WPAC Meeting Summary
July 25, 2014
Iowa Corn Growers Association
Johnston, IA

Keith Schilling, Geological Survey – Nutrient Loading Study

- Nutrient load is a product of concentration X discharge. The INRS goal is focused on a 45% reduction of load.
- Soil Loss peaked in the 1970s and has remained about the same since the 1990s.
- Streams account for approximately 5% of nitrate outputs.
- Temporal correlation may exist up to 2 years, which is a long lag time.
- From 1998 (when monitoring began) through 2012, 46 ambient (out of 60) sites were assessed (for nitrates), 37 of the sites did not show a significant trend. 6 sites with significant increasing trends were in western Iowa (MO River watershed).
- Collectively, nitrate concentrations are increasing at an average rate of .05 mg/l over the 14 year period.
- Reasons for the increase – weather patterns were not significant and some increases in fertilizer and animal units in NW Iowa, but more data is needed to determine why this happens.
- Discharge was not a part of the calculation. Including discharge could change the N trend, showing a possible decrease.
- A similar study for phosphorus, including discharge, at 12 sites saw 2.0-8.2% decrease.
- The model used is available and can be used to calculate annual trends in the future.

Chris Jones, IA Soybean Association (ISA) – ISA On-Farm Nitrate Study in the Raccoon River

- Study years 1999-2013, 60 monitoring sites (10,000 samples) and data from 500 fields.
- Found an increase in corn acres.
- Record nitrate levels occurred in 2012 with the Raccoon River reaching nitrates at 24 mg/l and the Des Moines River at 19/mg/l.
- Many county tile lines can be found with nitrate levels above 60 mg/l (for example Elk Run Creek 68 mg/l and a tile in Eastern Iowa was 89 mg/l).
- Historical data shows a correlation of higher nitrate levels to periods following drought.
- In the presenters opinion is that the correlation may be the result of side-dressing nitrogen.

1999-2003	2004-2013
40 sites	47 sites
38 sites trending down	45 sites trending down
0.28 mg/l per year (average)	0.62 mg/l per year (average)

- All six flow-gauged sites (Sac City, Jefferson, Redfield, Panora, Van Meter, and Fleur) showed a drop in nitrate concentration with flow-weighted data.
- Precipitation has increased – inputs have not changed.
- Nitrogen efficiency has not changed since the 1990s.
- Other findings:
    - More de-nitrification under corn.
    - More losses from soil mineralization after soybean in the fall, especially with fall tillage.
    - Farmers are more aggressively managing corn on corn.
    - More immobilization of N into the soil under corn.
    - Greater tile flow under soybeans, concentration remains the same, but there is more water.

- Going forward:
    - There has been incremental change – but conditions are still not acceptable
    - Transformational changes in agricultural production are needed.
    - There is a need to better manage soybeans.
    - Additional monitoring and credible data are needed for making policy and spending conservation dollars.
    - The public needs to understand that water must be better managed, keeping it on the landscape where it falls.

Jamie Benning, IA State University, Conservation Practices Central Database

- …
- …
- …

Questions for Discussion: WPAC Communication and Annual Report

1. Decisions will be based on consensus.
2. Requests for forwarding informational papers or articles, project updates, and so forth to WPAC members will be fulfilled by distribution at the WPAC meeting following the request.
3. Recipients of the WPAC annual report is outlined in IA Code 466B31 (3).
4. Inclusion in the WRCC/WPAC annual report, also included in IA Code 466B31 (3). In addition to IA Code requirements:
    a. Comments and recommendations in response to measurables.
    b. Summary of presentations – to include the issues being addressed, what has occurred and where are they headed.
    c. Identification of gaps.
    d. How do they measure success?

Future Program Suggestions:

- Panel – Watershed Management Authority (WMA), Water Quality Initiative, IA Department of Natural Resources (IDNR), and Resource Conservation and Development (RC & D)
- USDA – NRCS – Technical Assistance
- Point Source Trading
- Economic of Nutrient Management – Nutrient Research Center and/or Center for Agriculture and Rural Development (CARD)
- Watershed Planning
- New Technologies – saturated buffers, control drainage, etc.

Next meeting – September 26, 2014 – 10:00 AM- 3:00 PM – Iowa Corn Growers Association

Measures of Success Progress report 3/20/14

Update from Lawrence,

not the full committee

Measures of success committee

Measurable indicators of desirable change

Specific indicators in attached text

Inputs

People

Funding

Agency resources

Private sector resources

Human

Partner Organizations

Partner Agribusinesses

Farmer knowledge and attitude

Point source communities and management knowledge and attitude

Land

Land use changes

- Net acres cover crops
- Net acres perennials
- Etc.

Practice adoption

- Acres of practice X
- Acres of practice Y
- Etc.

Point source implementation

- Feasibility studies
- Permit applications
- Construction

Water

Calculated load reduction

Measured loads in priority watersheds

Organized watersheds reported load changes

Measured loads at existing monitoring stations

Resources for Water Quality

Drops in the Bucket:

The Erosion of Iowa Water Quality Funding

- Will Hoyer, Brian McDonough, David Osterberg
- March, 2012. The Iowa Policy Project

Report tracks funding for 10 distinct funding lines directed to water quality for the FY 2002-2012 period.

Resources for Water Quality

IDALS

- Conservation Reserve Enhancement Program (CREP)
- Conservation Reserve Program (CRP)
- Watershed Protection Fund
- Soil Conservation Cost Share
- Agricultural Drainage Well Closure
- Water Protection Loan Program

