ISA Environmental Programs

Water Resources Coordinating Council
April 10, 2013. Metro Waste Authority, Des Moines, Iowa

Todd Sutphin
Operations Manager, Environmental Programs and Service

Iowa Soybean Association

Environmental Programs and Services

- *Advance agricultural leadership for environmental quality by developing, applying, and promoting programs that assist producers to perform agronomically and economically*
- Develops policies and programs that help farmers expand profit opportunities while promoting environmentally sensitive production using the soybean checkoff and other resources.
- The Association is governed by an elected volunteer board of 21 farmers.
- Largest State-based row commodity association in U.S. serving 45,000 Iowa soybean farmers.

Environmental Programs & Services
IOWA SOYBEAN ASSOCIATION

Environmental Programs and Services

- Provide leadership for agriculture; have impact
  - **Conservation and Environment**
  - **Policy**
  - **Profitability**
- Seeking and capturing performance
- Apply science methods to gain understanding
- Crosses multiple geographic scales
- Valuing cooperative partnerships and collaborations
- Provide value to membership

Environmental Programs & Services
IOWA SOYBEAN ASSOCIATION

TEAM ISA FIELDS OF CHAMPIONS
IOWA SOYBEAN ASSOCIATION

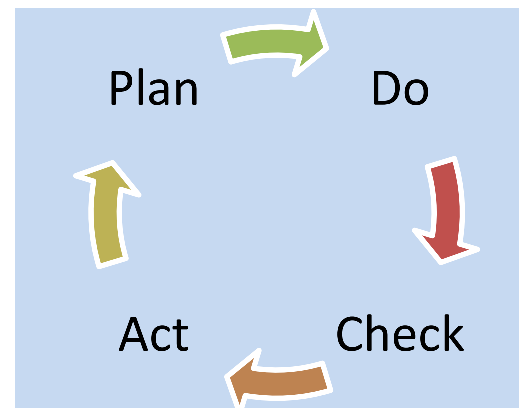
ISA EPS Strategies

- Technical assistance for farmers, watersheds and organized stakeholder groups
- Leveraging farmer investment with public – private partnerships
- Monitoring and assessment
- Data management and analysis
- Adaptive management framework – PLAN, DO, CHECK, ACT
- Targeting for cost effectiveness and measuring outcomes for performance
- Public education, communication and outreach
- Management evaluation and reporting

Farm Scale Planning

Soil | Water | Air | Plants | Animals | Wildlife | Energy

- **Create a plan to help farmers address natural resource concerns**
  - Document: nutrient, soil and pest management planning
  - Partner with TSPs, CCAs and Agronomists
- **Incorporates business management principles**
  - Environmental policy, legal requirements and communication
  - Continual improvement cycle
- **Implement evaluation and testing**
  - Provides feedback to the plan



TEAM ISA FIELDS OF CHAMPIONS
IOWA SOYBEAN ASSOCIATION

STARS

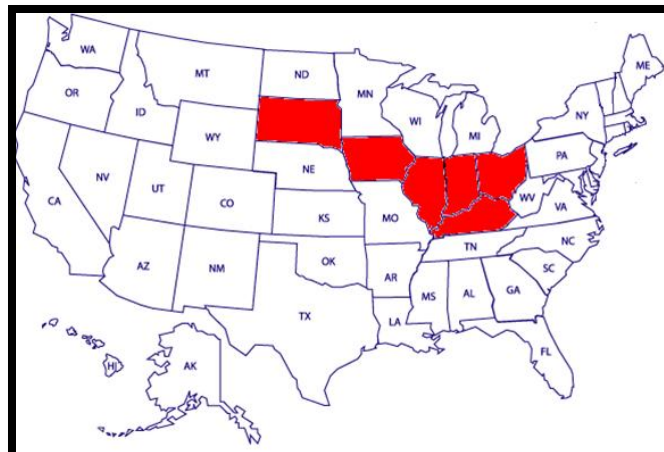
Strategies Targeting *American* Agricultural Resources and Sustainability

SOUTH DAKOTA SOYBEAN ASSOCIATION

ILLINOIS SOYBEAN ASSOCIATION

SOY OHIO
Ohio Soybean Council

Iowa Soybean ASSOCIATION
EXPANDING OPPORTUNITIES. DELIVERING RESULTS.



INDIANA SOYBEAN ALLIANCE™

USB
UNITED SOYBEAN BOARD
Making Your Checkoff Pay Off.

Kentucky Soybean Board

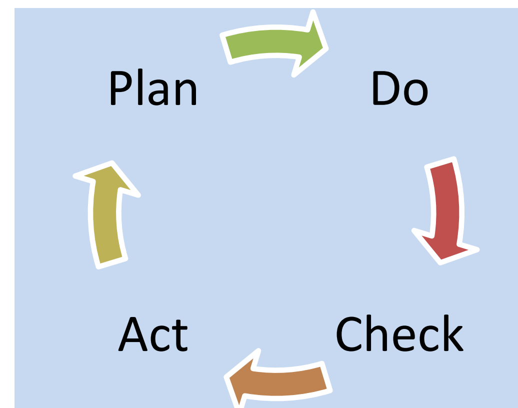
- Multi-state project to improve farm profitability, energy efficiency, and environmental performance.

STARS

Strategies Targeting *American* Agricultural Resources and Sustainability

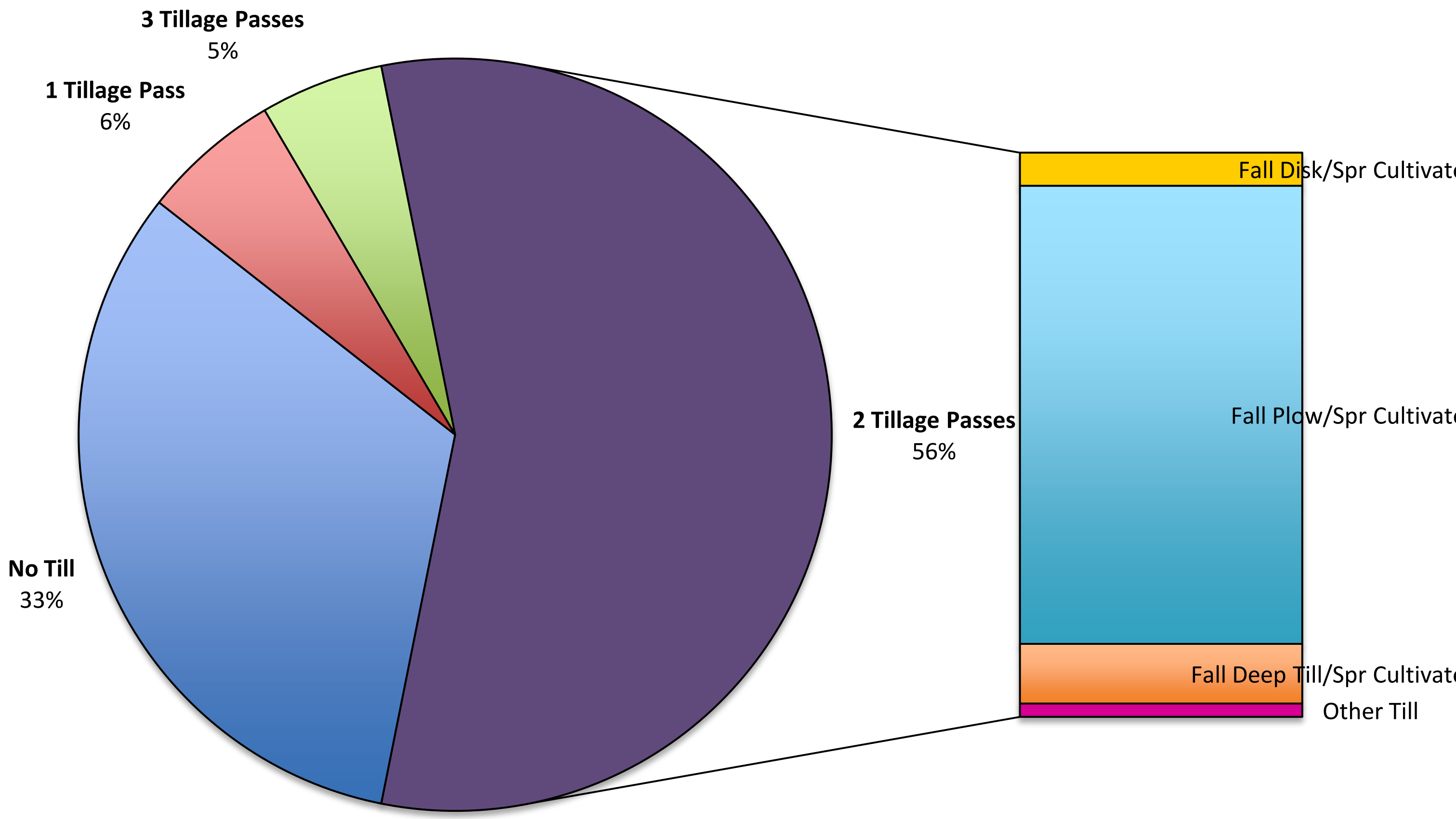
Soil → **Water** → **Air** → **Plants** → **Animals** → **Wildlife** → **Energy**

- Enroll approximately 500 participants across 6 states in CEMSA (soil, nutrient and energy)
- Partner with state soybean commodity groups
- Document and analyze energy use, other input use and management practices—3 years
- Address on-farm resource management and sustainability



Quantifying Practices

Frequency of Tillage among 2010 Iowa Soybean Fields (n=151)

