DTN Ag Summit
Chicago, Ill

Water Quality and Freedom To Operate

Tim Smith
Eagle Grove, IA

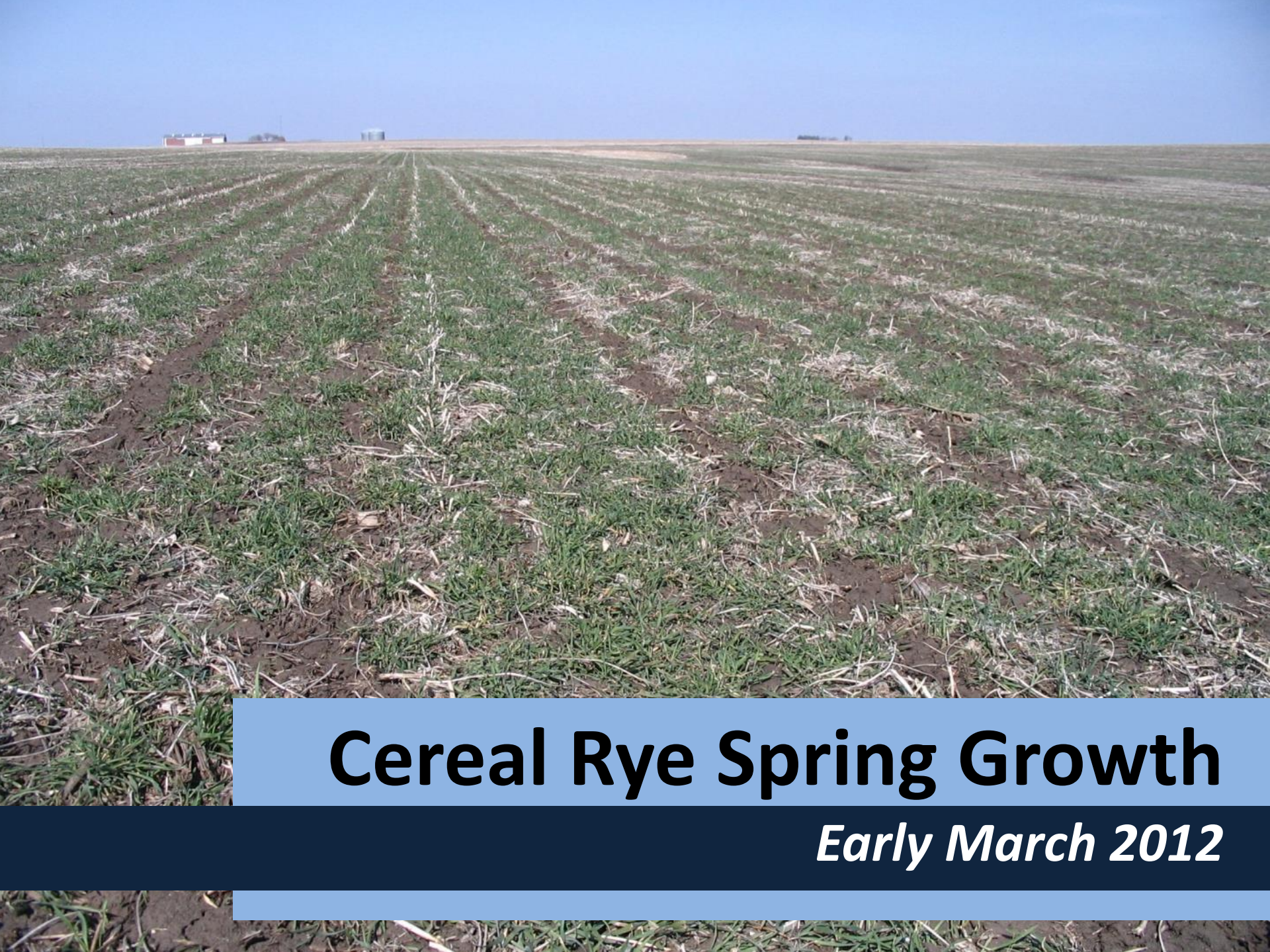
Ready to Change?

