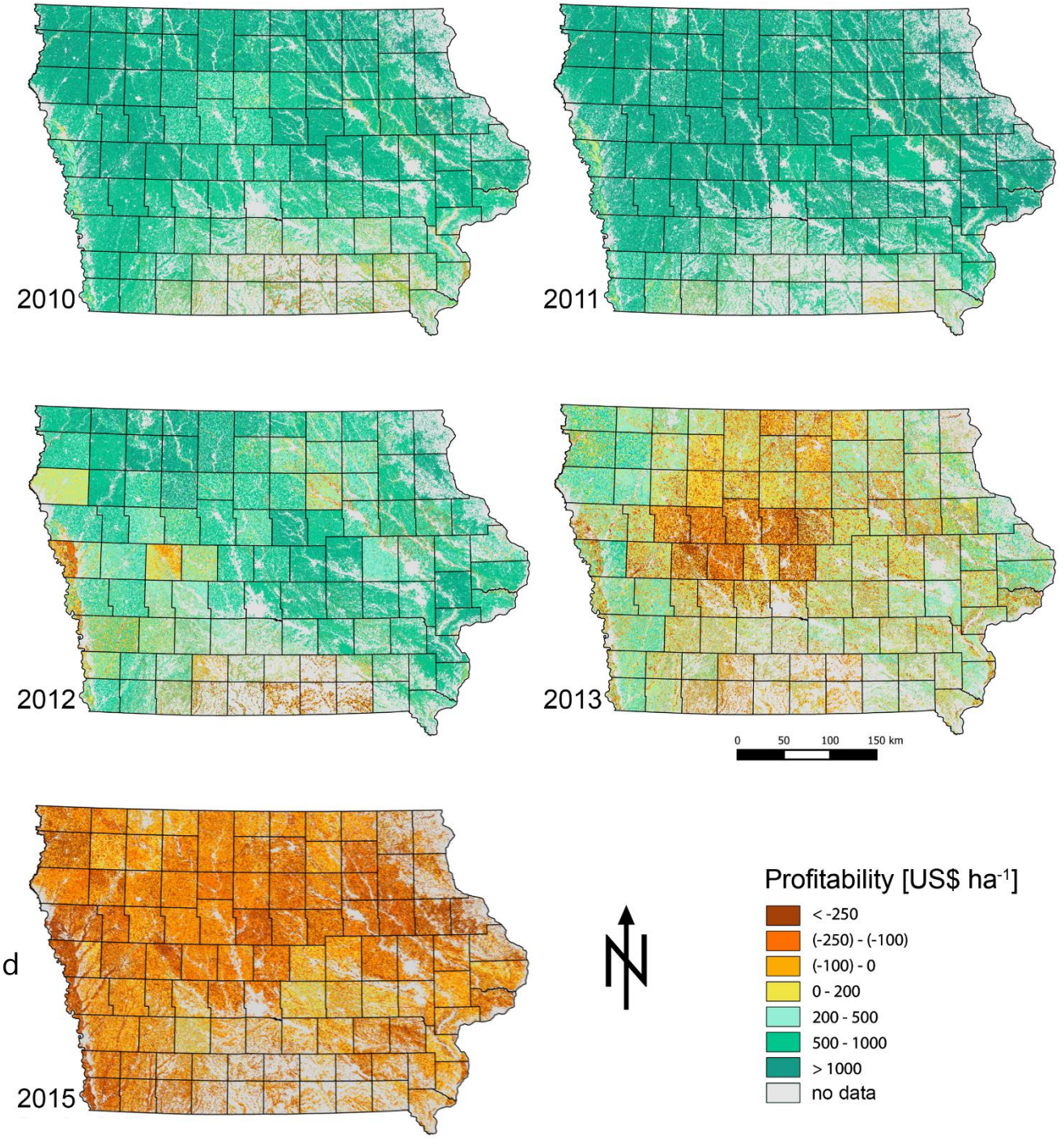
Corn and soy profitability is down in Iowa.

