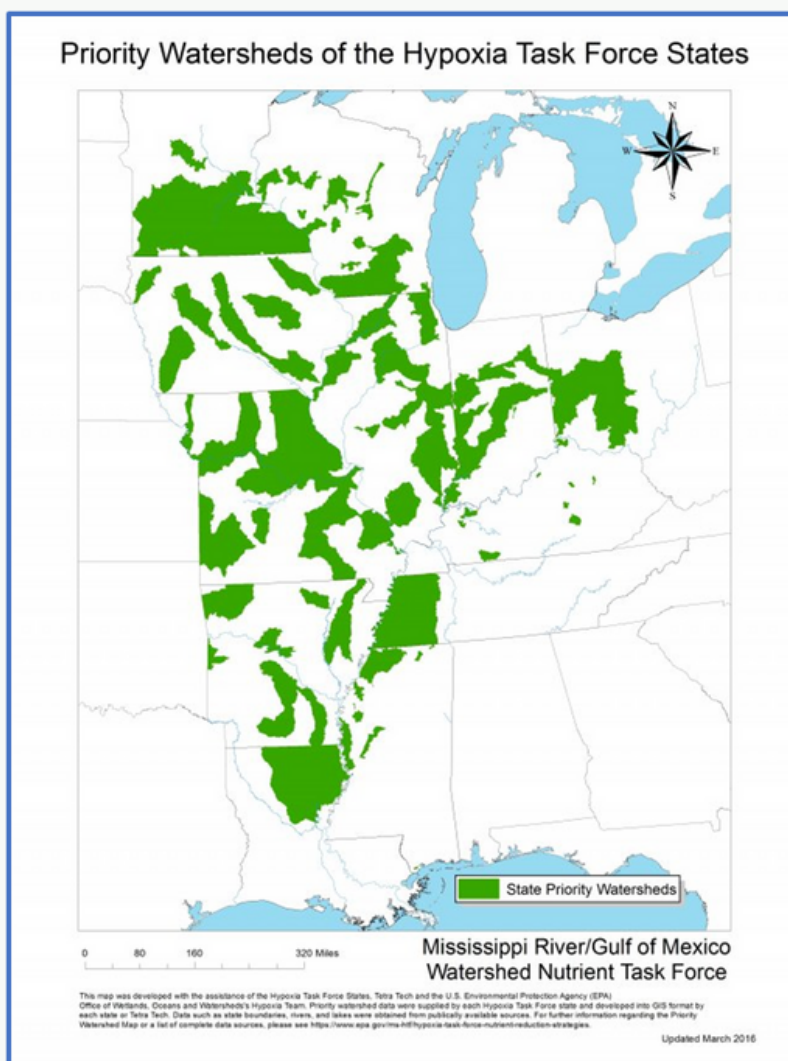
- **Yahara Pride Farms** reported over 97,000 pounds of phosphorus were removed since 2016 due to cost sharing with farmers to implement conservation practices.
- **Western Wisconsin Conservation Council** is providing cost-sharing opportunities for farmers interested in adopting cover crops, no-till, split applications of nitrogen and improving nitrogen-use efficiency.

C. Regional and National Efforts and Initiatives

1. Mississippi River/Gulf of Mexico Hypoxia Task Force (HTF)

Created in 1997 to understand the causes and effects of hypoxia in the Gulf of Mexico and to coordinate and support activities to address its cause, the HTF has become the major and most important public focal point for federal and state programming efforts to reduce nutrient losses in the basin. Co-chaired by Assistant Administrator of the US EPA Office of Water Radhika Fox and the Iowa Secretary of Agriculture Michael Naig the HTF is a strong federal-state partnership that has brought together tremendous resources to work on nutrient-loss reduction in the basin.

The HTF 2008 Action Plan called on states to develop “comprehensive nitrogen and phosphorus reduction strategies encompassing watersheds with significant contributions of nitrogen and phosphorus to the surface waters of the Mississippi/Atchafalaya River Basin, and ultimately to the Gulf of Mexico.” In 2011, US EPA issued its **Nutrient Framework Memorandum** to provide focused guidance in support of state-level strategies, and states throughout the basin subsequently developed their own NLRs that have today become in many cases the primary guide to work in each state for their nutrient loss reduction efforts. Each HTF state has designated priority watersheds as part of their nutrient reduction strategy. A map of the priority watersheds is below. The document **Priority Watershed Selection Process** details each state's selection process.



2. US EPA's Clean Water Act Section 319 Grant Program

US EPA's Section 319 program figures prominently among the active programming in many of the states discussed above. Established during the 1987 amendments to the CWA, the program provides additional and important federal agency focus to help guide and support state and local non-point source efforts. Under the program states, territories and tribes receive grant money that supports a wide variety of activities including technical assistance, financial assistance, education, training, technology transfer, demonstration projects and monitoring to assess the success of specific non-point source implementation projects. Since 1990, it has provided almost \$5 billion in grant support to these state, tribal and local projects, and the average annual total grants made since 2010 is approximately \$170 million.

