



UNIVERSITY OF MINNESOTA | EXTENSION
Driven to DiscoverSM

A Presentation of the 2011 IA-MN-SD Drainage Research Forum

November 22, 2011
Okoboji, Iowa

IOWA STATE UNIVERSITY
University Extension



SDSU
Extension

MAKING A DIFFERENCE IN MINNESOTA: ENVIRONMENT + FOOD & AGRICULTURE + COMMUNITIES + FAMILIES + YOUTH

Iowa Soybean Association Environmental Program



**TODD SUTPHIN
STATE WATERSHED COORDINATOR
IOWA SOYBEAN ASSOCIATION**

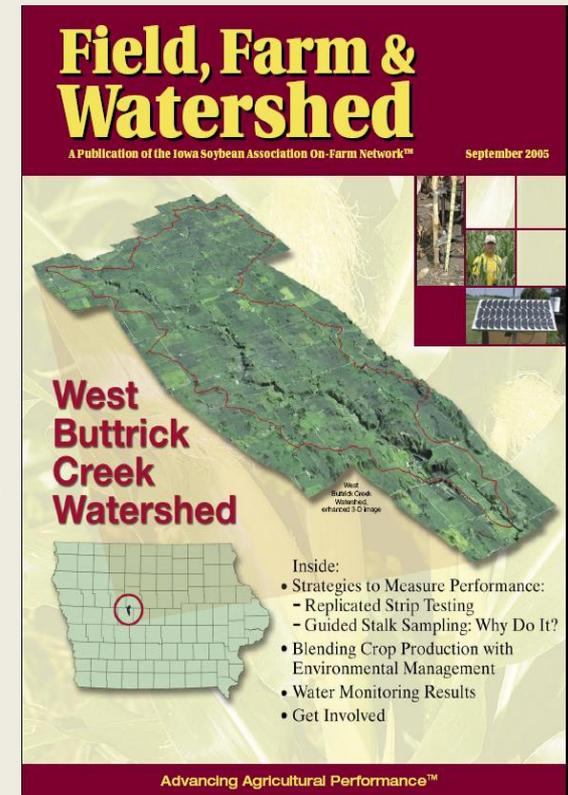
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**2011 DRAINAGE RESEARCH FORUM
NOVEMBER 22, 2011
ARROWHEAD RESORT – OKOBOJI, IOWA**

Environmental Programs and Services

- Provide leadership from agriculture; have impact.
 - **Environment**
 - **Policy**
 - **Profitability**
- Seeking and capturing performance; tools/ techniques help farmers address issues.
- Apply science to gain understanding, impact and profit
- Crosses multiple geographic scales
- Valuing cooperative partnerships and collaborations
- Provide value to membership and Iowa farmers.



**Environmental
Programs & Services**
IOWA SOYBEAN ASSOCIATION

Watershed Program

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Elements:

- Multi-scale watershed assessment and planning facilitation
- CEMSA planning with groups of farmers
- Management Evaluation – Groups / Replicated Strips Trials/Stalk sampling
- Environmental evaluation via water monitoring
- Targeted Conservation Systems – Bioreactor, Shallow Wetland, others
- Technical Service Contracts – ACWA / DMWW / TNC / ISU / Prairie River and Prairie Winds RC&D's

Watershed Planning

- **A comprehensive plan for the watershed**
 - Farmer involvement; locally-led
 - Inventories available data
 - Identifies water quality concerns
 - Outlines resources and partners available
 - Provides guidance on steps needed to address the concerns
- **Set of integrated solutions; no silver bullet**
- **Infield/Edge of Field**
- **MRBI practice list**
- **Implementation**

Lyons Creek Watershed



Watershed Management Plan

March 31, 2010



Environmental
Programs & Services
IOWA SOYBEAN ASSOCIATION

Watershed Planning

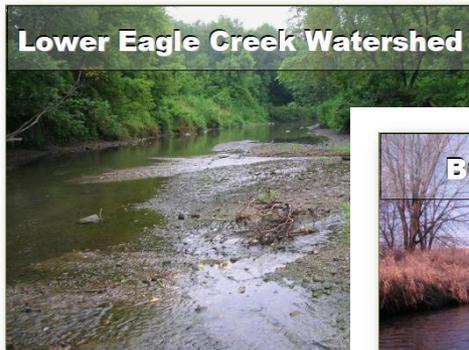
- Watershed plans – 6 complete
- Implement & measure practices
- Stakeholder engagement
- More monitoring and measuring

