

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Natural Resources and Environmental Stewardship

Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	5%		0%	
102	Soil, Plant, Water, Nutrient Relationships	9%		31%	
104	Protect Soil from Harmful Effects of Natural Elements	5%		1%	
111	Conservation and Efficient Use of Water	10%		0%	
112	Watershed Protection and Management	6%		3%	
121	Management of Range Resources	0%		3%	
123	Management and Sustainability of Forest Resources	5%		0%	
131	Alternative Uses of Land	6%		3%	
132	Weather and Climate	5%		8%	
133	Pollution Prevention and Mitigation	6%		5%	
134	Outdoor Recreation	0%		3%	
135	Aquatic and Terrestrial Wildlife	5%		16%	
136	Conservation of Biological Diversity	5%		7%	
141	Air Resource Protection and Management	5%		0%	
403	Waste Disposal, Recycling, and Reuse	5%		9%	
405	Drainage and Irrigation Systems and Facilities	9%		0%	
605	Natural Resource and Environmental Economics	9%		11%	
608	Community Resource Planning and Development	5%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	14.9	0.0	5.0	0.0
Actual Paid	11.8	0.0	6.8	0.0
Actual Volunteer	26.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1627876	0	913923	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1627876	0	913923	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
1883320	0	3749686	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The following basic to applied research activities will allow for attainment of the four program goals.

- Address air and water quality along with other environmental issues of Iowa through research, education, and extension programs targeted at solving environmental problems of producers, citizens, public health officials, and regulators.
 - Increase the research and adoption of best management conservation practices, crops, and cropping systems that control soil erosion, minimize sediment transport, and reduce nutrient export. Increase the research and adoption of practices, crops, and cropping systems that reduce nitrate export.
 - Approach water quality and quantity issues from a watershed perspective using adaptive management principles the link the private and public sectors.
 - Develop better models and tools to be used to evaluate the effects of changes in the mix and location of crop and livestock systems due to climate change and the impacts of those changes on native plants and animals (wildlands and wildlife).
 - Identify site specific strategies and facilitate the implementation of these strategies to improve air quality and address related concerns such as risks of domestic-wildlife disease transmission, particularly with respect to siting and operations of confined-animal feeding operations and neighbor-to-neighbor relationships.
 - Understand and evaluate the economic impact of management of natural resources including the economic viability of alternative crops, cropping practices, and cropping systems, and the economic and environmental benefits of such alternatives.
 - Quantify the non-market and market values associated with our Iowa natural resources including forests, natural areas/abandoned pasture, CRP, wildlife, energy, and community resources.
 - Research ways to conserve the use of energy inputs used in the production of food, feed, fiber and biofuels with a particular view towards carbon reduction.

- Faculty participate in relevant multistate research committees: NC1034, NC1190, NC1195, W2004, W2128, W2188, W3133.

The following extension/outreach activities will allow for attainment of the four program goals.

- Appropriate curriculum for targeted groups, fact sheets, and web access tools for decision making.
- Targeted programming to address policy issues as they arise including response to public comment documents, development of hard copy materials and resources for regulators and policymakers.
- Produce, update or revise handbooks, newsletters, and bulletins as appropriate.
- Hold workshops, field days, farm/field visits, and satellite and web based sessions as appropriate.
- Develop strategies and programs to increase community (citizen) involvement, especially related to private and public natural resources.
 - Develop and execute educational programs about conservation program in the new farm bill.
 - Develop and execute educational programs about indices and diagnostic tools (e.g. P Index) that can be used to improve nutrient management.
 - Develop and execute educational programs on methods to conserve and produce biorenewable energy.

2. Brief description of the target audience

This program focuses on the private and public sectors. The "actors" to be engaged with research and extension activities associated with this program include: crop and livestock producers, private citizens, public health officials, state and federal agricultural and natural resource agencies, environmental groups, landowners, homeowners, agricultural and natural resource scientists and engineers, agribusinesses, and policy makers.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	42718	11297	0	0

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	12	33	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of producers, agribusiness professionals, and land-owners who attend face-to-face educational activities, including individual consultations.

Year	Actual
2014	42718

Output #2

Output Measure

- Number of producers, agribusiness professionals and land-owners who subscribe to newsletters and access web-based resources.

Year	Actual
2014	2621395

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of acres where the adoption of BMPs and conservation practices was implemented.
2	Number of producers increasing the efficiency of manure and crop nutrient utilization while minimizing surface run off and preserving ground water quality.

Outcome #1

1. Outcome Measures

Number of acres where the adoption of BMPs and conservation practices was implemented.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	144270

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Soil erosion and nutrient loss are major problems facing Iowa farmers as higher land prices and rents increase the pressure to maximize production. Eroded sediment along with nutrients is a source of pollution in Iowa streams and rivers. Reducing soil erosion and nutrient loss will maintain the long term production of Iowa farmland, improve water quality for Iowans, and improve water quality in the Mississippi and Missouri rivers leaving Iowa.

