

North Central Iowa Agricultural Conservation Roadmap



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Motivation

Iowa farmers are global leaders in agriculture. Farmers steward natural resources to deliver conservation outcomes that benefit Iowa and society. This conservation roadmap for the north central Iowa crop district provides recommendations for farmers and supporting partners to scale up agricultural conservation. The roadmap assesses the current status of agricultural conservation. This includes an inventory of water resources and watershed projects. Conservation practices along with costs and benefits are identified. This will help farmers evaluate conservation opportunities.

Farms across north central Iowa have the potential to implement conservation systems at a cost of \$62 million per year. This could lead to direct and indirect public and private benefits of \$173 million per year. Agricultural conservation

also will build soil health and contribute to Iowa Nutrient Reduction Strategy water quality goals. To realize this vision, Iowa farmers and public and private partners can and are increasing adoption of conservation practices. Iowa soybean farmers aspire to be competitive, profitable, and resilient. Strong soils and clean water are a strategic component of that vision. This document provides a roadmap towards that future.

Conservation Status

The north central Iowa crop district includes 11 counties and spans 3,887,820 acres. There are 4,754 soybean farmers in the district. The total population is 165,169. Approximately 85 percent of land is used for row crop agriculture. This includes 1,181,606 acres of soybean production as of 2019.

Agricultural conservation is occurring on farms and in watersheds. Soil and water conservation programs typically involve watershed projects. These include planning, outreach, technical assistance, evaluation, and funding. North central Iowa contains 8 public lakes and 4,958 miles of streams and rivers. Watershed and lake restoration projects are occurring to conserve these water resources (Figure 1).

Watershed projects are a key tactic to implement and scale up the Iowa Nutrient Reduction Strategy. The Agricultural Conservation Planning Framework is a watershed planning tool used to identify opportunities for conservation adoption. This analysis is complete for approximately 40 percent of the sub-watersheds in north central Iowa.

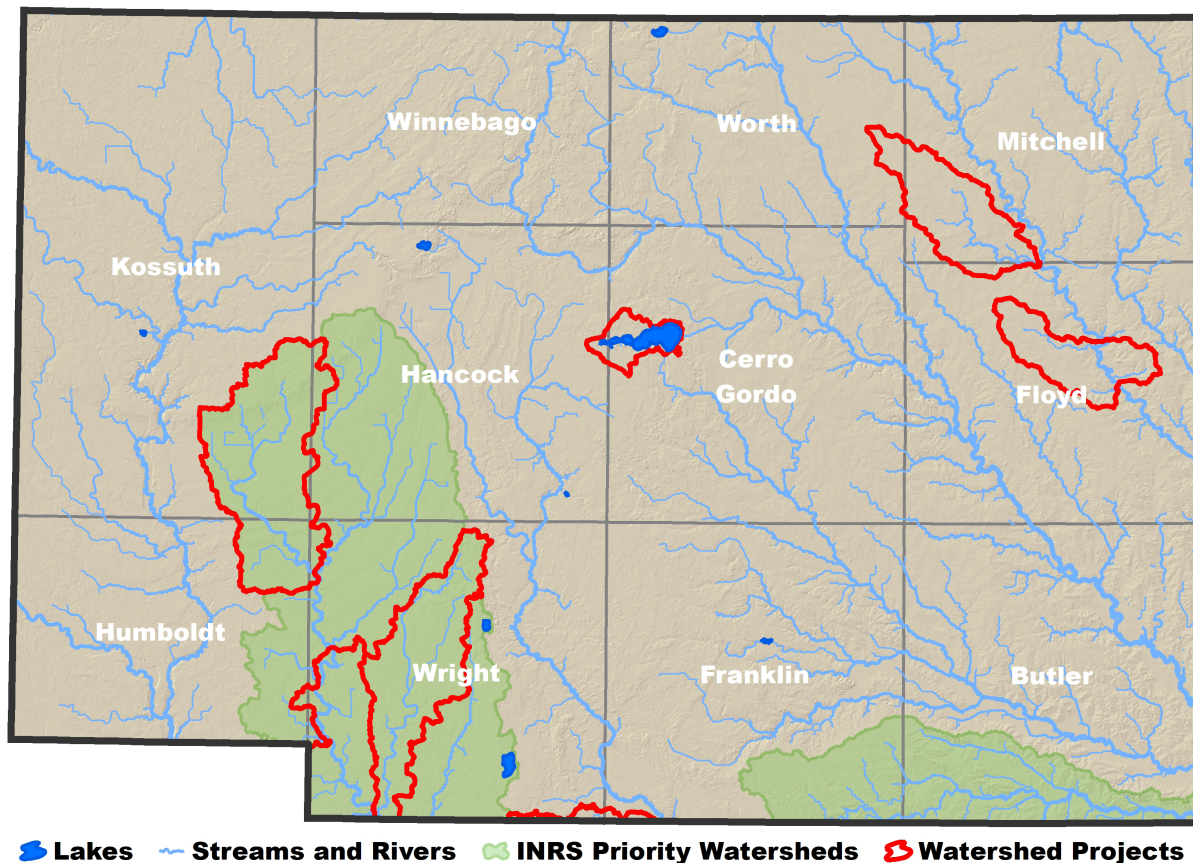


Figure 1. North central Iowa lakes, streams, and watershed projects.