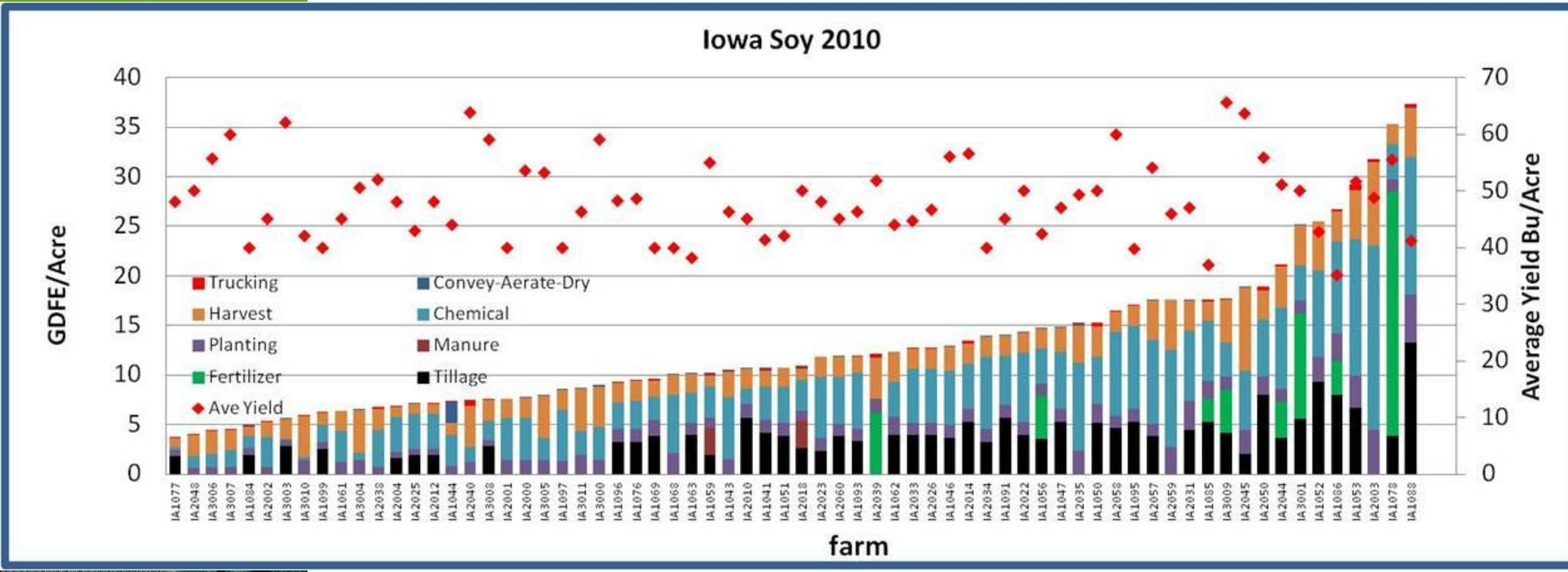


Source: Preliminary STAARS Data Analysis
Iowa Soybean Association Environment Programs and Services, February 2013

Funded by: Soybean Checkoff, USB and 6 QSSB's

Environmental Programs & Services
IOWA SOYBEAN ASSOCIATION

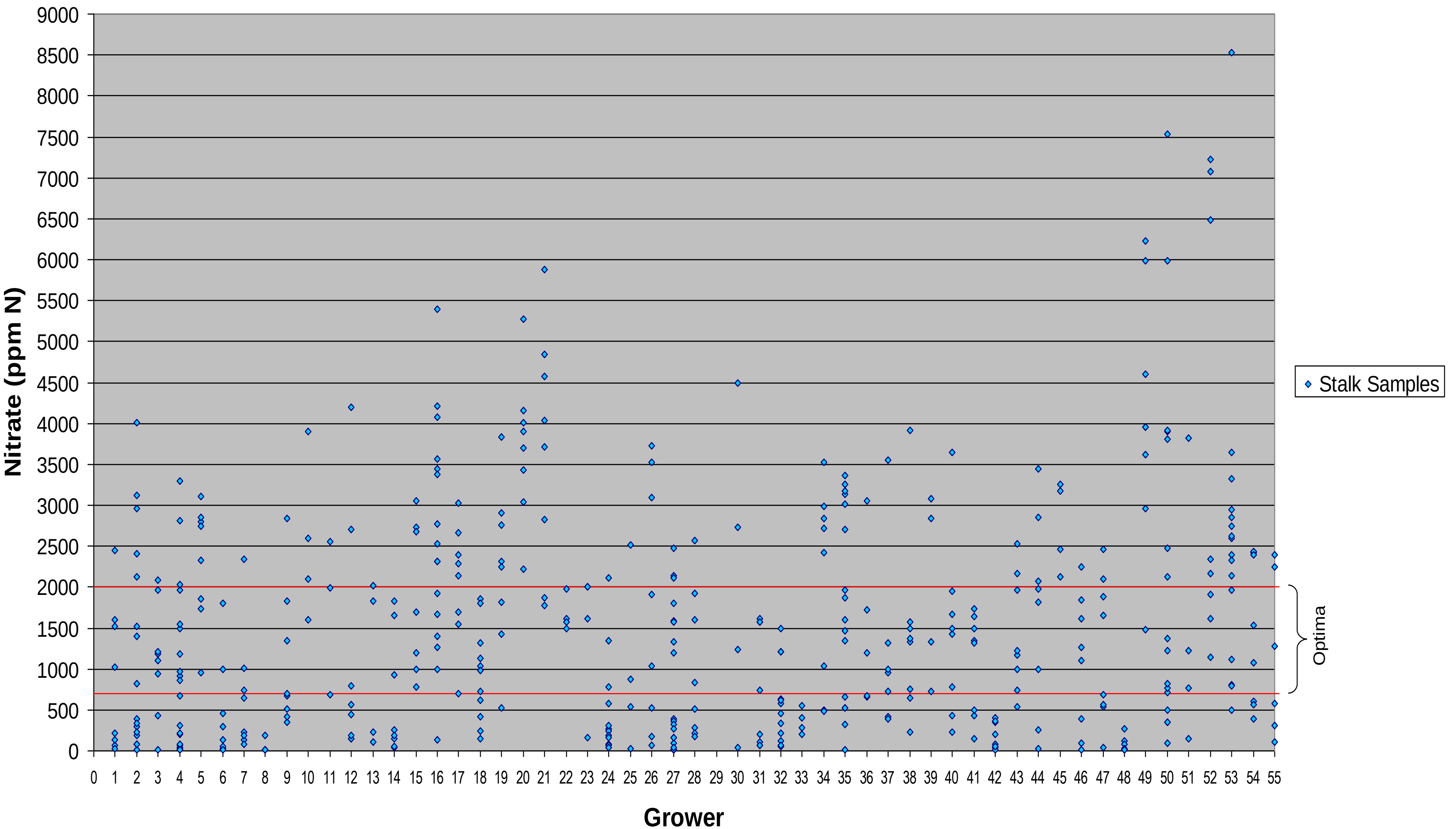
GDFE/ACRE & Yield
2010 Iowa Soy



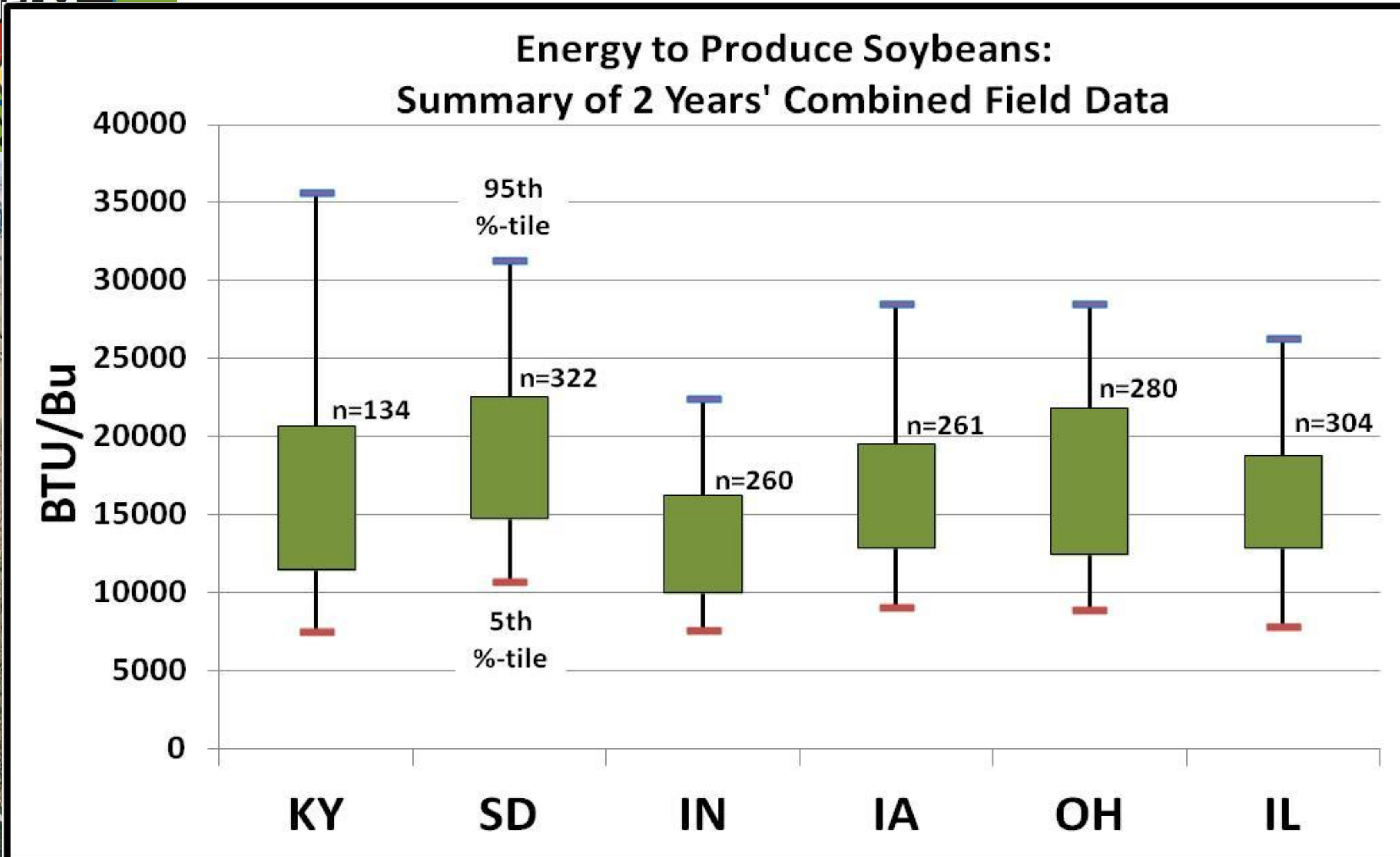
Source: Preliminary STAARS Data Analysis N= 72 Producers 149 Fields
Iowa Soybean Association Environment Programs and Services, February 2013
Funded by: Soybean Checkoff, USB and 6 QSSB's