What has been done

Iowa State University Extension and Outreach with the Iowa Learning Farms program provided farmers with needed information on cover crops, conservation tillage, and conservation drainage through partnerships with NRCS, Agribusiness and Extension and Outreach programming. Topics included water quality benefits of cover crops, improving soil with cover crops, managing cover crops, utilizing no-till and strip-till, the Iowa Nutrient Reduction Strategy, controlled and shallow drainage, and use of wetlands and bio-reactors for nitrate reduction.

Results

Since 2008, 86% of farmers attending Iowa Learning Farm field days have made a change in their behavior:

- * 37% of farmers increased surface residue management on 83,757 new acres of strip-till or no-till
- * 44% of farmers increased surface residue management on 60,513 new acres of cover crops since 2010
- * Of the 200,000 cover crop acres planted in Iowa last year, 21% of those acres were by farmers attending a ILF/PFI field day or workshop.

Over 1500 growers and service providers participated in ISUEO Western Iowa No-Till Team events over the last decade, representing approximately 2 million acres. Practices implemented in recent years as a result of WIN team continuing education and demonstration includes over 50,000 acres of cover crops added in the WIN area in 2013 to stabilize soil.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
104	Protect Soil from Harmful Effects of Natural Elements
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
405	Drainage and Irrigation Systems and Facilities

Outcome #2

1. Outcome Measures

Number of producers increasing the efficiency of manure and crop nutrient utilization while minimizing surface run off and preserving ground water quality.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1526

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A.

Reducing surface water nitrate (N) and phosphate (P) enrichment by 45% is a requirement for all states in the Mississippi river basin. Iowa is using the voluntary Iowa Nutrient Reduction Strategy plan to make progress toward that goal. Reducing P and N levels with cover crops, and reducing P losses with reduced tillage are important factors for progress toward that goal. Water quality improvement is the ultimate goal.

B.

Emergency action plans to reduce the risk of environmental damage from manure spills are critical to the effort to minimize surface run off. Environmental groups are closely reviewing manure spill investigation reports on file with the Iowa Department of Natural Resources (DNR). They are checking to see if enforcement action matches AFO/CAFO rules. Iowa law requires that manure spills, regardless of amount, are to be reported to DNR within 6 hours of onset or discovery. Manure spills can have serious environmental impact if manure reaches surface water sources such as streams. The impact to the stream can vary significantly based on existing conditions of the water quality, amount of manure reaching the stream, stream flow, fish and aquatic life present, and designated use (if any) of the stream.

C.

Manure from livestock farms can be an economic and environmental asset if properly applied to crop fields. When manure is mishandled or over applied, it becomes a liability contaminating the environment. Properly application of manure provides a win-win opportunity to minimize crop input cost while optimizing crop production and protecting the environment.

What has been done

A.

The NW Iowa No-till/Strip-till conferences have attracted 302 attendees to two conferences in the past two years. In SW Iowa, an on-going multi-organizational team established the WIN (Western Iowa No-till) team to offer education on these practices, attracting over 1500 attendees to meetings and field days over the past ten years. In SE Iowa, staff have conducted field days, demonstration plots and meetings to share research on successfully incorporating cover crops into their farming operation.

B.

Because of heightened scrutiny of manure management practices and the potential impact on water sources, it is important that livestock producers and manure applicators are well-equipped to 1) prevent manure spills from happening, 2) respond to manure spills in a time-sensitive, safe, and environmentally sound manner, and 3) provide appropriate clean-up and mitigation procedures. The 2014 Manure Applicator Certification (MAC) program reached a total of 1,047 confinement site applicators who attended one of the 72 live certification workshops conducted from January through February 2014.

C.

Iowa State University Extension helps farmers manage their manure through news articles, assisting with manure management plans, and providing education in the manure certification program. Research results presented demonstrate how careful application of the manure provides the optimal crop nutrients and protects the soil, water and air. The program also reviews past environmental spills from other livestock farmers so that steps can be taken to prevent repeating the same mistakes. This program is presented to over 1200 farmers in Iowa through 65 face to face meetings and additional DVD viewings.

Results

A.

