Dear Farmers and Friends,

The Iowa Soybean Association (ISA) Environmental Programs and Services (EPS) staff are pleased to present our 2015 progress report. The featured efforts build on a legacy of work started more than a decade ago. These endeavors, combined with those of the entire ISA research team, seek to improve productivity, increase management efficiency and better manage natural resources and environmental quality.

For 2015, our main focus was helping farmers and collaborators engage in improving water quality and advancing the work of the Iowa Nutrient Reduction Strategy, which was in its second year. This investment supported 36 active ISA-led projects — watershed planning, water quality monitoring and technical assistance — with more than 358 farmers.

The ISA works for and on behalf of Iowa farmers, providing them with technical assistance, data and information enabling them to make informed decisions. We believe collaboration and partnerships lead to better outcomes. In 2015, we launched a working relationship with the city of Cedar Rapids and an emerging relationship with the Iowa League of Cities. This work is about building a sustainable water future for Iowa and stronger agriculture to help Iowa be better tomorrow, than we are today. With this report, we hope to raise awareness of collaborative endeavors by the ISA and others across the state and to fan the flame for more progress next year.

ROGER WOLF
ISA EPS Director  |  rwolf@iasoybeans.com  |  515-334-1051
2002-2015 RESEARCH PROJECTS

Soil Quality Testing
Bioreactor
Oxbow Restoration
Water Monitoring Site
Habitat Plans
Conservation
Planning Participant

Guided Stalk Sampling
Nutrient Benchmarking
Replicated Strip Trial
Environmental Services Project Area
The 21st Century poses new challenges for managing water quantity and quality. A variety of factors such as flooding, drought, nutrient loss, population growth and land use make water management one of the most significant challenges facing society. To address these challenges urban and rural, agriculture and non-agriculture must work together to build a sustainable water future for all water resources, from the rain that grows crops to the water people drink.

One Water management, as a unifying theme, will help clarify roles, responsibilities and accountability; reduce conflict; and improve integrated management of resources to provide for future generations. Integrating efforts and improving collective understanding of surface and ground water, drinking water, wastewater, storm water and flood water management is essential to advance a more sustainable water future at local, regional and national levels.

The Iowa Soybean Association (ISA) supports strengthening and promoting collaborative partnerships and holistic water management through the One Water approach. The ISA further supports efforts to better align programs and research, enhance communication and exchange of information as well as to establish new opportunities that support expansion of implementation projects, such as the Middle Cedar Partnership Project (MCPP). This project, funded by the USDA Natural Resources Conservation Service's Regional Conservation Partnership Program, focuses on collaboration by urban and rural entities to improve water quality upstream of the city of Cedar Rapids and mitigate flood risk.

In addition to the MCPP project, several other urban and rural collaborative projects are underway thanks to financing through the State Revolving Fund (SRF). When a city receives a loan to improve drinking or waste water infrastructure, this program allows the city to reallocate a portion of the interest and invest it in water quality projects. The cities of Dubuque and Fort Dodge are utilizing SRF funds to work in rural watersheds upstream of their communities.

The value of water is often overlooked, yet it is integrally connected to decisions made on the land, in watersheds and within communities.

Why One Water? It's very simple — to build a sustainable water future for Iowa and beyond.
The city of Cedar Rapids draws its drinking water from shallow alluvial wells along the Cedar River. Elevated nitrate levels in the river resulted in an impairment listing for nitrate in 2004, and subsequently a Total Maximum Daily Load (TMDL) was developed in 2006 that targeted a 35 percent nitrate load reduction. A large majority — 70-75 percent — of the drinking water produced by Cedar Rapids Water Treatment facilities is distributed to food processors, such as PepsiCo, Cargill and General Mills. A devastating economic ripple effect would result if the city were unable to consistently provide a safe, high quality water product for these industrial consumers. Without sustained efforts to manage nutrient loading in the larger Cedar River Watershed, it will become increasingly difficult and costly to treat the city of Cedar Rapids' raw water sources in order to provide a safe and adequate supply of drinking water.

Seeking Solutions

In a proactive venture, Cedar Rapids and 15 partners, primarily commodity or conservation groups, entered into a five-year partnership agreement to implement various conservation practices.

