



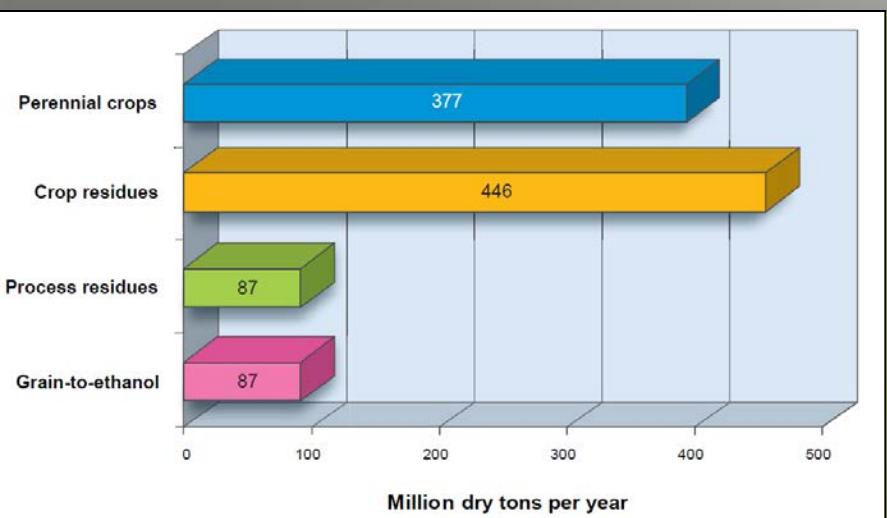
Crop Decision-making to Protect Soil and Water

AgSolver, Inc

August 7th, 2014

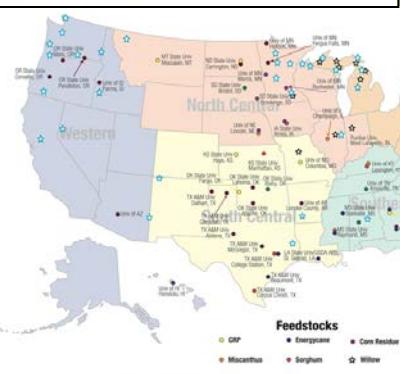
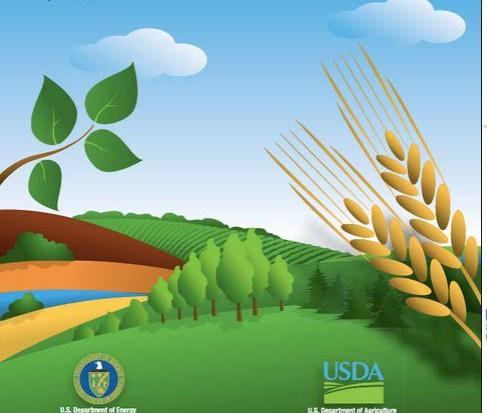
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History



