SectorStrategies

Western Iowa Livestock External Stewardship Pilot Project

Laying The Groundwork for a Future of Effective Nutrient Management

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NRCS Natural Resources Conservation Service

DNR

Iowa State University University Extension

United States Environmental Protection Agency

Prestage-Stoecker Farms

WESTERN IOWA LIVESTOCK EXTERNAL STEWARDSHIP PILOT PROJECT (WILESPP):

LAYING THE GROUNDWORK FOR A FUTURE OF EFFECTIVE NUTRIENT MANAGEMENT

October 2004

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IOWA STATE UNIVERSITY
University Extension

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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The Sector Strategies Program

This project was sponsored by the Sector Strategies Program, part of EPA's National Center for Environmental Innovation. The Sector Strategies Program works with 12 major industrial and service sectors, including the Agribusiness Sector. The program fosters collaborative working relationships among stakeholders in government, business, and other interested groups. The aim of these sector partnerships is to achieve better environmental performance with less regulatory burden. For more information on the Sector Strategies Program, visit www.epa.gov/sectors, or contact Roger Holtorf, National Program Leader for the Agribusiness Sector, at 202-566-2962 or via e-mail at holtorf.roger@epa.gov.

Photos courtesy of Iowa State University, Iowa Department of Natural Resources and USDA-NRCS.

Executive Summary

The Western Iowa Livestock External Stewardship Pilot Project (WILESPP) was undertaken to test whether the livestock industry, working together with state and federal agencies and producers, could design, implement, measure, and document voluntary environmental stewardship. The project emphasizes consultation, cooperation, and communication among meat processors, livestock producers, and government officials. These stakeholders worked together to share their collective environmental stewardship expertise, systematically develop and implement comprehensive nutrient management plans (CNMPs), and measure and document results.


Cows standing on dirt mound Photo by Angie Rieck-Hinz, ISU

In some circles, it has been surmised that the short-term costs to farmers of implementing proven conservation practices and nutrient management techniques have been a barrier to their voluntary adoption, despite the long-term benefits to the sustainable productivity of their land. The WILESPP project shows that these costs can be reduced, and both the short-term and long-term benefits outweigh these costs. The WILESPP team, comprising government, industry, and academic representatives, concluded that their approach is not only a cost-effective, feasible complement to a regulatory approach, but in many ways is superior in its ability to promote environmental stewardship beyond current regulatory requirements.

This project report describes the key features of the WILESPP and demonstrates that:

- Voluntary approaches are a viable complement to regulatory options and produce real environmental benefits,
- Comprehensive Nutrient Management Plans (CNMPs) are cost-effective to implement for many producers,
- The processor – producer working relationship has value to both processors and producers, and
- The multi-stakeholder approach increases the benefits and lowers the costs for all involved.

Beef feedlot Photo by Angie Rieck-Hinz, ISU

In addition to demonstrating an effective approach to encouraging voluntary environmental stewardship by livestock producers, the WILESPP highlighted the need for improvements in three related areas: efficiency, communication, and performance measurement.

- Improved efficiency, or streamlined CNMP development, while still providing site-specific technical assistance that meets technical standards, is driven by the need to develop a large number of CNMPs in a short period of time.
- Improved communication will be needed to convey the benefits of CNMPs in order to encourage more producers to voluntarily improve their performance.
- Finally, an improved means of quickly, but accurately, predicting the costs and benefits of voluntary conservation planning will be necessary to inform all potential stakeholders, especially livestock producers.

The WILESPP continues with all of the original participating producers now implementing their CNMPs according to accepted standards, making changes to their practices, and beginning to realize the economic and environmental benefits of doing so. This project can serve as a model for similar stewardship programs throughout the United States.

1

Introduction and Background

This report presents the findings of the Western Iowa Livestock External Stewardship Pilot Project (WILESPP). This unique industry-government collaboration has been in place for the last two years. The first year of the pilot project consisted primarily of recruiting livestock producers, collecting background information, developing Comprehensive Nutrient Management Plans (CNMPs) for participating farms, and documenting the resource requirements. After the first year of activity, a mid-term progress report was written in January 2003. The mid-term report described the first year's progress and lessons learned. It summarized the preliminary results based on the fairly limited data that were available at that time. During the second year of the project, the remainder of the CNMPs were developed, additional data were collected from the participating producers, CNMP implementation began, and all involved with the development of the management plans reported on their experiences and resources expended. In addition, the environmental impact of the project was estimated by modeling the baseline and new conditions at each participating farm. This final report summarizes the activities and results of the past two years and provides recommendations that can be used to guide future voluntary programs addressing nutrient management by livestock producers.

Common Concerns

Over the past 30 years, legislation and regulations limiting discharges of pollutants from industrial point sources have accomplished a great deal. There are now over 200,000 permitted point sources with discharge limits under the Clean Water Act. However, the legal focus of the nation's efforts to clean up our surface water and groundwater supplies is shifting. With the ongoing reductions in point sources of pollutants, non-point sources have now become a priority for improving water quality. Incremental releases of pollutants over wide areas within a watershed can have significant environmental impacts. Historically, voluntary efforts by agricultural producers have helped to maintain valuable soil and water quality, yet agricultural run-off is still one of the largest contributors to non-point source pollution, and as such, has become a top priority of both state and federal environmental protection agencies.

Within the agriculture sector, animal feeding operations (AFOs) have been identified as significant contributors to non-point source pollution of surface water and groundwater. While the animal manure from feeding operations is a valuable nutrient when properly applied to feed and forage crop fields, it can also end up in surface and ground water when improperly or overly applied, or when mismanaged. When large quantities of animal manure are generated in relatively small areas, it becomes more likely that manure and the associated biological oxygen demand (BOD), suspended solids, phosphorus, nitrates, fecal coliform, and other pollutants, will impair water resources.

EPA has developed guidelines that require the largest AFOs (commonly referred to as concentrated animal feeding operations, or CAFOs) to have operating permits reviewed and approved. Proposed permit requirements cover the implementation of specific management practices and discharge limits aimed at reducing environmental impacts. In addition to these EPA guidelines, many states have implemented their own rules and regulations covering a wide range of livestock and poultry operations.

Topsoil erosion is another non-point source of surface water pollution from the agricultural sector. While not specifically regulated like manure nutrients, soil erosion can be costly to farmers and the resultant sediment can be costly to the general public. Efforts to prevent soil erosion generally go hand-in-hand with nutrient management efforts. By and large, the conservation practices that keep topsoil on the farms also keep nutrients in place. Loss of topsoil reduces the land's ability to hold plant-available water and to provide nutrients to plant roots while also polluting water resources with sediment. According to a 1998 Technical Note by NRCS, erosion-caused losses of productivity on cropland and pastureland in the U.S. are about $27 billion per year. The off-site environmental costs of soil erosion account for an additional $17 billion per year.

Comprehensive Nutrient Management Planning

The WILESPP aims to demonstrate that the livestock industry, working together with state and federal agencies and producers, can design, implement, measure, and document voluntary environmental stewardship. The project emphasizes consultation, cooperation, and communication – meat processors and government officials share their environmental stewardship expertise with livestock producers – to systematically develop and implement nutrient management plans, and to measure and document results. In that WILESPP achieved these goals, it may be a model for similar stewardship programs throughout the U.S.

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) has developed a broad conservation planning approach for minimizing the adverse impacts of animal feeding operations on water quality. This approach is called Comprehensive Nutrient Management Planning (CNMP). The CNMP Technical Guidance in Part 600.5 of NRCS's National Planning Procedures Handbook identifies management activities and conservation systems to minimize water quality impairment from animal feeding facilities and the land application of manure and wastewater (see box). Comprehensive Nutrient Management Planning was developed to help the modern livestock producer voluntarily develop sustainable and environmentally sound conservation plans. Many within the livestock production industry feel that CNMPs allow producers more flexibility to achieve a high level of environmental protection than regulatory requirements. Furthermore, the use of CNMPs may result in financial benefits to producers by ensuring adequate soil fertility

while optimizing the nutrients deployed in crop production. In addition, in some areas, CNMPs can qualify livestock producers for reductions in liability insurance premiums. As a result, the WILESPP team felt that implementation of CNMPs by livestock producers would be an ideal means for demonstrating voluntary environmental stewardship.

Despite the general agreement that CNMPs can benefit both livestock producers and water quality, many questions remain. Are operators of animal feeding operations (especially independent, non-contract producers) willing to embrace the CNMP Guidelines? If so, are CNMPs prohibitively expensive and resource intensive? Could the main customers of animal feeding operations (meat processors/agribusiness) offer their resources and expertise to assist animal

What Is a Comprehensive Nutrient Management Plan (CNMP)?

A CNMP is a site-specific conservation plan that addresses soil and water resource concerns at animal feeding operations. Each plan requires a thorough, site-specific review of the farmstead and areas where manure will be applied and sets forth a plan to ensure that manure and wastewater are properly stored and handled, that stormwater remains clear or is captured, and that soil and water quality meet the criteria set forth by the NRCS Field Office Technical Guide. The plan may include information on feed management and other considerations.

Nutrients enter a producer's farm as feed and fertilizer and exit mainly in the livestock, manure, erosion and other products and byproducts of the operation. A comprehensive and well-written conservation plan uses systems of conservation practices to minimize releases of nutrients to the environment as they move through an animal feeding operation. An effective CNMP requires a good understanding of the quantity and behavior of nutrients in soils, manure, and fertilizer. A CNMP also requires careful documentation and encourages the producer to think through the various facets of nutrient management. As defined by Part 600.5 of the USDA National Planning Procedures Handbook, CNMPs should, at a minimum, follow NRCS conservation practice standards and specifications and must include the following:

- Documentation of the animal feeding operation owners'/operators' consideration of the six CNMP elements:
    - Manure and Wastewater Handling and Storage
    - Land Treatment Practices
    - Nutrient Management
    - Record Keeping
    - Feed Management
    - Other Utilization Activities

  A CNMP may not always address all six elements; however, each element needs to be considered by the operator during development of the CNMP, and the operator's decisions regarding each must be documented. The first four elements are required in order to have a CNMP.

- A description of specific activities that affect water quality at the facility's crop production area and that affect the land on which the manure and organic by-products are applied. Such activities usually include addressing soil erosion to reduce nutrient transport within or off the land.