How are you going to farm without a plow?


4440
JOHN DEERE

Fall Growth

Cereal rye seeded with floater, 10/2/2012

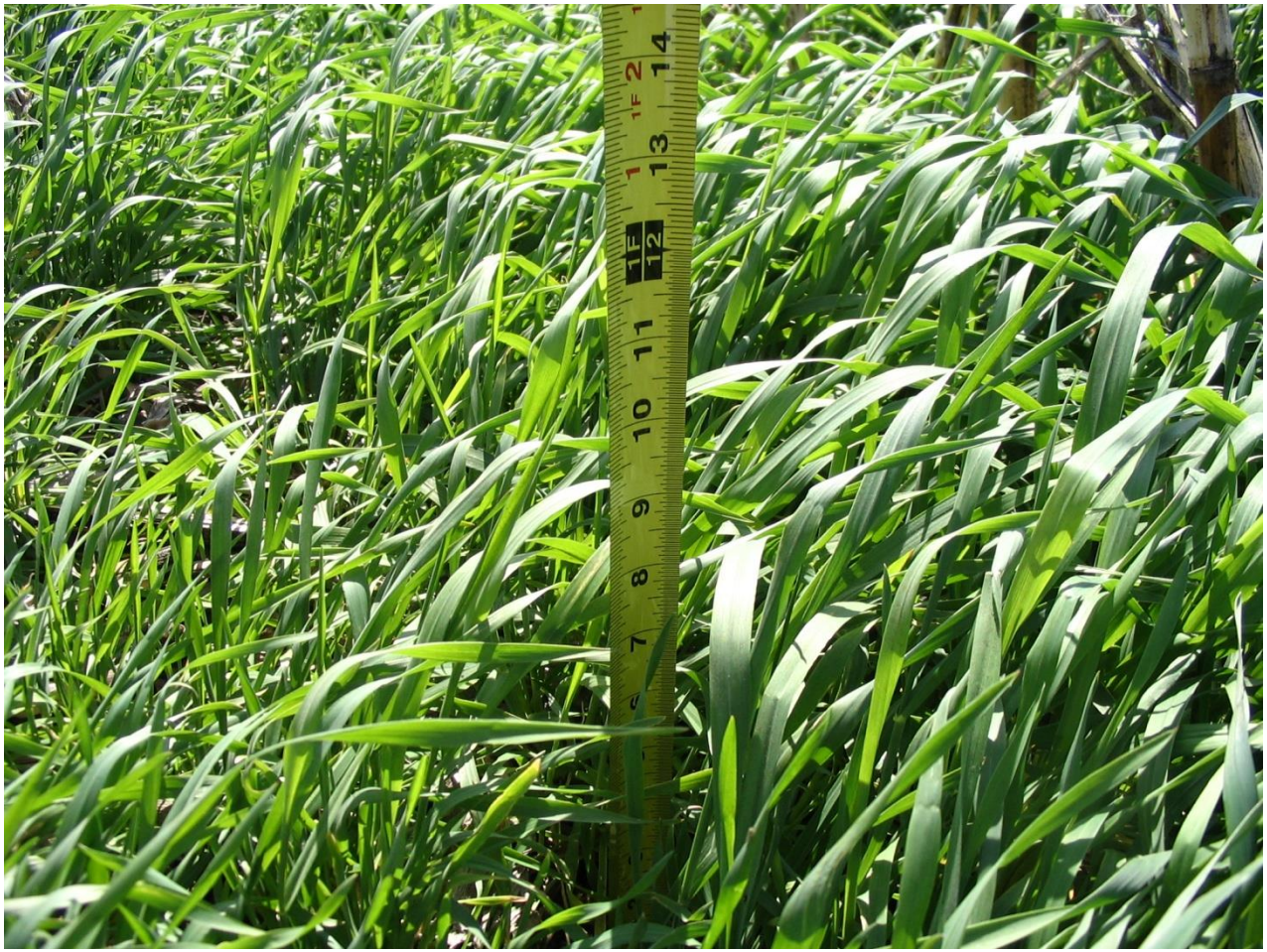


Cereal Rye Spring Growth

Early March 2012

Cereal Rye Spring Growth

8”-10” tall, 800# biomass / acre, 30# of N uptake by rye = $15.00/acre



Cereal Rye Termination

Spray when daytime temp. is warmer than 50F

Termination Timing

Spray rye 14 days before planting corn

Notice the tilled field across the fence…

Nutrient Management Practices

- Delay nitrogen application until spring or side dress
- Late spring nitrate test (for N side dress applications)
- Tissue samples of corn plant @ V10
- Grid soil sampling (2.5 ac grids)

Nutrient Management Practices

- Late summer stalk nitrate testing of corn plants
- Water monitoring of field tile water (testing for nitrate levels)
- Written nutrient management plan