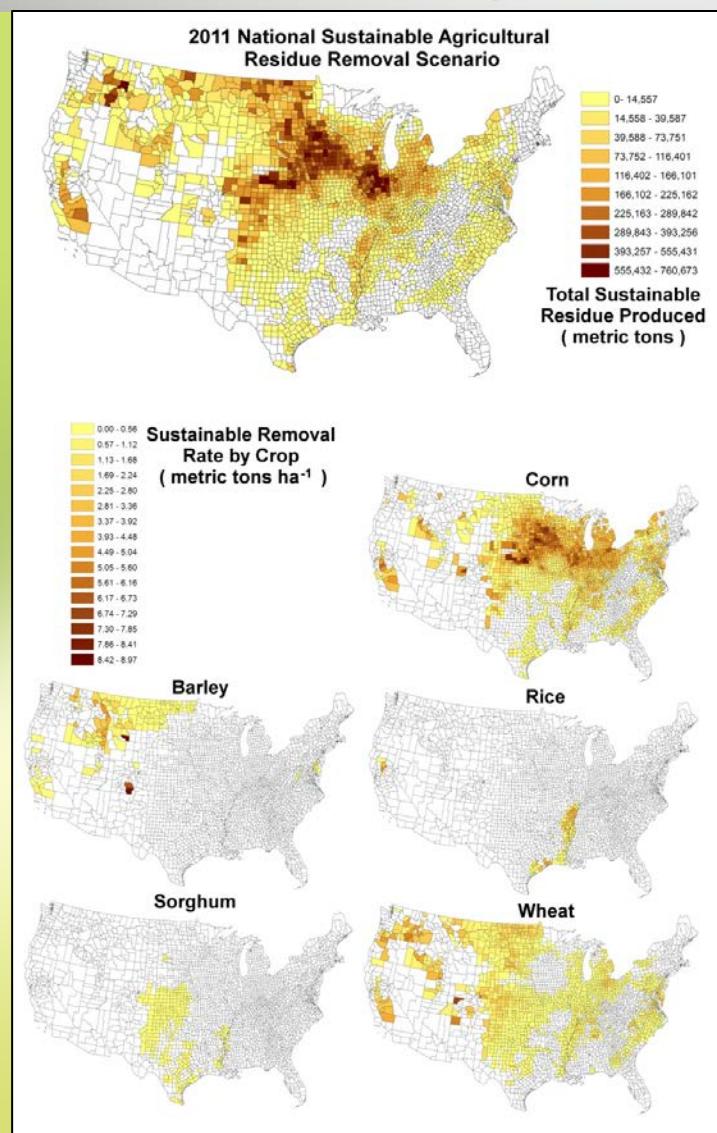
Biomass as Feedstock for a Bioenergy and Bioproducts Industry: The Technical Feasibility of a Billion-Ton Annual Supply

April 2005



U.S. DEPARTMENT OF
ENERGY
SunGrant
INITIATIVE
United States Department of Agriculture
USDA ARS Agricultural Research Service