Surveys collected from 102 participants at the most recent No-till/Strip Till conference in NW Iowa showed that 30 participants increased their number of acres of no-till or strip till on their farms as a result of information presented at previous conferences. Also, of those 102 who responded to the survey, 10 implemented practices learned at the previous conferences on 1-100 acres; 8

implemented practices on 100-200 acres; 19 on 200-400 acres; 10 on 400-1,000 acres, and 5 on more than 1000 acres. A summary of the lowest level in each category would show that at least 22,000 acres have had practices implanted as a result of these sessions. In SW Iowa, cover crops were implanted on over 50,000 acres in 2013 for soil stabilization and nutrient management. 70% of recent attendees will be implementing the N rate calculator, which means an approximate reduction of applied N rates by 3-7%. SE Iowa participants learned 1) that winter cereals harvested at the boot stage provided the highest feed value, 2) they could increase their forage supplies for livestock operations, and 3) most importantly, that management levels had to increase if cover crops were used.

B.

A total of 1,253 evaluations were completed, a combination of 1047 producers attending a live workshop and 206 who viewed the material by video. When participants were asked if they would be developing an emergency manure spill action plan, 48% responded they already had an emergency action plan; 40% said they plan to develop a plan; 7% said it was not applicable; <1% said they need more information; and 4% did not respond. We received 52 comments directed at the manure spill response scenario. Specific comments about the manure spill ranged from "good exercise" to "makes you think" to "the spill exercise was an eye opener and a good piece of information". Some participants recognized that the situation could be different for each manure spill so they thoughtfully commented on how they might approach different scenarios. On a follow-up survey, 331 out of 343 reported pre-planning is a good idea to prevent manure spills. On this survey 98 out of 376 (26%) respondents indicated they already have a complete emergency action plan; 145 out of 376 (39%) have a plan, but will improve it; and 99 out of 376 (26%) do not have a plan yet, but are working on one. 244 out of 376 (65%) have made modifications to their emergency action plan as result of MAC training.

C.

In follow up surveys of the participants, farmers reported on current practices and plans to reduce negative environmental impacts on over 150,000 acres. The results were:

- * 96% of farmers reported as a result of the training they have a better understanding of the need for emergency preparedness planning.
- * 48% of the farmers reported having already developed an emergency action plan for responding to any manure spills.
- * 40% of farmers reported they plan to develop an emergency action plan for responding to any manure spills.

Iowa farmers are using the knowledge gained from manure applicator training along with available technology and equipment to optimize manure applications in protecting the water, soil, and air.

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

134	Outdoor Recreation
136	Conservation of Biological Diversity
405	Drainage and Irrigation Systems and Facilities
605	Natural Resource and Environmental Economics

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Public Policy changes
- Government Regulations

Brief Explanation

Environmental groups are closely reviewing manure spill investigation reports on file with the Iowa Department of Natural Resources (DNR). They are checking to see if enforcement action matches AFO/CAFO rules.

Increases in corn and soybean prices in the past 5-7 years and associated increases in land and rent prices has increased the pressure on farmers to maximize production on all land being farmed. This has resulted in more marginal land being brought back into row crop production. From 2007 to 2014 CRP acres decreased by over 500,000 acres from 1,970,00 to 1,426,00 acres with most of these acres going back into row crop production. This has put and increased pressure on Iowa soil and water resources and increased the need for conservation measures on these acres. In a small measure, counterbalancing the increases in prices has been increases in farm income that have made more farmers willing to try the use of cover crops to build soils and reduce soil erosion. However, with the recent downturn in commodity prices, this may become a tougher sell.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Turning Point audience response technology to capture information regarding true implementation of the learning from the swine workshops.

Data for measuring the impact of Extension natural resources programs were gathered through end-of-meeting evaluations during Manure Applicator Certification Meetings and Iowa Learning Farm surveys one and 6-18 months following participation in field events.

In the end-of-meeting survey of the participants in manure applicator training 1200 participants returned surveys reporting that:

- 48% reported having already developed an emergency action plan for responding to any manure spills.
- 40% reported they plan to develop an emergency action plan for responding to any manure spills.

In follow-up mailed evaluations, participants in Iowa Learning Farm field activities reported that since 2008, 86% of farmers attending Iowa Learning Farm field days have made a

change in their behavior including:

- 37% of farmers increased surface residue management on 83,757 new acres of strip-till or no-till
- 44% of farmers increased surface residue management on 60,513 new acres of cover crops since 2010
- Of the 200,000 cover crop acres planted in Iowa last year, 21% of those acres were by farmers attending a ILF/PFI field day or workshop.

Key Items of Evaluation

One-thousand-forty-seven manure applicators were trained at 72 hands-on workshops regarding emergency planning to reduce the risk of a surface water runoff event. Data from participants gathered electronically showed that 65% (244 out of 376 surveyed) have made modifications to their emergency action plan as result of the training.

Educational events conducted by Extension agricultural engineers have resulted in 83,757 new acres of strip-till or no-till and 60,513 new acres of cover crops since 2010. Of the 200,000 cover crop acres planted in Iowa in 2013, 21% of those acres were by farmers attending a ILF/PFI field day or workshop.