Corn Harvest – Late Sept. 2012

170 bushels/acre with 15” of rainfall

Rye & Radish

Oats Mix


11.06.2014

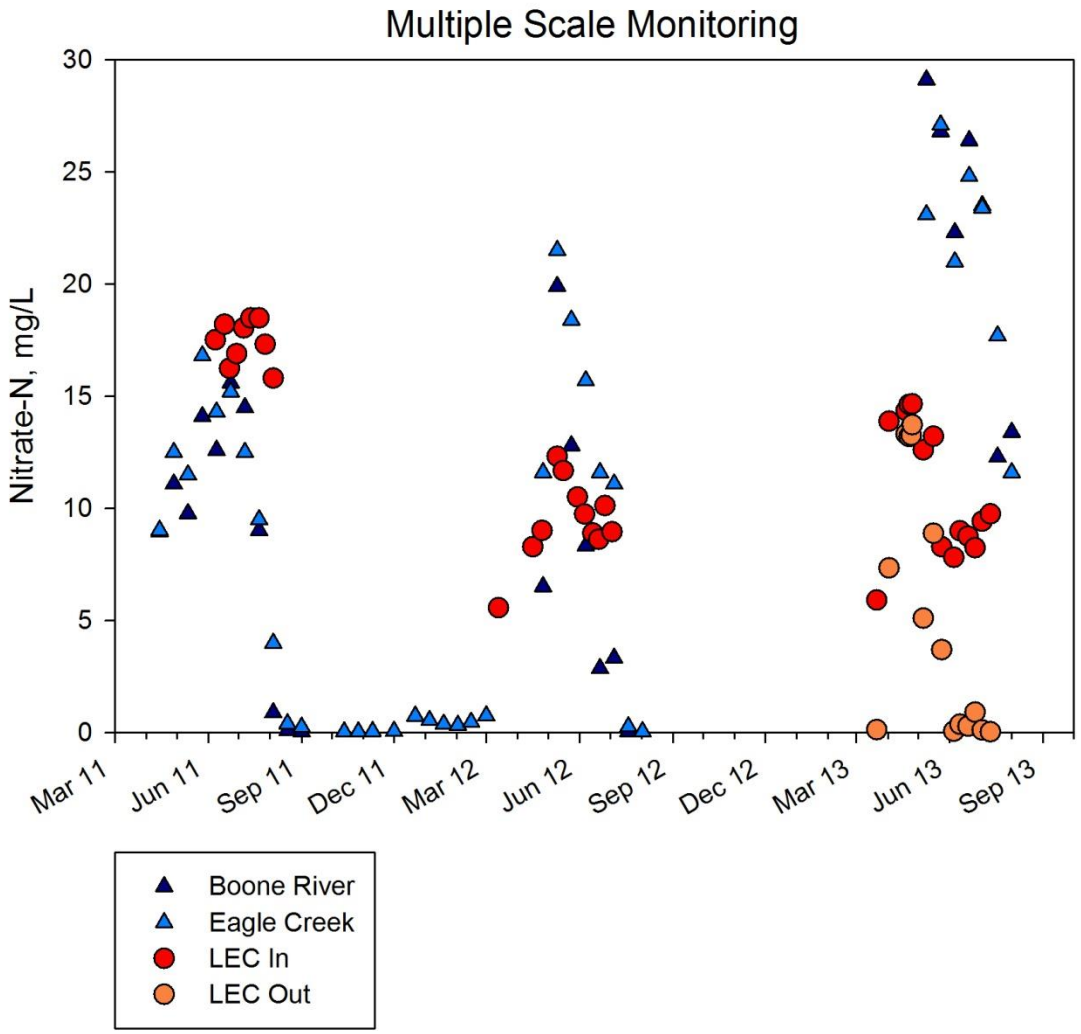

11.06.2014

Woodchip Bioreactor

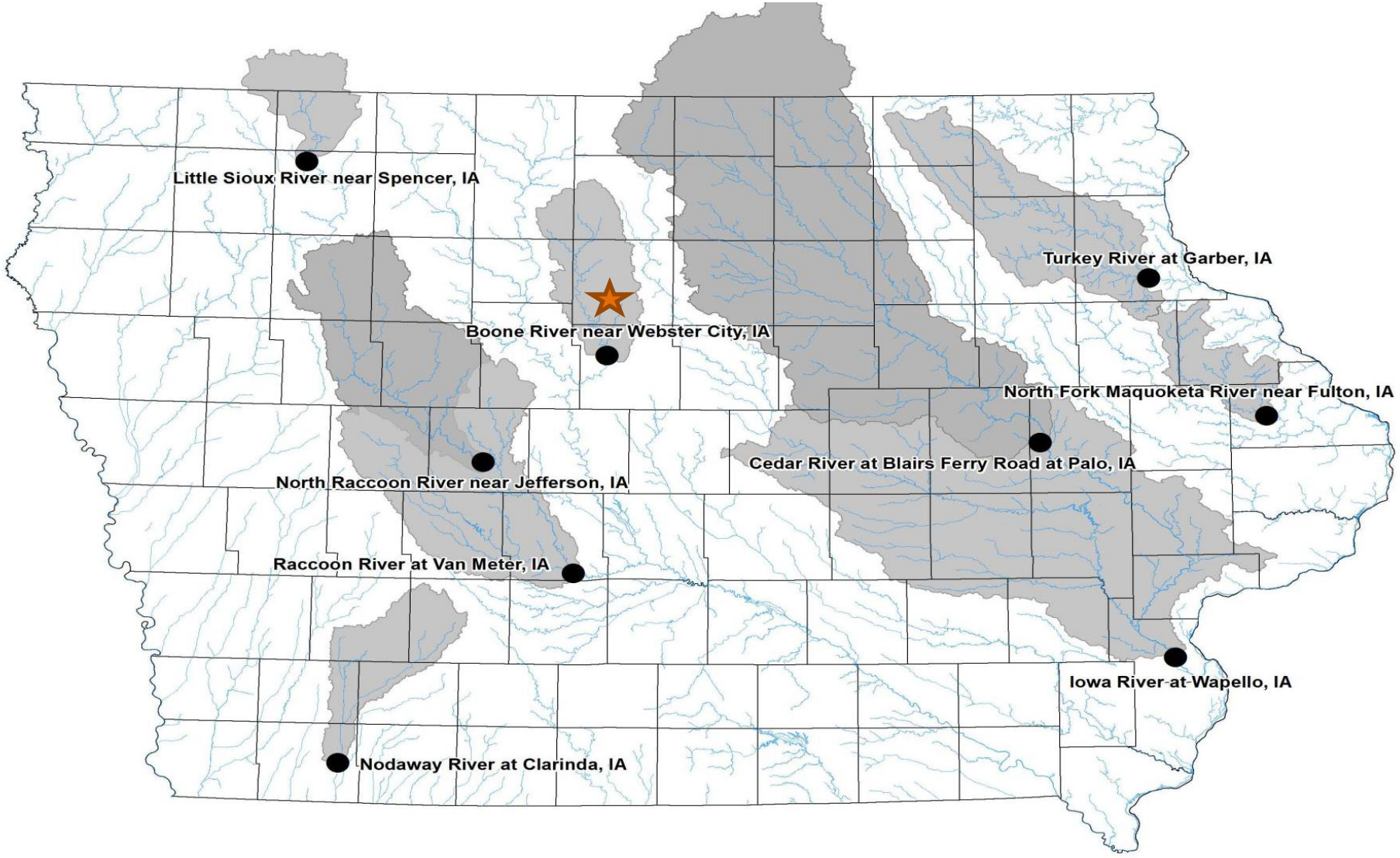
110’ x 10’ x 5’