Lyons Creek Watershed



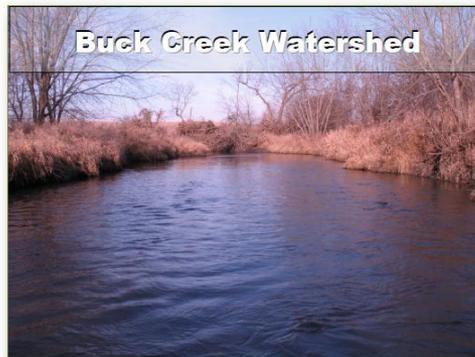
Watershed Management Plan

March 31, 2010



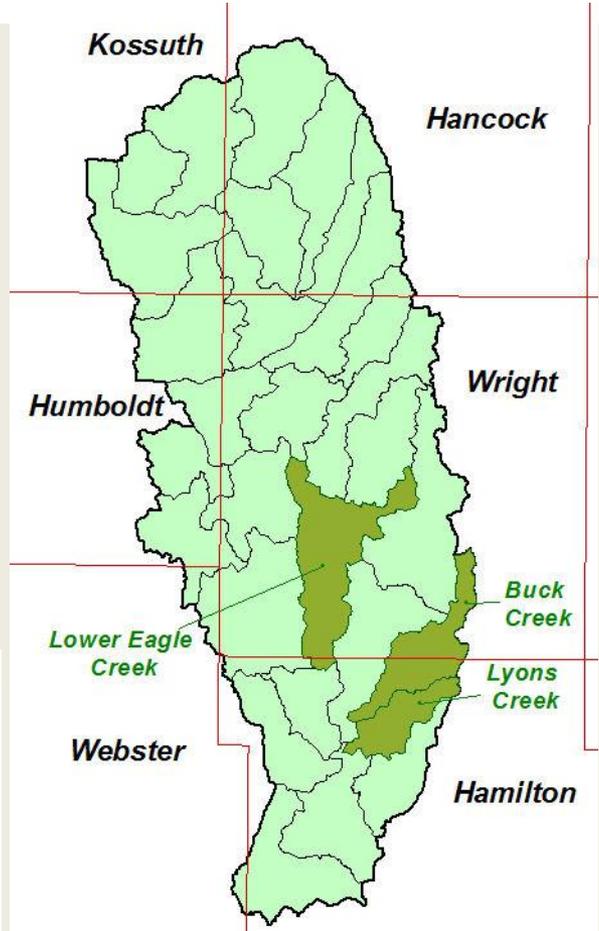
Watershed Management Plan

May, 2010



Watershed Management Plan

May, 2010



**Environmental
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Lyons Creek Watershed Management Plan

Table 28 Nutrient reduction for conservation practices based on available nutrients.

Practice	Expected reduction
Nitrification inhibitors	10%
Spring vs. Fall fertilization	20%
Cover Crops	50%
Water Table management	40%
Shallow or Wide Tiles	25%
Conversion to CRP	95%
Conversion to Perennial Crops	80%
Constructed Wetlands	50%
Bio-reactors	40%
Pasture management	20%
Riparian buffers/waterways	25%
Conservation Tillage	5%
Drainage mgmt	20%

Table 26 Potential best management practices.

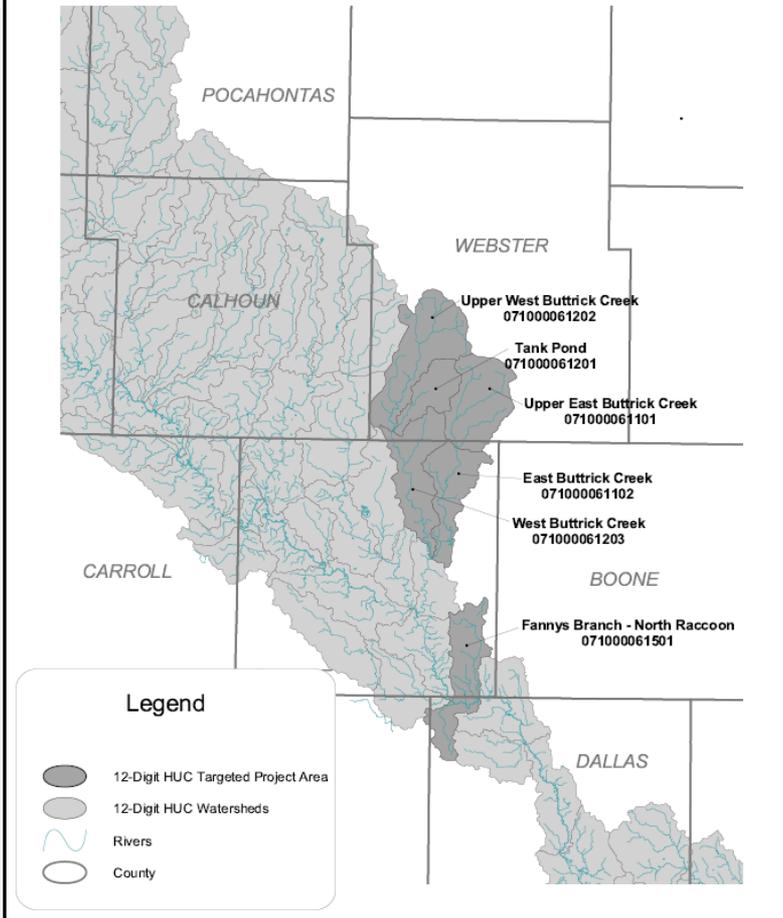
	NRCS Practice Code
Nutrient management	590
Residue & Tillage Mgmt, Ridge-till	346
Residue & Tillage Mgmt, No-till Strip-Till	329
Grassed Waterways	412
Filter Strip (could be enrolled under CRP)	393
Riparian Forest (could be enrolled under CRP)	391
Water and Sediment Control Basin	638
Cover crops	340
Bio-reactor	747
Wetland restoration	657
Prescribed Grazing	528
Fence	382
Stream Crossing	578
Watering Facility	614
Stream bank & Shoreline Protection	580
In-stream structures (for habitat; water quality)	xxxx