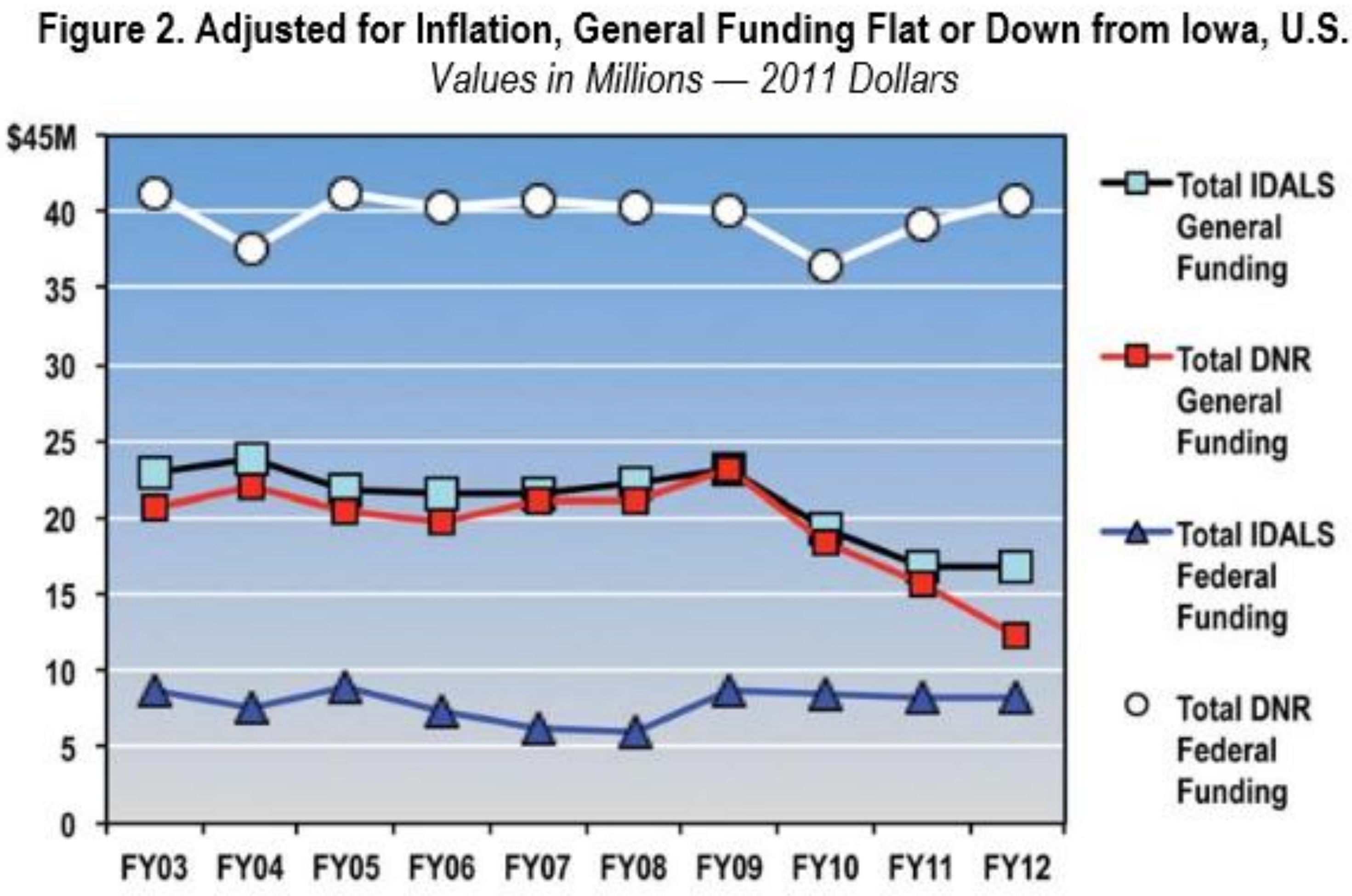
DNR and IDALS

- Resource Enhancement and Protection

DNR

- Geographic Information Systems (GIS) for Watersheds
- Water quality monitoring
- Water Quality Protection Fund

Resources for Water Quality



Farm and Rural Life Poll

- Iowa State University
- Established in 1982
- Approximately 2,000 Iowa farm operators participate annually
- Reoccurring questions that include conservation attitude and action

Farm and Rural Life Poll 2010

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
			—Percentage—		
a. Cover crops can reduce soil erosion significantly (n=1,275)	0.9	2.6	14.1	67.6	14.7
b. Cover crops reduce N and P losses (n=1,271)	0.6	5.7	35.4	49.3	9.0
c. If 50 percent cost-share were available for cover crop establishment, I would plant them (n=1,263)	3.3	15.3	53.6	22.2	5.5
d. I don't know enough about cover crops to use them (n=1,264)	5.0	27.1	32.9	32.7	2.3
e. Cover crops can improve soil productivity (n=1,263)	0.6	3.2	33.1	54.9	8.2
f. I don't have the necessary equipment for cover crops(n=1,257)	4.0	24.7	31.1	36.2	4.1
g. Cover crops can delay spring planting (n=1,260)	1.5	15.2	45.6	33.7	4.0
h. If shorter-season crop varieties yielded the same as longer-season, I would be more likely to plant cover crops (n=1,258)	1.4	12.4	54.6	29.3	2.3
i. There is rarely enough time between harvest and winter to justify the use of cover crops (n=1,269)	1.1	7.4	30.6	47.8	13.1
j. I would like to learn more about using cover crops (n=1,249)	2.9	13.1	43.6	36.0	4.5

Farm and Rural Life Poll 2010

A good farmer is one who…	Not Important at All	Not Really Important	Somewhat Important	Important	Very Important
			—Percentage—		
d. considers the health of streams that run through or along their land to be their responsibility (n=1,323)	0.5	1.4	16.7	54.0	27.5
e. minimizes soil erosion (n=1,323)	0.1	0.3	7.3	50.0	42.3
f. minimizes nutrient runoff into waterways (n=1,321)	0.1	0.4	8.1	49.1	42.3
k. uses cover crops between harvest and planting (n=1,313)	5.5	38.3	39.5	13.0	3.7
u. avoids fall tillage (n=1,308)	3.9	22.9	33.1	29.2	10.9
y. minimizes tillage (n=1,317)	1.7	11.2	34.7	38.4	14.0
aa. puts long-term conservation of farm resources before short-term profits (n=1,314)	0.8	3.3	28.0	47.6	20.3
ad. thinks beyond their own farm to the social and ecological health of their watershed (n=1,320)	0.7	3.5	32.5	47.8	15.5

Farm and Rural Life Poll 2010

Conservation practices	Have established practice to adequate extent	Should establish or improve practice	Practice not needed or not applicable	Don't know
a. Terraces (n=1,283)	36.2	12.0	46.9	4.9
b. Grassed waterways (n=1,296)	66.0	18.1	14.4	1.5
c. Conservation tillage (no-till, reduced tillage, strip tillage, etc.) (n=1,292)	66.5	11.6	18.0	3.9
d. Buffer strips of grass and/or trees along ditches, streams, and other waterways (n=1,291)	53.3	13.3	29.7	3.7
e. Contour buffer strips of grass or other perennial vegetation (n=1,287)	28.4	11.7	53.8	6.1
f. Manure management plan (n=1,282)	24.6	6.8	64.0	4.6
g. Nutrient management plan (n=1,274)	41.6	18.1	31.6	8.7
h. Cover crops (n=1,275)	11.5	18.2	57.5	12.9
i. Integration of small grain or forage crops into your crop rotation (n=1,255)	25.7	11.0	53.1	10.1

Farm and Rural Life Poll

- Examples of other topics
  - Nutrient removal wetlands
  - Perennials, CRP and biomass
  - Land owner attitudes
  - Water quality attitude

Public Cost Share Practices Annual Survey of Partners

Agency

Program

Practice Type/Code

Number of Practices

Practice Units (acres, feet, etc.)

Area Served (ac)

Total C/S

Total Private Match

Year Implemented

Lifetime Expectancy (years)

Contract/Easement Length

State/County/Watershed Level Tracking Potential

Annual N Load Reduction (lbs)

Annual P Load Reduction (lbs)

Annual Sediment Load Reduction (lbs)

Lifetime N Load Reduction (lbs)

Lifetime P Load Reduction (lbs)

Lifetime Sediment Load Reduction (lbs)

Reduction Calculation Method

Farm Service Administration Annual County Level Data Example of crops and use

Crop Code	Crop	Intended Use	Planted Acres
0011	Wheat	Forage	
0016	Oats	Grain	
0094	Rye	Left Standing	
0129	Rapeseed	Forage	
0265	Clover	Grazing	
0296	Mixed forages	Cover Only	
0099	CRP by type		
0158	TRITICALE		

Farm Service Administration CRP in Adair County

CP1 EST PERM INTRO GRASS AND LEGUME
CP2 EST PERM NATIVE GRASSES
CP3 TREE PLANTING
CP4 PERMANENT WL HABITAT
CP8 GRASS WATERWAYS
CP9 SHALLOW WATER AREAS FOR WL
CP10 VEG COVER, GRASS ALREADY EST
CP12 WILDLIFE(WL) FOOD PLOT
CP15 EST PERM VEG CVR CONTOUR STRPS

CP21 FILTER STRIPS
CP22 RIPARIAN BUFFER
CP23 WETLAND RESTORATION
CP25 RARE AND DECLINING HABITAT
CP28 FWP BUFFER
CP29 MPL WL HABITAT BUFFER
CP30 MPL WETLAND BUFFER
CP32 EXPIRED HARDWOOD TREES
CP33 HABITAT BUFRS UPLAND BIRDS

CP3A HARDWOOD TREE PLANTING
CP42 POLLINATOR HABITAT
CP4D PERM WL HABITAT NONEASE
CP5A FIELD WINDBREAK NONEASE
CP8A GRASS WATERWAY NONEASE
CP15A EST CONTR GRASS STRPS NONEASE
CP15B EST CONTR GRAS STRP ON TERRAC
CP23A WETLAND RESTOR NONFLOODPL
CP38B SAFE WETLANDS
CP38E SAFE GRASS

N and P Load Measurement in Iowa's Water

- **Iowa DNR: Iowa's Ambient Watershed Monitoring and Assessment Program**
  - 98 Sites throughout State
  - Includes Sites Upstream and Downstream of Urban Centers
  - Monitored monthly
  - Mostly paired with USGS Gage locations
  - Data from 2000-2010

N and P Load Measurement in Iowa's Water

- ISU, U of Iowa and UNI have monitoring
- Watershed scale monitoring
- Demonstration site monitoring
- Research scale monitoring

Other ongoing activities

- AAI technical committee on utilizing CCAs and agronomic databases to document acres
- WQI Communications Committee suggesting elements of “Partner Organizations”
- WPAC asked to suggest elements of “Partner Agribusinesses”
- DNR Nutrient Balance Committee discussing load measurements.