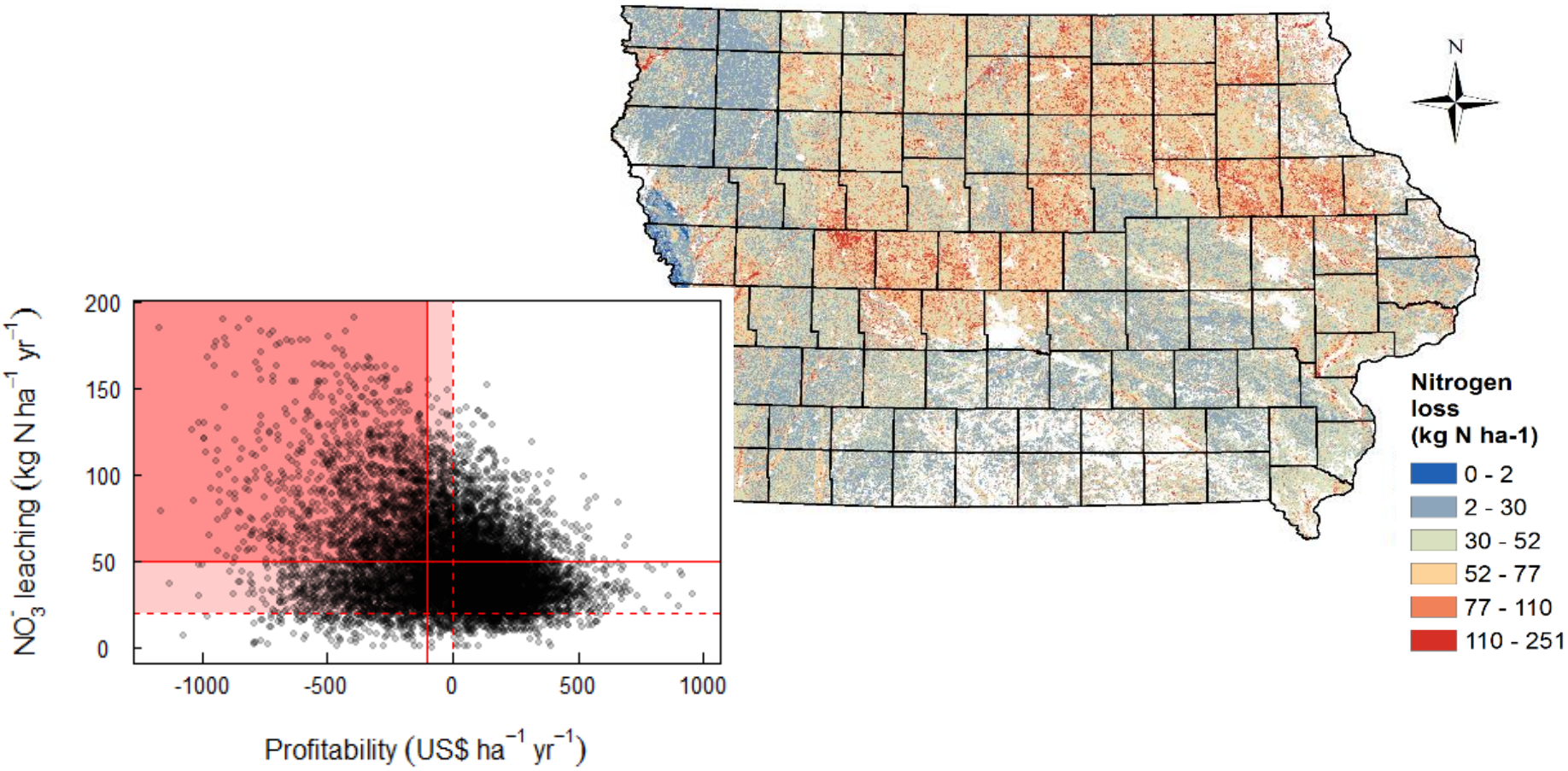
Some parts of fields are less profitable than others.