The project, titled the Middle Cedar Partnership Project (MCPP), combines downstream water users, such as Cedar Rapids, with upstream agriculture and conservation entities to address the primary concern of water quality, specifically reduction of nitrate loads to the Cedar River. The secondary resource concerns include flood reduction and soil health.

Initial partnership efforts focus on five targeted subwatersheds of the Cedar River. The project serves to connect downstream consumers with upstream producers who can work together to reduce the overall environmental impacts to Iowa streams and rivers. The MCPP is investing in key infrastructure, watershed planning and partnerships to improve water quality and mitigate flood risk.

Watershed Planning

The first step of the MCPP was to develop watershed plans for the five targeted subwatersheds in Black Hawk, Benton and Tama counties. A watershed plan provides a comprehensive vision for improving land and water quality over a period of time. The Iowa Soybean Association (ISA) led development of the Miller Creek Watershed Plan, one of the targeted subwatersheds, by working with farmers and conservation groups in the area.

The planning document defines and addresses existing land and water quality conditions and shortfalls, and provides a path for improvement. Plan development followed an established watershed planning process and incorporated input from many different stakeholders, both public and private.

ISA and the Black Hawk County Soil and Water Conservation District (SWCD) utilized an advisory committee to capture farmer input and develop goals. All available water quality data was gathered, visual inspections of the stream corridor were conducted and inventories of land use and management practices were collected.

A conceptual plan, or map of conservation and agricultural practices, was developed using computer modeling and mapping to meet the desired goals. Science from the Iowa Nutrient Reduction Strategy allowed watershed planners to balance practice performance with farmer and landowner willingness to implement practices. Combining these factors generated the conceptual plan identifying locations for practice placement to achieve maximum benefit.

An implementation schedule was developed to meet the plan’s goals. Methodologies and schedules track implementation and progress toward goals, facilitate communication and education with stakeholders, identify technical and financial assistance and evaluate effectiveness.

Implementation

In 2014, Black Hawk SWCD received a multi-year grant totaling nearly $500,000 from the Iowa Department of Agriculture and Land Stewardship’s Water Quality Initiative fund to implement conservation practices. Moreover, the MCPP will provide an additional $2 million of funding to the watershed and nearby watersheds across five years. A watershed monitoring strategy is included in the Miller Creek Watershed Plan to assess water quality improvements over time. Monitoring is important to track progress and make adjustments. The plan should adapt to new technologies, watershed conditions and available resources.

A 15-year phased implementation schedule allows for continuous improvements to ensure progress toward desired goals. The investment needed to achieve goals identified in the plan is nearly $5 million for constructed practices, including wetlands and bioreactors, among others. Additional investment — approximately $600,000 — is needed on a year-to-year basis to ensure management practices, such as cover crops, are implemented.

Cedar River Vision

Addressing water quality and flooding in the entire Cedar River Watershed will require long term vision; commitment from farmers, landowners and stakeholders; as well as significant public and private investment. Although the MCPP addresses only five of the 224 Cedar River subwatersheds, this approach exemplifies how partnerships can provide greater focus and resources.

To achieve success, future efforts must efficiently and accurately target the highest contributing subwatersheds. These areas should be identified through a combination of monitoring and modeling. For instance, the Upper Cedar Watershed Management Authority recently completed a watershed plan for the full Upper Cedar Watershed, a 1,689 square mile subwatershed of the Cedar River. The Upper Cedar Watershed Plan prioritized subwatersheds by area of greatest need. This approach enables action and targets resources where they will have the most impact, and should be adopted throughout the entire Cedar River Watershed.
In 2013, the Iowa Soybean Association (ISA) Environmental Programs and Services (EPS) team began watershed planning in the Rock Creek Watershed with support from the Walton Family Foundation. This plan is one of the first small watershed plans in Iowa to provide a roadmap for reaching the goals of the Iowa Nutrient Reduction Strategy — it already has paid dividends.

Following plan development, the Mitchell County Soil and Water Conservation District was awarded a multi-year grant in 2014 totaling nearly $1 million to focus on in-field practices. Then in 2015, the ISA EPS received funding from the Iowa Department of Agriculture and Land Stewardship (IDALS) for a Water Quality Initiative (WQI) project to further advance nutrient reduction in the watershed.