While CNMPs will not immediately eliminate environmental impacts at AFOs, they are an important step in that direction. The environmental stewardship process is a journey, not a destination. CNMPs are multi-year, facility-specific, and allow for flexible and innovative solutions. A thorough, certified CNMP leads to a higher level of awareness of the environmental impacts of each management decision.

feeding operations in implementing CNMPs and providing a more sustainable "gate-to-plate" system? Can these same customers team with government to provide technical assistance of value to the producers? What are the best mechanisms for achieving results for the producers? How can the results be measured? Knowing the answers to these questions will be critical for informing policy-makers at the state and federal level when they consider appropriate measures for reducing the environmental impacts from animal feeding operations.

Seeking Solutions

EPA's Sector Strategies Program set the stage for the development of the WILESPP in Omaha, Nebraska on May 5, 2000 when it convened the first of a series of meetings with meat processing industry stakeholders to discuss alternative, non-regulatory methods for environmental protection. Representatives from the meat processing industry, state and federal agencies, and other interested stakeholders agreed to work together to develop and test new policies that could lead to cleaner, cheaper, and more efficient environmental protection by government and the meat industry. In the summer of 2001, a coalition of forward-thinking meat processing firms conceived of and initiated the WILESPP with cattle and hog producers in western Iowa. The coalition formed a council of active stakeholders to steer the project and to ensure its smooth implementation.

Corn residue before (left) and after (right) incorporation with Aerway Aerator. Photo by Don Peterson, NRCS

The council of project stakeholders recognized the opportunity for meat processors, along with federal and state agencies, to bring their collective resources together in a way that could benefit both the environment and livestock producers. Many livestock producers are small family-owned and managed businesses. Historically, they have not been highly

regulated. In contrast, many meat processors are larger businesses with greater resources that enable them to take a leadership role in developing standards of environmental performance for their industry, as well as other industries in their supply chain. Most meat processors are subject to environmental requirements aimed at protecting air and water quality. Many are also proactive in going beyond their regulatory requirements by establishing pollution prevention programs and participating in local, state, and national recognition and award opportunities.

A key feature of the WILESPP is the active involvement of the meat processing companies with the livestock producers to assist them with their environmental stewardship efforts. This participation is critical for a number of reasons. First, the livestock producers have a genuine need for the knowledge and technical assistance that the meat processing companies can share with them. Second, this assistance is coming from a familiar and trusted source. Many of the livestock producers are contracted by the processing companies to supply their livestock and work closely with the companies to maintain a successful business relationship. Finally, the active involvement and encouragement of the meat processors serve to reinforce the importance of the project's objectives, remind the producers of the environmental impacts of their actions, and moves the entire industry towards improved environmental performance.

Agitating manure in earthen pit Photo by IDNR

Meat processors also have a business incentive for providing environmental assistance to their suppliers. A working relationship between processors and their contracted producers is not new. Meat processing companies have been providing technical assistance to their livestock producers for many years in order to ensure a reliable supply of high quality livestock. Environmental considerations have increasingly become an important part of this assistance. Processing companies do not want their environmental reputation with the public and regulators to be damaged by the poor environmental performance of one of their suppliers. For example, poor community relations of a livestock producer due to odors, enforcement or civil actions associated with catastrophic releases, or other environmental noncompliance would reflect poorly on the meat processing company with whom they do business.

Meat processors must ensure a steady supply of high quality livestock to their processing plants. Disruptions in this supply can have serious financial impacts on the company. Without assistance to producers, the costs of complying with increasing environmental regulations or fines for noncompliance could increase the risk that small- and medium-sized livestock producers will leave the business, thus reducing available supply. Food safety and security is also an important concern to the industry. Because animal health and quality are a function of the environmental conditions at production facilities, processors want to ensure a healthy environment and secure conditions at production sites.

2

Building a Model for Meat Industry Stewardship Projects

The process for launching the WILESPP merits description because one of the goals of the pilot project is to determine the feasibility of replicating it on the state or national level. In fact, the process and lessons learned while developing the project are some of the more important findings and were first presented in the project mid-term report. These findings are repeated here and cover the project planning, recruitment process, kickoff organizational meeting, and participants' survey.

Developing the Framework for a Pilot Project

The meeting of industry stakeholders in Omaha, Nebraska in May of 2000 resulted in a general agreement on environmental priorities for the meat industry. In particular, all involved agreed that the environmental impacts associated with livestock production, especially its impacts on surface and groundwater quality, are a challenge that should be a meat industry priority. Meeting participants also agreed that the industry, EPA, states, and others should work together to address these priorities. Collaboration, not confrontation, was the goal.

Meetings held throughout 2000 and early 2001 served as a forum for developing a general framework for collaboration among stakeholders with varied interests. The Pilot Project Framework Document established in detail the process by which a project idea would be developed, proposed, and implemented, how decisions would be made, and how the project results would be assessed. Within days of finalizing the framework document, Farmland Foods and Prestage-Stoecker Farms jointly developed the work plan for the WILESPP.

Establishing the WILESPP

The WILESPP work plan defined the project objectives, participants, roles, and a timeline for carrying out each of the project steps. It set forth the goal: *to demonstrate that voluntary environmental stewardship by livestock producers can be defined, documented, and measured.* The project's stated objectives were to:

- Create and test a replicable project and processes that meat processors can use to work with livestock producers on the use of Environmental Best Management Practices to address nutrient management and/or other environmental issues with the livestock industry stakeholders.
- Measure and evaluate the environmental and economic impacts, real and potential, of this pilot project.

Farmland Foods, Inc.

Farmland Foods, Inc. is participating in this pilot project as a demonstration of its corporate commitment to environmental stewardship. The company has a long-standing exemplary record of exceeding expectations in environmental stewardship in their processing business, and more recently, in its oversight and compliance with livestock production. According to Jerry Lehenbauer, formerly of Farmland Foods and one of the original WILESPP team members, "just like producers, this EMS project at our Denison, Iowa plant will make Farmland Foods a better steward. Farmland believes that being a good steward is the right thing to do. We have a 40-year history of working directly with our owners, the farmers marketing their livestock to us, and environmental stewardship is an extension of that relationship."

At the same time this pilot project was being discussed, rules were being drafted in Washington, D.C. that indicated livestock producers and processors could be co-permitted. Farmland Foods felt that resources were already available to livestock producers to achieve environmental stewardship without more regulatory oversight, and were willing to demonstrate the processes in place to achieve this objective.

- Determine the feasibility of adopting and replicating a stewardship project for the meat industry, nationwide.


Beef cattle on slats Photo by Angie Rieck-Hinz, ISU

The work plan described the geographic focus – four counties in western Iowa. It also described how the WILESPP would use the collective resources and skills of the participants to promote the voluntary development and implementation of resource management system conservation planning by a variety of livestock production operations. The project would also document the required resources and lessons learned so the results could be used on a larger scale (i.e., other states or nationally), and inform policy-makers when they consider options for reducing the environmental impacts of animal feeding operations.

The project was initially scheduled to begin in September of 2001; however, the events of September 11th and personnel changes at Farmland Foods during that period resulted in some delays. The first official organizational kick-off meeting took place on November 17th, 2001 in Carroll, Iowa. The project's key participants were all present. The key participants in the WILESPP and their roles are summarized in Table 1.

Table 1. WILESPP Key Players and Project Roles

PARTICIPANTS	PROJECT ROLES
Livestock Producers	Complete Producer Profile and ISU Survey; conduct On-Farm Assessment and Environmental Review (OFAER); collect soil, manure, and groundwater samples; create Emergency Action Plan; update conservation plan; assist with developing CNMP; implement CNMP; maintain records.
Farmland Foods, Inc. and Prestage-Stoecker Farms (agribusiness/meat processing companies)	Project leadership; recruit producers; assist contract producers with creating emergency action plan; coordinate OFEAR appointments; assist in the collection of soil, manure, and groundwater samples; GPS mapping of livestock sites; collect information needed for CNMPs – especially for nutrient management.
Iowa State University	Develop Producer Survey; collect pre-pilot survey information; maintain producer database; assist with outreach activities; conduct post-pilot survey, evaluate the survey results and share with producers; assist with educational materials and producer presentations.
USDA Natural Resource Conservation Service	Collect information required for CNMPs; assist in developing and implementing CNMPs and coordinating planning process with producers; assure that NRCS planning policy and conservation practice standards are met; certify conservation plans (which include the CNMP).
EPA	Project oversight, logistics, document preparation; recruit independent producers; assist independent producers with creating emergency action plan; coordinate OFAER appointments with independent producers; assist independent producers in the collection of soil, manure, and groundwater samples; GPS mapping of independent livestock sites; collect information needed for CNMP.
Certified Crop Advisors	Review current commercial fertilizer applications, crop histories, yield data, and tillage practices for each potential manure application field; assist in providing GPS mapping data on those fields where grid sampling has been done.
Iowa Department of Natural Resources	Project planning, oversight, mapping and modeling CNMPs' impacts on soil and phosphorus losses.

Recruiting Livestock Producers

The project plan called for working with 20 livestock operations: five Farmland Foods contract operations, five Prestage-Stoecker contract operations, five independent pork operations, and five independent beef operations. This goal was exceeded when 23 feeding operations (owned by 19 producers) representing both beef and pork producing enterprises offered to participate.

Prestage-Stoecker Farms

Prestage-Stoecker Farms joined as one of the two meat processing companies to support the early work of this project. According to Al Witt, Environmental Specialist at Prestage-Stoecker Farms,

"As members of the framework committee, we were pleased with the overall planning and thought process involved in designing this pilot. Programs such as this fail when they are created, directed, mandated with little thought process. Successful programs are generated from the ground up by the producers, who are the closest to the real issues and their solutions. We feel that the pilot encourages a management mindset and promotes diligence on documentation and keeping records. Prestage-Stoecker is excited about being part of this unique project."

Recruiting livestock producers to work with a coalition of industry stakeholders like meat processors and government agencies did present some challenges. Although every producer that was asked to participate in the WILESPP eventually agreed after the details of the project were explained, some producers were initially hesitant. The most common concerns were that the project would increase their cost of business and intrude upon the way they manage their operations. However, the producers were eager to dispel negative perceptions of livestock production's impact on the environment and wanted to demonstrate that voluntary programs can make a difference.

Farmland Foods and Prestage-Stoecker Farms took the lead in recruiting livestock producers with whom they have contracts to participate in the pilot project. Company environmental support staff approached the producers either directly, or through other local industry stakeholders (e.g., cattle brokers, extension personnel, livestock nutritionists, and crop consultants). The staff explained the project's objectives and what would be required of the producers, and reassured them that participation would not be overly burdensome. The contract producers had worked with the meat processing company environmental staff in the past and, generally, already trusted their judgment and intentions.