Baseline conditions are used to evaluate water quality improvements over time (Table 1). Many conservation practices have been adopted in north central Iowa to reduce soil erosion and improve water quality (Table 2). These practices have resulted in an estimated 3 percent decrease in nitrogen loss and 31 percent decrease in phosphorus loss. These improvements are compared to the Iowa Nutrient Reduction Strategy baseline period of 1980 through 1996. An estimated \$298 million has been invested by farmers and the public to build this conservation infrastructure in north central Iowa.

ATTRIBUTE	VALUE	UNITS
TOTAL AREA	3,887,820	acres
ROW CROP PRODUCTION	3,097,115	acres
TILE DRAINAGE	2,136,785	acres
SOIL EROSION	0.8	tons/acre/year
SEDIMENT YIELD	0.33	tons/acre/year
NITROGEN YIELD	24.7	pounds/acre/year
PHOSPHORUS YIELD	1.3	pounds/acre/year

Table 1. Land use data and rates of soil erosion, nitrogen loss, and phosphorus loss from agricultural land in north central Iowa. The interpretation time period is prior to the completion of the Iowa Nutrient Reduction Strategy in 2013. Sources: Daily Erosion Project and US Geological Survey.

CONSERVATION PRACTICE	QUANTITY	UNITS
NO-TILL	731,135	acres
COVER CROPS	29,513	acres
PONDS	2,940	structures
GRASSED WATERWAYS	38,758	acres
TERRACES	2,317	miles
WATER & SEDIMENT CONTROL BASINS	10,355	structures
CONTOUR BUFFER STRIPS	68,918	acres
STRIPCROPPING	12,362	acres
CONSERVATION RESERVE PROGRAM	135,587	acres
BUFFERS	13,863	acres
BIOREACTORS AND SATURATED BUFFERS	23	structures
CREP WETLANDS	30	structures

Table 2. Conservation practices currently used and installed in north central Iowa. Abbreviation: CREP (Conservation Reserve Enhancement Program). Sources: Conservation Technology Information Center, Iowa Best Management Practice Mapping Project, and Iowa Department of Agriculture and Land Stewardship.

Conservation Opportunities

Continued and increased adoption of conservation practices is necessary to achieve Iowa Nutrient Reduction Strategy goals. These practices are classified as cropping systems changes and infrastructure upgrades. Agronomic practices that can be incorporated into operations include nutrient management, no-till, and cover crops (Figure 2). Constructed practices include wetlands and edge-of-field tile drainage treatment systems (Figure 3). Due to the

scale of potential cropping systems transitions, a continuum was developed to allow farmers to identify appropriate opportunities and next steps. Each phase shown below includes current adoption levels, implementation goal, adoption costs, and environmental benefits.