Top resource concern – *Water Quality*

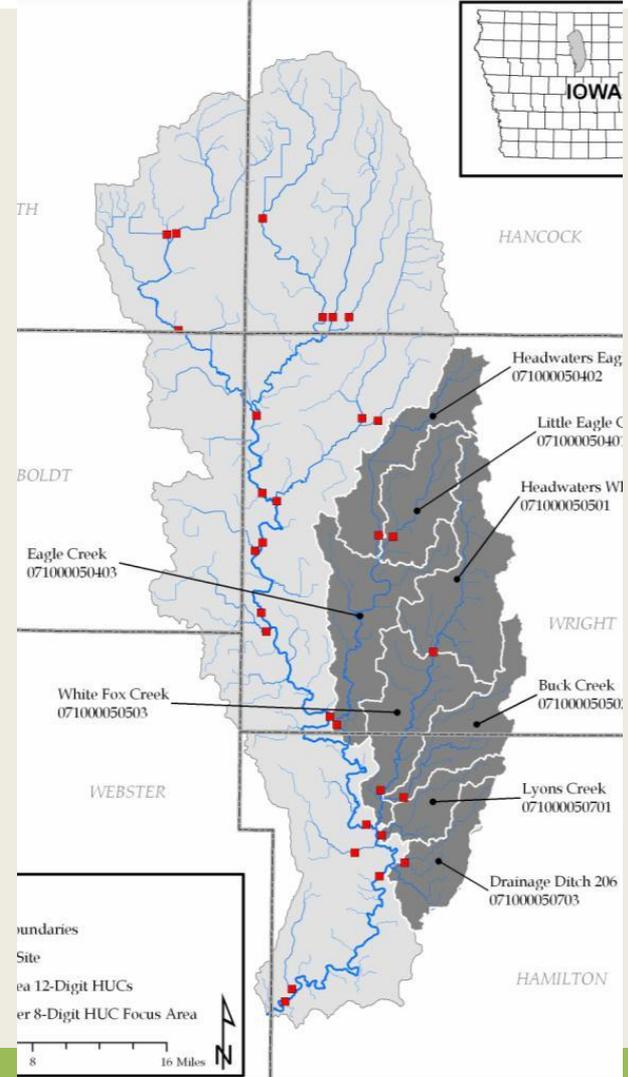
- *Nitrate*
- *Sediment*
- *Bacteria*

Mississippi River Basin Initiative

North Raccoon River MRBI-CCPI Application

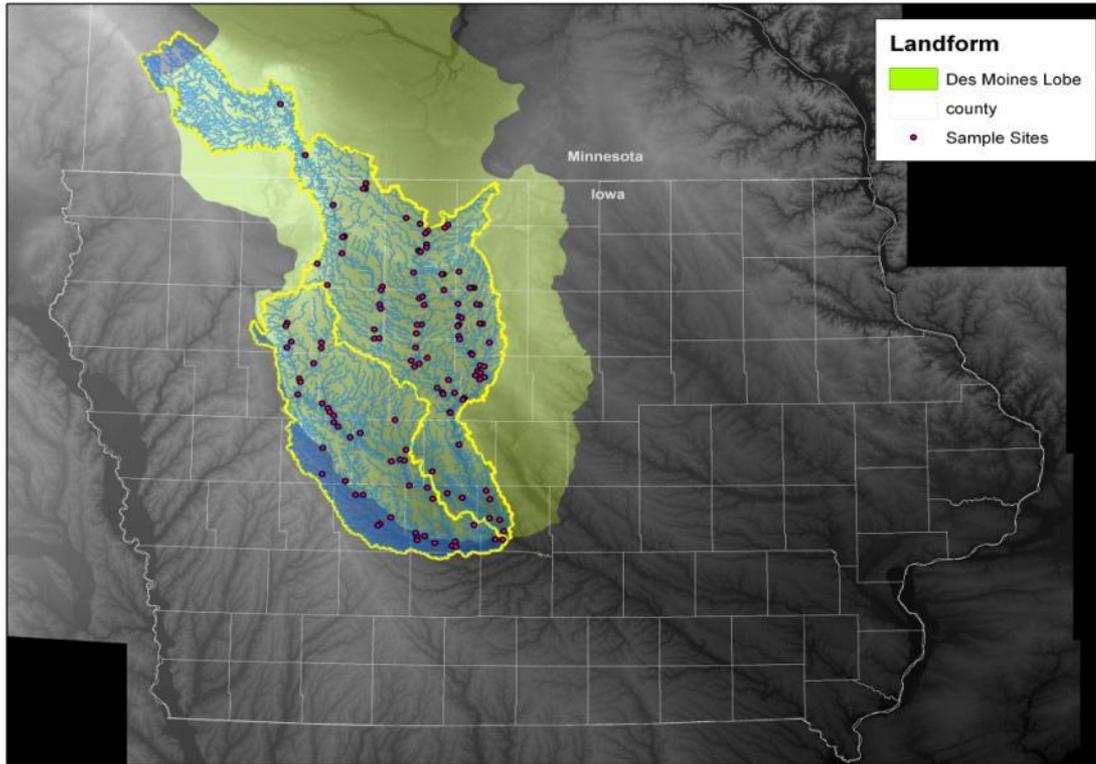


Boone River MRBI-CCPI Project Area



Additional \$7.4 million in financial incentives to help farmers implement new practices