[Zoom in to learn more at: http://mesonet.agron.iastate.edu/GIS/apps/profit/](http://mesonet.agron.iastate.edu/GIS/apps/profit/)



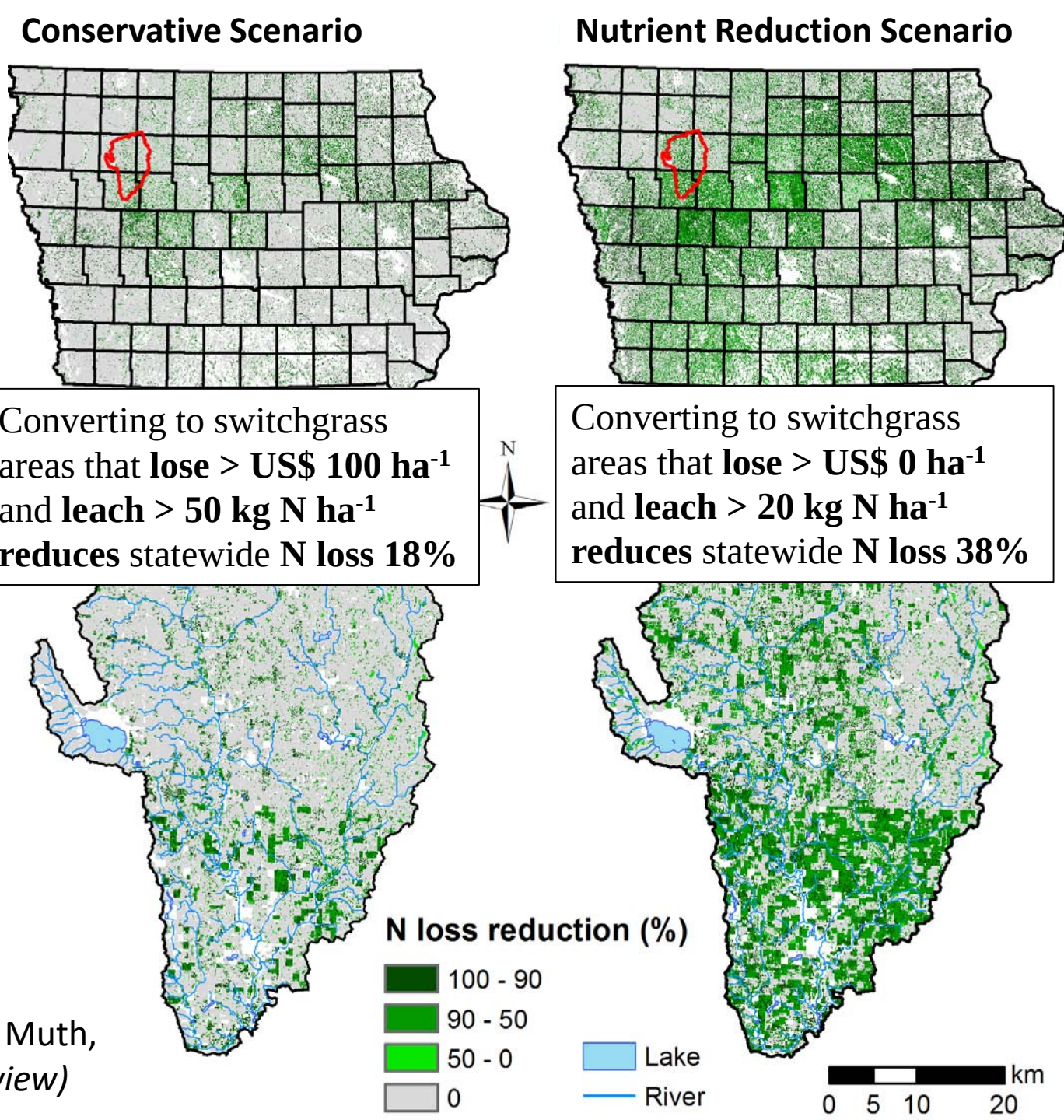
Brandes E, McNunn GS, Schulte LA, Bonner IJ, Muth DJ, Babcock BA, Sharma B, Heaton EA (2016) Subfield profitability analysis reveals an economic case for cropland diversification. *Environmental Research Letters*, **11**, 014009.