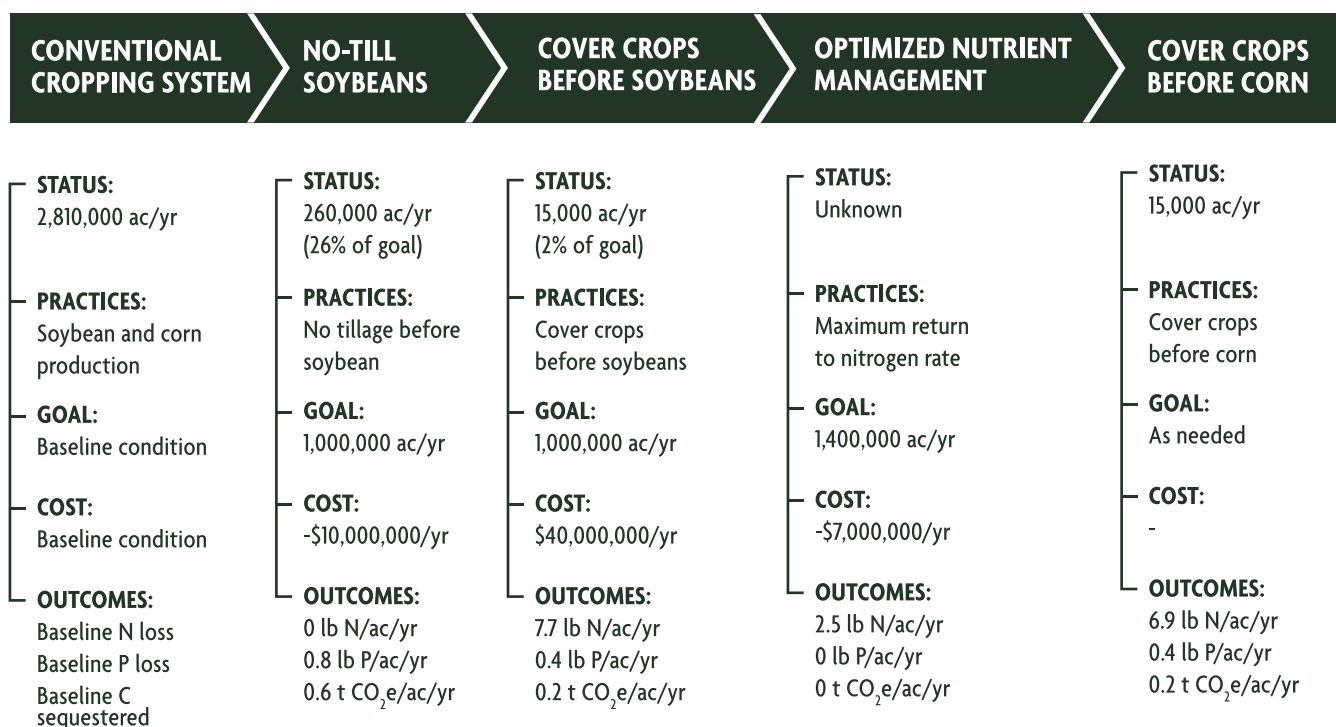


Figure 2. Conservation cropping systems continuum. Negative costs associated with no-till and nutrient management denote net profitability increases. Outcomes are reductions from baseline values. Abbreviations: ac/yr (acres per year), lb (pounds), N (nitrogen), P (phosphorus), C (carbon), t (tons), CO₂e (carbon dioxide equivalents).