Unlike other Iowa WQI projects, the Rock Creek WQI is considered a next generation project focused on innovative and collaborative efforts to expand implementation of practices and maximize water quality benefits. Additionally, the project offers a unique opportunity to target specific practices outlined in an existing watershed plan, in this case edge-of-field practices. The Rock Creek WQI provides funding from IDALS matched with resources from the Iowa Agriculture Water Alliance (IAWA) to install a combination of 25 bioreactors or saturated buffers from 2015-2017.

The Rock Creek WQI project launched with a public event in July of 2015. Iowa Secretary of Agriculture Bill Northey stressed the urgency of this work to the audience.

“This project builds on the work that already has been done in the watershed and will create a tremendous demonstration of some of the new practices available to help improve water quality,” Northey said. “In this project and all across the state we are finding farmers that are extremely engaged and interested in what they can do to reduce nutrient loss and protect water quality.”

To initiate the installation process, the EPS team conducted site visits to determine feasibility for edge-of-field practice implementation. The initial kickoff meeting was done in the watershed and will create a tremendous demonstration of some of the new practices available to help improve water quality,” Northey said. “In this project and all across the state we are finding farmers that are extremely engaged and interested in what they can do to reduce nutrient loss and protect water quality.”

Legend

- All cropland — no-till or strip-till, cover crops and nutrient management
- Targeted — controlled drainage (average slope <1%)
- Targeted — nitrate removal wetlands (possible locations)
- Targeted — bioreactors or saturated buffers (tile outlets between 6-10 in.)

Goals of the plan include:
1. Reduce in-stream nitrogen by 41 percent from 2009-2011 average levels.
2. Reduce in-stream phosphorus by 29 percent from 2009-2011 average levels.
3. Increase soil organic matter by 1 percent.
4. Maintain or increase agricultural productivity and revenues.
5. Reduce flood risk.
6. Maintain or increase upland wildlife habitat.
7. Maintain or improve aquatic life.
Along with cropping and nutrient management strategies to limit nitrate losses and improve nitrogen efficiency, there are several drainage system modifications and edge-of-field practices for reducing nitrate losses from drainage. Many of these practices are included in the Iowa Nutrient Reduction Strategy (INRS), and various programs are available to aid producers seeking to adopt these practices.

Drainage System Modifications

Controlled Drainage
Controlled drainage (drainage water management) uses flow control structures to manage the amount and timing of drainage by managing the outlet elevation. Draining less water at times when drainage is not critical results in reduced nitrate loss. When full drainage is needed, the system can be operated like a conventional drainage system. Controlled drainage also offers the potential for modest yield increases in some years by storing water for later crop use. However, it is limited to relatively flat fields with less than 2 percent slope.

Shallow Drainage
In shallow drainage, the drains are installed at shallower depths of 2.5–3 feet, instead of typical depths of 4 feet or greater. Shallow drains remove less water, which reduces nitrate losses. Unlike controlled drainage, shallow drainage is not limited by topography. To have the same drainage effect as deeper drains, the drain spacing must be narrower, which increases cost.

Recycling Drainage Water
In drainage water recycling, drainage water is captured in a holding pond or reservoir and used for irrigation in the summer. Drainage water recycling increases yields from the irrigation benefit, and the nitrate in the drainage water is recycled. Although drainage water recycling is attractive, its use can be limited by topographic requirements, the availability and cost of a storage reservoir and unknown economic returns. The Iowa Soybean Association (ISA) is currently working with researchers and other partners to evaluate the potential of this practice in Iowa.

Conservation Drainage Work at ISA
ISA has been heavily involved with bioreactor research and implementation since 2008. ISA has had a lead role in 19 installed bioreactors through coordinated projects among multiple partners. New efforts include the Rock Creek and Elk Run Water Quality Initiative projects. The Rock Creek project calls for a combination of 25 bioreactors or saturated buffers and the Elk Run project calls for eight bioreactors and six saturated buffers.

Conclusions
Agricultural drainage plays an important role in Iowa, and modern crop production would not be possible in many areas without subsurface (tile) drainage. Despite the many benefits, subsurface drainage also can increase nitrate losses from the field to surface waters. Conservation drainage is an emerging set of practices designed to maintain drainage benefits while addressing water quality and flow impacts.
While the Iowa Nutrient Reduction Strategy is focused on reducing nitrogen and phosphorus loss, many of the practices that reduce loss also improve soil health.