Agriculture's Clean Water Alliance



- 13 fertilizer dealers in the Raccoon/Des Moines River watersheds.
- Sell and apply most of the nitrogen used on 5 million acres of cropland in the watershed.
- Leading private sector sponsor of water quality monitoring
- Code of Practice
- Bioreactor demonstration study

Mission: To reduce the nutrient loss – specifically nitrate – from farm fields and to keep the nutrients from entering the Raccoon River and Des Moines River and its tributaries.

Water Monitoring

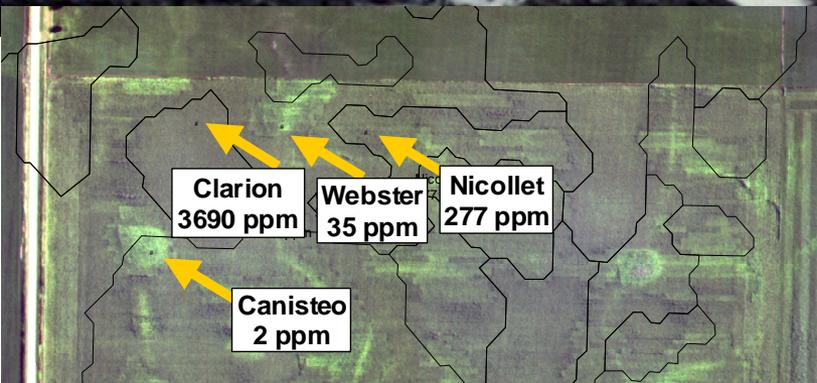


- Certified Sampling - QAQC
 - Nitrate and Bacteria
- Real-time Remote Monitoring
- Investigative Monitoring
 - Ammonia
 - Cyanobacteria
- Effectiveness and Special Project Monitoring
 - Bioreactors
 - Event-triggered monitoring
 - Paired micro-watershed studies



Management Evaluation

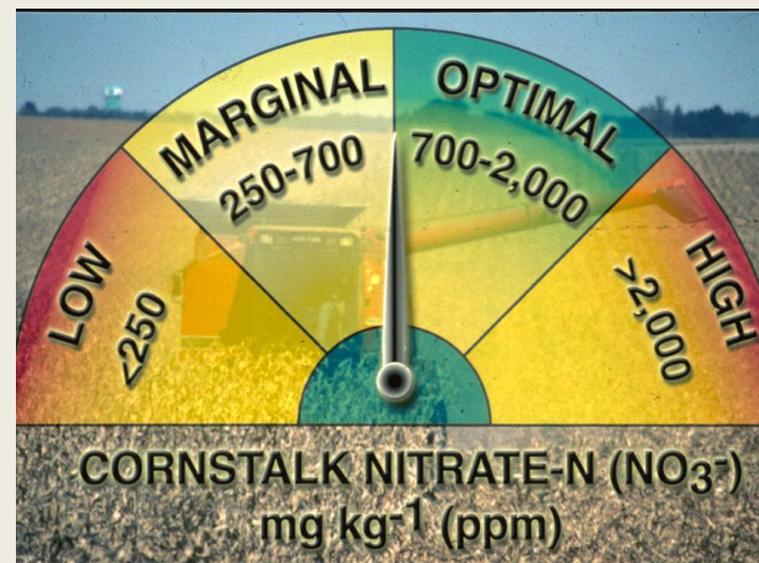
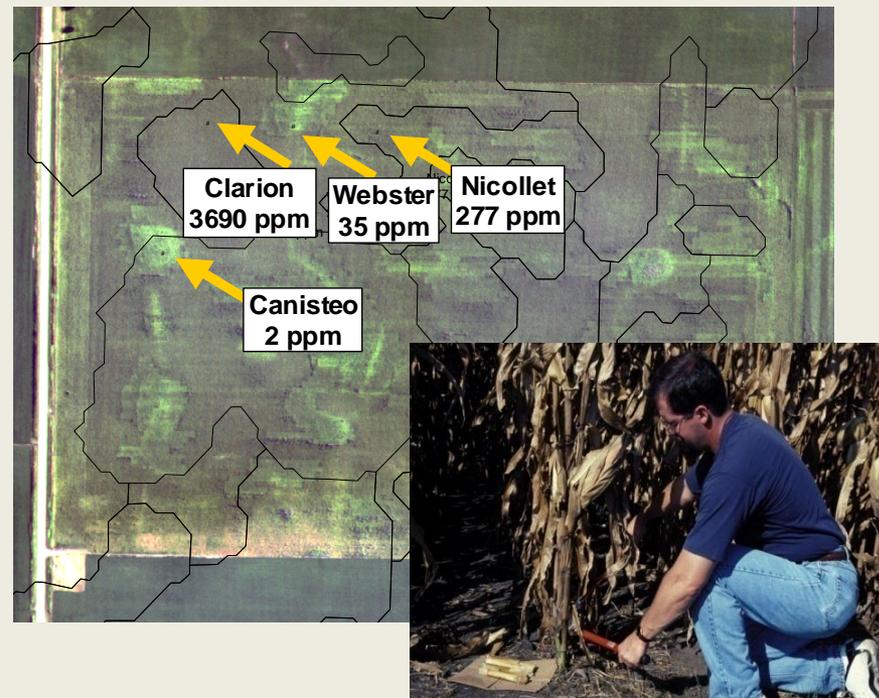
- Loss of N from Farm Fields
- Cost Farmers Money