Environmental Programs & Services
IOWA SOYBEAN ASSOCIATION

2006 Corn Stalk Nitrate Analysis *(Boone River)*: Comparison Between Growers



STAARS Data



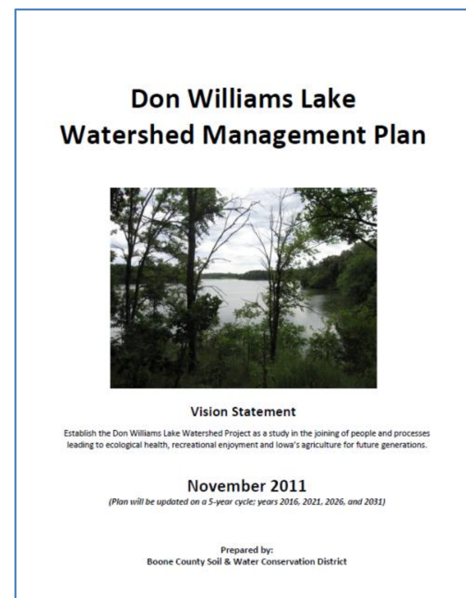
Source: Preliminary STAARS Data Analysis
Iowa Soybean Association Environment Programs and Services, February 2013
Funded by: Soybean Checkoff, USB and 6 QSSB's

Environmental Programs & Services
IOWA SOYBEAN ASSOCIATION

TEAM ISA FIELDS OF CHAMPIONS
IOWA SOYBEAN ASSOCIATION

Watershed Planning

- **A comprehensive plan for the watershed (follows watershed planning protocol)**
  - Farmer involvement; locally-led
  - Identify resource concerns
  - Establish specific goals/objectives
  - Inventory watershed
  - Formulate alternatives/evaluate alternatives
  - Make decisions/write plan; includes implementation schedule and resource needs.
- **Infield/Edge of Field**
- **Set of integrated solutions; no silver bullet**
- **Implementation**



Don Williams Lake
Watershed Management Plan

Vision Statement

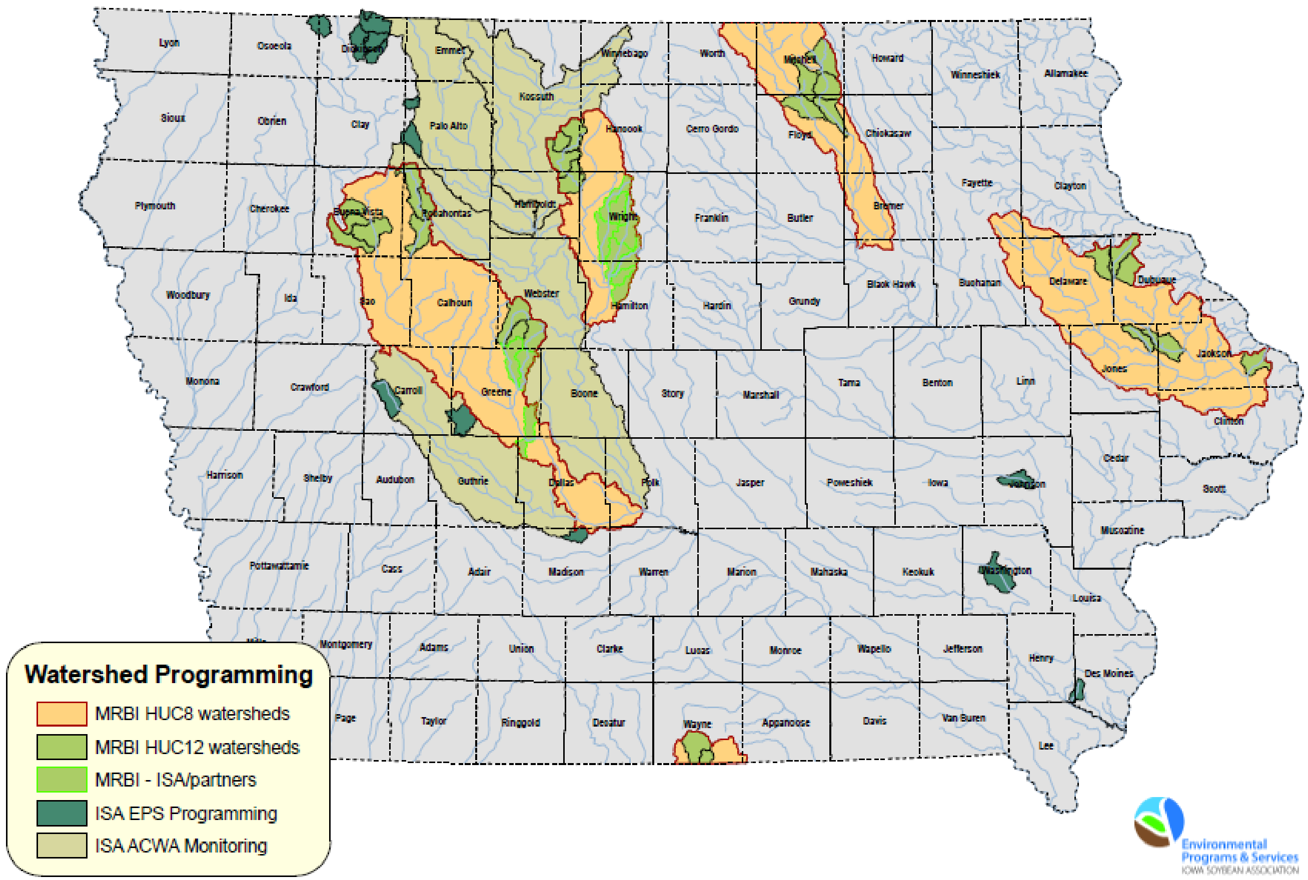
Establish the Don Williams Lake Watershed Project as a study in the joining of people and processes leading to ecological health, recreational enjoyment and Iowa's agriculture for future generations.

November 2011
(Plan will be updated on a 5-year cycle: years 2016, 2021, 2026, and 2031)

Prepared by:
Boone County Soil & Water Conservation District

Environmental Programs & Services
IOWA SOYBEAN ASSOCIATION

ISA Environmental Programs and Services - Watershed Programming



225 farms

65 defined watersheds

-**39 active and 26 supporting ~ 6 million acres**

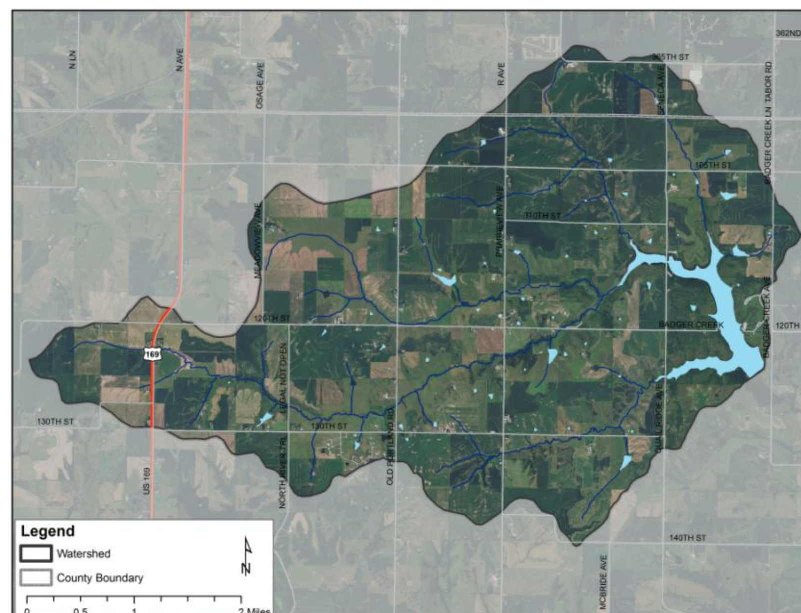
- over **35 public and private partners.**

Badger Creek Lake Watershed
Goals and Objectives

Goal 1: Reduce non-point source pollution to at or below TMDL levels in the Badger Creek Lake watershed while maintaining agricultural productivity.

Objective 1: Reduce sediment delivery to Badger Creek Lake by <u>7,078 tons</u> within 8 years, and an additional <u>3,805 tons</u> by year 20 for a <u>10,883 ton per year</u> or 74% load reduction.

Objective 2: Reduce phosphorus delivery to Badger Creek Lake by <u>9,202 pounds</u> within 8 years, and an additional <u>4,945 pounds</u> by year 20 for a <u>14,147 pounds per year</u> or 74% load reduction.



Badger Creek Lake Watershed

Table 9. Summary of Best Management Practices.

Upland Practices	Targeted Areas	Erosion Target Type	Treatment Type	Overall Goal (Acres/ Practices)	Sediment Reduction Efficiency	Phosphorus Reduction Efficiency	Erosion Reduction (t/y)	SD Reduction (t/y)	P Reduction (lbs)
Cover Crops[1]	Cropland	Sheet & Rill Erosion	Source Control	400	50%	50%	687.00	171.75	223.28
Grassed Waterways	Cropland	Ephemeral Gullies	Source Control	75	30%	-	154.58	108.20	140.66
Bioreactor	Cropland	NA	Source Control	1(#)	-	-	-	-	-
Grade Stabilization Structures	Cropland/ Park	Gully Erosion	Trap	9(#) - 459	90%	90%	2,838.00	1,986.60	2,582.58
Water and Sediment Control Basins	Cropland	Sheet & Rill Erosion	Trap	20(#) - 1,224 ac	90%	90%	7,567.99	1,892.00	2,459.60
Nutrient Management	Cropland	NA	Source Control	5,500	-	-	-	-	-
Terraces[3]	Cropland	Sheet & Rill Erosion	Trap	200,000 (ft) - 2,443 ac	90%	50%	5,082.75	1,270.69	1,651.90
Prescribed Grazing	Pasture	Sheet & Rill Erosion	Source Control	90	25%	25%	17.55	4.39	5.70
Residue & Tillage Management(No Till/Strip Till)[2]	Cropland	Sheet & Rill Erosion	Source Control	4,000	50%	50%	13,740.00	3,435.00	4,465.50
Riparian, In-Stream, Edge of Field Practices									
Pasture/Grassland Management	Pasture	Streambank Erosion	Source Control	200	50%	50%	78.00	19.50	25.35
Riparian Buffers	Cropland	Sheet & Rill Erosion	Trap	50	45%	45%	154.58	38.64	50.24
Wetland Restoration	All Sources	All Sources	Trap	2(#) - 5,225 ac	20%	20%	5,291.27	1,322.82	1,719.66
Streambank Protection	Streambank	Streambank/ Shoreline Erosion	Source Control	3,800 (ft)	90%	90%	350.00	315.00	409.50
Shoreline Protection	Shoreline	Shoreline Erosion	Source Control	5,000 (ft)	100%	100%	318.00	318.00	413.40
TOTAL								**10,882.59**	**14,147.36**

Badger Creek Lake Watershed - Implementation

Table 12. Implementation schedule.