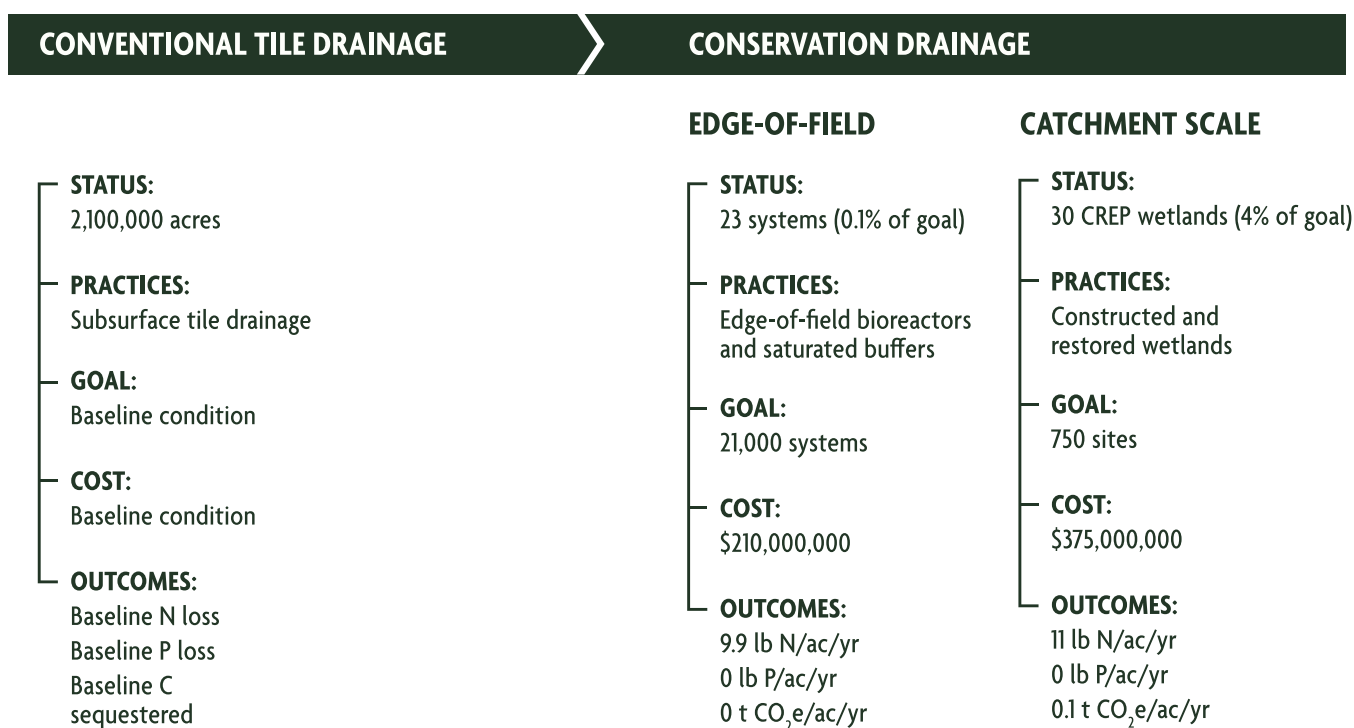


Figure 3. Conservation drainage opportunities. Outcomes are reductions from baseline values on a per-acre-treated basis. Abbreviations: ac/yr (acres per year), lb (pounds), N (nitrogen), P (phosphorus), C (carbon), t (tons), CO₂e (carbon dioxide equivalents), CREP (Conservation Reserve Enhancement Program).



There is ample opportunity for conservation cropping systems and conservation drainage adoption in north central Iowa. In addition to the practices above, precision perennial cover and emerging practices can be used on a site-specific basis to support both farm and statewide goals. Such practices include tile-zone wetlands and drainage water recycling. Additional agronomic practices also can be adopted to simultaneously build farm profitability and conservation outcomes. These may include complex crop rotations, manure management, livestock integration, or continuous no-till. Structural practices to minimize runoff and erosion also will continue to be important.

Federal and state programs are available to provide technical and financial support as farmers adopt more conservation. Federal options include the Environmental Quality Incentives Program, Conservation Stewardship Program, Conservation Reserve Program, and Regional Conservation Partnership Program. State examples include the Conservation Reserve Enhancement Program, Iowa Financial Incentives Program, and Iowa Water Quality Initiative. Additional programs and watershed-based incentives also may be available.

Each phase shown above includes specific conservation practices with costs and outcomes. At full adoption and under optimum management, the agronomic practices under

the envisioned conservation cropping system have the potential to save farmers an estimated \$55 million annually compared to a conventional soybean and corn system. This equates to approximately \$17 per acre or \$11,500 per soybean farmer in north central Iowa. These benefits are long-term, so current implementation costs also should be accounted for as farmers add conservation practices into operations. Including costs for conservation drainage over 15 years, the estimated total annual cost to implement these conservation system changes is \$62 million per year. This equates to approximately \$20 per acre or \$13,000 per soybean farmer in north central Iowa.

These cropping system and conservation drainage scenarios would result in significant conservation outcomes. These outcomes include additional 38 percent nitrogen loss reduction, 29 percent phosphorus loss reduction, and 910 thousand tons of carbon dioxide equivalents sequestered per year relative to current conditions. In addition to private benefits, these practices and outcomes are estimated to provide \$118 million per year in public benefits and economic impact. For example, there will be a need and opportunity for local businesses and infrastructure to develop and grow to deliver conservation services.

Recommendations

Farmer adoption of soil and water conservation through cropping systems and conservation drainage improvements can be supported through key steps. These include inventorying current conservation levels and benefits, recognizing future opportunities for agricultural conservation, securing technical and financial support, and using the watershed approach to build momentum, focus funding, and measure impacts.

This roadmap identifies the current status, future opportunities, and costs and benefits for agricultural conservation. Farmers already are leading adoption of these conservation systems and should continue to be supported. The watershed approach can be used to implement these changes across north central Iowa. Watershed projects provide a place-based framework to deliver technical and financial assistance, information, and partnerships to farmers. This supports farmers implementing conservation practices and documenting improvements over time.

With appropriate support from private and public partners, recommendations for farmers to scale up the watershed approach and conservation adoption in north central Iowa include:

- 1. Increase funding.**
Farmers can make long-term financial gains through more resilient soils and cropping systems. Optimized management of conservation practices also will increase profitability. However, farmers also should work with policy makers and relevant partners to increase and secure financial support for agricultural conservation projects.
- 2. Lead watershed projects.**
Existing watershed projects are a model for success. More watersheds should develop project plans. It is important for farmers to be leaders of watershed projects. Farmers should work with partners to assess local need and capacity. Watershed planning, partnerships, and funding will accelerate projects. The USDA Natural Resources Conservation Service and the Iowa Department of Agriculture and Land Stewardship are key agency partners. Other local partners can advance watershed projects. These include soil and water conservation districts, watershed management authorities, non-governmental organizations, and local businesses.
- 3. Implement conservation on farms.**
The watershed approach helps to increase transfer of knowledge and practices. Conservation adoption occurs at the scale of individual farms. Farmers should pursue research opportunities, data and information, and technical, financial, and social resources. This will increase both economic and environmental success as farmers incorporate additional conservation.
- 4. Document outcomes.**
Farmers should work with watershed partners to measure impacts and gauge progress over time. Groups should plan projects, set goals, track adoption, and verify environmental outcomes. These measurements will increase knowledge about the private and public benefits provided by agricultural conservation practices.

References

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