MONSANTO

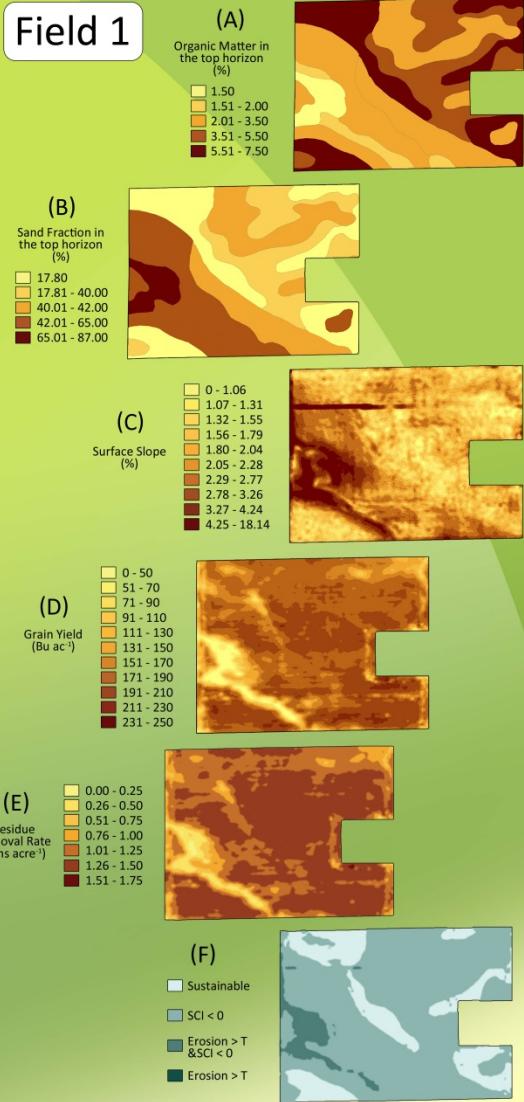


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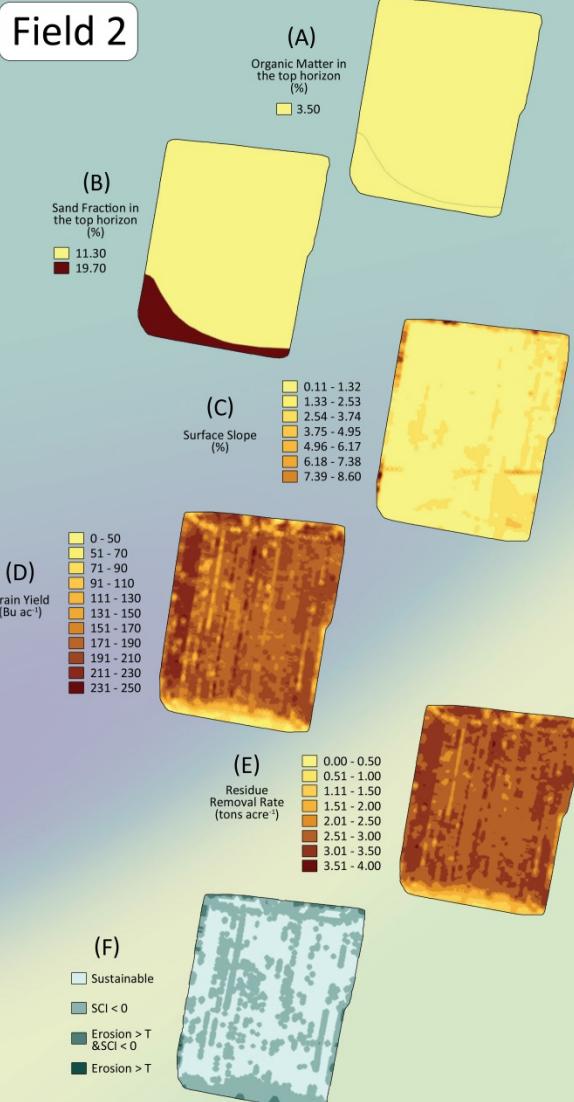
History: Sub-Field Scale Applications