During the past year, the Iowa Soybean Association (ISA) Environmental Programs and Services (EPS) team worked on a number of projects with a soil health component, mostly affiliated with cover crops. Healthy soil maintains the physical, chemical and biological properties that minimize erosion, recycle nutrients, infiltrate water and maintain soil carbon.

Gaining popularity in the landscape, cover crops are one practice that can address many aspects of soil health. They affect physical properties such as infiltration and aggregation, chemical properties of soil nitrogen and carbon as well as biological properties of soil organisms. The primary purpose for cover crop use varies — erosion control, forage or nutrient retention — and quantifying the effects on the cropping system and soil properties is an area of continuing research.

Since nitrogen is a focus of nutrient reduction efforts in Iowa, understanding cover crop nitrogen retention is important. A major challenge is determining the nitrogen variability within a field and what can be anticipated to meet crop needs. For many years, soil nitrate testing has been a useful tool, yet it only shows part of the picture. In 2015, the ISA explored a new test that may better assess the nitrogen mineralization potential of soil.

The Haney soil health test broadens the measurements of soil chemical properties with particular interest in additional measurements of soil carbon and nitrogen.

Through a grant from the USDA Natural Resources Conservation Service, the EPS team collected soil samples in a variety of field conditions to evaluate different soils and crop management practices with the Haney soil health test. This study included fields with and without cover crops in corn and soybean rotations in the Nishnabotna and Upper Cedar river watersheds. The project goals were to determine how this test helps improve nutrient management in both cover and no cover systems, and to develop strategies to quantify site specific effects of cover crops on soil nitrogen.

Beyond environmental benefits of healthy soil, expected benefits include more stable and higher crop yields. For example, soils with legacy erosion, oversupply of soil nitrogen or compaction are all areas where adopting practices to improve soil health can benefit crop production and environmental performance.

Although soil health improvements may take several years, EPS staff will continue to seek opportunities with producers, researchers and other partners to explore the effect of soil health indicators on agronomic and environmental performance. The ISA EPS team recognizes the pursuit of improved soil health will drive development of new techniques to measurably improve the competitiveness of Iowa soybean farmers.
Growth started with six new projects and partners added to the already long list the lab supports. New projects brought the need for increased capacity. Additional equipment was added to the lab, for nutrient analysis. Subsequently, 4,698 samples were analyzed for nutrients through October representing a 30 percent increase in total samples over last year. Additionally, the lab, which is certified by the Iowa Department of Natural Resources, completed an audit in December 2015 to extend its certification another two years.

**Partnerships**
ISA continues to engage with the Iowa Department of Agriculture and Land Stewardship’s Water Quality Initiatives (WQI) around the state. In addition to the five project areas already supported, Benton Tama WQI, Bluegrass and Cobblestone-East Nishnabotna WQI, Walnut Creek WQI, Lower Skunk WQI, Rock Creek WQI and Turkey River now send stream and tile samples to the ISA lab. These samples are collected by local coordinators to help guide and inform the projects. Practical Farmers of Iowa also is submitting samples from select producers to help evaluate practices on individual farms.

**Equipment**
Increased need for analysis drove ISA to invest in additional equipment to gain capacity and expand offerings. The lab purchased a second ion chromatography unit, doubling the samples it is able to process. Ion chromatography is the way nutrient concentrations are measured and is the cornerstone of the lab. Moreover, the lab secured a new oxidation reduction potential (ORP) field probe for use in bioreactor and oxbow studies. The handheld meter measures the combination of oxidation and reduction and helps determine the optimum conditions for bioreactor performance. In addition to the new probe, the lab analyzed a large number of samples for alkalinity for an Iowa State University experiment looking at fine tuning bioreactor retention times.