Nitrogen and profit loss in corn/soy fields



Subfield-scale NO_3-N leaching on corn/soy cropland. Values are annual rates averaged over the years 2012-2015.
Brandes, McNunn, Schulte, Muth, VanLoocke & Heaton (*in review)*

Integrating perennials on unprofitable parts of fields can meaningfully increase profitability *and* retain N



Brandes, McNunn, Schulte, Muth, VanLoocke & Heaton (*in review)*

Slide courtesy Lisa Schulte Moore

Photo: Tama Co., Tim Youngquist

100% crops

90% crops:
10% prairie

100% prairie

Sources: Zhou et al. 2012, Helmers et al. 2012, Hernandez-Santana et al. 2013, Iqbal et al. 2014, Mitchell et al. 2014, Zhou et al. 2014

Slide courtesy Dr. Lisa Schulte Moore

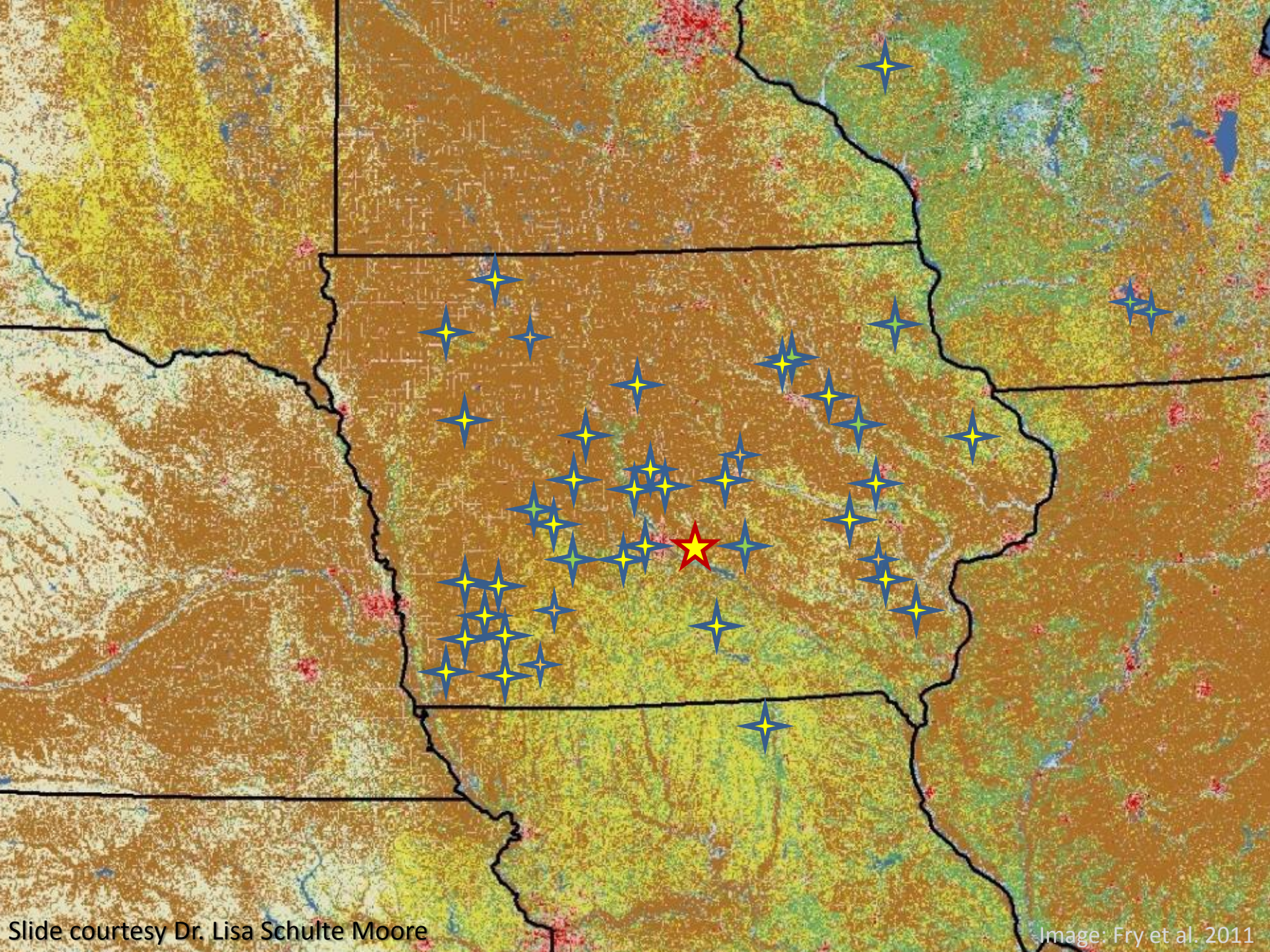
Strategically adding ~10% prairie to annual row crop fields…