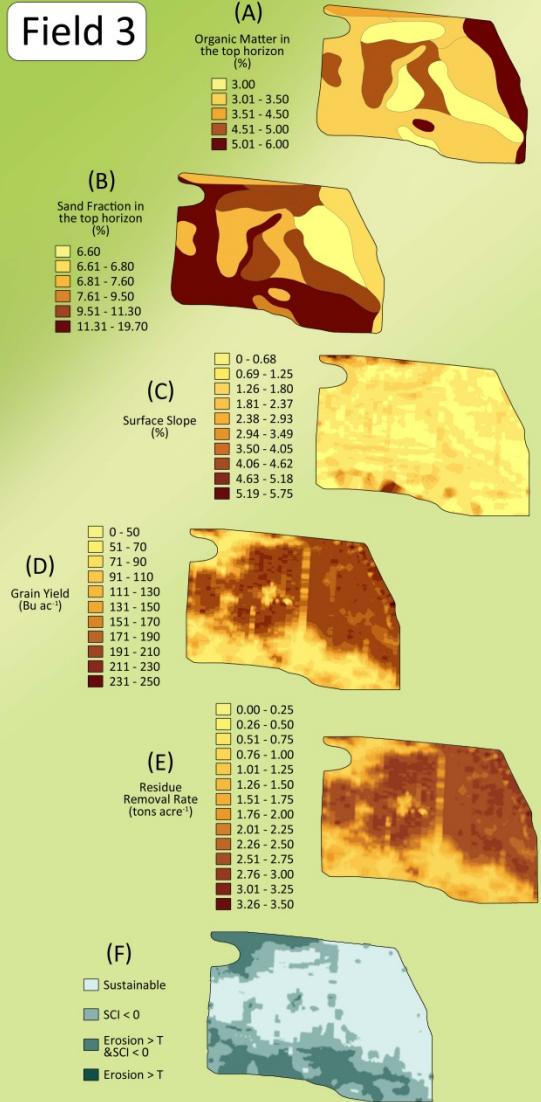
Field 1



Field 2



Field 3



Environmental Performance: Solving the Mass Balance



Cons. Outputs

SCI
 SCI-OM
 SCI-FO
 SCI-ER
 Water Ero
 Wind Ero

C Balance

c_rem_grn
 c_rem_biomass
 c_loss_ero
 ann_soil_c_delta
 co2_flux
 c_delta



P Balance

p_rem_grn
 p_rem_biomass
 p_loss_ero
 p_app

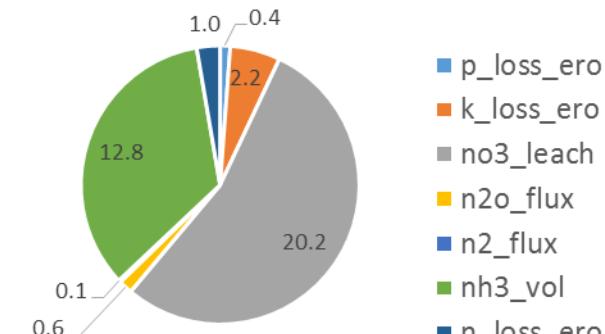
K Balance

k_rem_grn
 k_rem_biomass
 k_loss_ero
 k_app

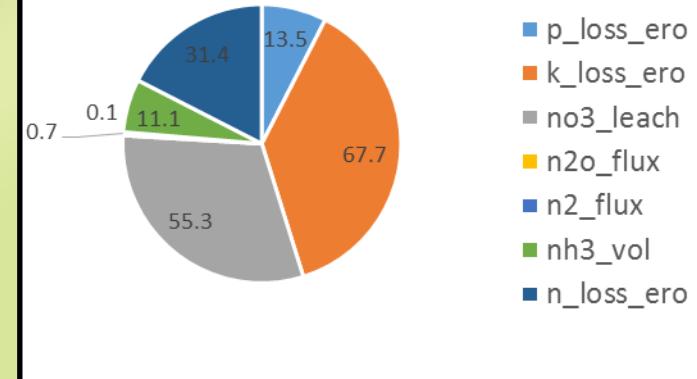
N Balance

n_litter_in	n2_fix
n_rem_grn	n2_fix
n_rem_biomass	crop_n_uptake
n_loss_ero	n_precip
n_app	n_delta
no3_leach	
n2o_flux	
n2_flux	
nh3_vol	