Technical service providers provided by EPA had the task of recruiting "independent" livestock producers. Overall, the independent producers required more convincing than the contract producers did. They wanted details on the Comprehensive Nutrient Management Planning Guidance, potential government agency involvement, and confidentiality of conservation plans and operations. Most importantly, local project leadership, in the form of the county Soil and Water Conservation District commissioners and NRCS staff, proved critical in recruiting independent producers. The producers typically knew the individuals and trusted their technical skills and discretion. In fact, many of the Pilot Project producers had on-going cooperative agreements for land treatment previously signed with soil and water conservation districts.

During the recruitment phase, recruiters discovered a significant difference between the level of environmental stewardship awareness between hog producers and cattle producers. The state of Iowa has one of the most stringent laws addressing hog producers. Consequently, the hog production business in Iowa has received a great deal of scrutiny and regulatory pressure since 1994. Iowa hog producers are required to maintain records and written plans, and Iowa DNR staff regularly visit their farms. Nutrient management plans have been required for most hog producers since 2001, whereas the beef production business has not received much regulatory scrutiny until recently.

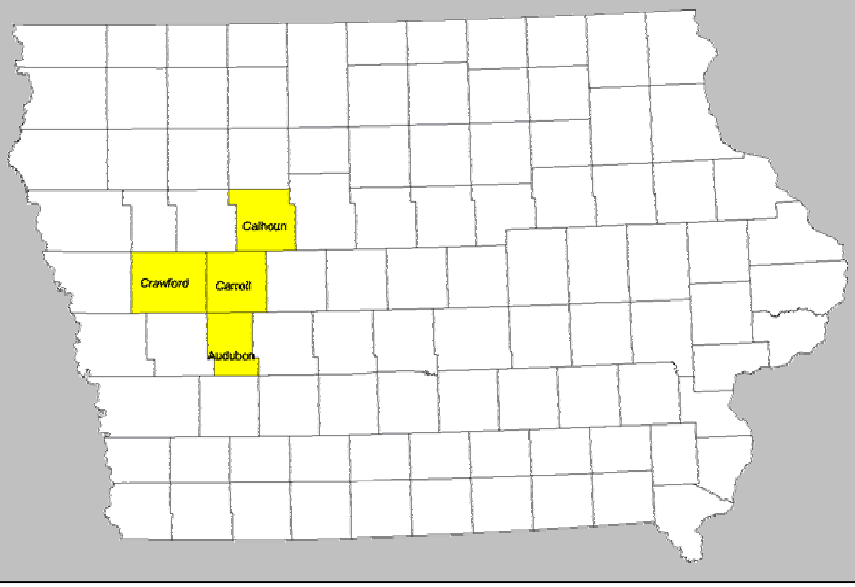
The project recruited producers from four counties in western Iowa: Carroll, Crawford, Audubon, and Calhoun (see Figure 1). Western Iowa was chosen for three reasons:

1. The USDA has multiple technical staff in the Natural Resource Conservation Service (NRCS) offices in each of the counties in the region.
2. There are numerous livestock operations in the region.
3. Farmland Foods and Prestage-Stoecker both have contract farms in the area and have skilled staff with experience in nutrient management and conservation planning.

Figure 1. Geographic Focus: Four Counties in Western Iowa

Portions of six watersheds are included within the boundaries of the four selected counties:

- Soldier River
- Boyer River
- West Nishnabotna River
- East Nishnabotna River
- South Raccoon River
- Raccoon River



WILESPP Producer Profile:

Dave Klocke

Dave Klocke and family, 2002.

My brother Dennis and I began our partnership in 1981 raising purebred breeding stock and engaging in crop farming. We built a 1,200-sow unit in 1993. In 1998, we expanded to 2,400 head. We built the unit with the intent to be responsible pork producers with high standards. It is important to us to be good neighbors and good citizens.

We volunteered to be part of the Stewardship Project to stay ahead of the curve, to be aware of new regulations, and to demonstrate to EPA that we are an environmentally sound operation. So far, the project has shown us that we are doing a good job from a regulatory standpoint and do not have to make any major changes.

Regulatory departments need to be educated that most producers are doing a good job. Unfortunately, publicity has focused on the practices contrary to the majority. This program helps reinforce that we are all working in the same direction. In addition, what is environmentally friendly is often also economically smart.

Changing to a CNMP will have no short-term effect on our operations because we've already done grid sampling and have been applying manure in amounts consistent with testing. In the long term, however, it is apparent that we will need more ground to spread our manure on.

Managing a successful farm operation in the narrow margin environment we are in requires us to use all of our assets to their fullest potential. That is why I see CNMP as a process that helps us manage our business from both an environmental and an economic standpoint.

One of the project objectives was to work with producers with a wide range of facility sizes, types of livestock, and awareness of nutrient management practices. The project succeeded in recruiting a highly varied set of pork and beef producers, ranging from those that use intense pasture management for cow and calf production on highly erodible lands, to those that have high volume, concentrated feedlot enterprises producing harvest-weight livestock. The operations include:

- Beef
  - Cow/Calf to feeder calves
  - Replacement breeding heifers
  - Feeder calves to yearling stockers
  - Feeder calves to show circuit
  - Feeder calves to breeding stock
  - Feeder calves to harvest
  - Yearling stockers to harvest
- Pork
  - Farrow to wean
  - Farrow to feeder pig
  - Farrow to harvest
  - Wean to harvest
  - Feeder pig to harvest

The owners of all of the operations participating in the project are also the managers. At some of the farms, the owner and family are the only employees. At others, there are numerous seasonal and full-time employees.

Once the 19 producers agreed to participate, all of the project partners and participating producers gathered in Caroll, Iowa for a kick-off organizational meeting. During the meeting, the producers were informed of the project's history, what was expected of them, and more details on CNMPs. This kick-off meeting also allowed the producers to communicate their needs and concerns to the project partners and to share their experiences with other participating producers. The project objectives, accomplishments, and preliminary results were also communicated during the course of the project through two newsletters.

Participant Survey

Iowa State University surveyed the participating producers at the start of the project to determine their existing environmental attitudes and practices related to facilities and manure application. A similar survey was conducted

WILESPP Producer Profile:

Darrel Nissen

Darrel Nissen, 2002

Darrel Nissen began his beef cow enterprise in 1980, a time when interest rates and land prices were high and commodity prices were extremely volatile. He knew that to develop his life-long interest in cattle production in the hills of western Iowa, he would need to start fairly small, but with high quality genetics. With the help of exotic cross genetics, AI breeding, and a steadfast commitment to being the best, over the next two decades Darrel built a successful, satisfying and sustainable beef enterprise. His success is evident in the numerous awards his cattle have received at county, state, and national fairs and expositions.

Darrel also realized that in order to maintain the quality of his brood cows, he needed to maintain good feed supplies, especially on his pastures. Initially, many of his pastures were small, poor quality, rented parcels not well suited for corn or soybean production. Over the years, his pasture sizes increased and now range from 80 to 160 acres, making it much easier to manage rotational grazing, fertilizer and herbicide application, and fencing. Darrel uses terraces, grassed waterways, minimum tillage, and contour planting throughout the pasture and crop fields that he owns and rents. Not only do these techniques reduce the amount of runoff to surface waters, they also have resulted in a marked improvement in the condition of his cattle.

Despite the obvious care Darrel has taken to maintain his operations, the CCA visited his farm as part of the WILESPP and made a few recommendations that benefited both Darrel's pastures and the water quality in his area. As a result, Darrel repaired eroded cow pathways; emptied, cleaned out, and rebuilt catch basins; and then reseeded with a mix of pasture grasses. These changes will further reduce erosion and nutrient transport from Darrel's farm. Darrel's reasons for participating in this pilot project were to learn about the environmental impacts associated with his operation and how best to manage these impacts.

by Iowa State University staff as a "post-project" survey to compare results and to evaluate changes in the producers' behavior and attitude during the span of the project.

The initial participant survey, conducted in early 2002, shows that participants differ significantly in size, enterprise type, and production technology, as shown in Table 2.

Table 2. Enterprise and Facility Description

		Type of Facility[1]					Size of Enterprise		
Enterprise	Respondents	CP	CL	OC	OE	P	Min	Ave	Max
		----------Number[2]---------					-----Animal Spaces-----		
Hog Finishing	15	9	4	3	0	0	500	2,600	5,000
Gestating Sows	2	0	1	1	1	0	200	1,300	2,400
Farrowing Crates	2	1	1	0	0	0	28	206	384
Nursery	3	3	0	0	0	0	250	850	2,000
Beef Cow	5	0	0	0	0	5	30	135	400
Backgrounding	2	0	0	0	2	0	80	165	250
Feedlot	6	0	0	3	6	0	60	370	1,300

1. Facility definitions: CP=Confinement with deep pit or outside slurry storage, CL=Confinement with flush system to a lagoon, OC=Open concrete lot, OE=Open earthen lot, P=Pasture.
2. The number of facility types do not sum to the number of enterprises responding because some respondents reported more than one type of facility.

3

Project Results

"This program helps reinforce that we are all working in the same direction. In addition, what is environmentally friendly is often also economically smart." – Dave Klocke, WILESPP hog producer

The WILESPP's primary aim is to encourage the voluntary use of proven conservation practices and nutrient management techniques to reduce the impacts of non-point source agricultural water pollution. The short-term costs to farmers of implementing these practices have, in some cases, been a barrier to their voluntary implementation, despite the long-term benefits to the sustainable productivity of their land. The WILESPP is showing that these costs can be reduced, and both the short-term and long-term benefits can outweigh these costs. In achieving the project objectives, the WILESPP team has concluded that this approach is not only a feasible complement to regulatory options, but in many ways is superior in its ability to promote environmental stewardship beyond current regulatory requirements.

This chapter presents the results of efforts to measure and evaluate the environmental, economic, and operational impacts of the pilot project in the following areas:

- Improved Conservation Practices
- More Efficient Nutrient Application

- Improved Crop Yield
- Reduced Soil and Nutrient Runoff to Surface Waters
- Return on CNMP Investment
- Improved Working Relationships

This chapter also includes a number of quotes from the project participants and stakeholders that help relay their varied perspectives. Many of the quotes in this report were collected as part of a survey designed and implemented by Iowa State University as part of their contribution to the project. Producer anonymity for these quotes is maintained as part of the Iowa State University's survey protocol.