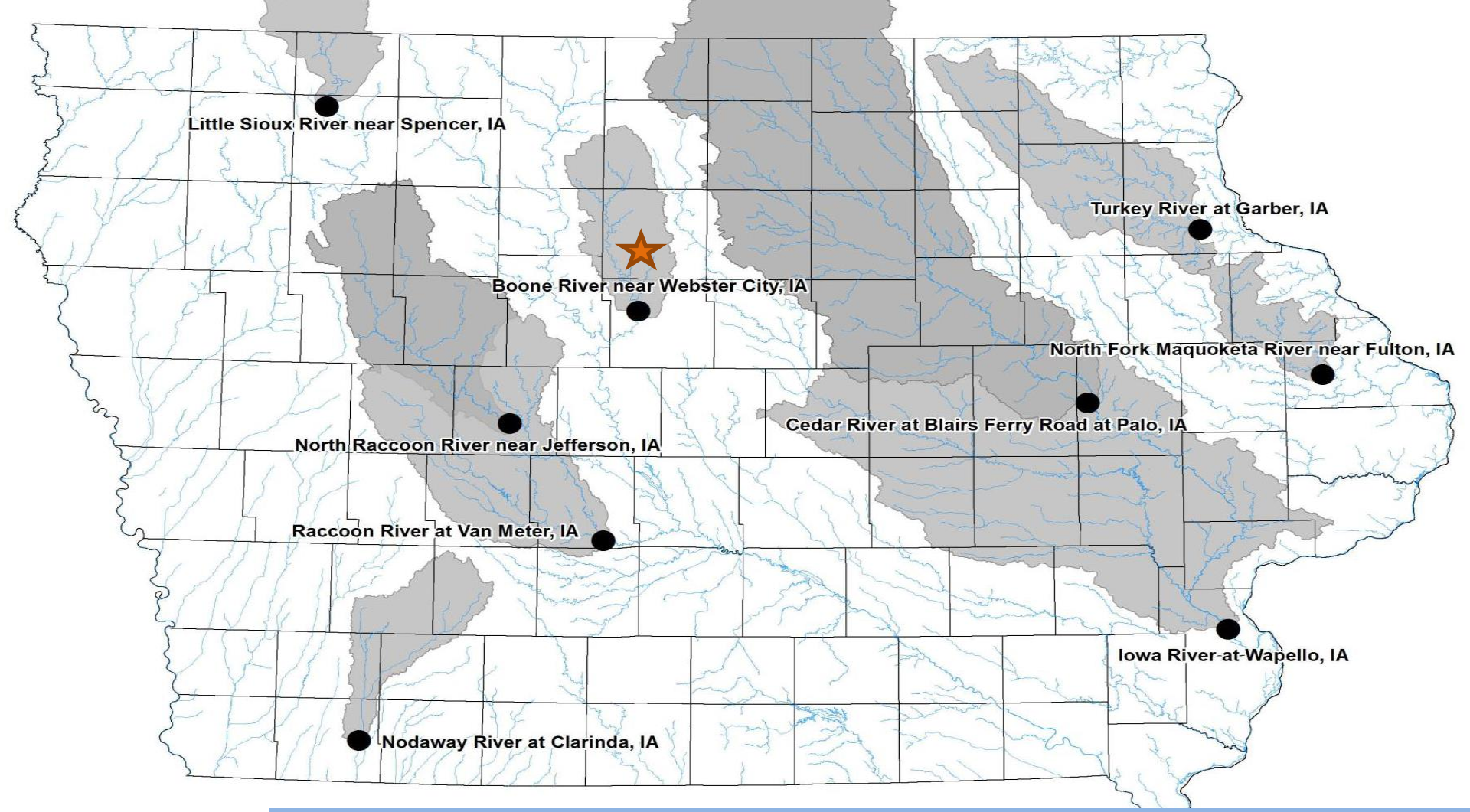
Bioreactor

125 cubic yards of wood chips


Multiple Scale Monitoring
Nitrate-N, mg/L
30
25
20
15
10
5
0
Mar 11
Jun 11
Sep 11
Dec 11
Mar 12
Jun 12
Sep 12
Dec 12
Mar 13
Jun 13
Sep 13
Boone River
Eagle Creek
LEC In
LEC Out

Mississippi River Basin Initiative (MRBI)





1671 Tons of N Daily Load

April 1 – July 3, 2013

NH3 plant produces 902 ton of N /day

Daily loss from 9 watersheds = 1671 ton/day

from April 1st to July 3rd 2013

Table 1. Nitrogen reduction practices – potential impact on nitrate-N reduction and corn yield based on literature review.

	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	Reduce to Maximum Return to Nitrogen value 149 kg N/ha (133 lb N/ac) for CS and 213 kg N/ha (190 lb N/ac) for CC	10‡	-1‡‡
	Nitrification Inhibitor	Nitrapyrin – 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)	-100***
	Extended Rota			
	Grazed Pastu			
Edge-of-Field	Drainage Water			
	Shallow Drain			
	Wetlands			
	Bioreactor			
	Buffers			

+ A positive number is nit
++ A positive corn yield c
practices are not expecte
* SD = standard deviation
‡ Reduction calculated ba
‡‡ Calculated based on the Maximum Return to Nitrogen (MRTN) relative yield at the given rates.
** Based on 1 study with 3 years of corn and 2 years of soybean.
*** This number is based on the Land Retirement number – there are no observations to develop a SD.

Nitrogen Reduction Practices

- Timing (Sidedress vs. preplant) = 7%
- Nitrogen Application rate (MRTN) = 10%
- Cover Crops (cereal rye) = 31%
- Bioreactors = 43%

Table 2. Practices with the largest potential impact on phosphorus load reduction.

Notes: Corn yield impacts associated with each practice also are shown as some practices may be increase or decrease corn production. See text for information on value calculations.