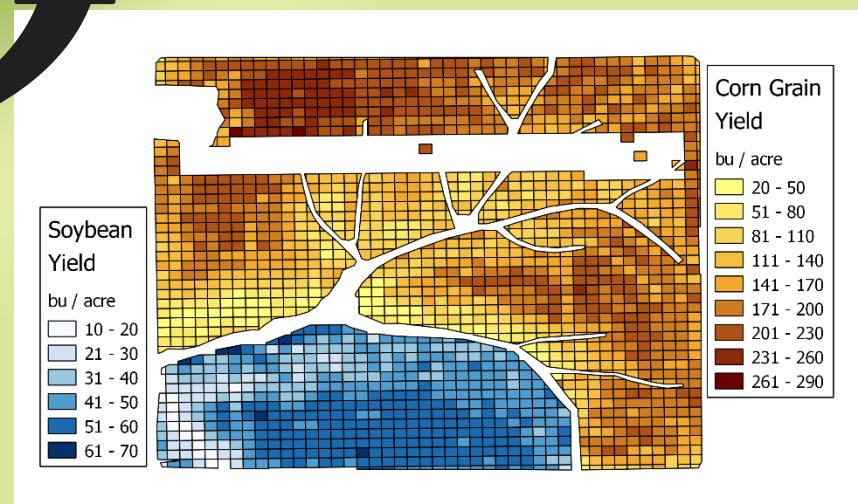
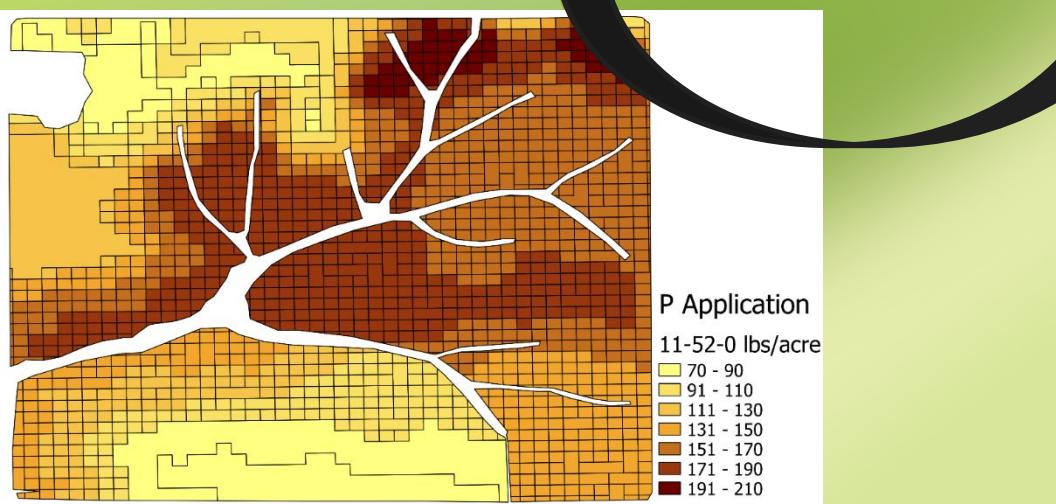
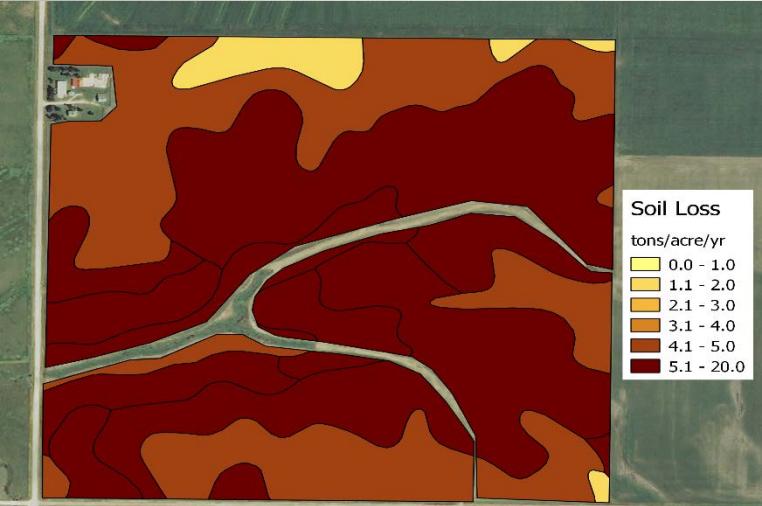
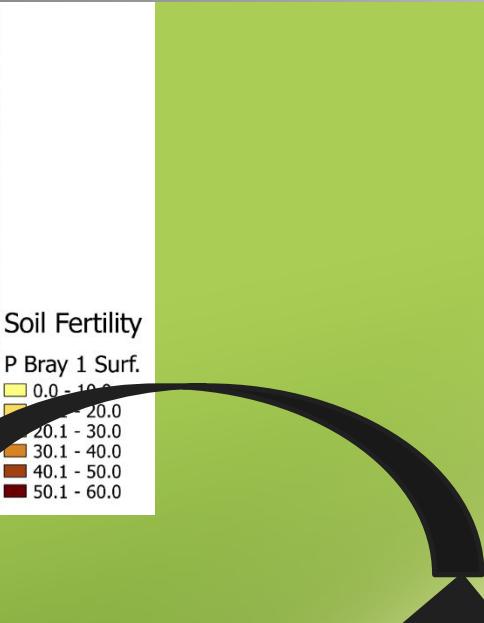
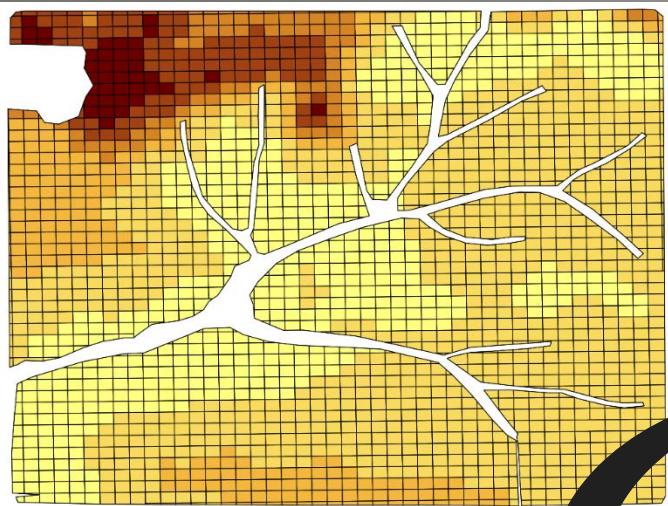
CG,CG,SB-NT-100rye-HRH