Improved Conservation Practices

The flexibility provided to livestock producers by a voluntary program like the WILESPP leads to better, and more cost effective, results than a traditional regulatory approach suitable for end-of-pipe sources. The conservation practices promoted by the WILESPP and CNMP process have been proven highly effective at reducing the environmental impacts of livestock operations. As part of the process for implementing the CNMP, the WILESPP participants received an on-farm assessment and environmental review (OFAER). The OFAER involves an assessment by a certified third party of the farm's operations and provides recommendations for practices to protect the environment. The OFAER recommendations and CNMP requirements result in a conservation plan with specific conservation practices to be implemented on each farm. While these practices have been used by farmers and promoted by government and non-government organizations for years, their site-specific nature has made them difficult to incorporate into regulations and permits. Typical conservation practices implemented by the WILESPP producers that reduce non-point source water pollution are shown in Tables 3 and 4.

Table 3. Conservation Practices Already Implemented and to be Maintained by Producers

ACTIVITY	QUANTITY (OUT OF 7,788 TOTAL WILESPP ACRES)
Conservation Crop Rotation	4,943 Acres
Conservation Tillage	2,171 Acres
Contour Farming	4,488 Acres
Cover Crops	38 Acres
Critical Area Plantings	7.6 Acres
Field Borders	57,650 Feet
Field Windbreaks	700 Feet
Filter Strips	18.1 Acres
Grade Stabilization Structures	1
Grassed Waterways	30.8 Acres
No-Till	3,415 Acres
Nutrient Management	3,470 Acres
Pest Management	643.3 Acres
Ponds	5
Prescribed Grazing	110 Acres
Terraces	109,765 Feet
Waste Storage Facilities	10
Wildlife Habitats (Upland)	8.6 Acres
Windbreaks	8.6 Acres

Table 4. New or Expanded Conservation Practices Voluntarily Planned to be Applied as Part of CNMP

ACTIVITY	QUANTITY (OUT OF 7,788 TOTAL WILESPP ACRES)
Contour Buffer Strips	40 Acres
Critical Area Seedings	3 Acres
Field Borders	5,500 Feet
Filter Strips	5.5 Acres
Grade Stabilization Structures	7
Grassed Waterways	26.6 Acres
No-Till	750 Acres
Nutrient Management	4,460 Acres
Terraces	6,800 Feet

Some of the WILESPP participants were already applying some of these best management techniques prior to the pilot project and the OFAER validated their good practices. As one participating WILESPP livestock producer put it:

"This is a very good program. As it turned out, I was doing everything right before this. As a result, no changes in my operation were needed. Things already in place were terraces, waterways, filter strips, no-till, and applying manure on corn stalks only."

Another livestock producer noted that while he was already implementing some of the better techniques, he did find the process informative:

"… it did make me more aware that I need to do a more thorough job of testing manure for its nutrient levels."

New practices being implemented by WILESPP producers as a direct result of the project were described by a number of the participating producers.

"Distance to stay-back from intakes, creeks, neighbor's property, set-back guideline when applying manure."

"Fall-seeding rye on chopped corn silage acres, recording manure application, better matching manure with low nutrient spots in field, better calving lot utilization of grass growth."

"Record keeping; pay more attention to media publications; testing manure quality."

More Efficient Nutrient Application

The practices implemented by the WILESPP farms are aimed at ensuring proper application of manure and prevention of runoff from areas that have manure applications and intensive animal use. Using data collected through the survey of participating producers, John Lawrence of Iowa State University summarized the potential for improved efficiency in nutrient application as follows:

"In general, producers over-estimated the nutrient value of their manure. The estimated nitrogen content averaged 20% higher than actual (based on lab analysis), and the estimated phosphorus content was 275% higher than actual. Based on expected application rates, these errors would lead farmers to believe they are applying 22 lbs more nitrogen and 99 lbs more phosphorus per acre than they actually applied, reducing their yield potential. Given this, improved nutrient planning and management under this program should quickly impact the bottom line of participating farms." -- John Lawrence of Iowa State University

Efficient nutrient application saves money. Producers pay for the nutrients entering their farms in the form of feed grain, silage, and fertilizer for crops. By utilizing manure nutrients more efficiently and losing less to the environment, producers will have more available for crops. They will be required to purchase fewer nutrients from outside vendors resulting in lower costs. Therefore, producers often realize financial benefits from improved nutrient management and conservation associated with CNMPs. In some cases, a better understanding of manure nutrient content and soil nutrient content will allow producers to apply more nutrients to their fields to reach the ideal agronomic rate, thereby increasing crop yield.

In other cases, producers will determine that some or all of their fields should receive fewer nutrients, reducing their application rates for those fields (and associated application costs) while allowing them to apply it elsewhere or to sell valuable manure to other farmers. In either case, applying conservation practices in the CNMP to the requirements of NRCS standards and specifications will result in better soil and water quality and likely improved wildlife habitat.

Costs Increase When Manure Is Over-Applied

Assuming a 4,100 gallon per acre (gpa) recommended manure application rate and application costs of $.00914 per gallon, the following table demonstrates how quickly the economics will deteriorate if nutrients are not applied correctly.

	Agronomic Rate	% Over Recommended Rate			
		15%	25%	35%	50%
Rate (gpa)	4,100	4,715	5,125	5,535	6,150
Cost/acre	$37.48	$43.10	$46.84	$50.59	$56.21

These costs do not include the added costs of having to purchase other nutrients to replace the wasted manure.

Improved Crop Yield [1]

The WILESPP did not attempt to measure actual changes in crop yields resulting from the project, but one participating producer did note that he was seeing some improvements:

"When we first tested our manure for nutrient analysis, I found out it was quite a bit lower than the standard that ISU put out, so then I increased our commercial fertilizer, [Phosphorus], and [Potassium] to match removal rates and [crop] yields seem to be responding accordingly. The P index has been a learning experience and a lot of people will get their eyes opened in the future when it becomes implemented."

In addition, based on a 2001 Iowa State University study, we can assume that CNMP practices, such as more efficient nutrient application, would lead to increases in crop yield and revenues. Over-estimating the nutrient value of their manure led some producers to apply less nitrogen than recommended. In the case of corn crops and all else being equal, the study showed that a reduced nitrogen application rate of about 33% below recommended rates would result in about three fewer bushels of corn per acre. So, a rate of 20% below recommended rates may result in about two fewer bushels of corn per acre. With the price of corn approximately $2.15 per bushel, there would be an average revenue loss of $4.30 per acre or, for the average WILESPP operation, $2,100 per year. Adjusting the nitrogen application to recommended rates would likely improve crop yield. Again, this is assuming that nitrogen is the limiting nutrient and does not take into consideration the additional costs of applying (and purchasing, if necessary) additional nutrients.

[1] Developing actual estimates of increased crop yields for the WILESPP producers presents significant challenges. One difficulty is that different crops respond differently to different fertilizer elements. For example, corn response to nitrogen (N) fertilizer is much greater than that of soybean. Estimating improvements in crop yield is further confounded by such variables as existing soil fertility levels, climatic conditions, the form of the nutrient applied, and changes in production practices that affect nutrient use efficiency (Fertilizer Contributions to Crop Yield, Potash and Phosphate Institute, 1996). An additional pound per acre of nitrogen or phosphorus to a crop in a field in which nutrient levels are at or near agronomic rates will have much less impact on crop yields than an additional pound of nutrients in a field that is well below agronomic rates.

Reduced Soil and Nutrient Runoff to Surface Waters

Soil and nutrient loss are two of the primary indicators of environmental degradation associated with livestock production. The loss of sediment and phosphorus from the land and their impacts downstream on the river and marine environments are well known and documented. The WILESPP farms demonstrated that these impacts can be significantly reduced through a voluntary CNMP approach. Results from a widely recognized modeling methodology are presented in Table 5 and indicate that a typical livestock producer in western Iowa with a CNMP could expect, on average, a 13% reduction in soil leaving their farms via runoff and a 7% reduction in phosphorus entering surface water bodies. A summary of the methods used by Iowa DNR to develop these estimates is provided on the following page.

Table 5. Annual Benefits of CNMP for 16 Livestock Operations in Carroll and Crawford Counties, as Estimated by Iowa DNR[1]

SCENARIO	SOIL LOSS (TONS)		PHOSPHORUS LOSS (LBS)	
	Per Acre	Total	Per Acre	Total
Estimate of participating producers' environmental impact assuming typical conservation practices for region[1]	4.19	32,650	2.53	19,690
Estimate of participating producers' environmental impact after implementing CNMPs	3.63	28,230	2.36	18,370
Estimate of sediment/phosphorus loss prevented	0.56	4,420	0.17	1,320
Percent reduction	13.4%		6.7%	

1. Data on the conservation practices used in two of the counties in which the WILESPP operates were obtained from NRCS's National Resources Inventory (NRI), a statistical survey of land use and natural resource conditions and trends in the U.S. Estimates are based on the 16 producers operating in Carroll and Crawford Counties.

Soil and Nutrient Loss: Methodology

To assess the environmental benefits of CNMPs, the WILESPP estimated changes in the amounts of soil and nutrients escaping each producer's farm. To represent nutrient losses, the WILESPP team analyzed the loss of a single nutrient, phosphorus, from participating producer farms. Nitrogen losses were not analyzed by the WILESPP because available methods for estimating nitrogen losses to surface waters are not easily quantified. In addition, phosphorus is usually the nutrient that must be carefully managed when applying manure to crop fields in western Iowa.

Soil loss is dependent on a number of factors including the slope of the land, soil type, rainfall, and conservation techniques used. Estimates of soil loss resulting from erosion can be developed using a number of established techniques and models. The best technique or model depends on the site conditions, available data, and user preferences.

The WILESPP examined three methods for estimating soil loss from the participating farms and one method for estimating nutrient loss. All methods were based on the basic Revised Universal Soil Loss Equation (see Appendix 1). The RUSLE equation is typically applied through computer models. RUSLE2 is the current computer model routinely used by NRCS and throughout the world. RUSLE2 improved upon and recently replaced the original RUSLE1 model and is considered much more powerful and accurate than RUSLE1.

