

ISA ENVIRONMENTAL
PROGRAMS & SERVICES

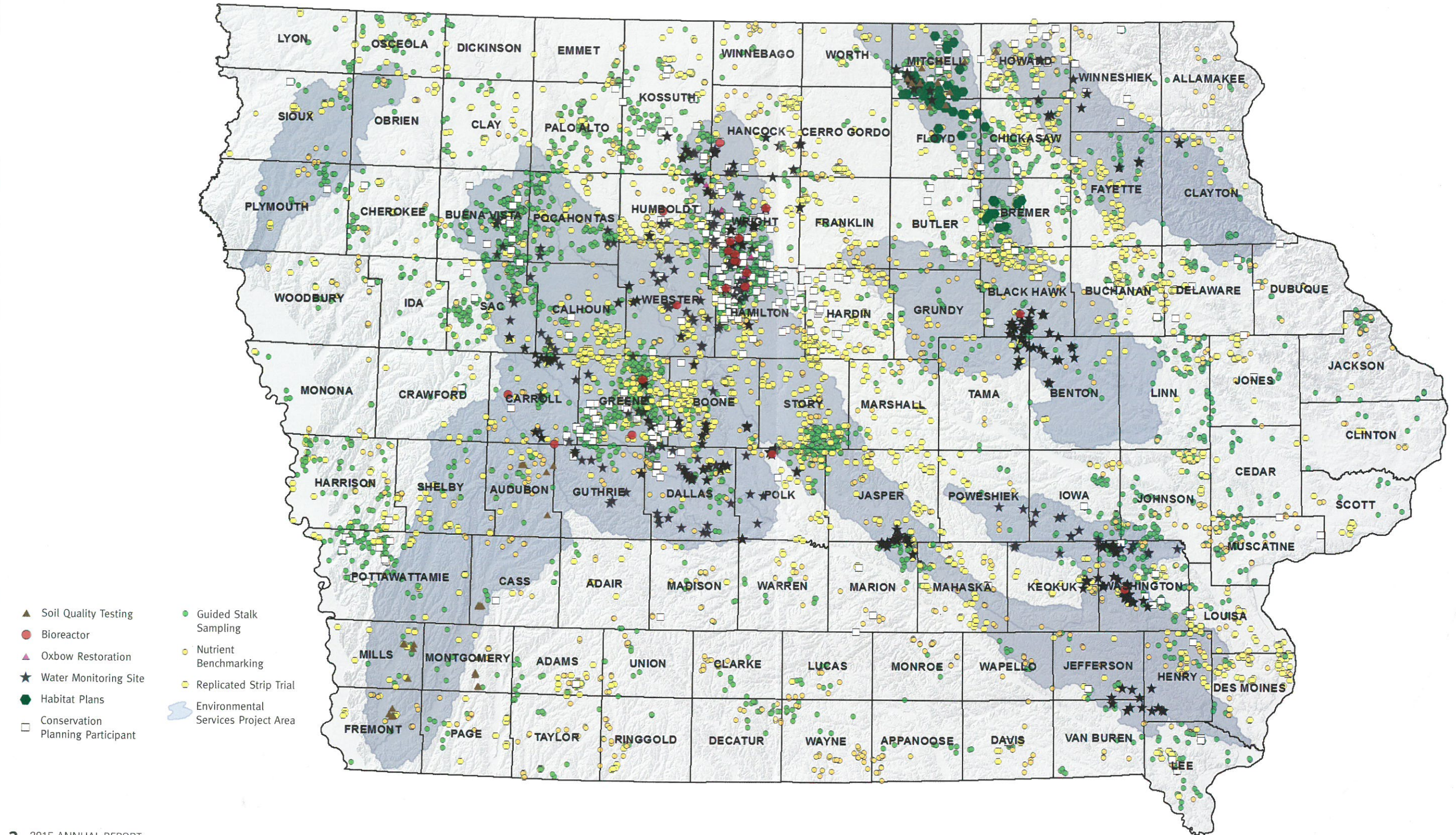
2015 ANNUAL REPORT




IMPROVING COMPETITIVENESS | ENHANCING ENVIRONMENTAL QUALITY



2002-2015 RESEARCH PROJECTS





ONE WATER

BUILDING A SUSTAINABLE WATER FUTURE

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 (MCPPE). 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 MCPPE 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.