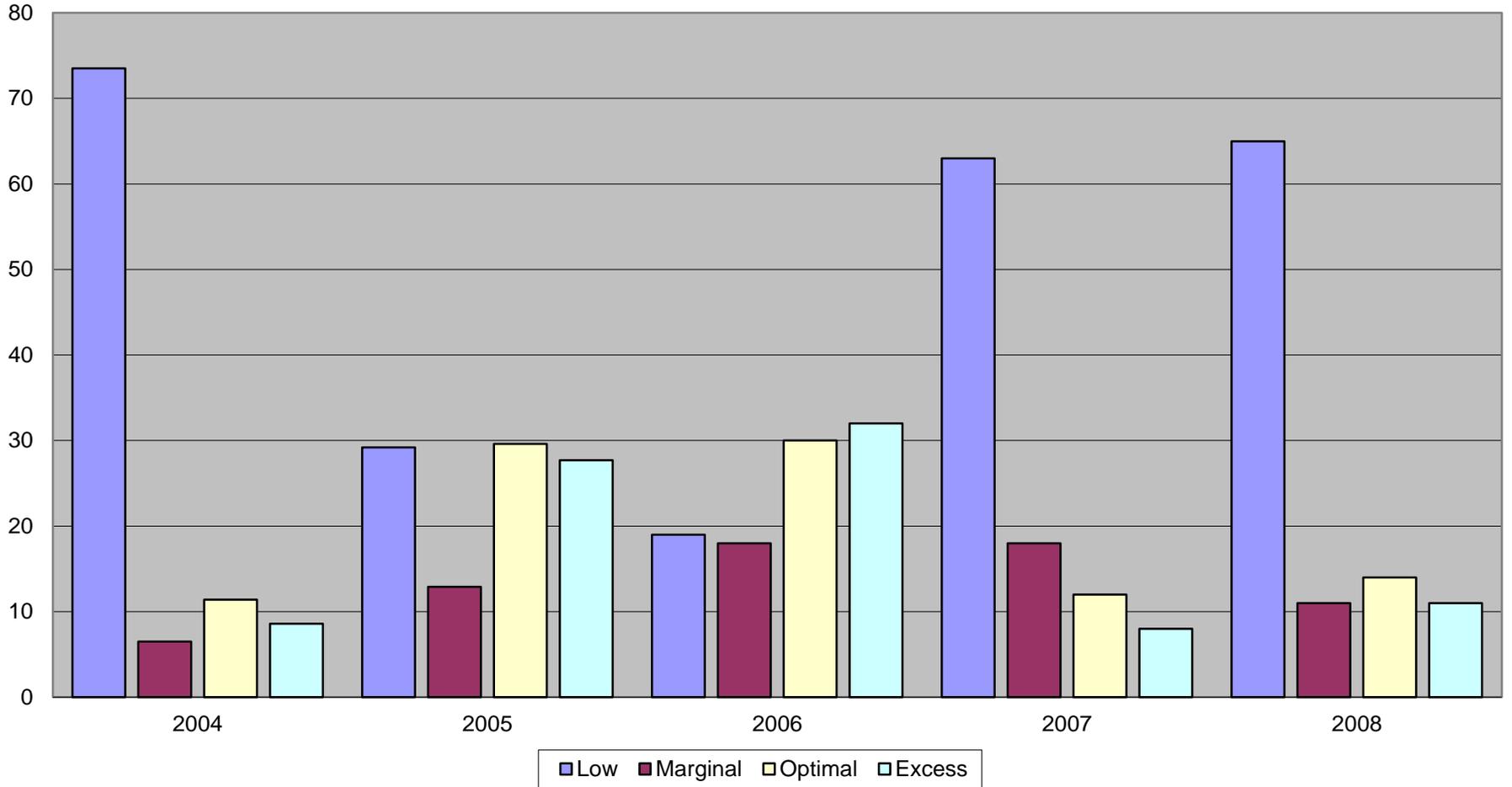
N Management

Stalk Test

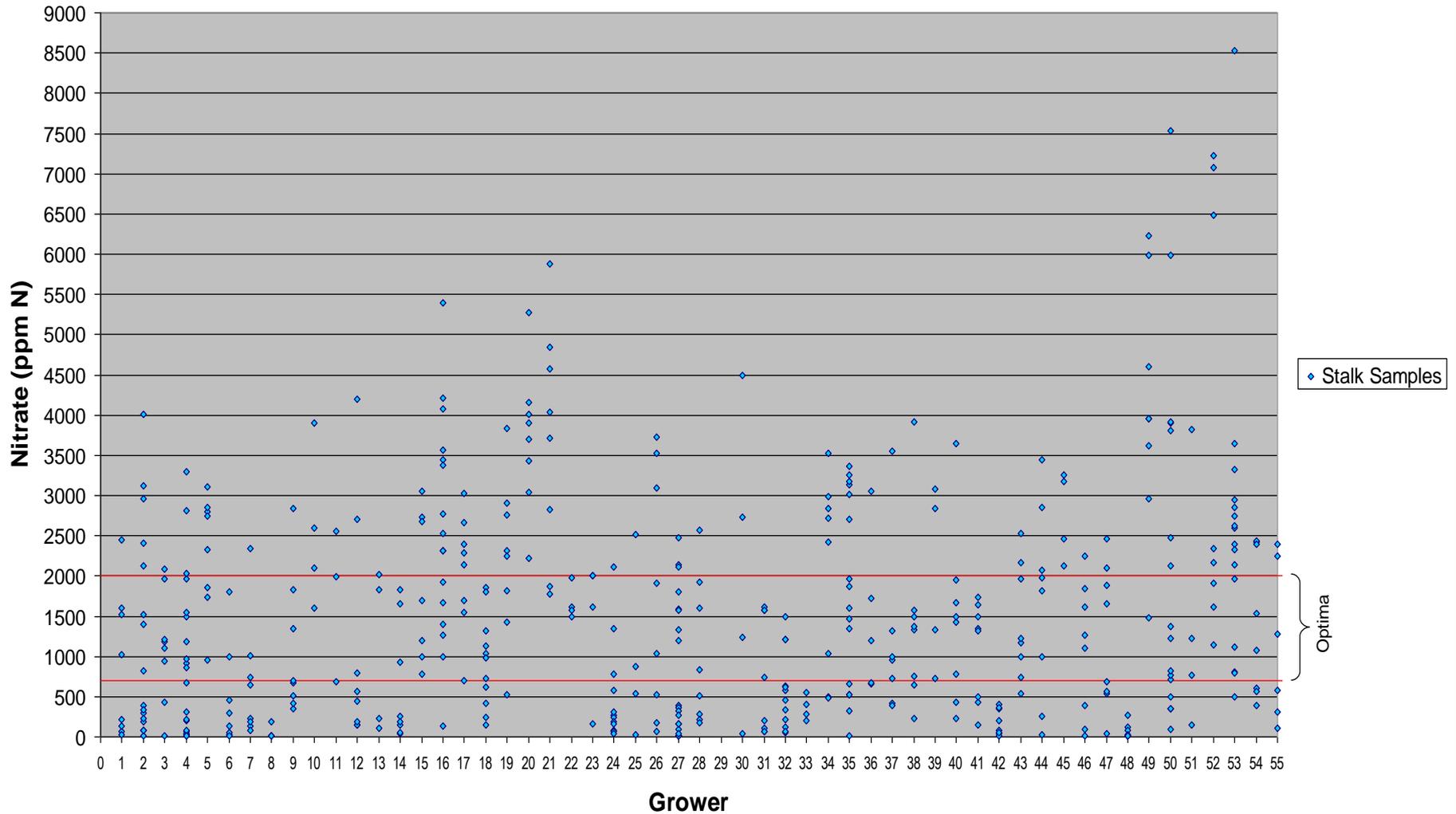
- Stalk nitrate samples collected after physiological maturity to assess the N status of the crop.
- As the corn plant takes up N, it first accumulates in the ear to achieve maximum yield, then the lower portion of the stalk.
- The Stalk Nitrate Test determines excess N availability, even at levels where yield is not limited.



Boone River - Results of Nitrogen Evaluation



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



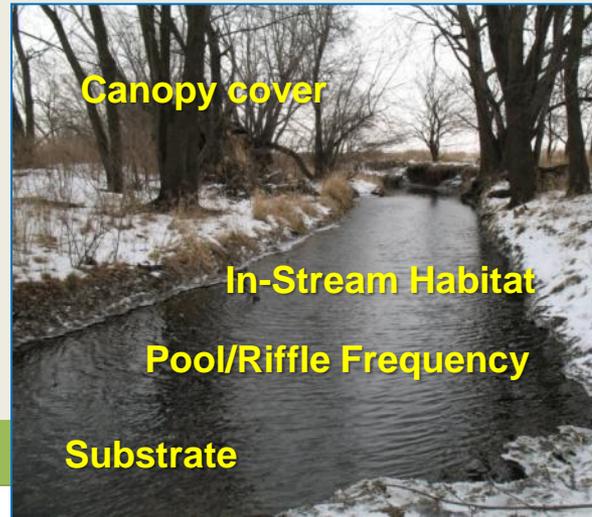
Rapid Assessment of Stream Conditions Along Length (RASCAL)