Estimates of soil loss and phosphorus loss were developed by Iowa DNR using a Graphical Information System (GIS) application in conjunction with RUSLE1. Iowa DNR was not able to use RUSLE2 for its soil loss calculations because, in its current format, it is not compatible with GIS applications. Baseline conservation input data consisted of the average conservation practices and treatments for the WILESPP counties obtained from the National Resources Inventory (NRI). In addition, data from the GPS mapping of WILESPP fields were used in conjunction with existing soil type, slope, and rainfall data. These data were then analyzed using the Iowa DNR-developed GIS model to obtain the soil and phosphorus loss estimates presented in the table below. The maps in Appendix 3 demonstrate estimated soil loss under varying scenarios for portions of a field using the Iowa DNR techniques.

Iowa DNR estimated changes in the soil losses from participating producers' farms prior to implementing the CNMPs and after implementing the CNMPs. Recognizing that the participating farms are more proactive than most other producers in the area of environmental stewardship and that many had already embraced many of the nutrient management practices recommended in their CNMPs, the project participants asked, "What would be the environmental benefits if more typical farms embraced the practices detailed in CNMPs?" To answer this question, Iowa DNR conducted detailed and extensive analyses using GIS tools and data sources that included actual soil types and typical conservation practices used in the area. Iowa DNR predicted the baseline sediment and phosphorus loss from the participating producers' farms if these farms had been implementing the average (and less comprehensive) conservation practices used by producers in the area. These comparisons are presented in Table 5 and illustrate the impacts of CNMPs if they were to be implemented more broadly. Descriptions of the methodology and data sources used are presented in Appendix 1.

The practices implemented by the WILESPP farms to reduce soil and nutrient loss are aimed at ensuring proper application of manure and prevention of runoff from areas that have manure applications and intensive animal use. While the WILESPP estimated soil and phosphorus loss from the participating farms, two other main pollutants associated with livestock operations, nitrogen and pathogens, can also be expected to decrease. Another side benefit is more productive soil through improvement in soil tilth, organic matter, compaction, and soil deposition.

Additional estimates of soil loss were calculated by the NRCS district conservationists as shown in Table 6. The district conservationists' baseline estimates were based on their own observations of "typical" conservation practices and treatments in their county. This baseline was compared to the practices and treatments in place at the WILESPP farms after implementation of the CNMPs. Estimates of pre- and post-CNMP soil loss were then developed using RUSLE2 as shown in the table below. Because the data used by the district conservationists to represent "typical" practices were not systematically collected and are subjective, they should be thought of as rough estimates.

Table 6. RUSLE2 Estimated Annual Soil Loss for WILESPP Operations before and after CNMP Implementation, as Estimated by NRCS

	Low (tons/acre)	High (tons/acre)	Average (tons/acre)	Total (tons)
Soil loss prior to plan	2	15	6	47,000
Soil loss after implementing plan	1	5	4	31,000

Farm-specific estimates of soil loss were calculated by Joe Lally, project team member, and Jay Ford, NRCS-DC, based on knowledge of the baseline practices and treatments of selected WILESPP producers compared to the practices and treatments implemented as a result of the WILESPP. These data were then processed using RUSLE2 to derive the estimated soil losses presented in Table 7. This method has the advantage of comparing actual pre- and post-WILESPP results instead of comparing average results at typical non-participating farms to post-WILESPP results at participating farms. It should be noted that these results do not utilize much of the detailed topographic and soil type data used in the Iowa DNR analysis (see Table 5).

Table 7. Pre- and Post-CNMP Soil Loss for Selected Participants

LIVESTOCK PRODUCER	ANNUAL SOIL LOSS (TONS PER ACRE)		COMMENTS
	Pre-CNMP	Post-CNMP	
Drees	7	3.2	Went from injecting liquid hog manure into bean stubble to injecting into corn stubble without further tillage before planting. No-till plants placed directly into corn stubble and bean stubble.
Backhaus	7	2.2	Going from an injection of manure to top-dressing corn stalk residue with a limited quantity of liquid manure. Installing 4.5 miles of filter strips this crop year (2004) equaling 14.6 acres.
R. Weed	10	5	Switched to continuous corn from a corn-soybean rotation. 50% cover or more after planting. Was over-applying nitrogen in old corn-soybean rotation. Now injecting liquid hog manure on all acres each year and decreasing application rate. Also eliminating liquid nitrogen as an herbicide carrier.
J. Weed	10	4	Changed manure application to 11,000 gal/ac on 80 acres from 9,000 gal/ac on 95 ac. Apply 9,000 gal/ac on 15 acres every other year with new CNMP instead of every year. Will complete terraces and/or contour buffer strips.
Renze	3.5	1.8	Corn silage to hay on more acres – will be installing a few more terraces. Switching from high moisture ration to more dry feed mix in ration. Redesigning feedlots to incorporate solids settling and grass buffers.
Goslar	10	5	Switched to continuous corn and additional alfalfa hay production on E slopes. Was applying 20-30 lbs. of nitrogen more than crop usage – need to give up weed and feed starter program. No credit in past for cattle manure that was applied to soybean stubble. May go to 4 years hay rotation on 30 ac of E slope on one tract, and 25 ac of another tract – total increased hay production from 10 acres to 60 acres.
Nissen	16	4	No-till fall-seeded rye into corn silage stubble. Switch 3 year corn/1 year soybeans rotation to continuous corn silage/rye.

The WILESPP results demonstrate that not only do the CNMP planning process and improved management practices protect the environment at a lower cost to the public than regulatory options, they can also bring both short-term and long-term financial benefits to livestock producers.

Together, manure sampling, soil grid sampling and mapping, and more precise manure application rates allow producers to apply the proper nutrient levels to their fields to ensure that crops have just enough for optimal growth and no more. Other conservation practices, such as conservation crop rotation and tillage, contour farming, terracing, cover crops, buffer

strips, and grassed waterways all prevent the wasteful erosion of valuable soil nutrients and improve soil quality.

With fewer nutrients and less soil runoff entering the local watershed, we can expect this approach to result in better water quality. Improvements are already becoming evident, as noted by Darrel Nissen, a representative beef producer on the WILESPP project team:

"Our operation has been committed to a lifetime of continuous improvement of our land, animal, and water resources. By participating in the Western Iowa Pilot Project, we have gained first-hand information on the latest rules and regulations, a third party review of our current management practices, a noticeable improvement in the quality of our pasture drinking water, and a lower volume of sediment leaving our silage fields as a result of implementing our CNMP. We've also been able to demonstrate this success to other producers and several of the agency and industry people working with this project."

Return on CNMP Investment

Although implementation of a CNMP involves up-front investments of time and money, the WILESPP demonstrated how a livestock producer can achieve a return on this investment from greater crop yield, reduced soil and nutrient loss, and improved soil quality. This finding is based on an in-depth evaluation of the pre- and post-CNMP costs and benefits for Mr. Nissen.

With the assistance of other team members, Nissen changed his crop rotation from three years of corn followed by one year of soybean to continuous corn with fall-seeded rye. He also grid mapped and soil tested all of his crop fields to get a detailed understanding of his soil nutrient levels. Using this knowledge, he was able to spread his cattle's manure on the crop fields at variable rates to maximize his crop yield. These new practices reduced his farm's loss of valuable nutrients and soil[2]. As seen in Table 8, the per acre costs of making these changes were offset by the additional value realized from increased crop yields, reduced soil erosion, and improved soil quality.

[2] Natural topsoil formation is a very slow process, perhaps as low as 0.5 ton per acre per year on average. As a result, most soils cannot renew their eroded surface while erosion continues to degrade the soil. The value of topsoil to individual farmers is difficult to quantify and varies from region to region and farm to farm. A "rule of thumb" estimate used by NRCS and others is $5 per ton. However, others have estimated $6.75 per ton and topsoil sells for $15 per ton. Even using the $5 per ton rate, many soil conservation practices can be shown to be cost effective.

Table 8. Example of CNMP Costs Offset by Conservation Savings and Revenue Gains

Operating Costs ($ per Acre)						
	Pre-CNMP (Corn, Corn, Corn, Soybean Rotation)			Post-CNMP (Corn Silage (continuous) plus Fall-Seeded Rye)		
Costs Influenced by Management Practices	Corn Year	Soybean Year	4 Year Total (Corn *3) +Soybean	Corn Year	Fall Rye	4 Year Total (Corn*4)+ (Rye*4)
Seed	$26	$23	$101	$27	$5	$128
Nitrogen	$40	-	$120	$28	-	$112
Phosphorus	$14	$10	$52	-	-	-
Potassium	$6	$10	$28	-	-	-
Herbicide	$32	$26	$122	$32	-	$128
Insurance	$7	$5	$26	$7	-	$28
Miscellaneous	$7	$7	$28	$7	-	$28
Harvest	$22	$17	$83	$100	$10	$440
Haul	$5	$2	$17	-	-	-
Storage	$7	$7	$28	-	-	-
Variable Rate Manure Application	-	-	-	$15	-	$60
4 Year Total	$605			$924		
Total Annual Operating Costs	$151			$231		
Soil Loss Costs per Acre						
	Pre-CNMP			Post-CNMP		
Annual Soil Loss (Tons/Acre)	16.4 tons			4.47 tons		
Total Cost of Soil Loss at $5/Ton	$82			$22		
Rye Yield Revenue per Acre						
Annual Rye Yield per Acre	-			0.5 ton		
Total Revenue at $50/Ton	-			$25		
Total Cost per Acre						
	Pre-CNMP			Post-CNMP		
	$233			$228		

As part of his CNMP, Nissen voluntarily invested in a number of additional operational improvements to further reduce erosion, improve livestock quality, and ensure a good reputation and relationship with neighbors. Some of the changes included: installing surface water diversion terraces around his calving yard; emptying, cleaning and recharging his drinking water ponds; excavating, fertilizing and reseeding worn cattle paths; and reseeding his heifer yard with grass and allowing to mature before restocking. Now that Nissen's CNMP is in place, we anticipate that his farm will continue to achieve

greater operational efficiencies and crop yields. All of these practices will also benefit the environment by improving the quality of down-gradient surface water bodies.

In summary, the CNMPs made sense to the producers. The post-project survey indicated that they generally understood the objectives and recommendations, and 13 of the 19 producers planned to have them fully implemented in 2004. They rated reduced soil erosion, reduced N and P runoff, and improved overall management of land resources among the greatest benefits of the CNMPs. Many of the producers believe they will receive an economic benefit from following the CNMP. On average, they rated reducing fertilizer costs as one of the most effective aspects of the CNMP, rating it at 4.4 on a scale of 0 to 5, with 5 being very high.