DNR 2012 Nonpoint Source Management Plan

Goals

1. Build Partnerships to Enhance a Collaborative Watershed Approach to Nonpoint Source Water Pollution
2. Improve Technical Assistance, Outreach and Education to Facilitate NPS Assessment, Planning and Implementation
3. Science-Based Performance Measures
4. Funding

DNR 2012 Nonpoint Source Management Plan

Objective 3: SCIENCE-BASED PERFORMANCE MEASURES

1. Encourage greater public participation in the monitoring and evaluation of water quality best management practices.
2. Develop local natural resource goals with targeted solutions to meet watershed needs.
3. Utilize long-term research projects, including monitoring, funding, and alternative management practices to confirm post-project results of demonstration projects.
4. Place greater focus on up-scaling small-plot research to watershed scale.
5. Establish uniform practices and protocols for monitoring that can be applied to watershed needs.
6. Adopt system-based implementation and monitoring strategies versus practice-based approaches.

Challenges

- What agency is responsible to
  - Collect each measure
  - Compile report
  - Post report
- What resources are available

DNR 2012 Nonpoint Source Management Plan

- Objective 1.1 Recommends *a centralized clearing house for information and data sharing*
- *The WRCC and WPAC provide the perfect structure for a centralized clearing house for this type of reporting.*
- *Since the councils closely associate with the Secretary of Agriculture, the Department of Agriculture and Land Stewardship's Division of Soil Conservation acts as the lead entity in this objective.*

Chris Jones
Environmental Scientist
Iowa Soybean Association
July 25, 2014

WPAC

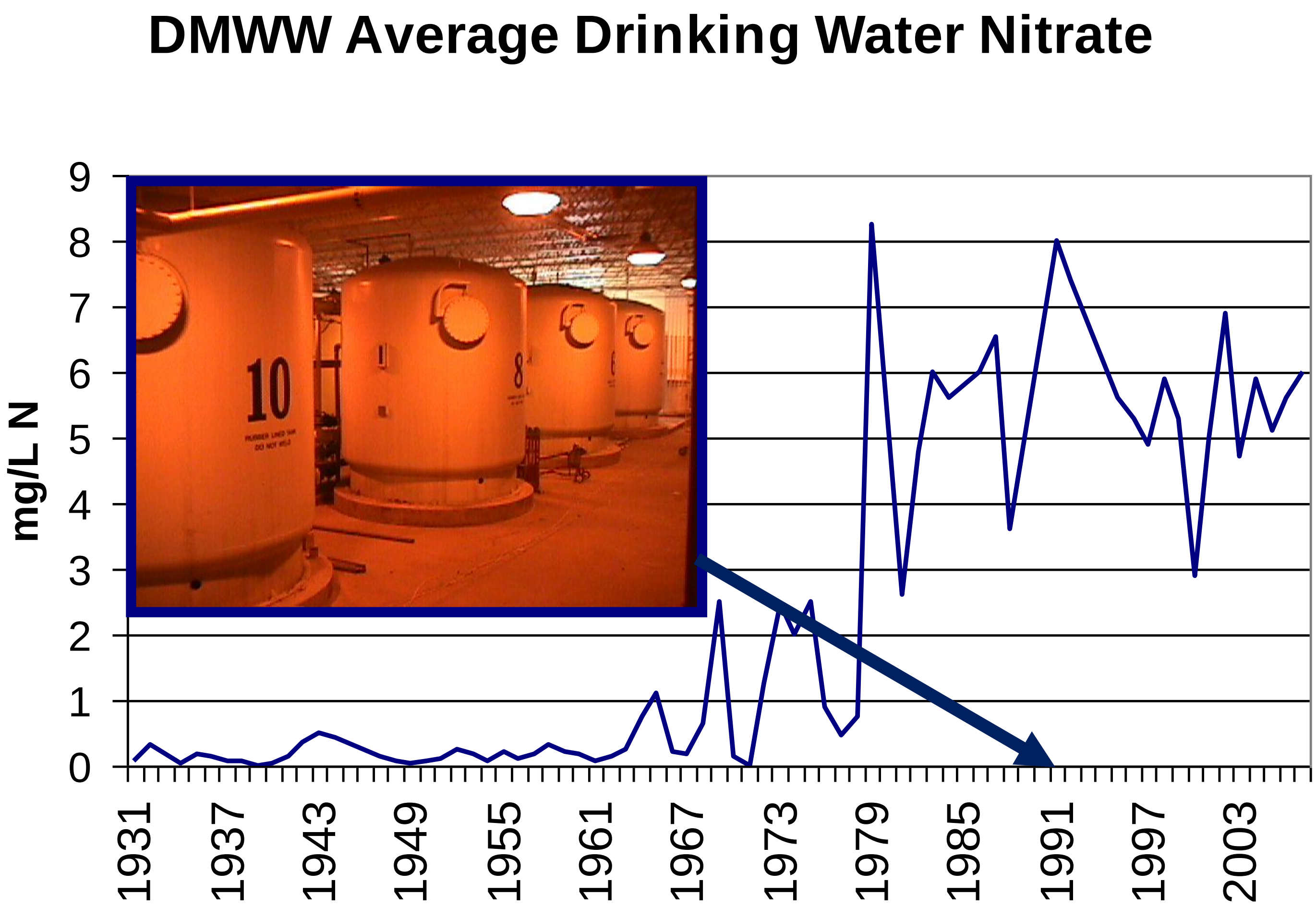
On the Contradiction of Increased Corn Acres and Declining Raccoon River Nitrate, 1999-2013

History

Raccoon River is a Stream of National Significance. Why?

- Water used by Des Moines Water Works since 1947
- Groundwater under the influence of the Raccoon has been used since 1880s
- Land use in watershed is almost completely agricultural

1960s: Elevated Nitrate begins



Biofuels: Making it Worse?

Union of Concerned Scientists

THE ENERGY-WATER COLLISION

Corn Ethanol's Threat to Water Resources

POLLUTION FROM CORN FARMING is a leading cause of water quality problems in the Upper Mississippi River watershed, polluting drinking water in agricultural areas and degrading rivers and lakes, while also expanding the Gulf of Mexico's "dead zone" (a large area deprived of oxygen). These problems—and their associated economic and health impacts—are exacerbated by government policies that increase demand for corn ethanol, in turn expanding U.S. corn production. Better agricultural practices that keep fertilizer out of freshwater can mitigate the water quality problems associated with corn cultivation and corn ethanol production, but if we want to protect water quality while also reducing U.S. oil dependence, biofuel production must move beyond corn to more diverse and environmentally friendly crops and waste materials.

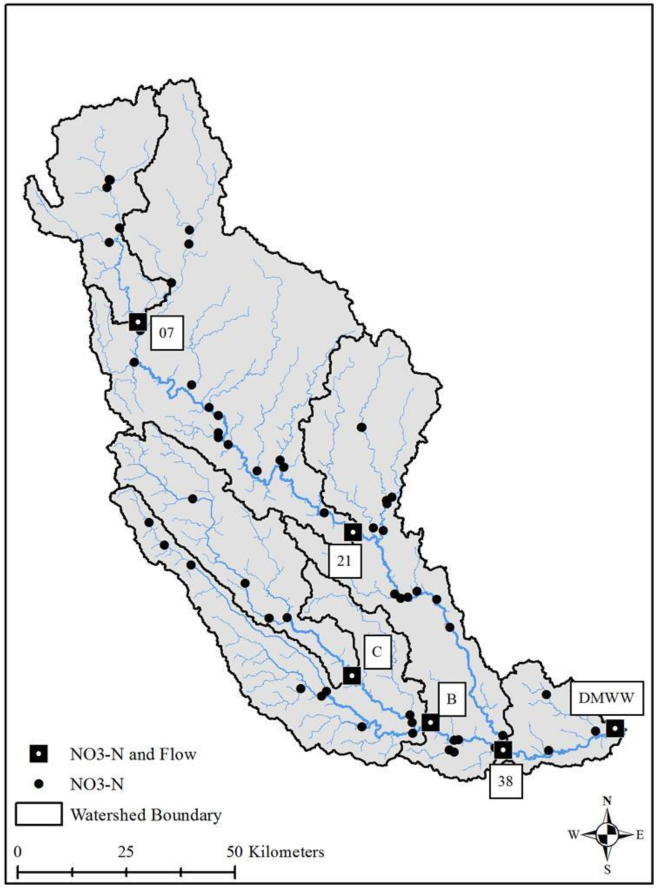
The Corn Belt and Mississippi River Basin

The Mississippi-Atchafalaya River Basin drains 31 states that cover 40 percent of the contiguous United States (Figure 1) (Committee on Environment and Natural Resources 2010). The Corn Belt states of Illinois, Indiana, Iowa, Kansas, Minnesota, Nebraska, Ohio, and South Dakota grow more than three-quarters of the corn grown in America. This corn is used for livestock majority of the overall growth in corn production over the same period (Figure 3, p. 2) (ERS 2010).