TURNING VISION INTO REALITY:

THE MIDDLE CEDAR RIVER WATERSHED

Improving land and water resources is a complex task requiring collaboration, partnerships and practice adoption. By working together to achieve the same goals and outcomes, urban and rural partners can better prepare and respond to challenges.

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 (MCP), 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 MCP is investing in key infrastructure, watershed planning and partnerships to improve water quality and mitigate flood risk.

Watershed Planning

The first step of the MCP 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 MCP 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 MCP 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 1,685 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.





PUTTING PLANNING INTO ACTION

WATERSHED PLANNING IS PAVING THE WAY TO IMPROVED WATER QUALITY IN THE ROCK CREEK WATERSHED.

Farmers in the Rock Creek Watershed are driving change and planning to install the largest concentration of bioreactors and saturated buffers in the nation. It all started with a watershed plan.

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.

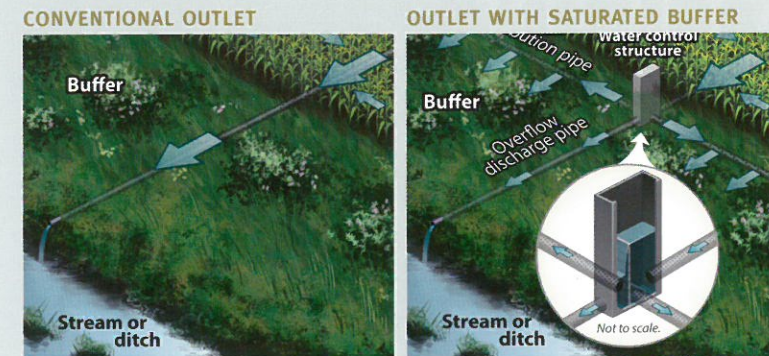
The Rock Creek WQI project launched with a public event in July of 2015. Iowa Secretary of Agriculture Bill Northey stressed the urgency of this work to the audience.

“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 generated 21 potential sites. These sites were vetted and submitted to an agricultural drainage engineering firm, Ecosystem Services Exchange, for site survey and design. Sites selected for installation through the project will be prioritized based on the expected potential nitrate load treated and cost effectiveness of the bioreactor or saturated buffer installed based on site characteristics.

As with other bioreactor and saturated buffer projects, the biggest barrier from practice enrollment to installation is difficulty in knowing the drainage capacity of the tile system. Even with available tile maps, site surveys may need to be conducted to ensure the practice is designed to the USDA Natural Resources Conservation Service’s standards.

The Rock Creek WQI anticipates installing practices in the spring of 2016. The ISA EPS team will provide additional landowner outreach and site visits to ensure locations with the best potential for treatment are identified in the watershed.