Goal 1	Reduce non-point source pollution to at or below TMDL levels in the Badger Creek Lake watershed while maintaining agricultural productivity.	Phase 1 Years 1-4			Phase 2 Years 5-8			Phase 3 Years 9-12			Phases 4 & 5 Years 13-20		
Obj. 1&2	Reduce sediment and phosphorus delivery to the lake.	Units (Acres/ Practice)	SD Reduction (tons)	P Reduction (lbs)	Units (Acres/ Practice)	SD Reduction (tons)	P Reduction (lbs)	Units (Acres/ Practice)	SD Reduction (tons)	P Reduction (lbs)	Units (Acres/ Practice)	SD Reduction (tons)	P Reduction (lbs)
	Cover Crops (340)	*100*	42.9	55.8	*100*	42.9	55.8	*100*	42.9	55.8	*100*	42.9	55.8
	Grassed Waterways (412)	*30*	43.3	56.3	*30*	43.3	56.3	*15*	21.6	28.1	--		
	Grade Stabilization Structures (410)	*6(#)*	1,324.4	1,721.72	*3(#)*	662.2	860.86	--			--		
	Water and Sediment Control Basins (638)	*10(#)*	946	1,229.80	*5(#)*	473	614.9	*5(#)*	473	614.9	--		
	Nutrient Management (590)	*2,000*	0	0	*1,500*	0	0	*1,000*	0	0	*1,000*	0	0
	Bioreactor (747)	*1(#)*	0	0	--			--			--		
	Terraces (600)	*70,000 (ft.)*	444.7	578.2	*50,000 (ft.)*	317.7	413.0	*40,000 (ft.)*	254.1	330.4	*40,000 (ft.)*	254.1	330.4
	Prescribed Grazing (528)	*35*	1.70	2.21	*35*	1.70	2.21	*10*	.5	.63	*10*	.5	.63
	Residue & Tillage Management(No Till/Strip Till) (329)	*1,600*	1,374	1,786.2	*1,200*	1,030.5	1,339.7	*600*	515.3	669.8	*600*	515.3	669.8
	Pasture/Grassland Management 512)	*80*	7.8	10.1	*60*	5.9	7.6	*40*	3.9	5.1	*20*	2.0	2.5
	Riparian Buffers (393)	*20*	15.5	20.1	*10*	7.7	10.0	*10*	7.7	10.0	*10*	7.7	10.0
	Wetland Restoration	--			--			*1(#)*	1,183.6	1,538.6	*1(#)*	139.2	181.0
	Streambank Protection	*1,000 (ft)*	82.9	107.8	*1,000 (ft)*	82.9	107.8	*1,000 (ft)*	82.9	107.8	*800 (ft)*	66.3	86.2
	Shoreline Protection	*1,000 (ft)*	63.6	82.7	*1,000 (ft)*	63.6	82.7	*1,500 (ft)*	95.4	124.0	*1,500 (ft)*	95.4	124.0
TOTAL Reduction			*4,346.8*	*5,650.9*		*2,731.4*	*3,550.9*		*2,680.9*	*3,485.1*		*1,123.4*	*1,460.3*

Badger Creek Lake Watershed *Planning Maps*

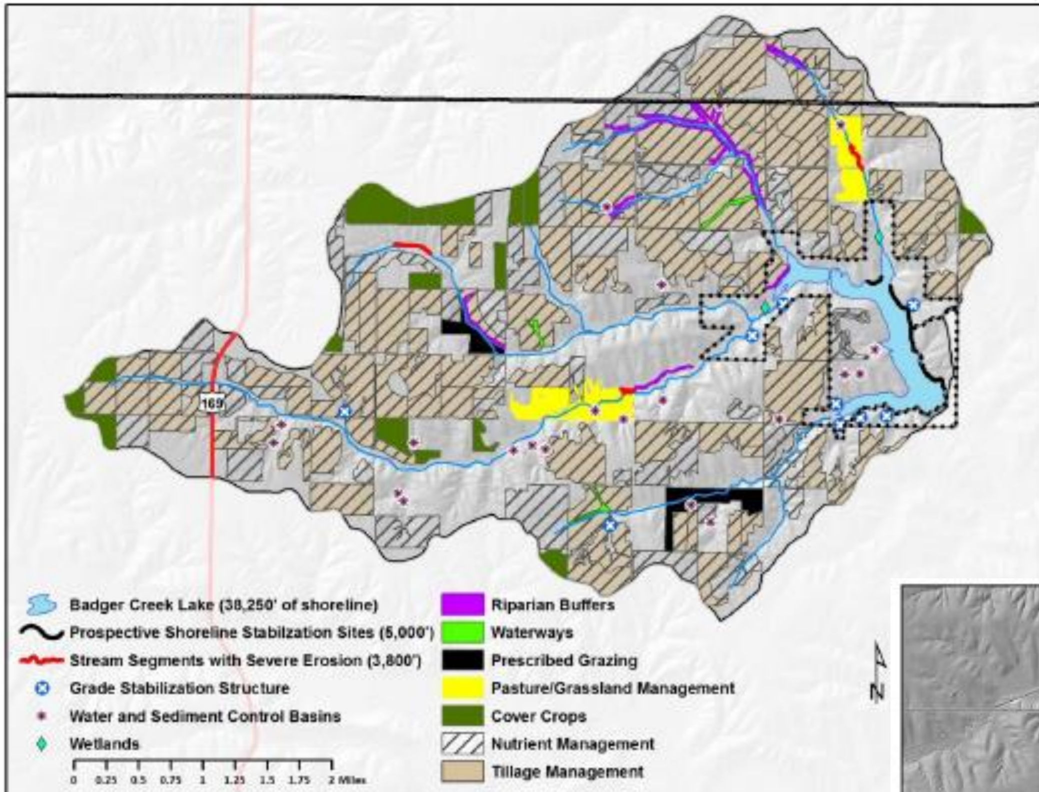


Figure 19. Ideal BMP placement scenario.

Implementation Funding:

- National Water Quality Initiative
  - ~$250,000; 2012
  - ~$328,000; 2013
- EPA Section 319
  - ~$420,000
- Iowa DNR - TBD
- Local Match/Other - TBD

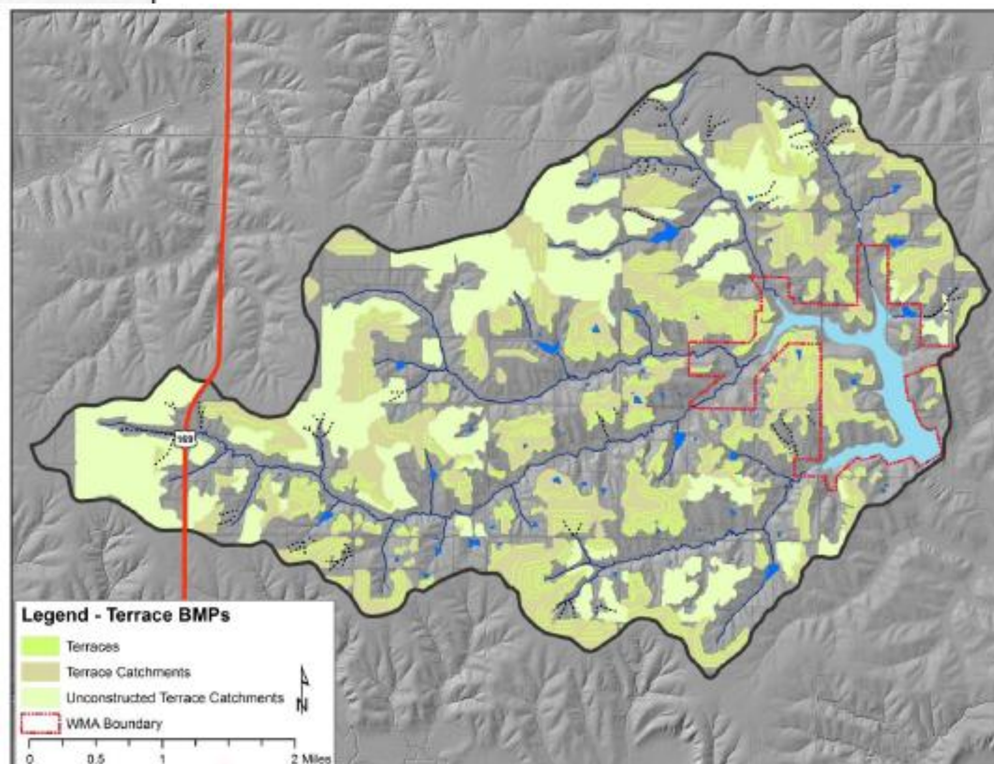
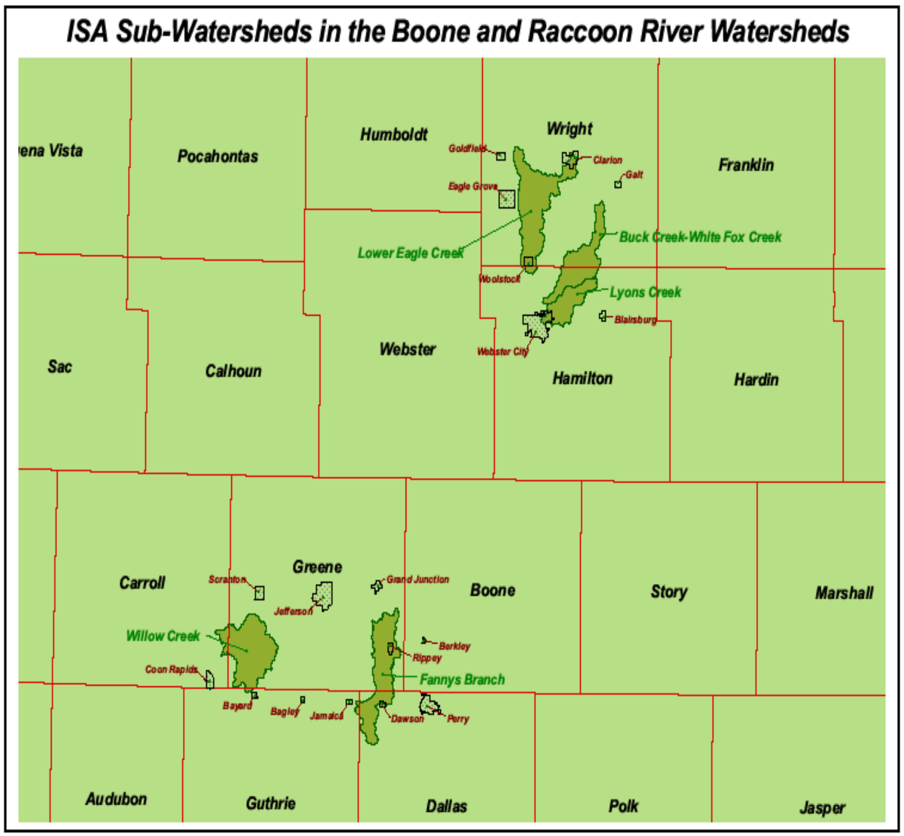