Improved Working Relationships

An important feature of the WILESPP is the active involvement of the meat production and processing companies with the livestock producers to assist them with their environmental stewardship efforts. Over the course of the pilot project, most project participants saw value in this collaborative approach as demonstrated by the survey results and quotes from participating producers and processors.

In receiving assistance from meat processors, contracted livestock producers realize a significant benefit in the form of increased environmental knowledge and performance. According to the post-project survey

conducted by Iowa State University, the nine independent producers that do not normally receive assistance from meat processors gained more from the project's one-on-one assistance than their contracted counterparts, ranking the change in their overall environmental awareness resulting from the project as a 3.5, with 5.0 being the highest, compared to a 2.7 for the contracted producers. In general, the contracted producers were already doing many of the manure and nutrient management practices recommended in their CNMPs. For the most part, independent producers were not managing nutrients to the same degree before the project. Participating producers reinforced these survey results in the following statements:

"I wouldn't change anything. The people and organizations involved were very helpful and knowledgeable and were extremely interested in working with the producer to find a program that fit into everybody's plan."

"All my environmental practices came from working with the Prestage-Stoecker farm environmental team."

"I was pleased to find the people connected with the pilot were as anxious to support my management efforts as they were at charting progress on environmental issues."

"We volunteered to be part of the Stewardship Project to stay ahead of the curve. This program helps reinforce that we are all (government and industry) working in the same direction."

"I think one of the biggest benefits has been getting all the interested parties to work together, namely EPA, DNR, NRCS, Farmland, Prestage, and producers."

From the meat processors' perspective, the WILESPP approach of providing hands-on environmental assistance to livestock growers is a necessity for good nutrient management and other conservation practices, but it also reflects initiatives that processors already pursue, in large part to manage risk. Al Witt, of Prestage-Stoecker, put it this way:

"The program that Prestage-Stoecker has with all of its contract growers is very similar to the WILESPP program. Environmental liability is one of the main reasons for having environmental programs with the producers. That is why we have [certified crop advisors] on staff. We are trying to proactively reduce our risk. . . . Prestage-Stoecker sees avoiding litigation as very important. Because the producers are relatively small, litigators will go after the deep pockets."

While noting the substantial benefits that CNMPs can provide to processors, livestock producers, and the environment, Witt felt a potential barrier to widespread adoption of

the plans is the amount of time required to produce them, especially given the upcoming regulatory deadlines imposed by the new CAFO regulations. Prestage-Stoecker has been able to reduce significantly the amount of time its own CCAs spend on developing manure nutrient management plans as well as the burden on its contract producers. Witt noted that Prestage-Stoecker's program focuses only on manure nutrient management plans, which are only a piece of the larger CNMPs. Nevertheless, he felt that some of Prestage-Stoecker's experience in working with livestock producers in this area could be applied to the WILESPP voluntary approach. His specific ideas included:


Houle tank with disc — Photo by Don Peterson, NRCS

- Simplify the CNMP documentation as much as possible – too much paperwork and documentation reduces the ability and willingness of often very busy producers to utilize the plans. The project team recognizes, however, that whatever the format of the CNMP, it must meet NRCS and State agency requirements.
- Per NRCS CNMP standards, where possible, use more visual aids, such as aerial photos and plot maps, to make it as easy as possible for producers to implement the plans.
- Per NRCS CNMP standards, processors should provide guidance to their producer/suppliers that is as simple and, to a certain extent, prescriptive as possible in defining their CNMPs.

The WILESPP project also provided benefits to government stakeholders. The costs of achieving stewardship through the voluntary partnership approach were spread among

stakeholders. The time and money spent on developing and implementing the CNMPs mainly fell upon the local NRCS field offices, the certified crop advisors (CCAs), the producers themselves, and the meat processing firms. The costs of overall project coordination, impacts measurement, and results reporting were primarily borne by the EPA, Iowa DNR, and Iowa State University. Table 9 shows the distribution of time required to develop and implement the CNMPs by project participant and activity. The total time to develop a CNMP, not including implementing recommended practices and evaluating the plan, was about 57 hours per producer. It should be noted that this estimate is based on a limited sample in a single location in the U.S. and that many of the producers had already applied numerous soil and water conservation practices. NRCS completed a national study of CNMPs and estimated that the average time requirement, including implementation and evaluation, is about 135 hours.

Table 9. Average CNMP Development and Implementation Time Requirements per Producer

Action	Agribusiness Coordinator	Agronomist	NRCS District Conservationist	Producer
Updating/Completing Nutrient Management Plan	12 hours	2 hours		2 hours
Preparing Emergency Action Plan	1 hour			
Creating Nutrient Management Narrative	1 hour			
CNMP Design and Planning[1]				
Identify Problems and Opportunities and Determine Objectives			5 hours	2 hours
Inventory Resources and Analyze Resource Data			12 hours	2 hours
Formulate Alternatives, Evaluate Alternatives, and Make Decisions			16 hours	2 hours
Implement the Plan[2]			NA	NA
Evaluate the Plan			NA	NA
Total	14 hours	2 hours	33 hours[1]	8+ hours[2]

1. A fairly significant range of time is needed to develop CNMPs for each farm, which is highly dependent upon the producer's previous experience with the planning process, and the size and type of operation. NRCS received a nutrient management plan from a private agronomist for 17 project participants. However, many of these plans were not fully compliant with the NRCS standards. Therefore, NRCS staff time for planning includes some time for the nutrient management plan. Time estimates shown also reflect the fact that many of the participating producers had experience with conservation efforts prior to this pilot project.

2 Producers were still implementing their CNMPs at the time this report was written; therefore, sufficient data on the time requirements for implementing the CNMPs were not available.

Developing and implementing the CNMPs required time and effort by all participating parties, including the NRCS district conservationists. However, the project did help the NRCS achieve its overall mission. As part of NRCS's role in assisting farmers to conserve soil and nutrients, NRCS set a goal of developing 160 nutrient management plans (NMPs) in Iowa. The 20 NMPs developed as part of the CNMPs are helping NRCS reach this goal. The WILESPP also provided NRCS with an opportunity to examine and improve upon the process for developing CNMPs and to obtain feedback on the process through the post-project survey. One NRCS district conservationist acknowledged the value of the project and CNMPs while noting the required time requirements:

"This was a learning experience for me. I was opposed to CNMPs, but have now changed my opinion. My only concern is with the amount of time required." -- NRCS, District Conservationist

Leroy Brown, the former Iowa NRCS State Conservationist, summed up the NRCS involvement in the WILESPP as follows:

"NRCS staff is excited to be involved in this effort of landowners, private industry, and government to demonstrate that agriculture will respond to the needs of the environment in a voluntary manner if provided with adequate information and technical help. This is particularly so when the response occurs through a locally-led effort spearheaded by some local group, such as the Soil and Water Conservation District."

NRCS and Iowa DNR, having related missions in the area of conservation, found their participation in the WILESPP provided a means for coordinating their data collection and permitting requirements. Iowa DNR policy changed to recognize NRCS-certified CNMPs as meeting the State's nutrient management requirements. In addition, because CNMPs exceed Iowa's requirements for manure management plans, Iowa DNR has the benefit of knowing that some producers are exceeding their requirements, allowing Iowa DNR to devote its assistance and inspection resources elsewhere.

4

Recommendations

The WILESPP showed that a multi-stakeholder group can effectively encourage voluntary environmental stewardship by livestock producers. The WILESPP team believes that the success of environmental initiatives and future voluntary stewardship programs depends on the participation of and leadership from meat processing companies.

Many lessons were learned during the course of the project that will be of value to further efforts promoting voluntary environmental stewardship. The project participants have considered these lessons and developed recommendations for future efforts. In general, project improvements fall into three related areas: efficiency, communication, and performance measurement.

In order to promote widespread use of CNMPs in a short period of time, the process of developing a producer-specific CNMP should be streamlined. While the project demonstrated relatively low resource requirements for each stakeholder on a per producer basis, the project team feels that improvements are possible and necessary if the WILESPP approach is to be expanded to encompass a significant portion of the thousands of animal feeding operations.

Improved communication among participants is necessary to orchestrate the activities of the wide variety of stakeholders such that they each understand their role in the project and work together efficiently towards a common goal. Improved communication beyond the project-specific community will also be needed to convey the benefits of the project and CNMPs in order to encourage more producers to participate.

Improved performance measurement will be necessary to educate all potential stakeholders of the superior results possible through a voluntary approach like the WILESPP. New measurement tools should include the ability to predict easily and quickly not only the environmental benefits of alternative management practices, but also the potential financial costs and benefits so that they can be communicated to the livestock producers and other stakeholders.

Specific recommendations described below address one or more of these general areas.

Convene an Early Stakeholder Meeting to Explain Roles

It is critical in a voluntary project that everyone understands their roles from the start and is confident they have the resources, ability and desire to carry them out. All participants should have an opportunity to contribute to the project design as it progresses from the conceptual stage to a detailed project plan. An early stakeholder meeting to discuss project design would improve project efficiency. The WILESPP did not involve the independent agronomists during the meetings in which the project plan was developed. Getting the input and buyoff of independent agronomists on their role in developing the CNMPs could have improved efficiency in CNMP development.

Develop a Standardized CNMP Format

Greater standardization of the CNMPs will allow for efficient review of the documents for certification. More consistent formats and content would streamline the regulatory review of CNMPs in those states where elements of the CNMP are required of AFOs. An improved standardized format could also ensure that all of the information needed to measure the environmental impacts of CNMPs is available in an easy to use table so that it can easily be extracted from the document.

Streamline the Development of CNMPs

One perceived obstacle for programs that encourage the voluntary development and implementation of CNMPs is the amount of time required from the assistance-providing stakeholders like NRCS, contracted processors, and state environmental agencies. In addition, technical assistance providers need to focus more and more of their efforts on addressing the upcoming requirements for CNMPs under the CAFO regulations. While the site-specific nature of CNMPs eliminates the possibility of a "cookie cutter" approach, most project participants feel opportunities exist to make the process more efficient and effective.

Pigs on concrete lot Photo by IDNR

Portions of the CNMP development process, such as nutrient management plans, may be amenable to automation using custom software. The nutrient management plans were one of the most time consuming components of the CNMP. Iowa DNR project participant Chris Ensminger noted that Iowa DNR staff developed some electronic forms during the WILESPP that could significantly reduce the time to develop nutrient

management plans. Automation of CNMPs, along with inputting key CNMP data directly into a database, would make it easier for users like Iowa DNR to analyze data from a large number of CNMPs, identify data outliers, and summarize data electronically. Lyle Asell of Iowa DNR felt that, ultimately, the aim should be to work towards creating tools that allow farmers to develop their own CNMPs with little or no outside help and that allow them to predict the impact of various conservation practices.