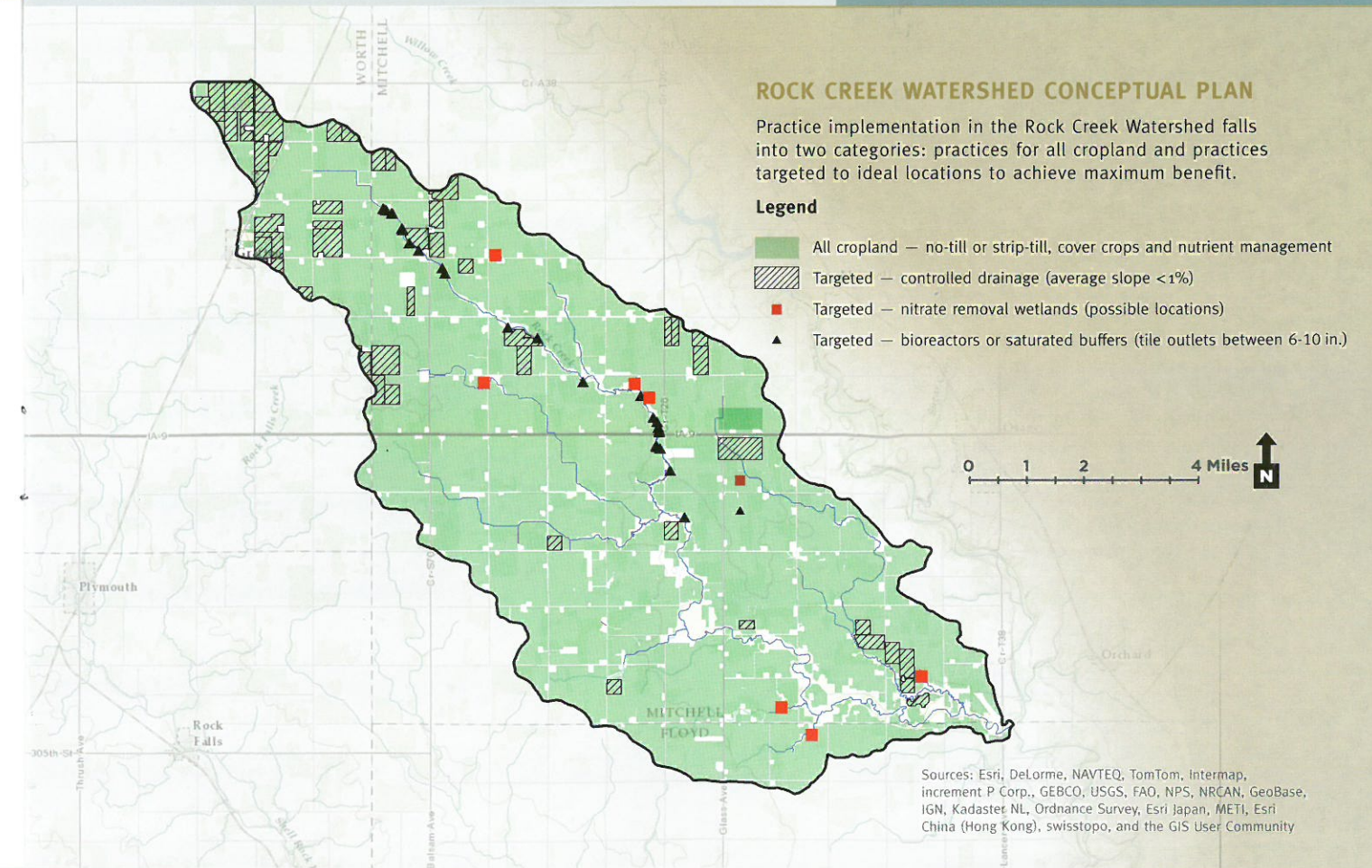


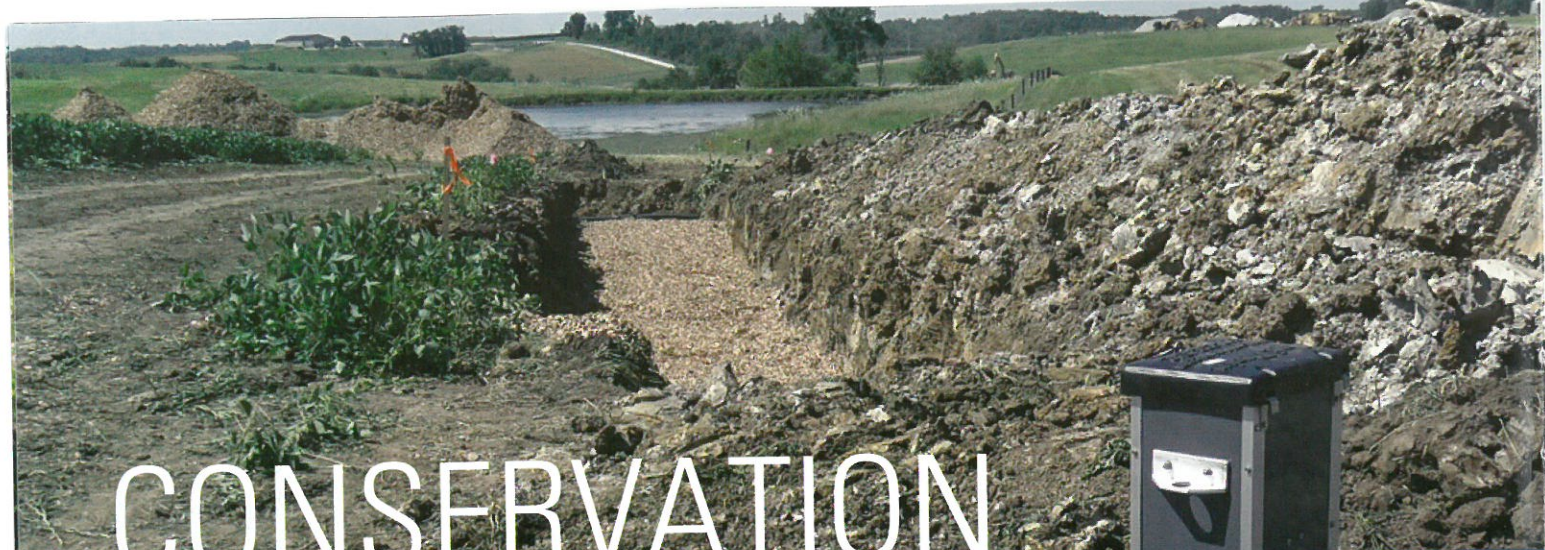
ROCK CREEK WATERSHED PLANNING

Planning was guided by local farmer and technical advisory committees. Both groups were utilized to identify resource concerns, establish goals to address the concerns and develop an implementation plan to achieve the identified goals. The plan identified resource concerns by reviewing existing water quality data, conducting a stream assessment and reviewing existing geospatial data.

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.





CONSERVATION DRAINAGE STRATEGIES FOR IOWA

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.

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.



Edge-of-Field Practices Bioreactors

A bioreactor is a trench filled with wood chips that drainage water is routed through. A flow control structure is used to divert water through the bioreactor. Denitrifying bacteria in the wood chips convert nitrate in the drainage water into inert nitrogen gas, reducing the amount of nitrate delivered to the outlet. Water in excess of the bioreactor is allowed to bypass the system so that drainage in the field is not impeded.

Wetlands

Nitrate concentrations can be reduced by routing drainage

water through a wetland, which also provides wildlife habitat and other benefits. Nitrate reductions result from plant nutrient uptake, microbial immobilization and denitrification. Compared to bioreactors, wetlands require greater land area, making them suitable for capture of water from multiple fields.

Saturated Buffers

Saturated buffers use a control structure to divert drainage water and raise the water table within a riparian buffer. Water flows through the soil in the buffer, where it has a chance to interact with plants and microbes in the buffer for nitrate removal. A bypass is provided for high flows that exceed the buffer capacity.

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.





SOIL HEALTH

GREATER ADOPTION CALLS FOR NEW MEASUREMENTS