This increase in corn production—and the fertilizer use associated with it—has implications for water quality from the Corn Belt to the Gulf of Mexico. Rains wash nitrogen and phosphorus pollution from farm fields into creeks, then small rivers, large riv-

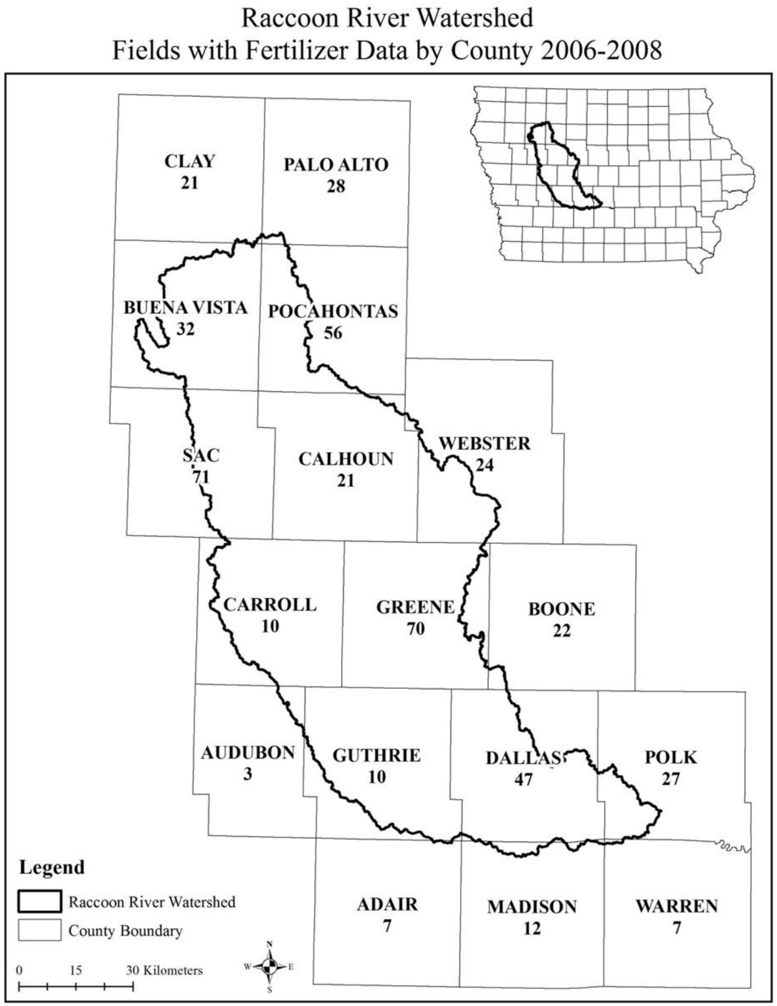
Water Monitoring

Sponsored Monitoring at ~60 sites in Raccoon Watershed since 1999



6325 ACWA samples and 2889 samples collected at DMWW

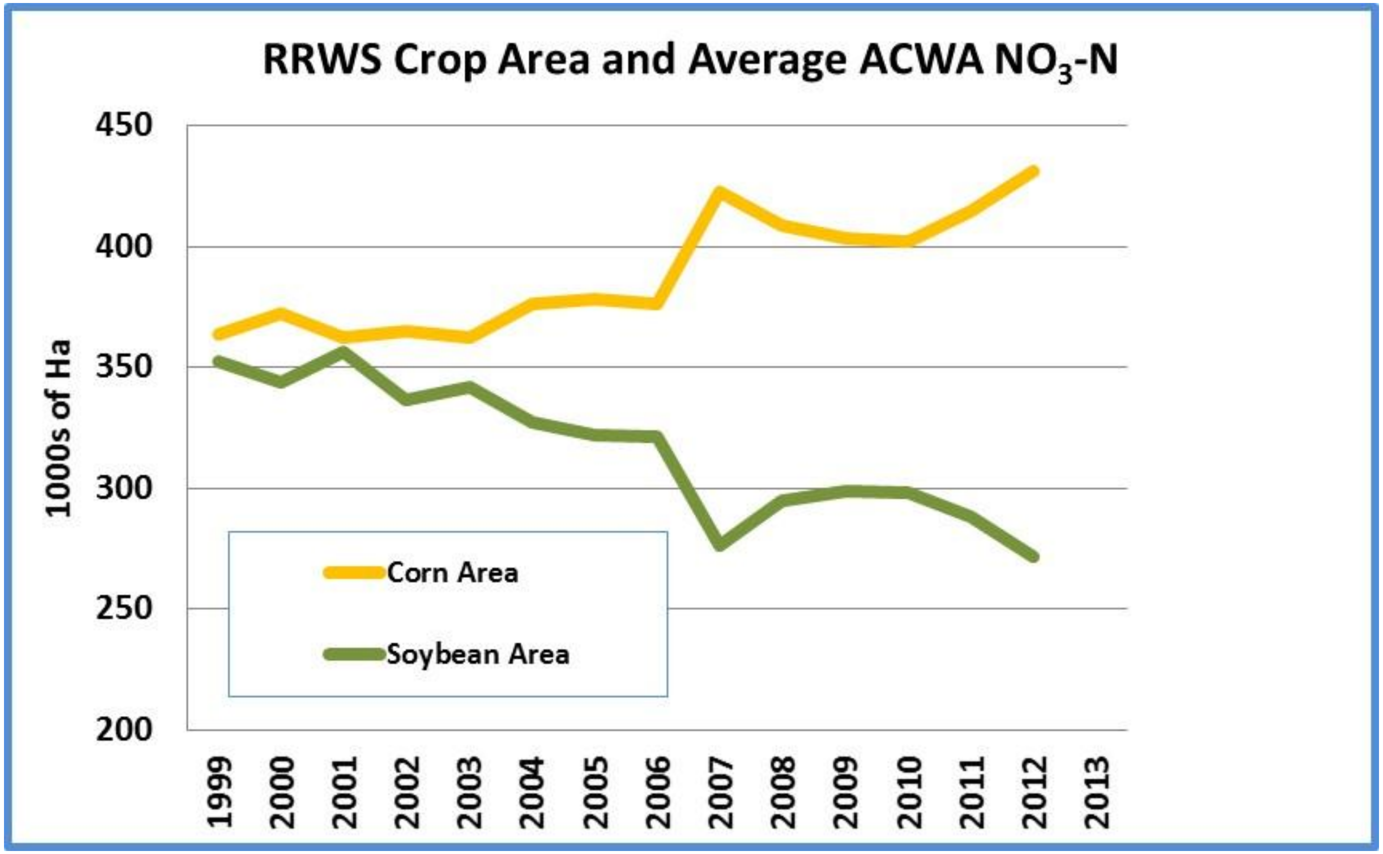
On-Farm Network Fertilizer Data



Corn and Soybean Acreage

AGRICULTURE COUNTS
NASS

Crop Area



RRWS Crop Area and Average ACWA NO_3-N
450
400
350
300
250
200
1000s of Ha
Corn Area
Soybean Area
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013