**Tile Monitoring**
2015 also marked a significant expansion in individual producer tile monitoring. ISA worked with more than 130 producers and sampled 250 tile lines. This type of monitoring allows producers to document their nitrate levels and consider how management decisions impact those levels. When this data is combined with management data from individual fields, farmers are able to compare practices in different areas to help guide continuous improvement.
Iowa soybean farmers | Agriculture's Clean Water Alliance (ACWA) | Ag Drainage Management Coalition (ADMC) | Agren, Inc. | Agri Drain Corp | AgSolver | Altria | America's Watershed Initiative | Boone River Watershed Association | Carroll County Conservation Board | City of Cedar Rapids Dallas County Conservation Board | Dickinson Clean Water Alliance | Drake University: College of Law Environmental Sciences | Ecosystem Services Exchange | Environmental Defense Fund (EDF) | Environmental Intelligence, Inc. (EII) | Environmental Protection Agency (EPA) | Family Farm Alliance | Fishers & Farmers Partnership (FFP), which includes: Illinois DNR, Iowa DNR, ISA, Minnesota Corn Growers Association, Minnesota DNR, Missouri Agribusiness, Missouri Department of Conservation, National Mississippi River Museum and Aquarium, USDA-NRCS, USDA Forest Service, US Fish & Wildlife Service (USFWS), US Geological Survey (USGS), Wallace Pasture Project (WI), Wisconsin DNR, New Ground, Inc. | Greater Des Moines Partnership | Green Lands Blue Waters | Herron Lake Watershed District | IHR (Iowa Flood Center) | Illinois Soybean Association | Indiana Soybean Alliance | Iowa Agriculture Water Alliance (Iowa) | Iowa Cattlemen's Association | Iowa Corn Growers Association | Iowa Farm Bureau | Iowa Pork Producers Association | Iowa Department of Agriculture and Land Stewardship (IDALS) | Iowa Department of Natural Resources (IDNR) | Iowa Geological Survey | Iowa Land Improvement Contractors Association (LICA) | Iowa League of Cities | Iowa Nutrient Research Center | Iowa State University: Natural Resources Ecology & Management (NREM), Ag & Biosystems Engineering, Center for Agriculture & Rural Development (CARD), Extension Outreach, Leopold Center, Agronomy | Iowa's US Congressional Delegation (Ernst, Harkin, Grassley, Latham, Loebback, Boswell, King, Braley) | The Johnson Foundation at Wingspread | Kentucky Soybean Board and Association | Lime Creek Watershed Improvement Association | The McKnight Foundation | Minnesota Department of Agriculture | Mitchell County Conservation Board | MSA Professional Services | Monsanto | National Academy of Sciences, National Research Council (NAS, NRC) | National Biodiesel Board (NBB) | National Fish and Wildlife Foundation (NFWF) | National Laboratory for Agriculture and the Environment (NLAE, USDA-ARS) | Northeast Iowa Resource Conservation and Development, Inc. | The Fertilizer Institute (TFI) | The Nature Conservancy in Iowa (TNC Iowa) | The Nature Conservancy, Great Rivers Partnership (TNC) | North Central Regional Water Network | Ohio Soybean Council | People's Company | Pheasants Forever | Pioneer Hi-bred, A DuPont Business | Practical Farmers of Iowa | Prairie Rivers of Iowa RC&D (USDA NRCS) | Prairie Winds RC&D (USDA NRCS) | Sand County Foundation/Bradley Fund for the Environment (SCF) | Smeltzer Family Trust, Iowa Learning Farm | Soil and Water Conservation Districts (SWCDs) in: Audubon County, Benton County, Black Hawk County, Boone County, Bremer County, Buchanan County, Calhoun County, Carroll County, Chickasaw County, Dallas County, Emmet County, Floyd County, Greene County, Hamilton County, Hancock County, Henry County, Howard County, Jasper County, Johnson County, Kossuth County, Madison County, Marion County, Mitchell County, Palo Alto County, Sac County, Tama County, Washington County, Webster County, Wright County | Soil and Water Conservation Society (SWCS) | South Dakota Soybean Research and Promotion Council | South Dakota State University | Trees Forever | 25x‘25 Alliance | University of Illinois | University of Iowa, State Hygienic Lab | University of Minnesota | University of Wisconsin - Platteville | United Soybean Board (USB) | US Army Corps of Engineers | USDA Natural Resources and Conservation Service (NRCS) | USDA Agricultural Research Service (ARS) | US Geological Survey (USGS) | US Water Alliance Walton Family Foundation (WFF) | Watershed Management Authorities (WMA), Upper Cedar River, English River, Turkey River, Walnut Creek | Western Illinois University | White Rock Conservancy

WE WOULD LIKE TO THANK ALL OF OUR PAST AND PRESENT PARTNERS AND SUPPORTERS FOR THEIR COLLABORATION AND ASSISTANCE. WE LOOK FORWARD TO WORKING WITH YOU IN 2016.