- Assess in-stream & near-stream conditions; use GPS technology to provide continuous stream condition data for watershed



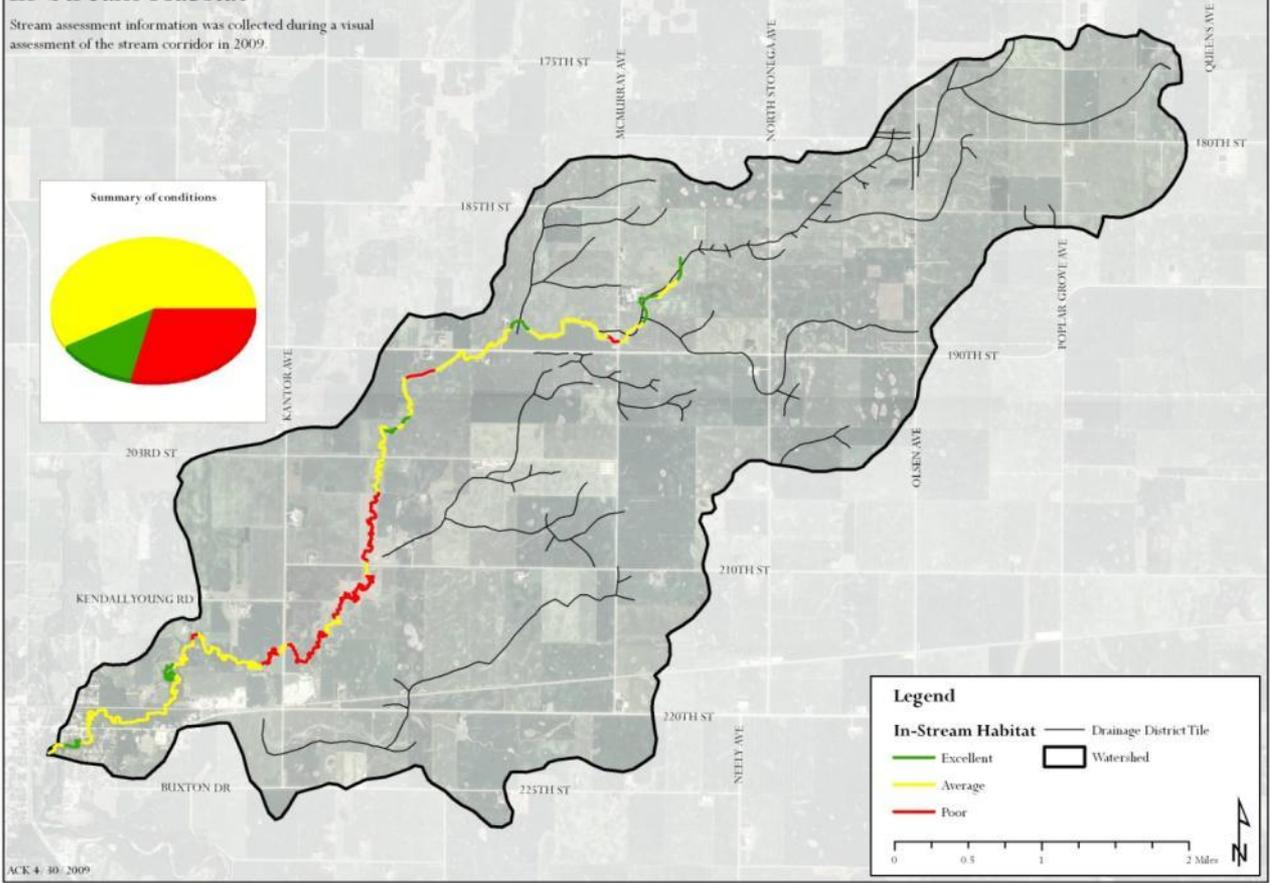
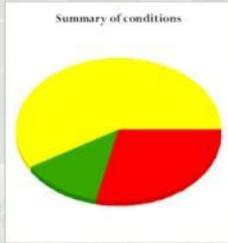
Riparian Zone Cover/
Riparian Zone Width

- Results are intended to assist watershed groups identify priority areas for targeted conservation practices / BMPs.
- Land use assessment – help target upland BMPs.



Lyons Creek - Hamilton County In-Stream Habitat

Stream assessment information was collected during a visual assessment of the stream corridor in 2009.