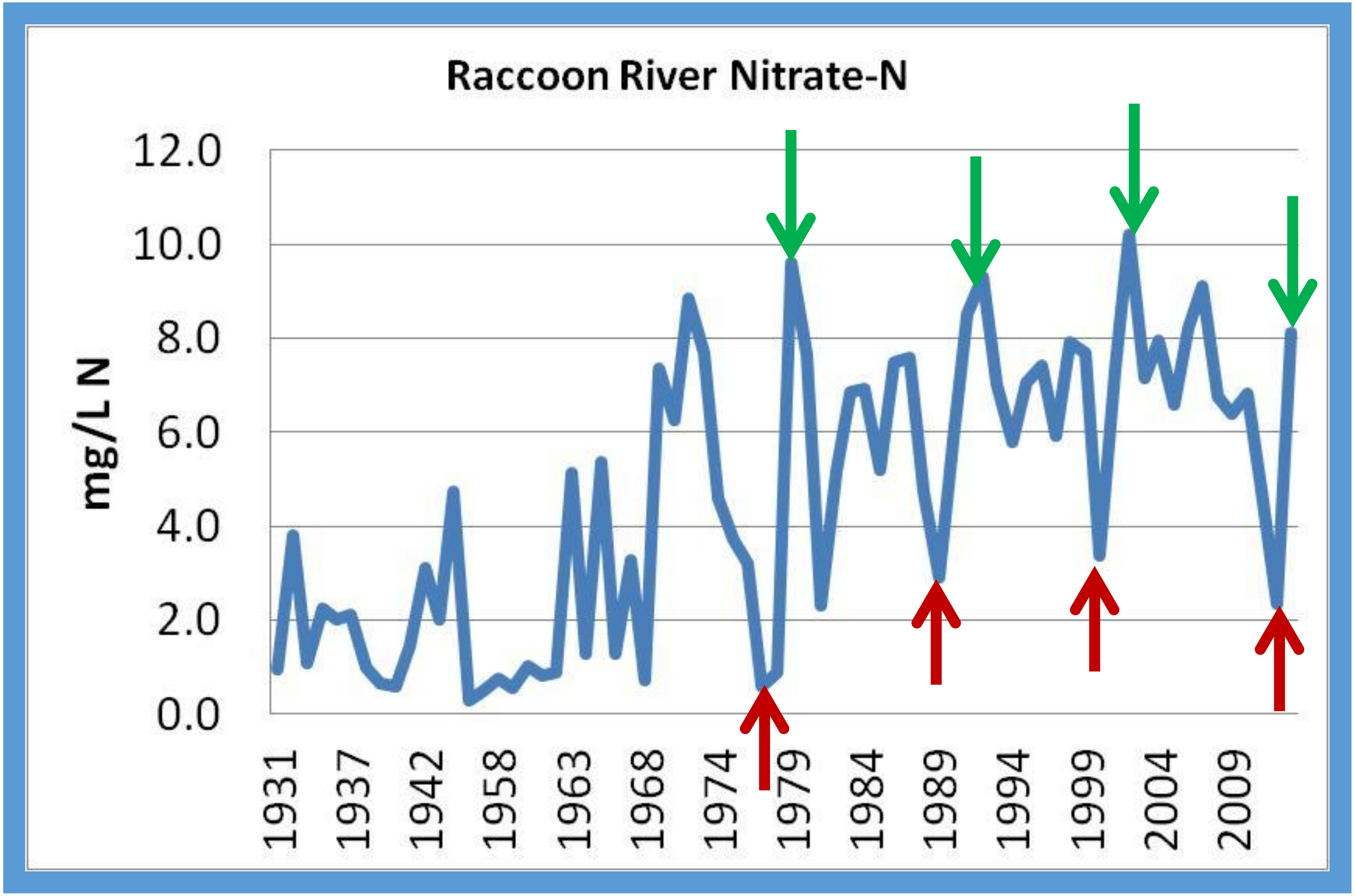
Fertilizer Data

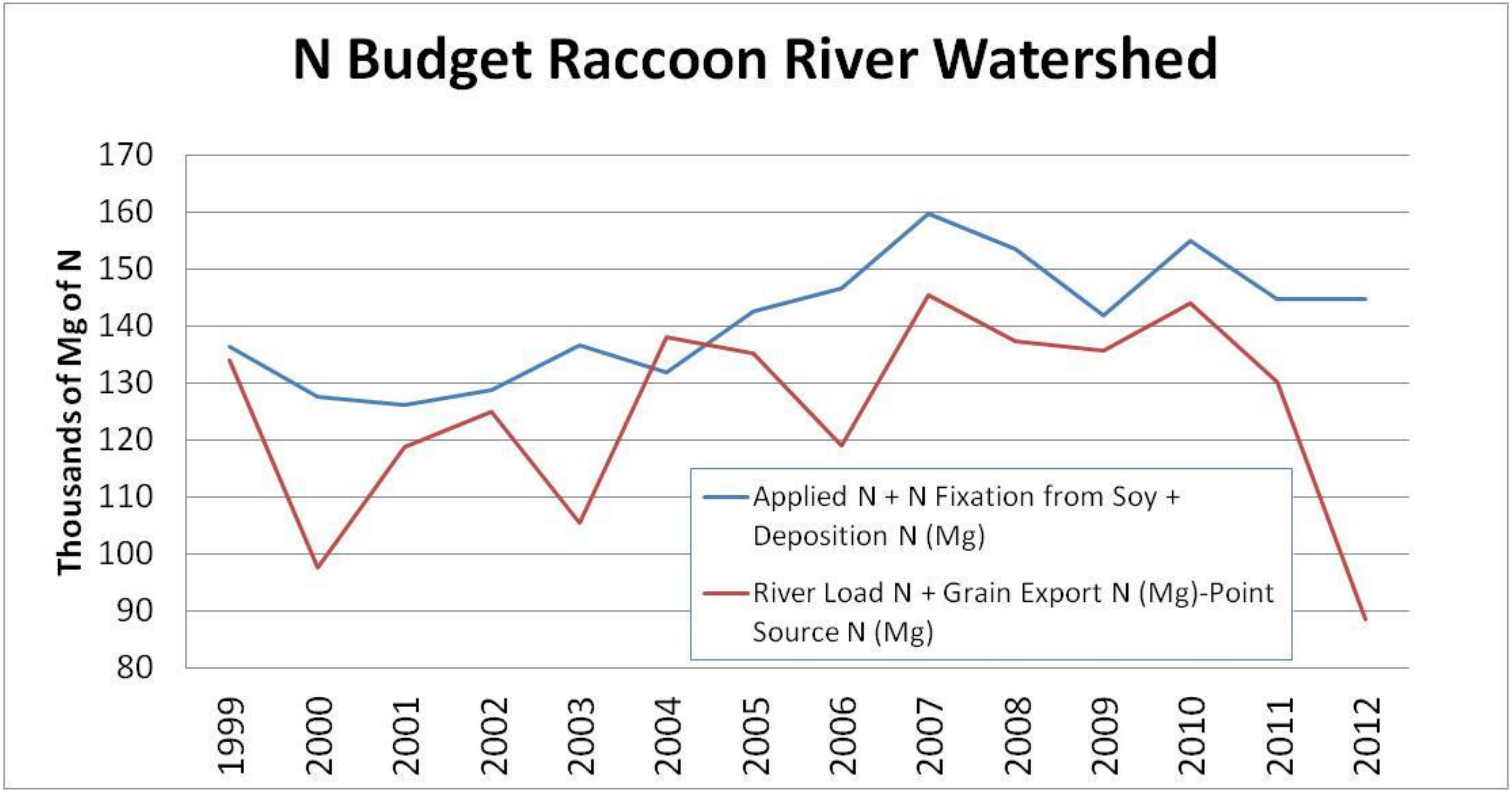
Commerical N				Manure N			
Following Soybean		Following Corn		Following Soybean		Following Corn	
Fields	Average Rate (lbs/acre)	Fields	Average Rate (lbs/acre)	Fields	Average Rate (lbs/acre)	Fields	Average Rate (lbs/acre)
266	150	107	185	56	168	39	206

2013: Extraordinary Year for WQ

- **DMWW Record for Raccoon: 24 mg/L**
- **DMWW Record for Des Moines: 19 mg/L**
- **June and May two biggest loading months ever for Raccoon**
- **49 of the 50 ACWA sites monitored in 2013 had their highest nitrate concentration ever**
- **Elk Run Creek: 68 mg/L**
- **County tile lines in RR and DMR WSs >60 mg/L**
- **E. Iowa Tile sample: 89 mg/L**