Soil health has generated a lot of buzz lately as new initiatives and partnerships promoting improvements bring greater attention to the concept. Soil health reflects numerous properties and processes of soil measured as physical, chemical and biological indicators that, if impaired, can result in crop or environmental problems.

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.





WATER MONITORING

ISA LAB EXPANDS PARTNERS AND CAPACITY

In its fifth year of operation, the Iowa Soybean Association's (ISA) water laboratory celebrated a year of expansion to serve the growing need for water monitoring across the state.

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 Crabapple-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

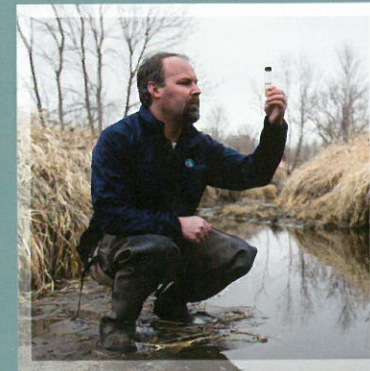
Increased need for analysis drove ISA to invest

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.

“4,698 water samples were analyzed for nutrients through October 2015, representing a 30 percent increase in total samples compared to 2014.”



FUNDS SECURED FOR CONSERVATION IMPLEMENTATION: \$2,705,128.00

2015 BY THE NUMBERS

EPS Team

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Theo Gunther
Resource Management Specialist

Diane Ercse
Watershed Coordinator-Resource Management Specialist

Karl Gesch
Watershed Coordinator-Resource Management Specialist

Dave Graham
Water-Field Technician

Michelle Jones
Environmental Communications Specialist

36 ACTIVE PROJECTS

1,880 TILE SAMPLES

130+ TILE SAMPLING PARTICIPANTS

2,201 STREAM SAMPLES

143 SOIL HEALTH TEST SAMPLES

9 BIOREACTORS MONITORED FOR PERFORMANCE

6 WATERSHED PLANS DEVELOPED

54 HABITAT ASSESSMENTS & PLANS DEVELOPED

629 ACRES ENROLLED INTO PROGRAMS AS A RESULT OF HABITAT PLANNING

82 PROJECT PARTNERS

4 SCIENTIFIC JOURNAL PUBLICATIONS

EPS FINANCIAL INVESTMENT



2001-2015: \$21,650,260

2015: \$2,589,691

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.

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 | IIHR (Iowa Flood Center) | Illinois Soybean Association | Indiana Soybean Alliance | Iowa Agriculture Water Alliance (IAWA) | 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, Loeb, 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 | 25x25 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