CG,CG,SB-RT-NCC-HRH

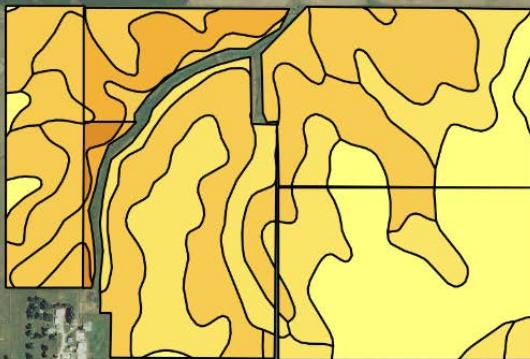


Precision Data Solutions: Nutrient Management



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Precision Data Solutions: Nutrient Management

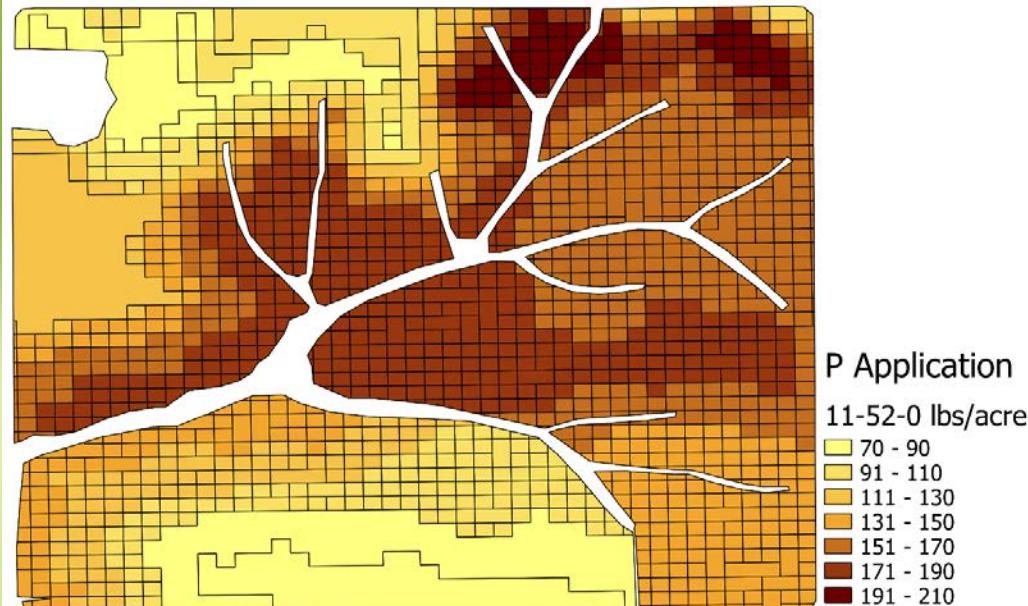


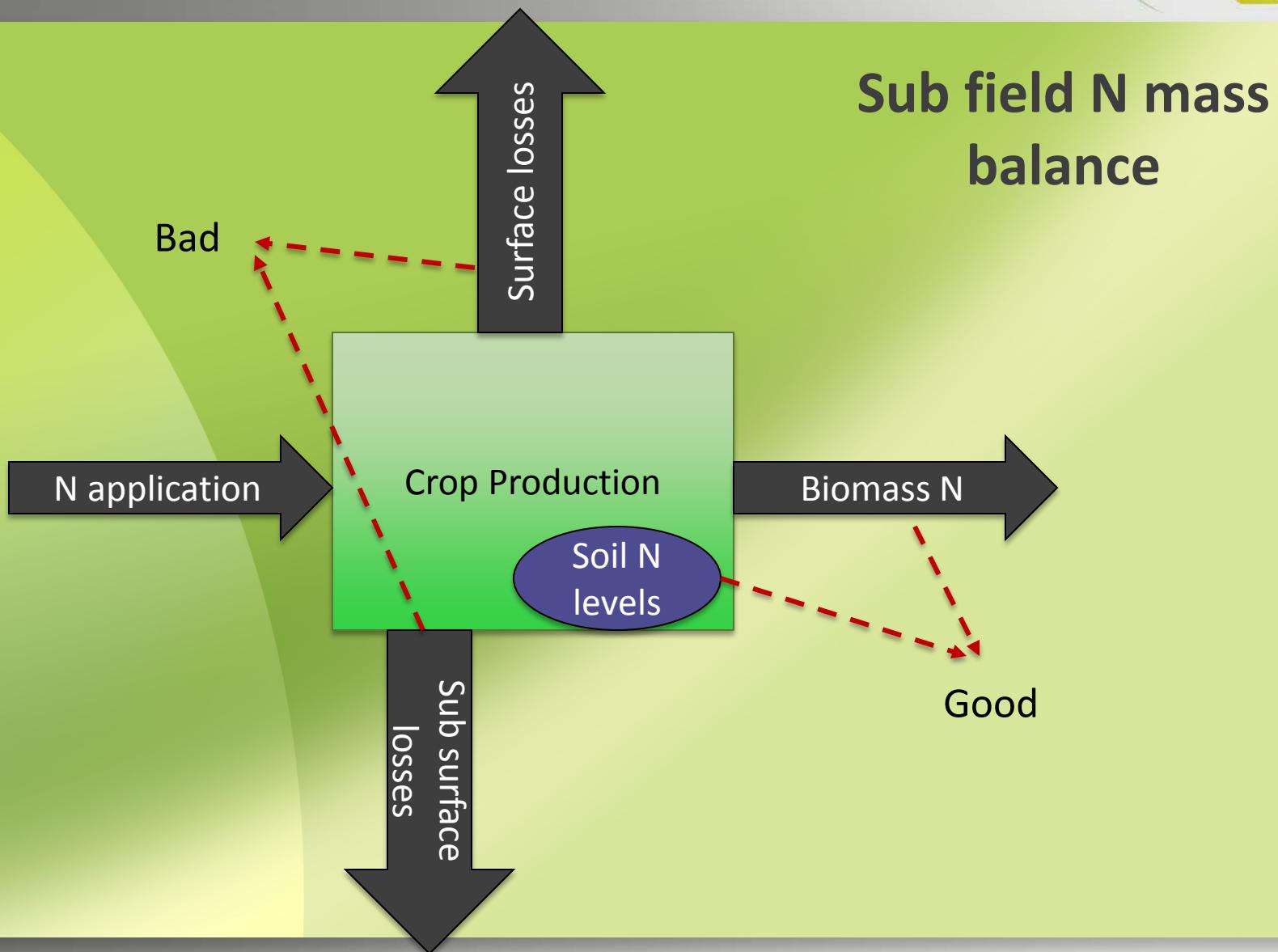
Iowa Phosphorus Index

P runoff risk

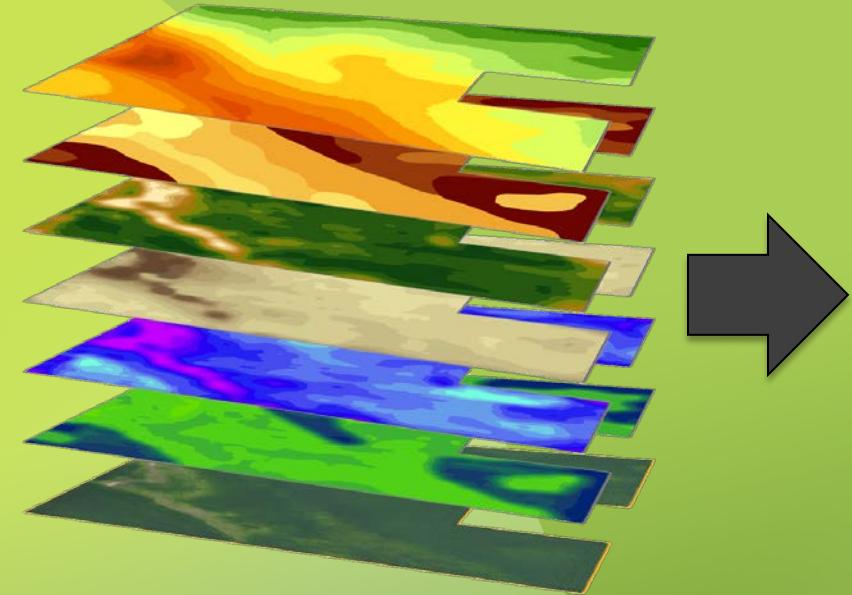
0.0 - 1.0
1.1 - 2.0
2.1 - 3.0
3.1 - 4.0
4.1 - 5.0
5.1 - 6.0
6.1 - 7.0
7.1 - 20.0