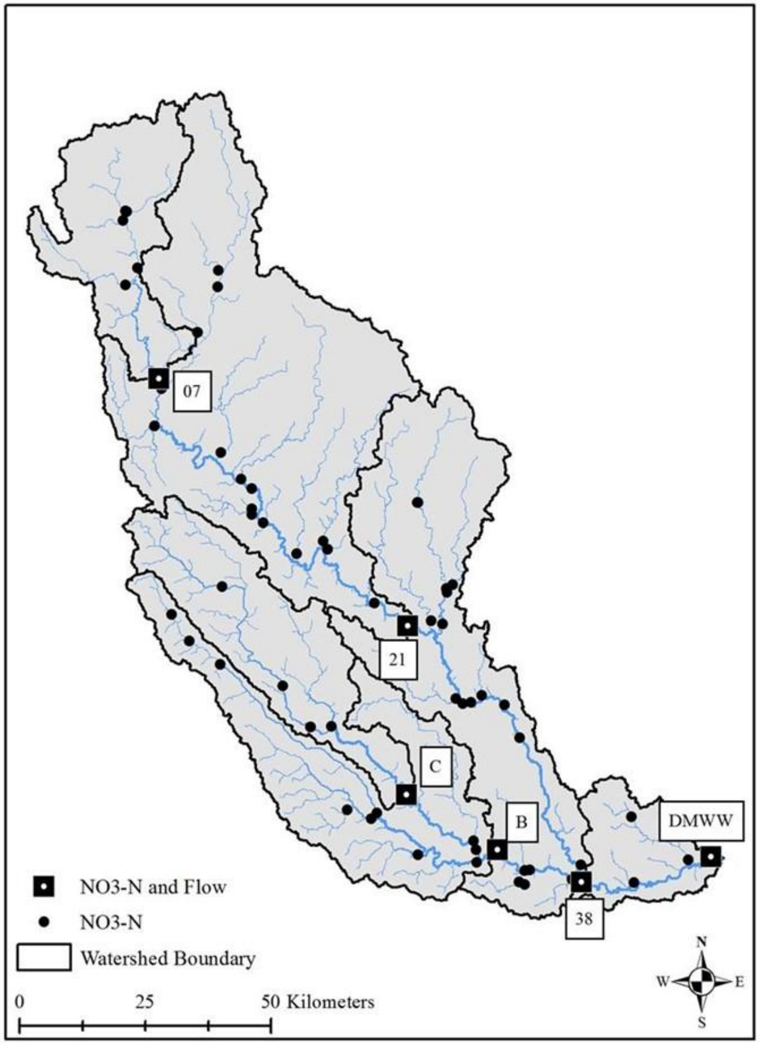
Effect of Drought





N Budget Raccoon River Watershed
Thousands of Mg of N
170
160
150
140
130
120
110
100
90
80
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
Applied N + N Fixation from Soy + Deposition N (Mg)
River Load N + Grain Export N (Mg)-Point Source N (Mg)

Water Monitoring



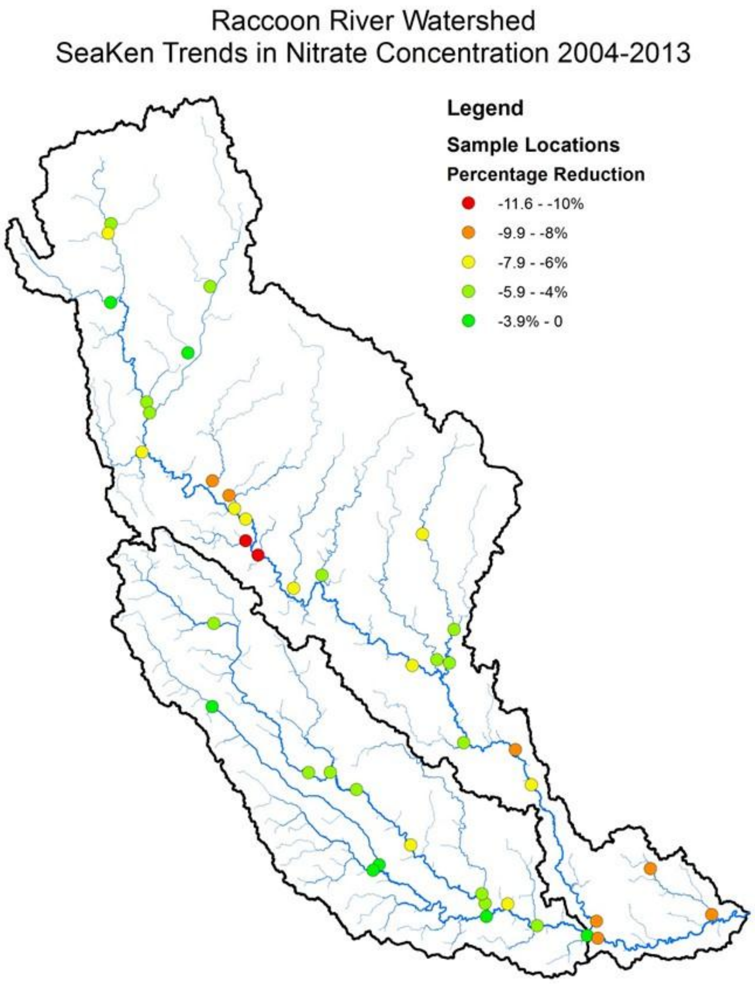
Nitrate Trends

1999-2013

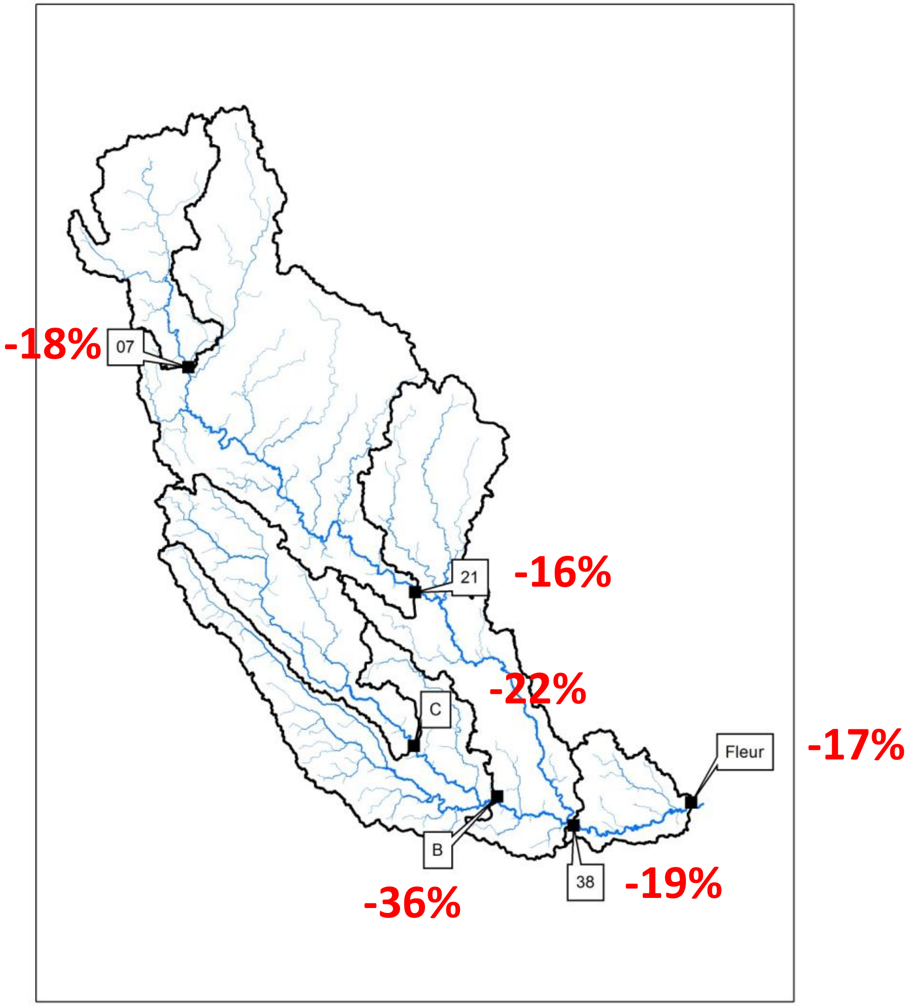
- 40 sites with enough samples to test for trend
- 38 sites trending down
- Average decline = 0.28 mg L^{-1} yr^{-1}