ACK 4 - 10 - 2009

RASCAL Assessments – Lyons Creek

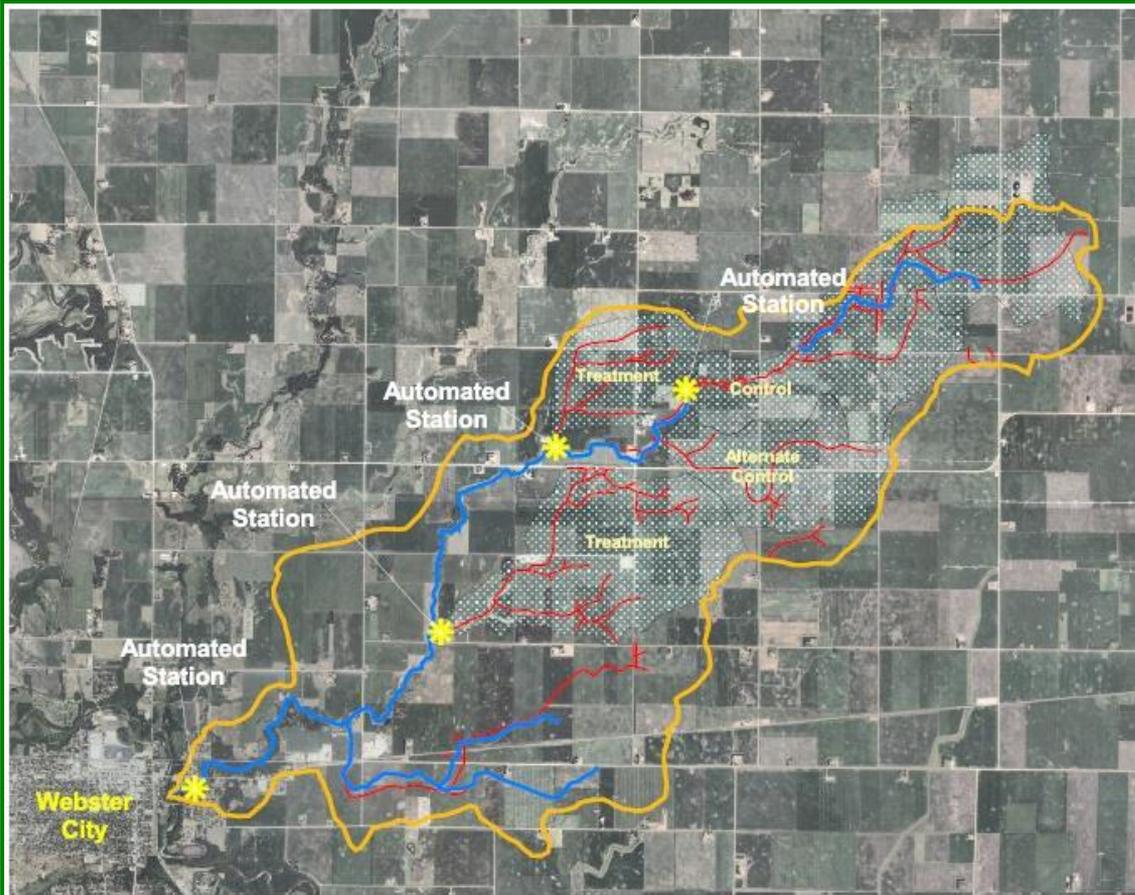


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Survey Parameter	Categories				
Adjacent Land Cover	Row Crop	Trees	Grass	Pasture	Residential
	38.3%	14.5%	5.1%	35.0%	9.1%
Riparian Zone Width	< 10 ft	10 - 30 ft	30 - 60 ft	> 60 ft	
	36.4%	11.7%	24.4%	28.6%	
Bank Stability	Stable	Mod. Stable	Mod. Unstable	Unstable	
	6.3%	34.2%	26.8%	32.7%	
Substrate	Boulder	Cobble	Gravel	Sand	Silt/Mud
	0.6%	15.0%	20.5%	55.4%	8.5%
Stream Habitat	Poor	Average	Excellent		
	28.6%	58.7%	12.7%		

Lyons Creek Paired Watershed Study



- 600 – 1,100 acres
- Two treatment; one control
- Partnering with TNC, IDNR, IGSB, others

Lyons Creek Paired Watershed Study



Potential Practices for Treatment Watershed

- Cover Crops
- Intensive Nutrient Management (timing, rate, form)
- Edge of Field Buffers - Tile line Bioreactors, Riparian Buffers, Constructed Wetlands
- Drainage Water Management
- Tillage changes – Strip till, No-Till
- Alternative Surface water intakes

Bioreactor Demo and Evaluation

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- End of tile nitrate treatment process
- Under anaerobic conditions nitrate-N is reduced by soil microbes using the wood chips as a carbon source
- Typical costs of installations range from \$6,000 - \$10,000
- Bioreactor size has been between 0.06 – 0.08% of acres treated
- Observed a 38% load reduction during the 2009 growing season in Greene County



Upper control structure



Existing field tile



Greene County – Tile Bioreactor









- FSA requires re-seeding
- Re-growth is usually shorter



Re-seed the area

Lessons Learned

- Local commitment and participation/Locally-led
- Planning is essential
- Infrastructure to gain capacity
- Everyone has a voice; who is your constituency
- Partnerships!
 - Synchronization of public and private; Local to Federal. Program delivery.
 - Benefits: time, resources, and expertise
- Resource management
- Program Delivery (both in-field and edge of field)
- Adaptive Management or Plan-Do-Check-Act
- No “silver bullet”
- TIME

Thank You



Special thank you to our collaborators and supporters –

- USDA Natural Resources Conservation Service
- Des Moines Water Works
- Sand County Foundation
- Agriculture's Clean Water Alliance.

For more information please contact:

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