1. 44% reduction in water runoff
2. 95% reduction in soil loss through runoff
3. 90% reduction in phosphorus runoff
4. 84% reduction in nitrogen runoff and 70% reduction in subsurface nitrate loss (not tiled)
5. 2-3 times more beneficial insects and birds
6. No reduction in per acre yields
7. Costs less than terraces; comparable to cover crops

Source: Data collected by STRIPS team, 2007-2014 at Neal Smith National Wildlife Refuge
Slide courtesy Dr. Lisa Schulte Moore

Slide courtesy Dr. Lisa Schulte Moore

Photo: Wright Co., Lynn Betts



Slide courtesy Dr. Lisa Schulte Moore

Image: Fry et al. 2011

http://sustainability.uiowa.edu/biomass

Facilities Management
The University of Iowa

Conversion
- (processing)
- combustion
- heat & power

AGgrow TECH

Agricultural Services
- planting
- management
- harvest

Iowa State University
Department of Agronomy

Agronomy
- research
- extension
  - nitrogen, water, temperature

Current Biomass Fuels at U Iowa

- Total fuel budget = $14.6M

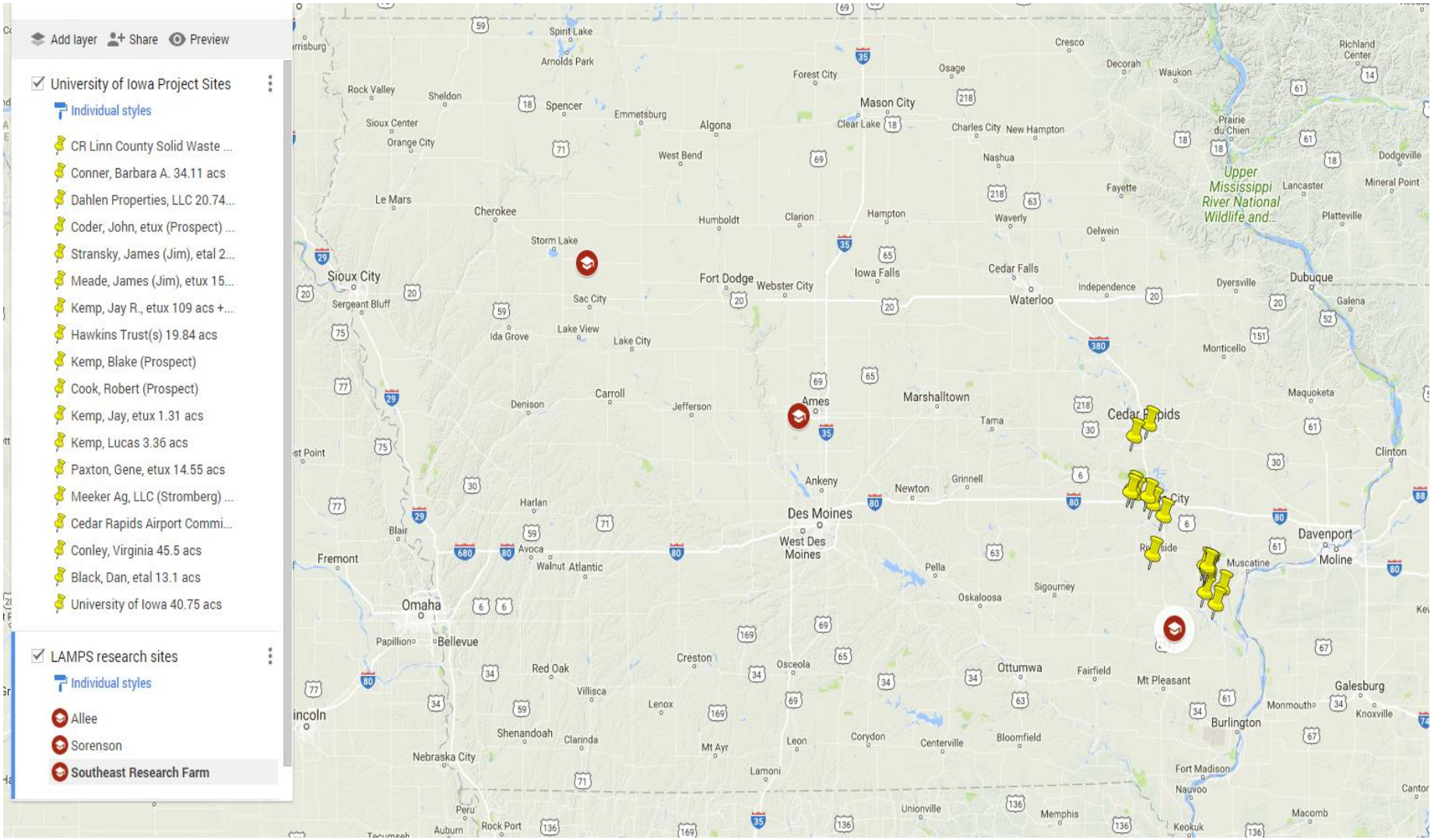
- Biomass demand by 2025: 110,000 t y^{1}

BOILER	FUEL	CAPACITY (LB/hour)
7	Gas	140,000
8	Gas	145,000
10	Coal, Biomass, & Gas	170,000
11	Coal & Biomass	170,000

University of Iowa Miscanthus Business Plan Review

		Manageable Risk Profile
TECH	Miscanthus Combustibility	low
	Compatible Spec	mid
	Technology to Produce Spec	high
	Technology Development	high
OPERATIONAL	**Land**	
	Participation in Project Area	low
	Land Suitability	low
	Crop Establishment	
	Planting Stock / Material Source	low
	Planting Schedule	mid
	Planting Method	low
	Successful Crop Establishment	mid
	Annual Yield Expectations	mid
	Winterkill / Crop Loss	mid
	Invasive potential	low
	Supply Chain	
	Harvesting	mid
	Storage	low
	Collection / Transportation	low

Research and commercial miscanthus locations



IMPACT

By burning Miscanthus instead of coal the UI will annually:

- keep **$10 million in Iowa** by buying biomass instead of out-of-state coal
- Reduce **nitrate leaching and soil loss by ~90%** while building soil and providing wildlife habitat
- Provide farmers **~$200/acre**, similar to Conservation Reserve Program (CRP payments)
- directly displace **>50,000 tons of fossil CO_2**, (>20 tons of CO_2 per acre from >4 tons of coal per acre)