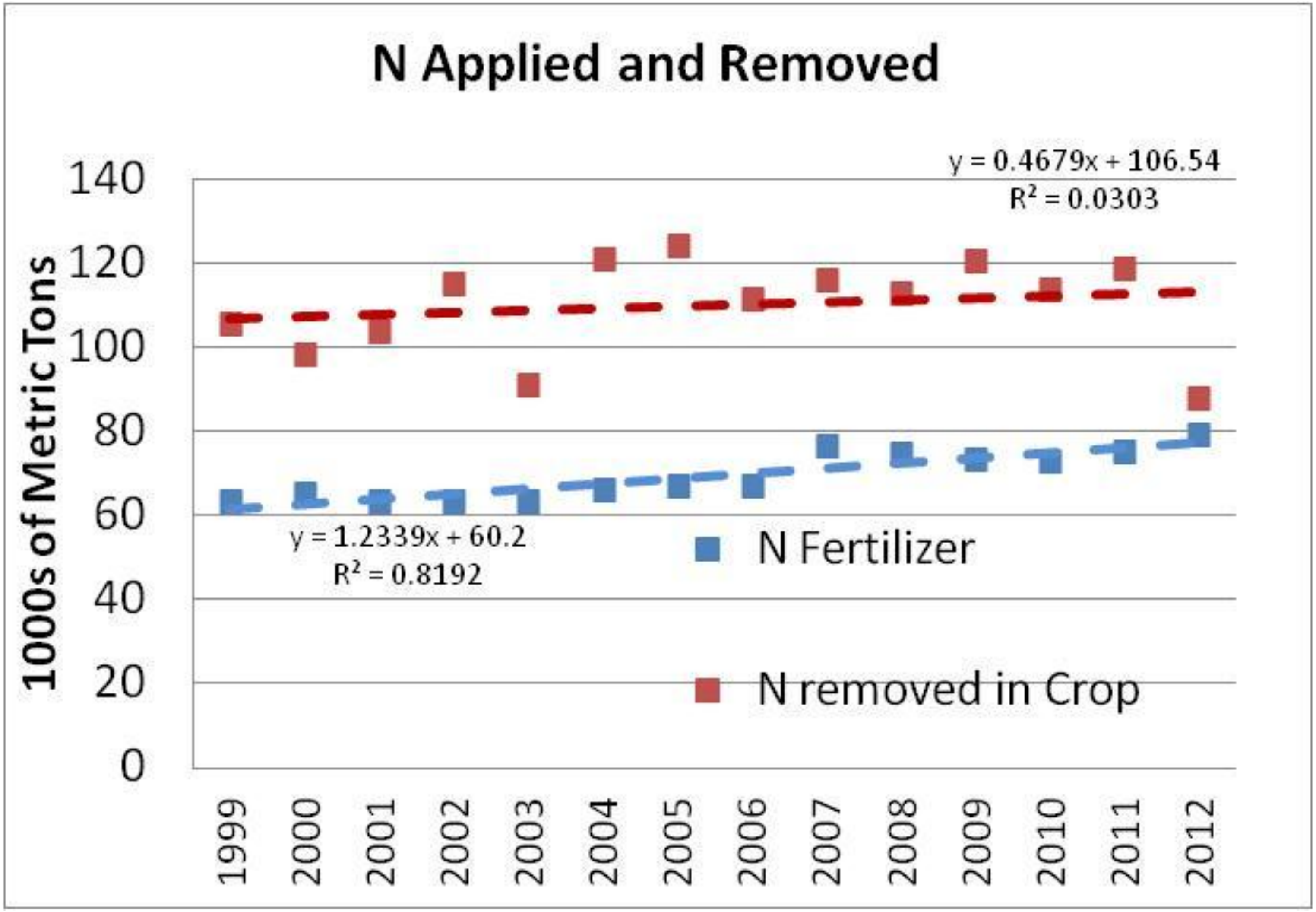
2004-2013

- 47 sites with enough samples to test for trend
- 45 sites trending down
- Average decline = 0.62 mg L^{-1} yr^{-1}

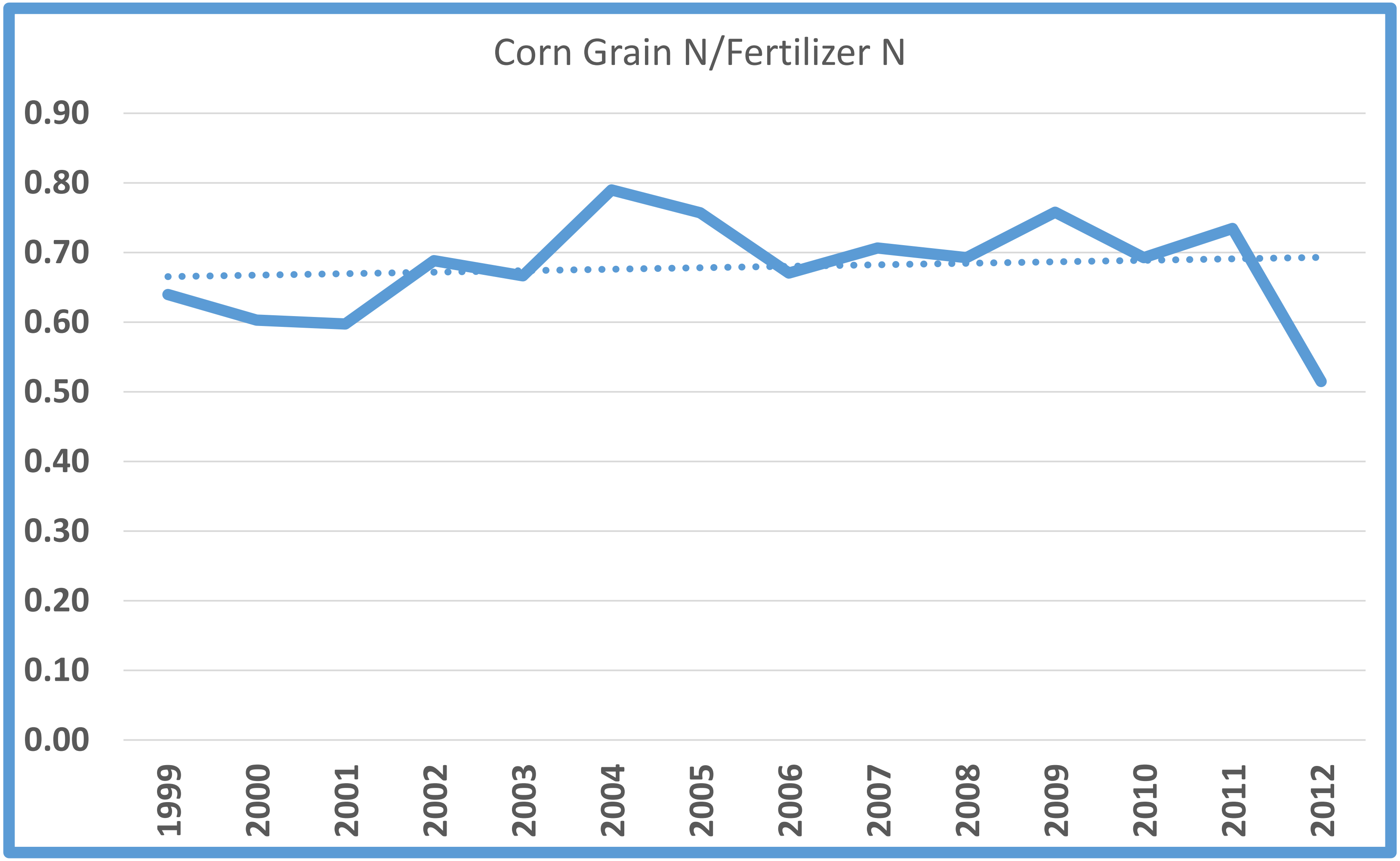

Raccoon River Watershed
SeaKen Trends in Nitrate Concentration 2004-2013
Legend
Sample Locations
Percentage Reduction
-11.6 - -10%
-9.9 - -8%
-7.9 - -6%
-5.9 - -4%
-3.9% - 0