As a partial result of the WILESPP, Iowa NRCS led an effort to gain consensus on the development of an Iowa "One Plan" to assist producers in developing and implementing CNMPs and manure nutrient management plans required by Iowa DNR. The "One Plan" will meet NRCS standards and will be accepted by Iowa DNR for its permit requirements.

Al Witt of Prestage-Stoecker noted that his firm routinely develops the manure nutrient management plans for its contracted producers and that they have streamlined the process such that it now takes less time. Similar efficiencies may be found in the other aspects of CNMP development. While not all livestock producers have the benefit of such assistance from their contracted processors, future efforts should, whenever possible, take even more advantage of the skills and expertise of CCAs to assist with portions of CNMP development.


Photo by IDNR

Dennis Pate of NRCS sees it all this way:

"Yes, time and simplicity are important, but the bottom line is that an effective CNMP is site-specific, based on the needs of the client, and is packaged and explained to the client so that he or she can understand and follow it. It is the implementation, not the development of the CNMP that is most important."

Clarify Roles and Responsibilities of Private Sector Assistance Providers

The WILESPP project plan recognized that outside vendors would be important in creating the nutrient management plans (NMPs), updating the commercial nutrient components of the NMPs, and coordinating the information with the District Conservationists at the USDA-NRCS office as part of the CNMP. As the project got underway, however, it became apparent that without an interest in the success of the project, private sector service providers might need an explicit detailed accounting of their role and responsibilities in the project in order to avoid conflicts of interest and to ensure that project priorities are met. Alternatively, a qualified agronomist directly employed by the project participants (e.g., meat processors, EPA, or an appropriate state agency) may provide the best possible service. Under either scenario, supplying the private sector assistance providers with simple, standardized tools could significantly reduce their burden and increase their efficiency in providing nutrient management planning and implementation assistance.

Demonstrate and Communicate the Benefits of Specific CNMP Practices

Good communication with the livestock producers about the CNMP requirements and their benefits is critical to encouraging participation. Al Witt of Prestage-Stoecker recommends shortening the CNMP documents and making them less cumbersome for the livestock producers. He recommends reducing the amount of background information in the documents, which most producers do not have time to review. In the plans developed by Prestage-Stoecker for its contract livestock producers, only the specific information that producers need to implement the plans is provided. Also, CNMPs need to be demonstrated to producers with tools with which they are most familiar, such as color-coded plot maps, aerial photos, and other visuals that show the right amounts, locations, and best practices for applying nutrients.

Livestock producers also need to understand the benefits they can expect from implementing the plans. With the necessary data entered electronically during the development of the CNMP, Iowa DNR participants noted that the conservation and

financial benefits of CNMPs could be estimated in real time using computer programs. These benefits should also be presented in formats best suited to producers (e.g., color-coded plot maps, aerial photos) perhaps via the Internet.

Moving Forward

The WILESPP participants agree that, ultimately, their project can and should form the basis for a widespread program that promotes voluntary stewardship by livestock producers. The project's findings demonstrate that the environmental benefits of such a program would be substantial, while the costs could be relatively low and shared amongst the various stakeholders. Others have also recognized the benefits of a voluntary, cooperative approach to stewardship by livestock producers, as demonstrated by the Michigan Agriculture Environmental Assurance Program (see box).

Project participants believe that this pilot provides a foundation to develop larger-scale voluntary programs that will build upon the lessons learned in the WILESPP and incorporate the recommendations contained in this report. Such a program will need the active participation of additional meat processing firms and commitments

A Similar Approach:

Michigan Agriculture Environmental Assurance Program

Other organizations are seeing the benefits of adopting the industry/regulator partnership approach to improving the environmental performance of livestock producers. The Michigan Agriculture Environmental Assurance Program (MAEAP) is a voluntary agricultural pollution prevention program that ensures that participating producers use effective land stewardship practices that comply with environmental regulations. MAEAP uses a voluntary, education-based approach to achieve various environmental goals, including:

- Solving environmental pollution problems
- Preventing pollution at its source
- Maintaining and enhancing natural resources
- Monitoring and recording changes in producers' management practices
- Providing incentives for participation
- Encouraging sharing of technological information
- Rewarding accomplishment through award recognition

A systems approach was taken to assist producers in evaluating their farms for environmental risk. The three systems include Livestock, Farmstead, and Cropping. The primary component of the Livestock System is the completion and implementation of a Comprehensive Nutrient Management Plan.

Producers can request third party verification from the Michigan Department of Agriculture after they have developed a CNMP and are following their schedule of implemented practices or improvements. When these requirements are successfully met, producers receive MAEAP verification and recognition for their accomplishments. Some CAFOs may be eligible to choose to become verified through MAEAP instead of seeking coverage under the NPDES General Permit.

"Changes in agricultural practices and increased rural population density have contributed to the need for additional environmental stewardship tools like MAEAP." – Dan Wyant, Director of the Michigan Department of Agriculture, from the MAEAP website.

"The tools and plans developed from the pilot project will assist the MAEAP in achieving its goal of involving 85 percent of livestock production in the MAEAP by 2005." – Russell J. Harding, former Director, Michigan Department of Environmental Quality

from state and federal environmental and agricultural agencies. It will also count on the continued dedication of individual livestock producers working to improve their own operations while improving the environment of their community. Working together through such a program, industry and government can have a profound impact on how resource management is practiced in the U.S., with lasting environmental benefits for us all.

"If we can demonstrate an industry-led effort, including producers and processors, that results in improved environmental management while maintaining profitability, then we have another tool we can use to shape change. The more tools we have and use, the less we will have to rely on the big 'R' tool. Just as the commercial said, 'show me the beef,' I believe the public is saying, 'show me the results.' This is our challenge and opportunity. We are off to a good start, but have a ways to go. We have a lot of good people working together on this project. If we continue to take it seriously, learn from successes and failures, and demonstrate progress, we will be successful." -- Lyle Asell, Iowa DNR

Appendix 1:

Methodology for Estimating Soil and Phosphorus Losses

Using geographical information systems (GIS) tools, data collected from the participating producers throughout the project, and data obtained from NRCS's National Resources Inventory (NRI), Iowa DNR was able to develop estimates for soil and phosphorus loss as a result of erosion from each producer's farm.

For soil loss, Iowa DNR used the Revised Universal Soil Loss Equation (RUSLE). RUSLE is a well-validated equation for estimating average annual soil loss and sediment yield resulting from erosion. RUSLE has been adopted by NRCS as its erosion prediction tool. The RUSLE equation is as follows:

A = R*K*LS*C*P

where:

A = annual soil loss from sheet and rill erosion in tons/acre

R = rainfall erosivity factor

K = soil erodibility factor

LS = slope length and steepness factor

C = cover and management factor

P = support practice factor

Iowa DNR used data from NRCS for the R factor and from a digital version of the NRCS County Soil Survey for the K and LS factors of the equation. For the C and P factors, Iowa DNR used information from the NRCS's National Resources Inventory (NRI). The NRI is a statistical survey of land use and natural resource conditions and trends on U.S. non-federal lands, and serves as the federal government's principal source of information on the status, condition, and trends of soil, water, and related resources in the United States. NRCS conducts the NRI in cooperation with Iowa State University's Center for Survey Statistics and Methodology.

Phosphorus losses were estimated using the Phosphorus Index developed by Iowa State University, the National Soil Tilth Lab, and NRCS. The Phosphorus Index is a tool used to assess the potential for phosphorus (P) to move from agricultural fields to surface water. It uses an integrated approach that considers soil and landscape features as well as soil conservation and P management practices in individual fields. These characteristics include source factors such as soil test P; total soil P; rate, method, and timing of P application from commercial fertilizer, manure, and other organic sources; and erosion. Transport factors include sediment delivery, relative field location in the watershed, soil conservation practices, precipitation, runoff, and tile flow/subsurface drainage. Erosion, runoff, and drainage factors for a site or field are used in a mathematical equation to determine whether the phosphorus movement risk is very low, low, medium, high, or very high.

The Phosphorus Index uses a multiplicative approach to combine source and transport factors in estimating P delivered to water resources. The source factors are combined in a multiplicative manner within three major components based on the major transport mechanisms: an erosion component (sediment loss), a runoff component (water loss), and a subsurface drainage component (water loss through tiles and/or coarse subsoil/substrata). Each component provides a rough (or proportional) estimate of amounts of P delivered from fields through each transport mechanism that would be available for aquatic ecosystems (lb P/acre/year).

Appendix 2:

Project Participants and Plan

Original Project Stewardship Council*

Roger Holtorf.....EPA-OPEI	Dennis Pate.....USDA-NRCS
Al Witt .....Prestage-Stoecker Farms	Jay Ford .....USDA-NRCS
Kellie Welter.....Prestage-Stoecker Farms	Dave York.....USDA-NRCS
Scott McLaughlin . Prestage-Stoecker Farms	Lyle Asell .....IDNR
Jay Green .....Farmland Foods, Inc.	Josh Sobaski.....IDNR
Duane Ideus .....Farmland Foods, Inc.	John Lawrence .....Iowa State University
Patti Vogt .....Farmland Foods, Inc	Rod Backhaus..... Wallace Foundation

* Some of the original Stewardship Council Members are no longer affiliated with the organizations noted here or play an active role on the WILESPP.

First Year Project Plan

Step 1: Stakeholder sponsor fills out producer profile and Soil and Water Conservation District (SWCD) cooperator agreement at producer's farm. Completed profile worksheet and SWCD cooperator agreement are signed by Producer and filed at the appropriate County NRCS office. A copy of the producer profile is sent to Iowa State University. All conservation planning is to be completed according to NRCS planning process (to the RMS level) and all practices will be planned and implemented per NRCS standards and specifications, including the Comprehensive Nutrient Management Guidance.

Step 1A: Iowa State University will undertake "Plan Producer Technical Survey," gather information, and maintain files in an ISU database.

Step 2: Producer or Stakeholder gathers representative manure sample of manure to be field applied in fall of 2001, sends it to lab for analysis. Results to certified crop advisor (CCA), ISU, and project Stewardship Council.