Figure 20. Ideal BMP placement scenario – constructed and unconstructed terraces.

ISA Conservation Innovation Grant



- Develop watershed plans
- Monitor water quality
- Develop Resource Management plans for 100 – 120 producers
- Conduct evaluation for 100 – 120 producers
- Aggregate evaluation results
- Bring additional financial and technical resources to the watersheds

Highlights/Lessons Learned

- Local commitment and participation/Locally-led
- Planning is essential (farm/watershed)
- Infrastructure to gain capacity
- Adaptive Management or Plan-Do-Check-Act
- Alignment (agronomists, co-op, CCA)
- Program Delivery; Tech. Assist. (public/private)
- No “silver bullet”
- TIME

<u>Next steps</u>:

- Update existing plans; interim goals; adaptive management – continual improvement
- Develop watershed plans for priority watersheds identified in State Nutrient Strategy

Iowa Nutrient Reduction Strategy

- A science-based framework for assessing and reducing nutrient loss from both point and nonpoint sources.
- Nonpoint Source Goals
  - Reduce Total N by 41%
  - Reduce Total P 29%
- Dedicated funding soon

Iowa Strategy to Reduce Nutrient Loss: Nitrogen Practices

This table lists practices with the largest potential impact on nitrate-N concentration reduction (except where noted). Corn yield impacts associated with each practice also are shown as some practices may be detrimental to corn production. If using a combination of practices, the reductions are not additive. Reductions are field level results that may be expected where practice is applicable and implemented.

	Practice	Comments	% Nitrate-N Reduction+	% Corn Yield Change++
			Average (SD*)	Average (SD*)
Nitrogen Management	Timing	Moving from fall to spring pre-plant application	6 (25)	4 (16)
		Spring pre-plant/sidedress 40-60 split Compared to fall-applied	5 (28)	10 (7)
		Sidedress – Compared to pre-plant application	7 (37)	0 (3)
		Sidedress – Soil test based compared to pre-plant	4 (20)	13 (22)**
	Source	Liquid swine manure compared to spring-applied fertilizer	4 (11)	0 (13)
		Poultry manure compared to spring-applied fertilizer	-3 (20)	-2 (14)
	Nitrogen Application Rate	Nitrogen rate at the MRTN (0.10 N:corn price ratio) compared to current estimated application rate. (ISU Corn Nitrogen Rate Calculator – http://extension.agron.iastate.edu/soilfertility/nrate.aspx can be used to estimate MRTN but this would change Nitrate-N concentration reduction)	10	-1
	Nitrification Inhibitor	Nitrapyrin in fall – Compared to fall-applied without Nitrapyrin	9 (19)	6 (22)
	Cover Crops	Rye	31 (29)	-6 (7)
		Oat	28 (2)	-5 (1)
	Living Mulches	e.g. Kura clover – Nitrate-N reduction from one site	41 (16)	-9 (32)
Land Use	Perennial	Energy Crops – Compared to spring-applied fertilizer	72 (23)	
		Land Retirement (CRP) – Compared to spring-applied fertilizer	85 (9)	
	Extended Rotations	At least 2 years of alfalfa in a 4 or 5 year rotation	42 (12)	7 (7)
	Grazed Pastures	No pertinent information from Iowa – assume similar to CRP	85	
Edge-of-Field	Drainage Water Mgmt.	No impact on concentration	33 (32)	
	Shallow Drainage	No impact on concentration	32 (15)	
	Wetlands	Targeted water quality	52	
	Bioreactors		43 (21)	
	Buffers	Only for water that interacts with the active zone below the buffer. This would only be a fraction of all water that makes it to a stream.	91 (20)	

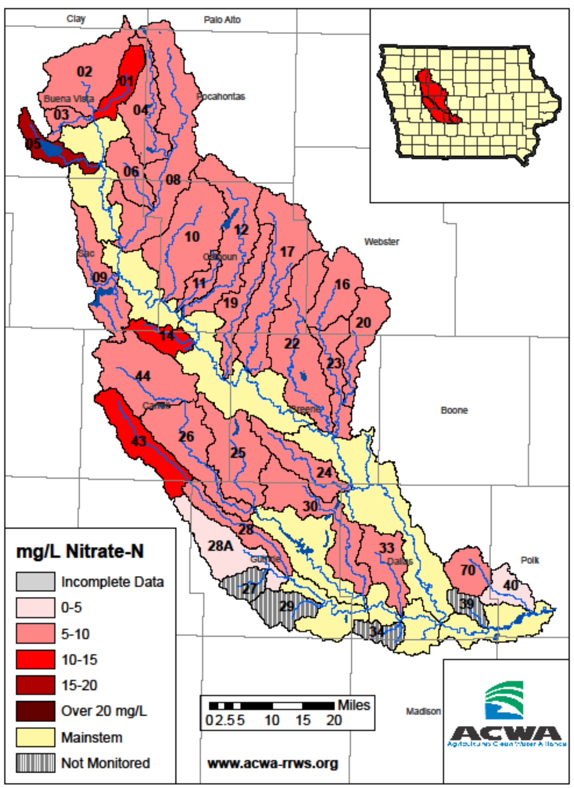
+ A positive number is nitrate concentration or load reduction and a negative number is an increase.
++ A positive corn yield change is increased yield and a negative number is decreased yield. Practices are not expected to affect soybean yield.
* SD = standard deviation. Large SD relative to the average indicates highly variable results.
** This increase in crop yield should be viewed with caution as the sidedress treatment from one of the main studies had 95 lb-N/acre for the pre-plant treatment but 110 lb-N/acre to 200 lb-N/acre for the sidedress with soil test treatment so the corn yield impact may be due to nitrogen application rate differences.

SP 435 February 2013

Environmental Programs and Services

Association and Contract Management

2011 Ave. Nitrate Concentrations-Raccoon River Tributaries



ACWA Members

Ag organizations working for better water quality

Ag Partners LLC
Albert City, Iowa
www.agpartners.com

Dedham Cooperative Association
Dedham, Iowa

Farmers Cooperative Company
Ames, Iowa
www.fccoop.com

First Cooperative Association
Cherokee, Iowa
www.first.coop

Gold-Eagle Cooperative
Goldfield, Iowa
www.goldeaglecoop.com

Heartland Co-op
West Des Moines, Iowa
www.heartlandcoop.com

Key Cooperative
Roland, Iowa
www.keycoop.com

Helena Chemical Company-Midwest Division
West Des Moines, Iowa
www.helenachemical.com

NEW Cooperative, Inc.
Fort Dodge, Iowa
www.newcoop.com

Pro Cooperative
Pocahontas, Iowa
www.procooperative.com

Crop Production Services
Wall Lake, Iowa
www.uap.com

Van Diest Supply
Webster City, Iowa
www.vdsc.com

West Central
Ralston, Iowa
www.westcentral.coop

Associate Members

Dow AgroScience
Indianapolis, IN
www.dowagro.com

Koch Fertilizer, LLC
Wichita, KS
www.kochfertilizer.com

Partners

Our partners make this work possible. Thanks to:

National Laboratory for Agriculture and the Environment
www.ars.usda.gov

Des Moines Water Works
www.dmww.com

Lake Panorama Association
www.lakepanorama.org

Raccoon River Watershed Association
www.northraccoon.org

U.S. Geological Survey
www.usgs.gov

Iowa Soybean Association
www.iasoybeans.com

Sand County Foundation
www.sandcounty.net

The Nature Conservancy
www.nature.org

USDA Natural Resources Conservation Service
www.nrcs.usda.gov

ACWA Thanks

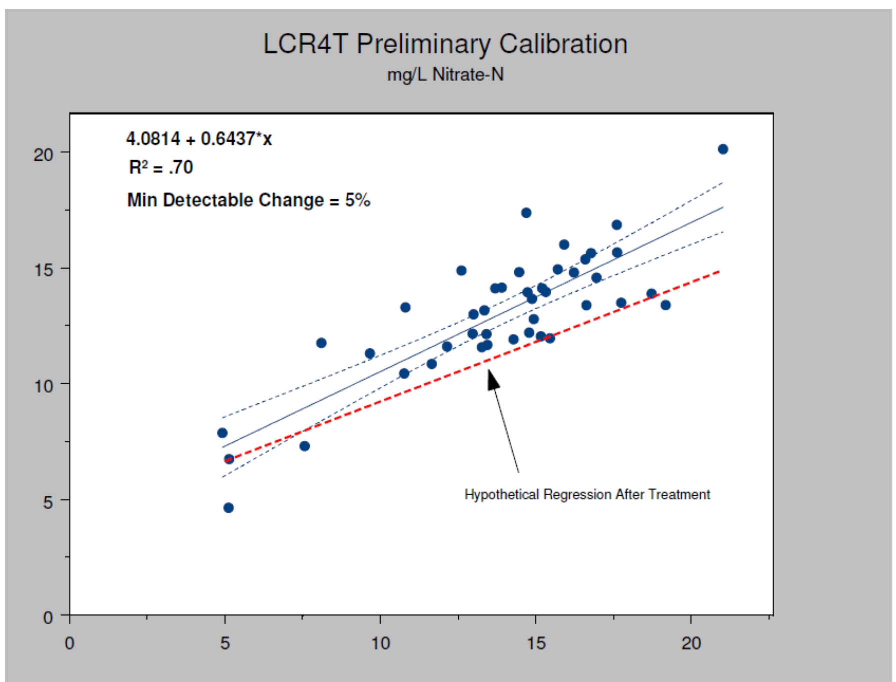
The McKnight Foundation
www.mcknight.org

for special project funding

ACWA
Agriculture's Clean Water Alliance

1255 SW Prairie Trail Parkway • Ankeny, Iowa 50023
(PH) 515-727-0648 (F) 515-251-8657
www.acwa-rrws.org

Water Monitoring Analytical Services

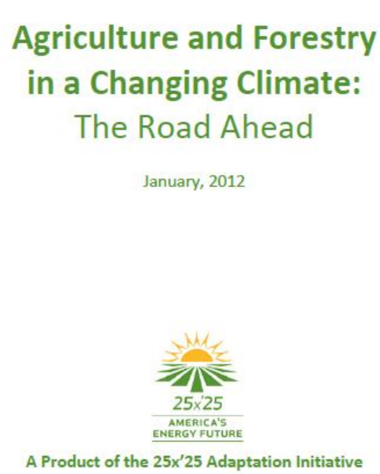


Water laboratory, auto samplers and paired micro watershed study analysis.

Environmental Programs & Services
IOWA SOYBEAN ASSOCIATION

Environmental Programs and Services

Leadership Services - Provided staff leadership and farmer champions including sustainability tours for food companies, ISA Farm Bill Task force, National Soy Sustainability Task Force, Iowa Nutrient Reduction Strategy and several national committees working on Mississippi River issues.



Agriculture and Forestry in a Changing Climate: The Road Ahead

January, 2012

25x'25 AMERICA'S ENERGY FUTURE

A Product of the 25x'25 Adaptation Initiative

THE Unilever/ADM/Iowa Soy Grower - Sustainability Pilot Project

PURPOSE: ADM would like to help Unilever create a more direct connec provide high-quality soybeans for its Hellmann's Mayonnaise. To do thi involved in this supply-chain together to discuss and determine the best successful project. A successful project should include benefits to grow communities, and the environment.

ADM: Our vision is to be the most-admired global agri-business. To ach recognize the critical business relationships that it enjoys along the supp source from the US grower, we source from the most productive set of farms in the world. And when ADM refines and sells our crop products, most advanced and responsible consumer products companies in the w customer, ADM is committed to the kind of business performance and impacts local communities and the environment.

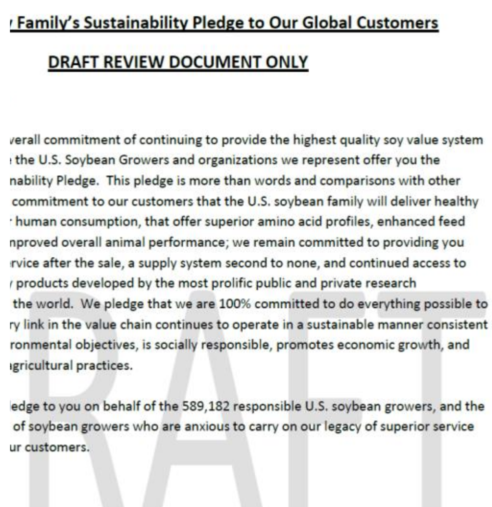
Unilever: On any given day, two billion people use Unilever products to get more out of life. With more than 400 brands focused on health and touches so many people's lives in so many different ways. Unilever's po nutritionally balanced foods to indulgent ice creams, affordable soaps, l everyday household care products. We produce world-leading brands in Dove, Axe, Hellmann's and Omo, alongside trusted local names such as Suave.

nds with a social missio derpins our strategy. In vith a vision to develop he size of its business v

20). This includes ingre

he Sustainable Living pl 0% of the eggs that Hel er in this area.

tone Alliance for Sustai s, agribusinesses, food rtners to focus on defir tM initiative is organiz ated to developing coll int Calculator is a web-



Family's Sustainability Pledge to Our Global Customers

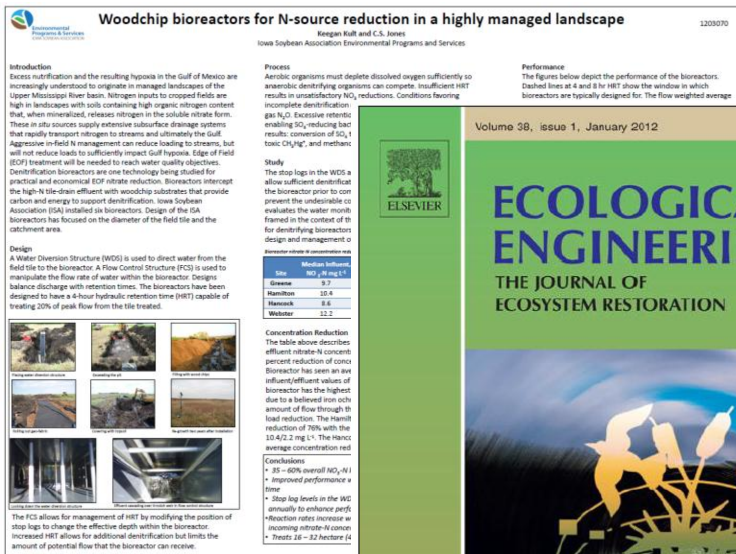
DRAFT REVIEW DOCUMENT ONLY

verall commitment of continuing to provide the highest quality soy value system the U.S. Soybean Growers and organizations we represent offer you the nability Pledge. This pledge is more than words and comparisons with other commitment to our customers that the U.S. soybean family will deliver healthy human consumption, that offer superior amino acid profiles, enhanced feed nproved overall animal performance; we remain committed to providing you rvice after the sale, a supply system second to none, and continued access to products developed by the most prolific public and private research the world. We pledge that we are 100% committed to do everything possible to ry link in the value chain continues to operate in a sustainable manner consistent ronmental objectives, is socially responsible, promotes economic growth, and gricultural practices.

edge to you on behalf of the 589,182 responsible U.S. soybean growers, and the of soybean growers who are anxious to carry on our legacy of superior service ur customers.

Environmental Programs and Services

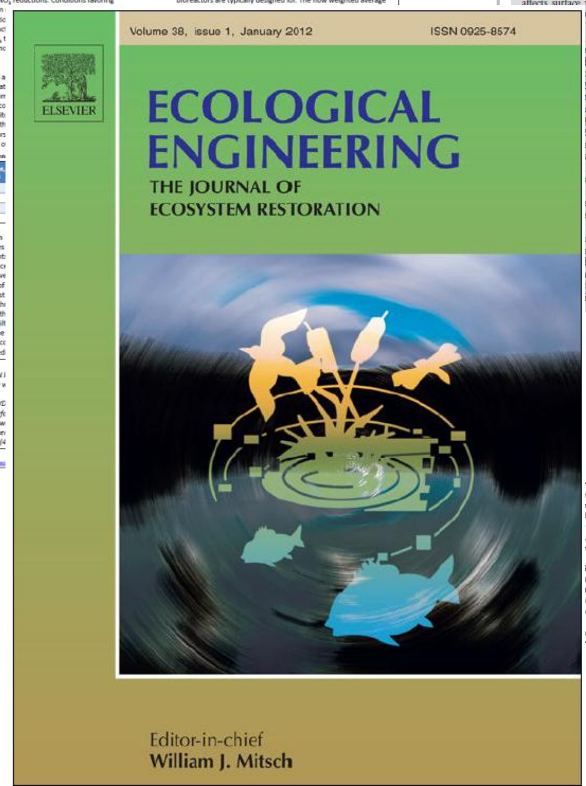
Science publications - Four scientific papers published in respected environmental journals - including our work on bioreactors, water quality and watersheds.