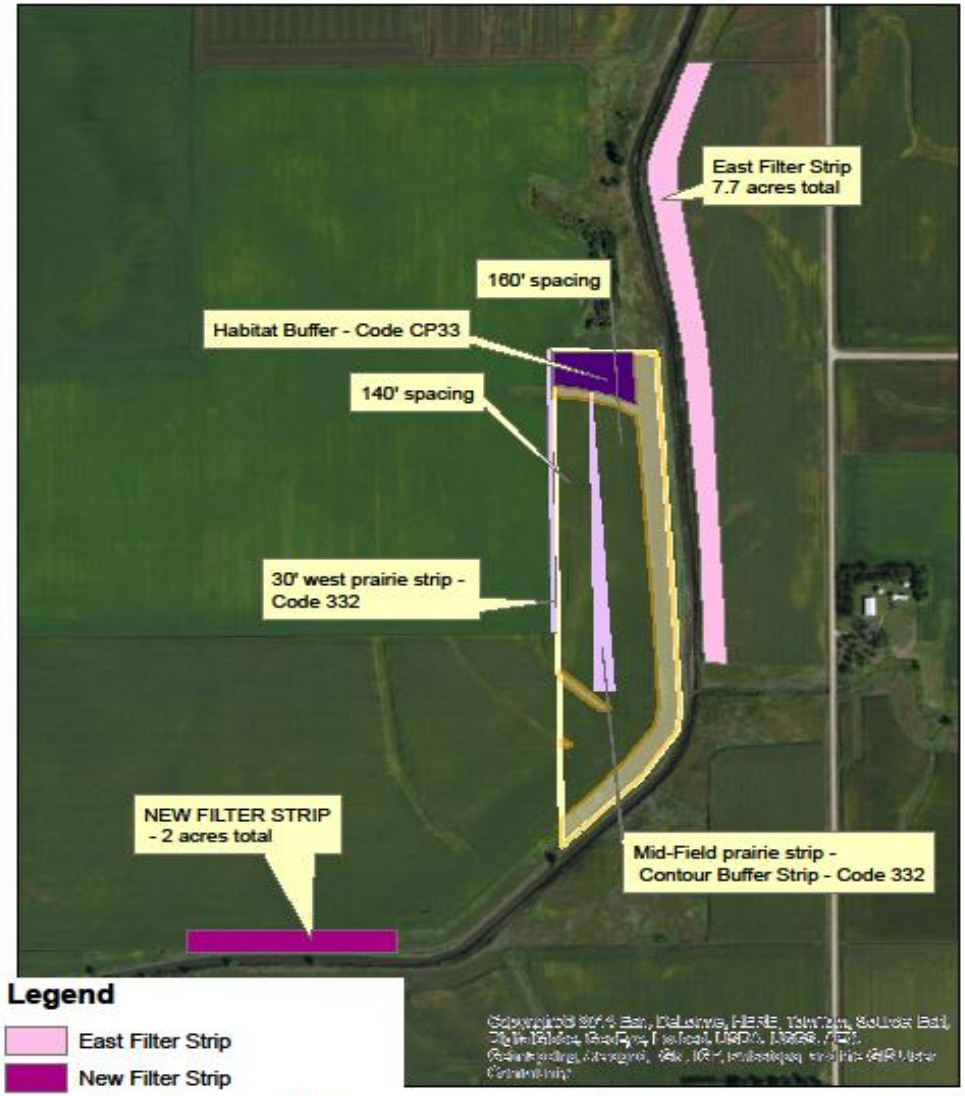
	Practice	Comments	% Phosphorus Load Reduction[a]	% Corn Yield Change[b]
			Average (SD[c])	Average (SD[c])
Phosphorus Management Practices	Phosphorus Application	Applying P based on crop removal - Assuming optimal soil-test P level and P incorporation	0.6[d] [70[e]]	0[f]
		Soil-Test P – Producer does not apply P until soil-test P drops to the optimal level	17[g] [40[h]]	0[f]
		Site-specific P management		0[f]
	Source of Phosphorus	Liquid swine, dairy, and poultry manure compared to commercial fertilizer – Runoff shortly after application	46 (45)	-1 (13)
		Beef manure compared to commercial fertilizer – Runoff shortly after application	46 (96)	
	Placement of Phosphorus	Broadcast incorporated within one week compared to no incorporation – Same tillage	36 (27)	0[f]
		With Seed or knifed bands compared to surface application without incorporation	24 (46) [35[i]]	0[f]
Erosion Control and Land Use Change Practices	Tillage	Conservation till – chisel plowing compared to moldboard plowing	33 (49)	0 (6)
		No till compared to chisel plowing	90 (17)	-6 (8)
	Crop Choice	Extended rotation	[j]	7 (7)[k]
	Perennial	Energy crops	34 (34)	NA
		Land retirement (CRP)	75[l]	NA
		Grazed pastures	59 (42)	NA
Edge-of-				