The program primarily emphasizes use of the "watershed approach" to address non-point source concerns affecting waterways. Watershed plans are called for in projects, and they serve as a strategy and roadmap for achieving water quality resource goals. The plans serve as the technical basis to guide the work to reduce pollutant loads and the implementation of the practices in the most critical areas. These plans also focus on the involvement and engagement of the affected stakeholders and landowners in the process along the way. Without local capacity and local buy-in by landowners and stakeholders, projects don't succeed.

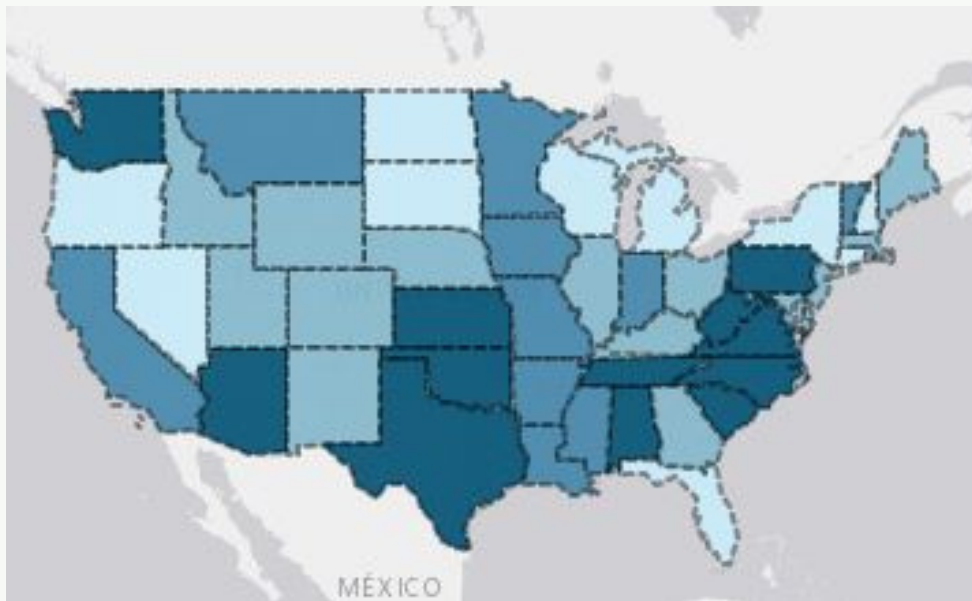
Since 2008, the program has supported almost 2,000 local watershed projects involving livestock, crop production and forestry activities, accounting for about a third of the grant funds allocated by the program.

See US EPA's Section 319 report, [National Nonpoint Source Program —a Catalyst for Water Quality Improvements](#), for a great discussion of the program, how it works and its accomplishments, along with some great examples of how it has worked with the non-point source sectors like agriculture. Also see [US EPA's website for a set of resources](#) developed to support and evaluate the operation of the program.

Agricultural organizations have made proactive use of Section 319 to advance agricultures' efforts to reduce nutrient losses for farms and ranches to protect water quality, and agriculture supports the program and welcomes this programming. It takes a lot of partnerships and collaboration to make progress. It also takes patience, durable programming and time, and agriculture is grateful for US EPA's recognition of this.

Success takes time. It takes time to see the effects of the work and practices installed to control NPS pollution. The amount of time depends on the number and nature of practices and the local climate and hydrology. The lag time between when the work is done and when we see water-quality improvements is highly site specific. It might range from mere months for short-lived contaminants like bacteria, to years for excessive nutrients in soils, to decades for sediments accumulated in river systems. Because the timeframe for success is unpredictable, it is important to manage stakeholders' expectations and keep them informed and engaged through the project and into the future. (See the [Catalyst Report](#) , page 7).

US EPA, working with project participants, has created an excellent resource to explore the particulars of 319 project success stories in states across the country, including in the Mississippi River Basin. The project features particular water bodies that were struggling with non-point source pollution problems and were once impaired and have achieved documented water quality improvements.



US EPA; Success Stories about Restoring Water Bodies Impaired by Nonpoint Source Pollution

3. USDA NRCS Programming -- the Mississippi River Basin Healthy Watersheds Initiative

NRCS administers multiple, critical conservation financial assistance programs which, over their lives, have contributed billions of dollars to support farmer and rancher adoption of conservation practices on working agricultural lands in the Mississippi River Basin. Every year, the programs are highly oversubscribed, signaling farmers' and ranchers' high degree of interest in taking part in these conservation efforts and their support for the programs' objectives.