Step 3: Producers/Assistance Providers gather soil sample from fields where fall application of manure will take place. Results are sent to CCA, NRCS, and ISU.

Step 4: GPS mapping of Producer's production sites by Stakeholder. Site maps will be created and copies provided to NRCS and CCA.

Step 5: Producer completes updated Conservation Plan for farm, to at least the CNMP level. NRCS District Conservationist and CCA coordinate the planning process.

Step 6: Form A of OFAER is filled out and sent in by Stakeholder sponsor to OFAER. OFAER assessment occurs within six months of submitting Form A. Results are given to Producer.

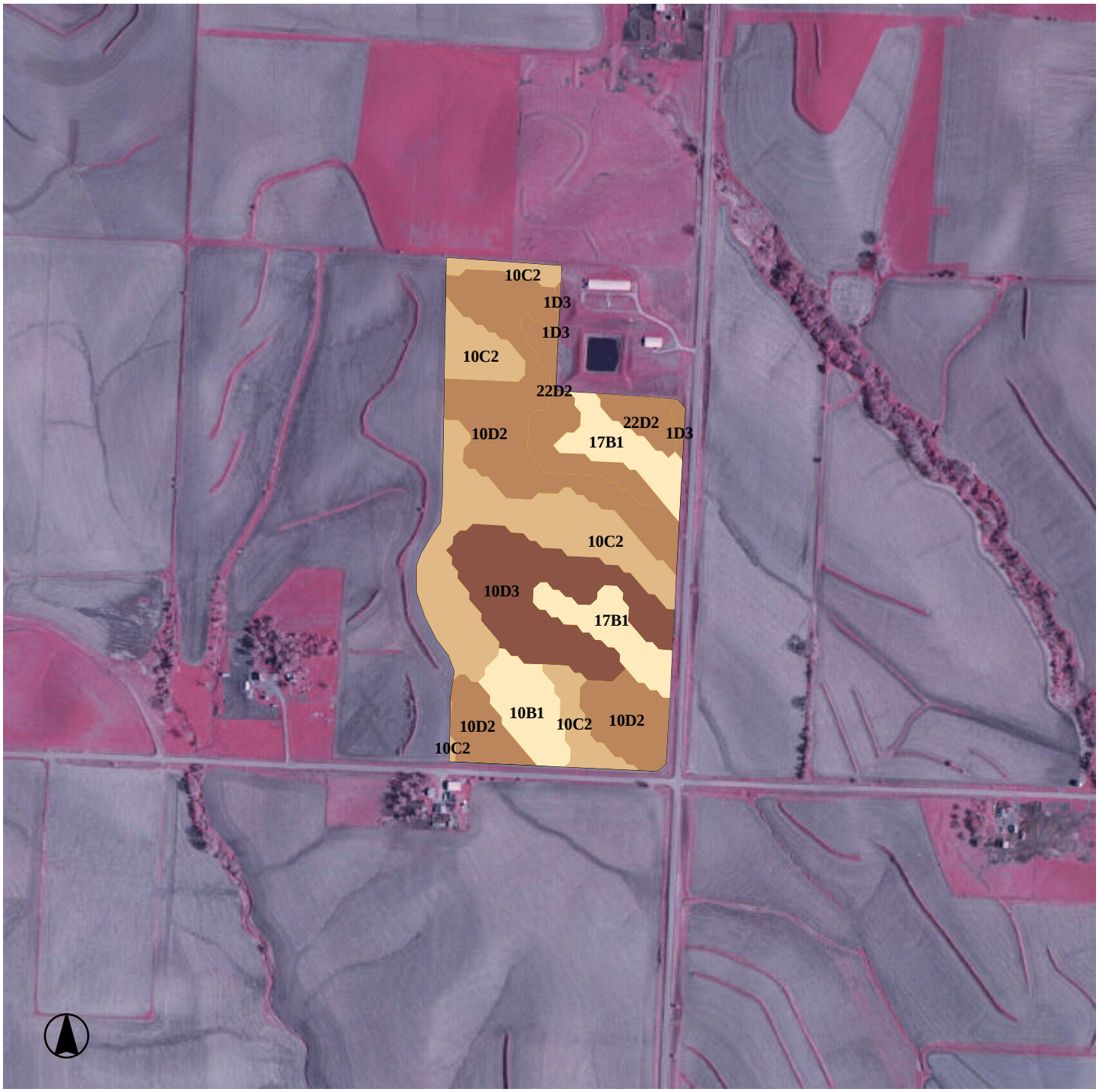
Step 7: Producer develops and implements the Conservation Plan with coordination from NRCS District Conservationist and CCA. Producer maintains records.

Step 8: Manure application logs are filled out by Producers during field application events. Copies are sent to NRCS, CCA, and ISU.

Appendix 3:

Sample Soil Loss Maps

Tract: T4203 Field: 1a-opt 1



RUSLE Report

Total Acres = 61.83

Utilized C Factor = 0.05
Utilized P Factor =0.75

NRCS RUSLE = 3.52 t/a/y
NRCS Total = 217.86 t/y

GIS Avg RUSLE = 3.09 t/a/y
GIS Total = 191.05 t/y

Worst Case Avg RUSLE = 19.76 t/a/y
Worst Case Total = 1221.90 t/y

P-Index Report

Erosion Component = 1.29
Runoff Component = 0.47
Subsurface Drainage Component = 0.00

Final PI Score = 1.77
Risk Assessment: Low

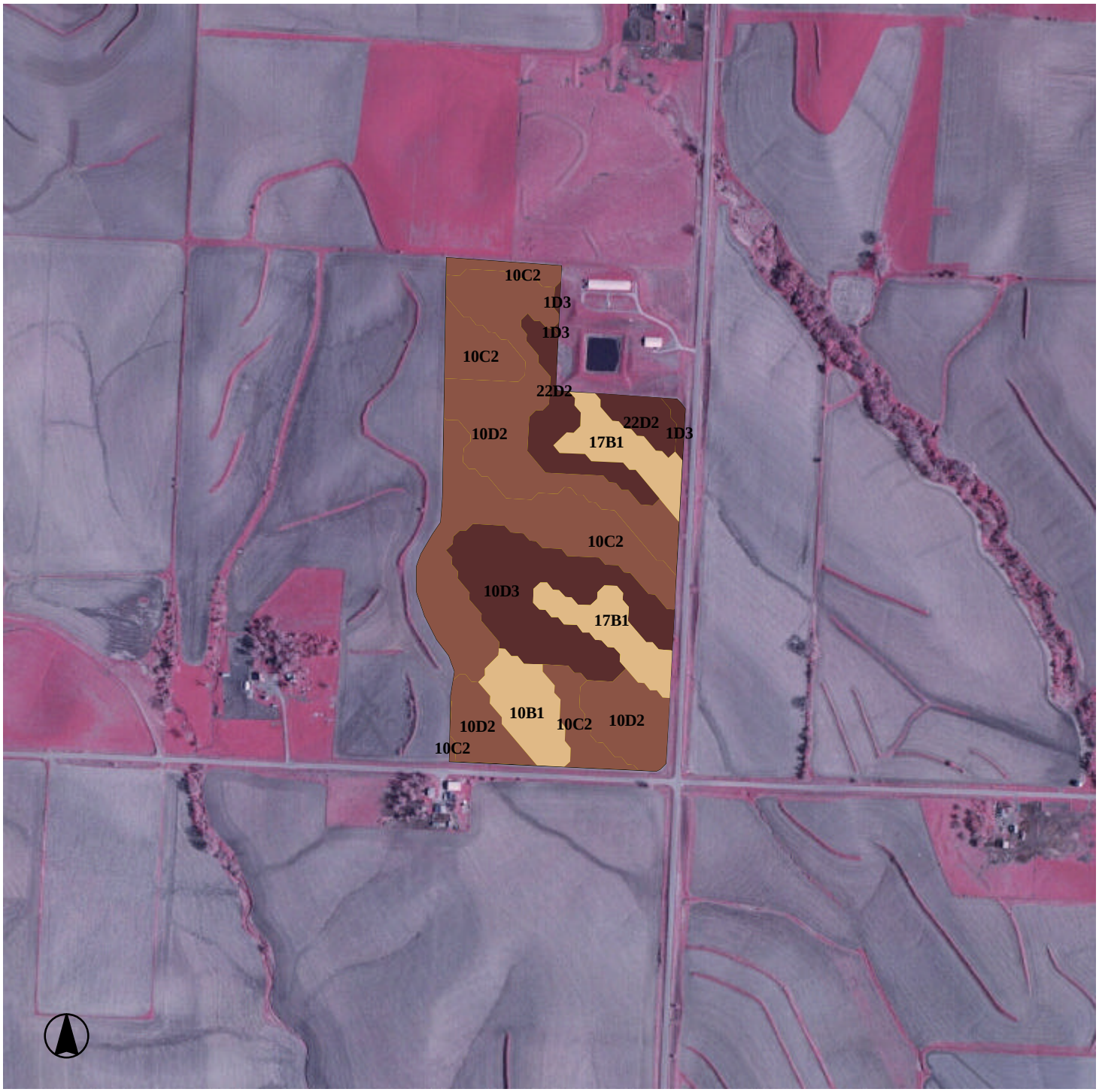
Conditions

Rotation = Corn, Corn
Tillage = Mulch(spring), Mulch(spring)
Residue = 50%, 50%
Practices = Contouring

RUSLE(t/a/y)
< 1
1 - 3
3 - 5
5 - 10
>10

Wed Oct 29 06:59:17 2003

Tract: T4203 Field: 1a



RUSLE Report

Total Acres = 61.83

Utilized C Factor = 0.13
Utilized P Factor =0.75

NRCS RUSLE = 8.32 t/a/y
NRCS Total = 514.39 t/y

GIS Avg RUSLE = 7.30 t/a/y
GIS Total = 451.12 t/y

Worst Case Avg RUSLE = 19.76 t/a/y
Worst Case Total = 1221.90 t/y

P-Index Report

Erosion Component = 3.05
Runoff Component = 0.47
Subsurface Drainage Component = 0.00

Final PI Score = 3.53
Risk Assessment: Medium

Conditions

Rotation = Corn, Soybeans(narrow)
Tillage = Mulch(fall), Mulch(fall)
Residue = 20%, 40%
Practices = Contouring

RUSLE(t/a/y)
< 1
1 - 3
3 - 5
5 - 10
>10

Wed Oct 29 06:52:39 2003