Woodchip bioreactors for N-source reduction in a highly managed landscape

Keegan Kult and C.S. Jones

Iowa Soybean Association Environmental Programs and Services



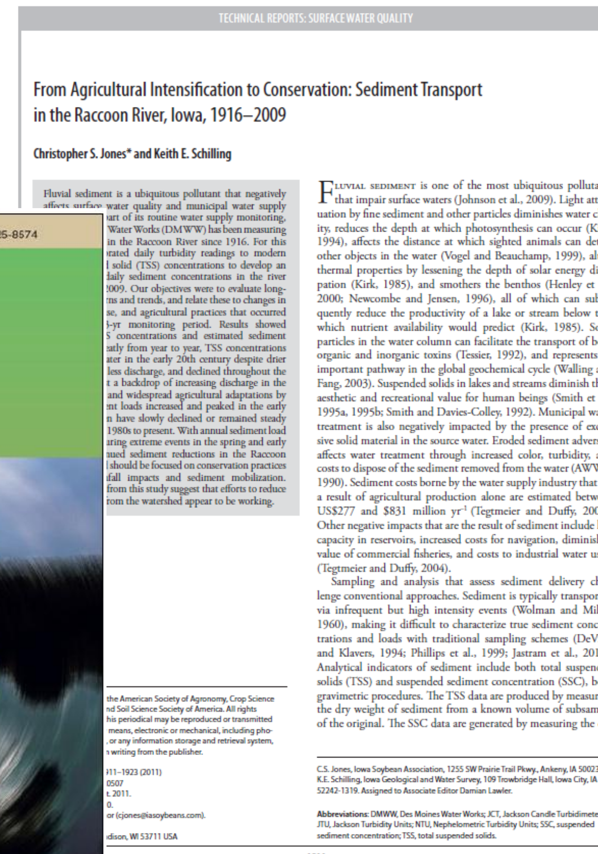
Volume 38, issue 1, January 2012 ISSN 0925-8574

ELSEVIER

ECOLOGICAL ENGINEERING

THE JOURNAL OF ECOSYSTEM RESTORATION

Editor-in-chief William J. Mitsch

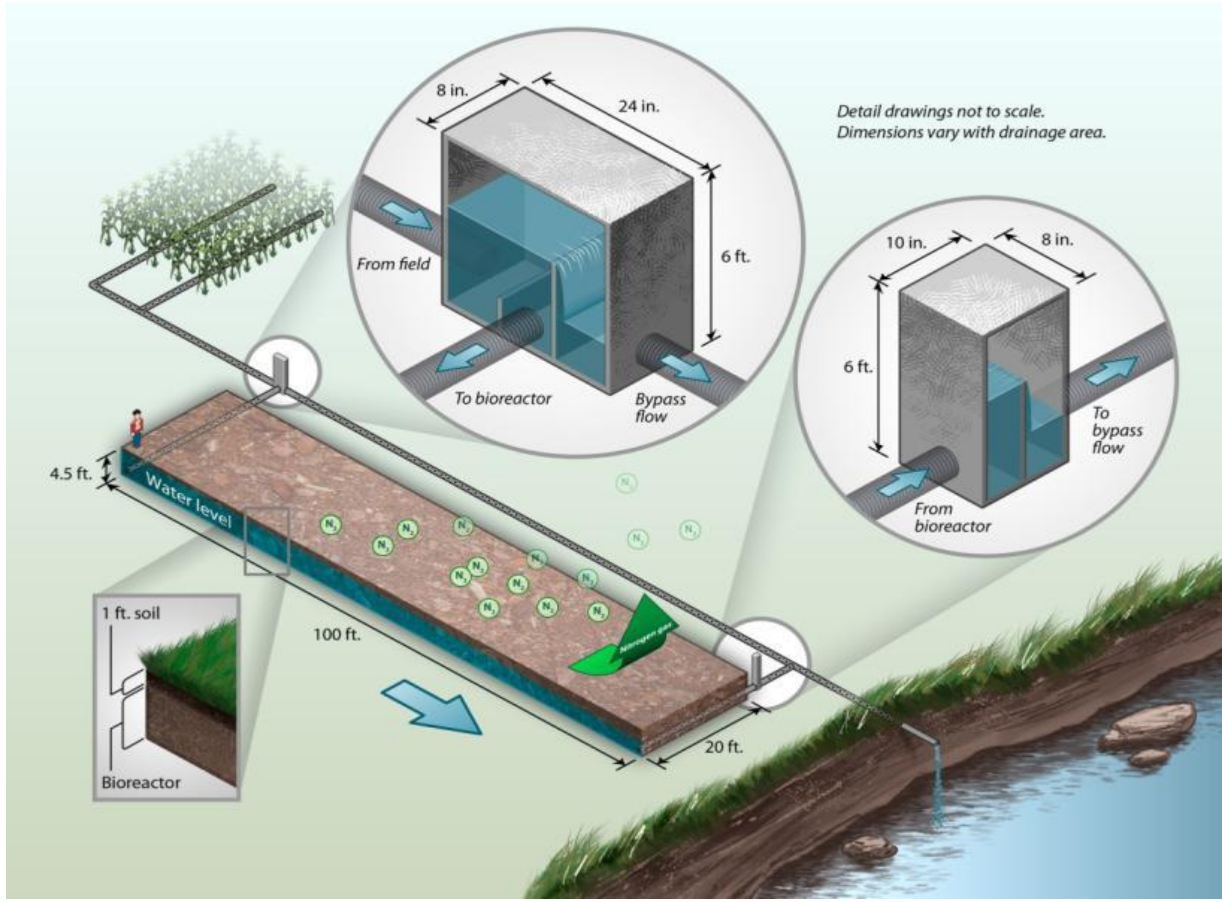


TECHNICAL REPORTS: SURFACE WATER QUALITY

From Agricultural Intensification to Conservation: Sediment Transport in the Raccoon River, Iowa, 1916–2009

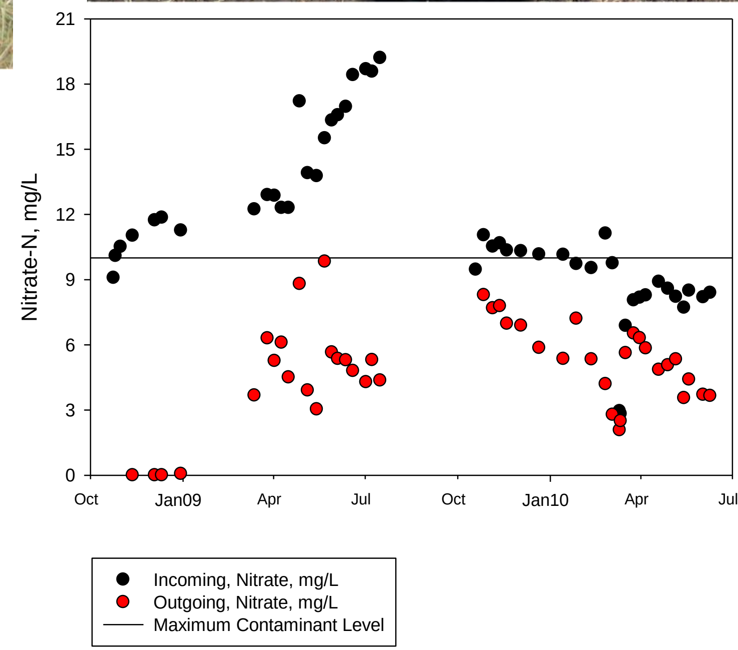
Christopher S. Jones* and Keith E. Schilling

Drainage Water Treatment
Woodchip Bioreactor

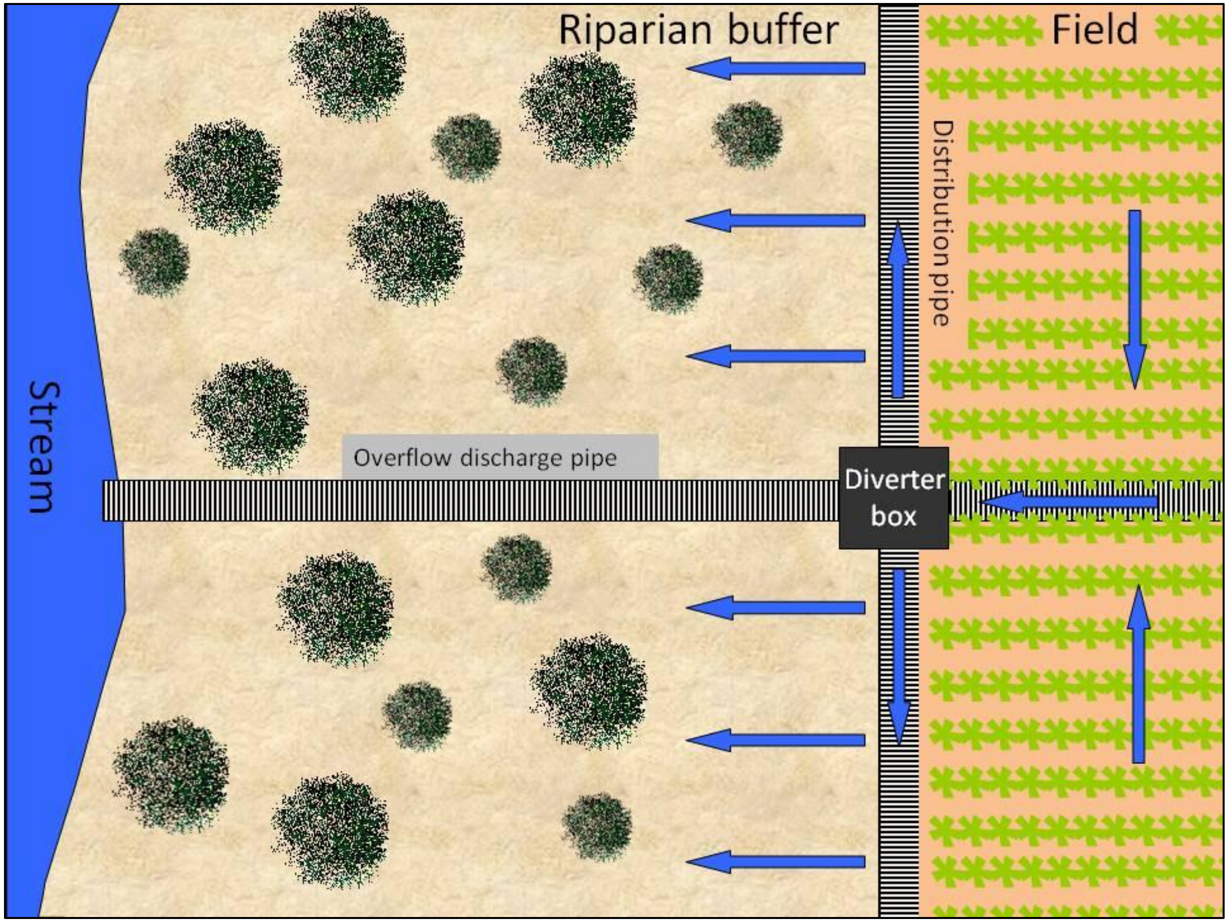


Source: Christianson, Laura and Matthew Helmers. 2011. Woodchip bioreactors for nitrate in agricultural drainage. Iowa State University Extension Publication. PMR 1008.
Available at: https://store.extension.iastate.edu/ItemDetail.aspx?ProductID=13691.