From these programs USDA NRCS has crafted an initiative for the Mississippi River Basin called the Healthy Watersheds Initiative, which began in 2009. The MRBI uses several Farm Bill programs, including the Environmental Quality Incentives Program and the Conservation Stewardship Program, to support farmer and rancher adoption of water quality improving practices on working agricultural lands. The MRBI works in the basis of small watersheds which can support states' work with farmers under the state NLRs. From 2010 to 2019, for example, \$307 million was obligated for MRBI project contracts through EQIP, providing treatment on over 1.46 million acres.

In addition, as noted throughout this report, many states are applying for and implementing projects through RCPP.

Fiscal Year 2019 Mississippi River Basin Healthy Watersheds Initiative NRCS Financial Assistance (EQIP FA) for Active and Completed Contracts

State	Acres	NRCS Investment	Contracts
Arkansas	12,980	\$3,721,483	60
Illinois	4,625	\$750,827	35
Indiana	0	\$0	0
Iowa	16,830	\$3,389,629	90
Kentucky	1,432	\$442,400	12
Louisiana	12,654	\$1,986,132	17
Minnesota	977	\$648,142	12
Mississippi	10,899	\$5,747,797	103
Missouri	10,009	\$2,173,372	59
Ohio	3,043	\$818,879	19
South Dakota	0	\$0	0
Tennessee	12,545	\$2,124,749	79
Wisconsin	2,901	\$481,033	20
Total	88,897	\$22,052,085	506

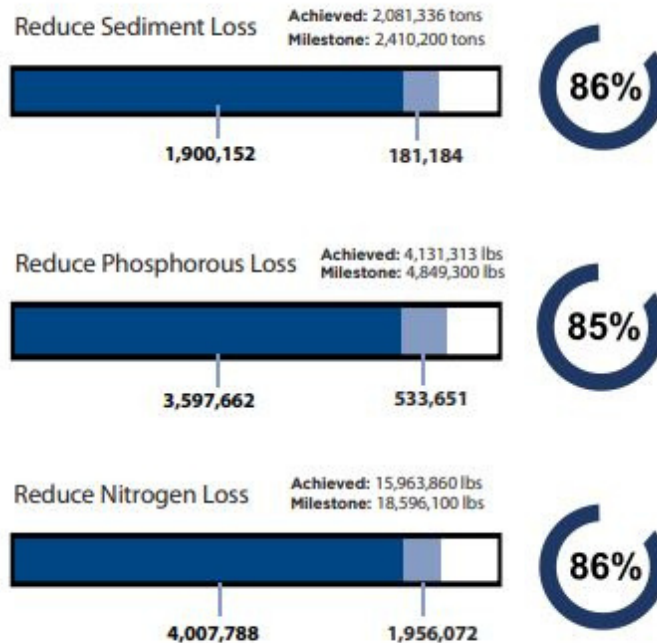
Data source: FPAC Economics and Policy Analysis Division, December 2019

Overall Summary - FY2010-19

Total NRCS Investment	\$307,068,123
Number of Contracts	8,205
Total Acres Contracted	1,461,725

2023 Milestones:

■ FY2010-18 ■ FY2019



D. Conclusion

US EPA's 2011 Framework Memorandum detailed an innovative and highly constructive approach that offered states and the stakeholders in the states the opportunity to assume a major leadership role in reducing nutrient losses to surface water to protect water quality. That approach centers on states developing with stakeholders an authoritative Nutrient Loss reduction Strategy (NLRS) and then moving into implementing on the ground the measures called for in the strategy. Such efforts in the Mississippi River Basin would not only be protective of local water quality but would also have major beneficial consequences for the Gulf of Mexico. It is for this reason that the federal-state Gulf of Mexico Hypoxia Task Force has actively supported and encourage the states of the Mississippi River Basin to engage in this NLRS process.

We hope that this report has effectively conveyed the breadth and depth of the ongoing commitment being made to the success of their state's NLRSs by the MRB state agricultural trade associations, representing farmers and ranchers and the agribusinesses that support them. Much of this work is being undertaken by the farmer and agribusiness groups' own volition and funding, with major private investments being made by the farmers themselves without public assistance to make the needed changes. Other efforts result from close collaboration with state agencies and universities, as well as NGOs. Others are undertaken in direct response to and with the support of the federal agencies' financial assistance programming. In each state, all of this, or a subset of it, is taking place.

The primary purpose of this report is to draw attention to the work of farmers across the MRB in implementing nutrient reduction strategies field by field and season by season and highlight the sustained efforts of the agricultural trade associations that support them in doing so. American agriculture is deeply invested in the NLRS process in the MRB and very much wants to work with our federal and state partners and stakeholders to sustain this amount of effort. We look forward to additional collaboration.



ANPC
Agricultural Nutrient Policy Council