Phosphorus Reduction Practices

- Wait to apply until optimal soil-test P level = 17%
- P placement (banded under surface) = 24%
- No-tillage vs. chisel plow = 90%

a - A
b - A
c - St
d - M
requ
e - T
appl
lowa
f - In
g - M
(Mal
h - Estimates made from unpublished work by Mallarino (2011) in conjunction with the Iowa P Index and Mallarino and Pratel (2007). These studies were conducted at several locations and over several years but may, or may not, represent conditions in all Iowa fields.
i - Numbers are from a report by (Dinnes, 2004) and are the author's professional judgment

Tim Smith - Wright County - Annotated Strips Layout - DRAFT



Legend

- East Filter Strip
- New Filter Strip
- Habitat Buffer - Code CP33
- Existing Filter Strip & Waterways
- Prairie STRIP - Code 332
- Field Border

0 465 930 1,860 Feet

Mid-field strip is 80' at widest point
West strip is 30' wide
New filter strip is shown in approximate location
East filter strip is show in

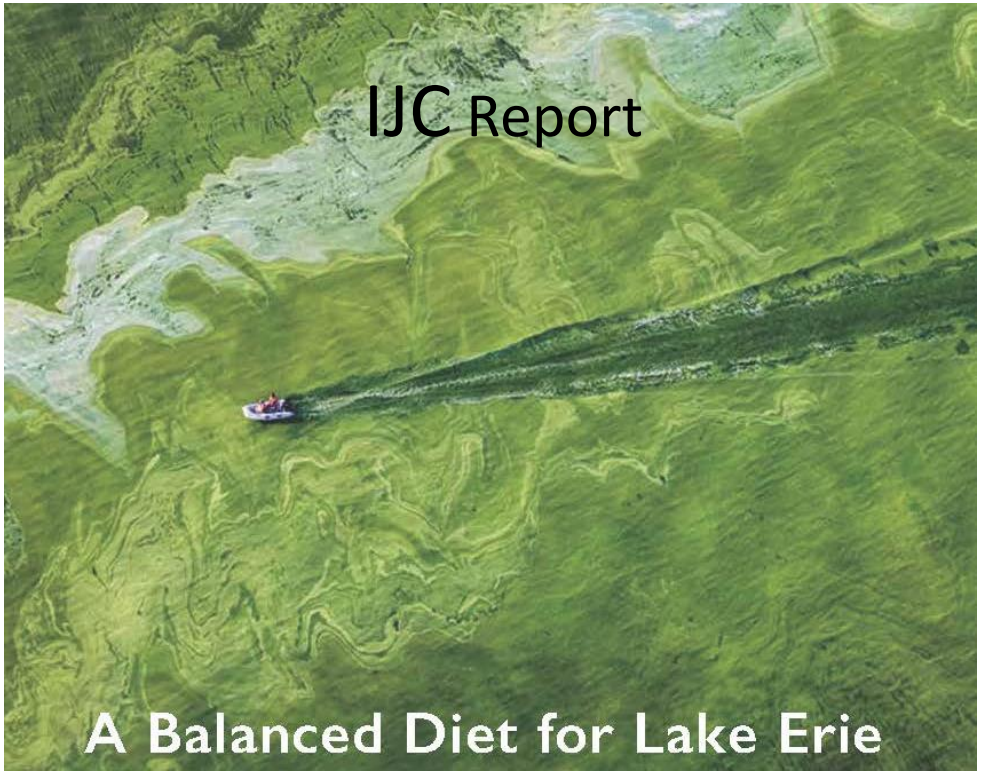
N

Produced by: Tim Youngquist
ISU STRIPS Research Team
10-01-2014

Regulation vs Freedom to Operate

Battle Lines Drawn On EPA's Chesapeake Bay TMDL Authority

The 21 State Attorneys General's amicus brief, filed in February, also challenged EPA's authority over state authority.



Questions?

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