Woodchip Bioreactors for N removal. An innovative practice being applied in watersheds with nitrogen resource concerns. Water monitoring data to validate performance.



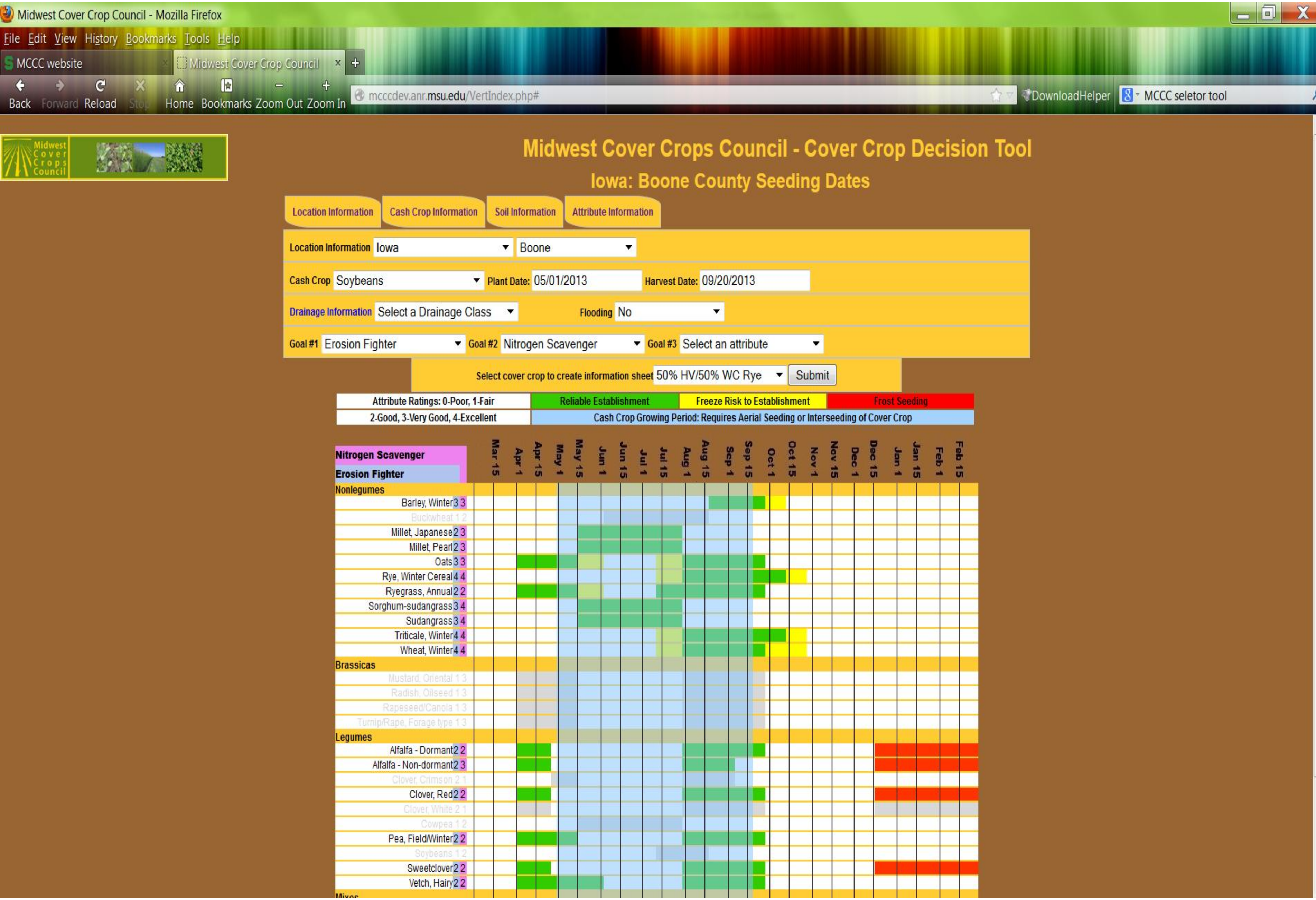
Re-saturated Riparian Buffers



Cover Crops

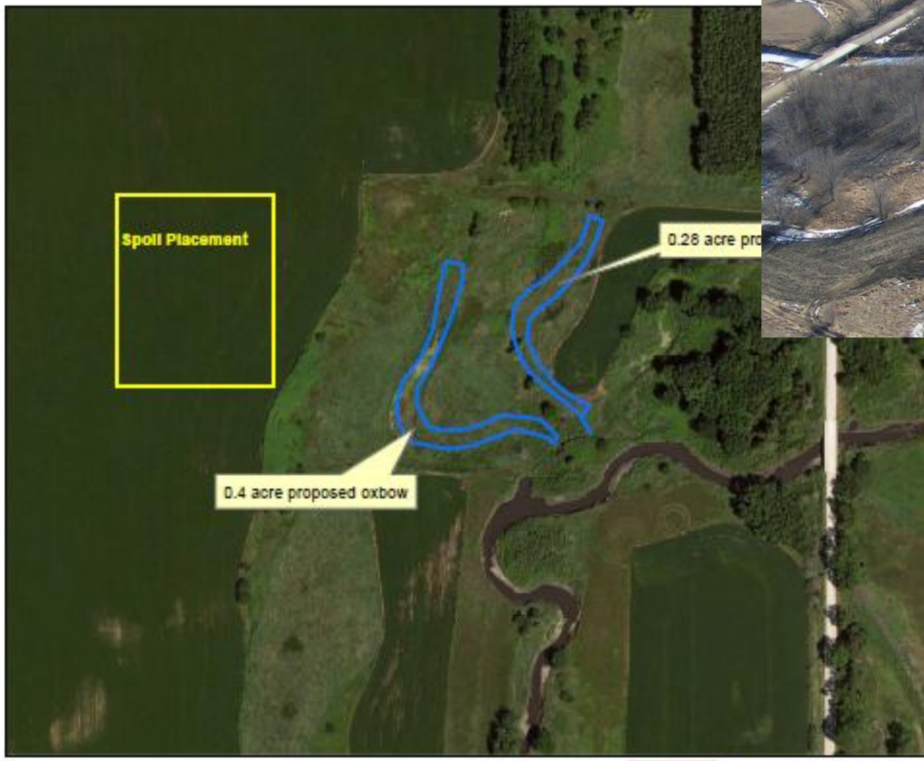
Numerous opportunities

- Wheat, rye, oats, radishes, etc
- **They are a tool, and like any good tool must be used and managed properly**
- Challenges
  - Lack of moisture after planting leading to poor germination
  - Flying into standing beans seem to work better than standing corn
  - Herbicide (before corn planting) sprayed, weather turned cool and wet, corn planted into cover crop that was still green, 40 bushel yield loss
- But great potential
  - **Reduced erosion**, increased nutrient retention, increased soil organic matter, increased earthworm population, **weed suppression**, green fields in March!, grazing, adds option to treating HEL ground, carbon sequestration, **moisture retention**


Midwest Cover Crop Council - Mozilla Firefox
File Edit View History Bookmarks Tools Help
MCCC website
Midwest Cover Crop Council
Back Forward Reload Stop Home Bookmarks Zoom Out Zoom In
mcccdev.anr.msu.edu/VertIndex.php#
DownloadHelper
MCCC seletor tool
Midwest Cover Crops Council
Midwest Cover Crops Council - Cover Crop Decision Tool
Iowa: Boone County Seeding Dates
Location Information
Cash Crop Information
Soil Information
Attribute Information
Location Information Iowa Boone
Cash Crop Soybeans Plant Date: 05/01/2013 Harvest Date: 09/20/2013
Drainage Information Select a Drainage Class Flooding No
Goal #1 Erosion Fighter Goal #2 Nitrogen Scavenger Goal #3 Select an attribute
Select cover crop to create information sheet 50% HV/50% WC Rye Submit
Attribute Ratings: 0-Poor, 1-Fair
2-Good, 3-Very Good, 4-Excellent
Reliable Establishment
Freeze Risk to Establishment
Frost Seeding
Cash Crop Growing Period: Requires Aerial Seeding or Interseeding of Cover Crop
Nitrogen Scavenger
Erosion Fighter
Mar 15 Apr 1 Apr 15 May 1 May 15 Jun 1 Jun 15 Jul 1 Jul 15 Aug 1 Aug 15 Sep 1 Sep 15 Oct 1 Oct 15 Nov 1 Nov 15 Dec 1 Dec 15 Jan 1 Jan 15 Feb 1 Feb 15
Nonlegumes
Barley, Winter 3 3
Buckwheat 1 2
Millet, Japanese 2 3
Millet, Pearl 2 3
Oats 3 3
Rye, Winter Cereal 4 4
Ryegrass, Annual 2 2
Sorghum-sudangrass 3 4
Sudangrass 3 4
Triticale, Winter 4 4
Wheat, Winter 4 4
Brassicas
Mustard, Oriental 1 3
Radish, Oilseed 1 3
Rapeseed/Canola 1 3
Turnip/Rape, Forage type 1 3
Legumes
Alfalfa - Dormant 2 2
Alfalfa - Non-dormant 2 3
Clover, Crimson 2 1
Clover, Red 2 2
Clover, White 2 1
Cowpea 1 2
Pea, Field/Winter 2 2
Soybeans 1 2
Sweetclover 2 2
Vetch, Hairy 2 2

10/26/12

[redacted] Preliminary Oxbow Restoration Map
Wright County, IA
[redacted]



0 140 280 560 Feet

Estimated oxbow removal 4,387 cubic yards PSA. Excavate oxbow bottoms to old river bottom, not to exceed 88.8. Leave oxbow bottoms uneven with 2:1 slopes. Haul all spoils out of the floodplain and reseed disturbed areas. Also two nearby active tile lines will be diverted into each of the oxbows in order to improve water quality within White Fox Creek.

Design by: Aleshia Kenney, USFWS
Rock Island Ecological Services Field Office
1511 47th Avenue
Moline, IL 61265
309-757-5800 x218

8-30-2012

Environmental Programs & Services
IOWA SOYBEAN ASSOCIATION

Oxbow Restoration within Boone River Watershed supports biodiversity and water quality goals

Oxbow Restoration

Before

After

Thank You

Questions?