Flow Weighted Averages 1999-2003

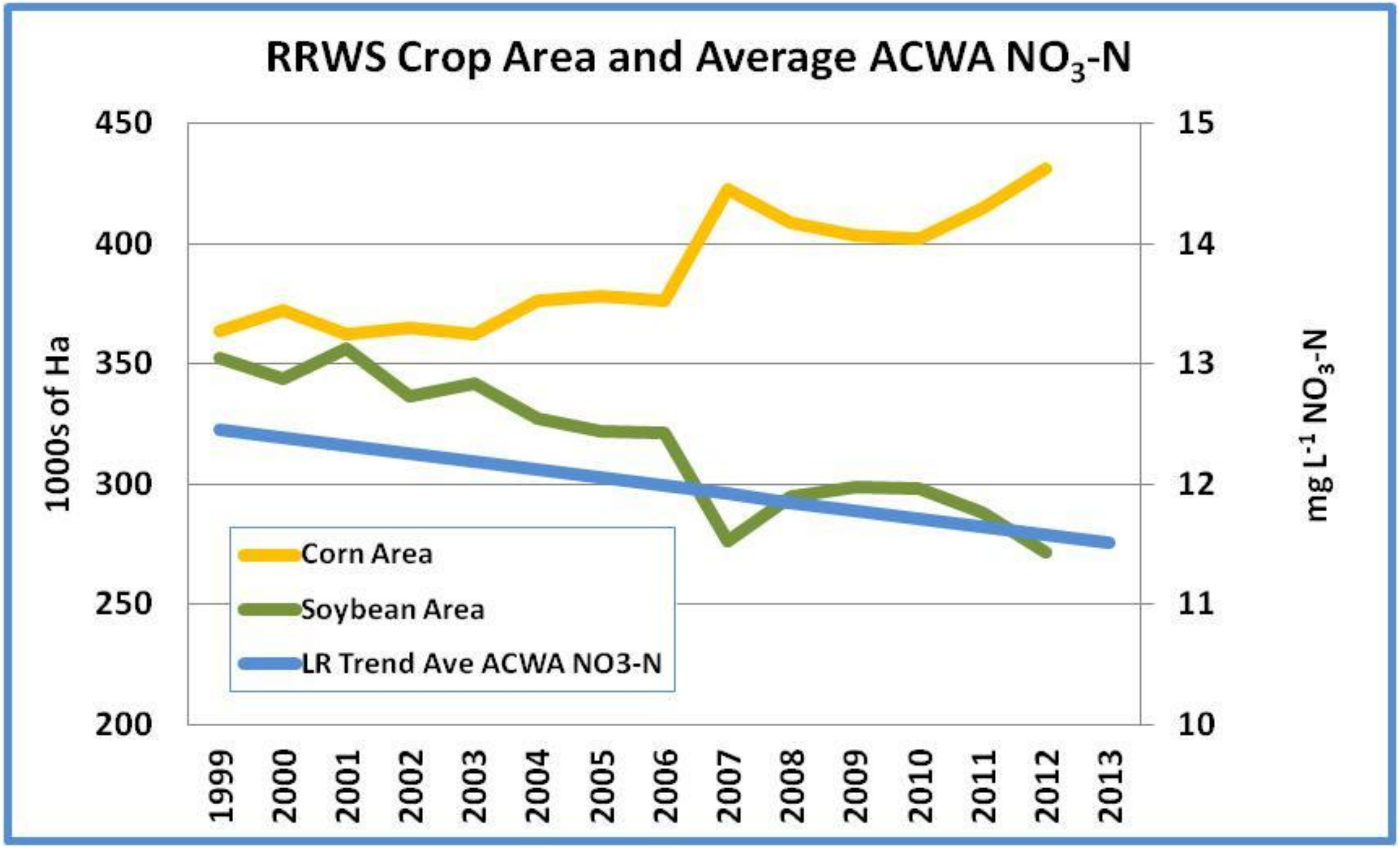




N Applied and Removed
y = 0.4679x + 106.54
R² = 0.0303
140
120
100
80
60
40
20
0
1000s of Metric Tons
y = 1.2339x + 60.2
R² = 0.8192
N Fertilizer
N removed in Crop
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012


Corn Grain N/Fertilizer N
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012

Soybeans?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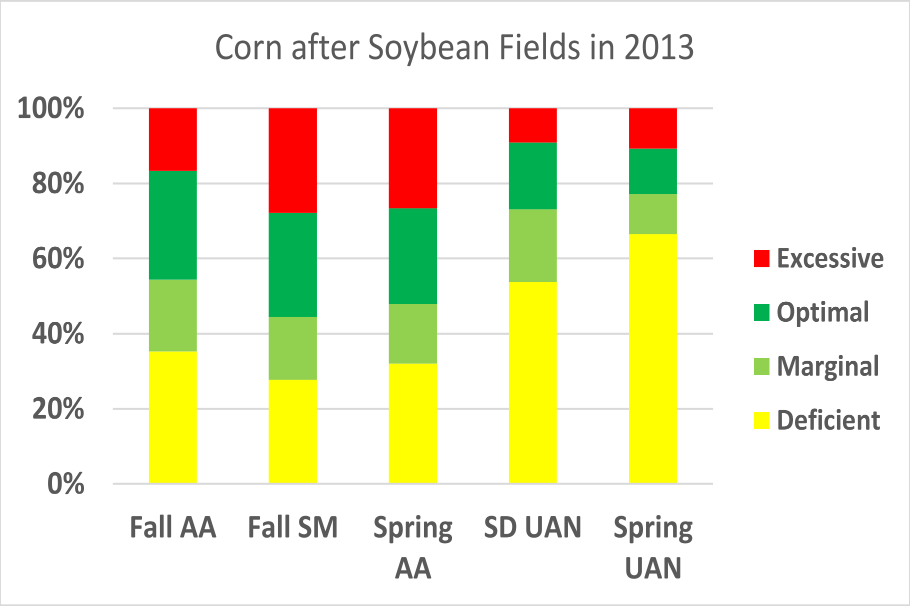
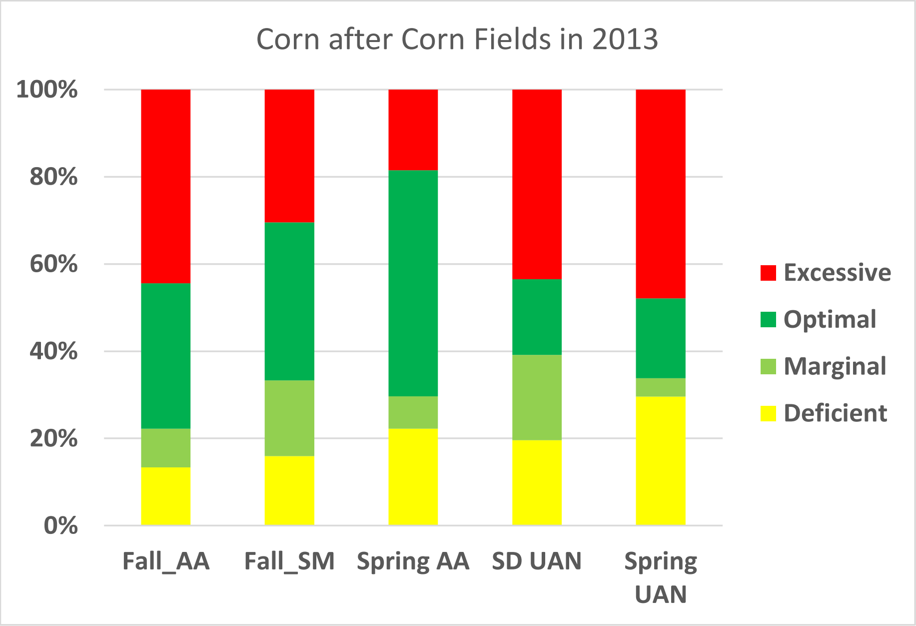
10
mg L^{-1} NO_3-N
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Corn Area
Soybean Area
LR Trend Ave ACWA NO3-N

Why Soybean?

We know that accurately targeting the optimal N rate is more difficult following soybean





Graphs provided P. Kyveryga

Why Soybean?

- More denitrification under Corn
- More losses from soil mineralization after SB in autumn, especially with fall tillage
- Farmers are managing more aggressively with C-C
- More immobilization into the soil under corn
- Greater tile flow under Soybean

Going Forward

- Incremental Improvement Likely, but current condition still unacceptable to most

- Transformational Improvements? Cover Crops?

- Better management of Soy may have disproportionately positive effects on Water Quality

- Monitoring and credible data will be critical for making policy and spending conservation dollars