- Agronomic management to address key performance metrics
- Cover Crop
 - Select Acres
 - \$30 / acre Cost
 - On select acres >\$50 / acre N, P & K savings
 - Potential Yield Increase

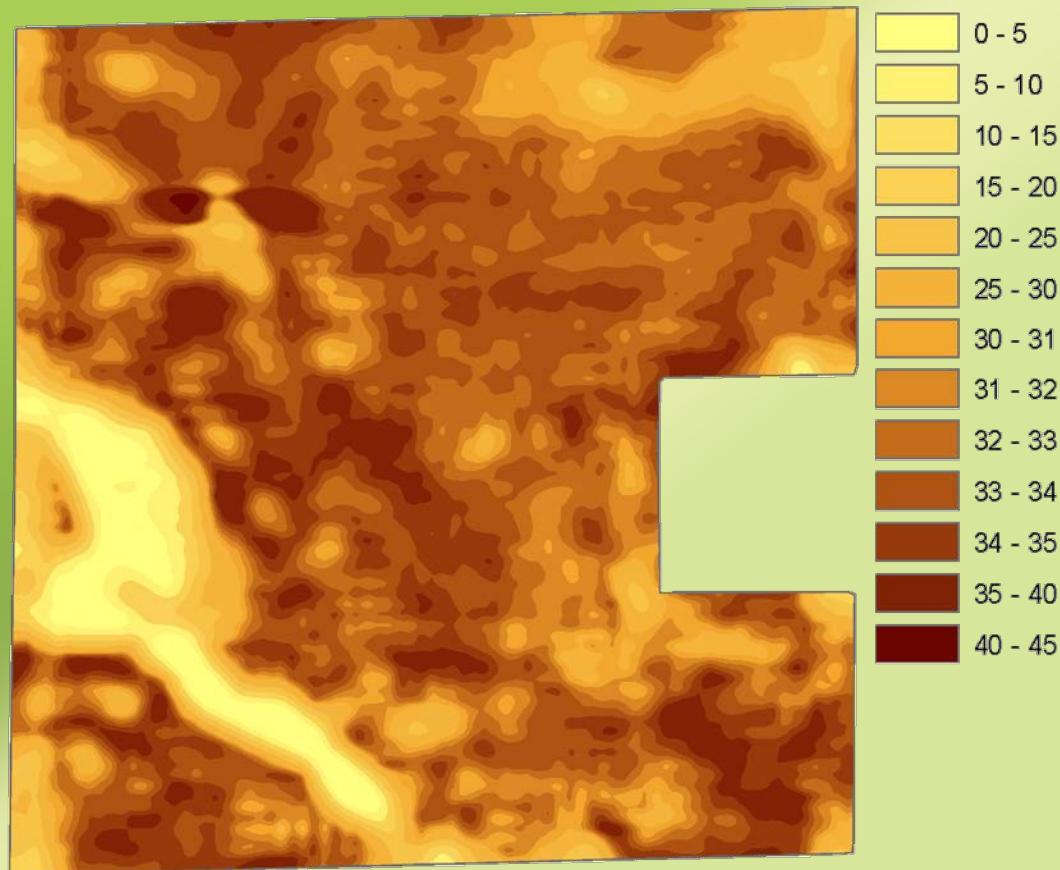




Precision Data Solutions: Nutrient Management



Percentage of Applied N Utilized or Available

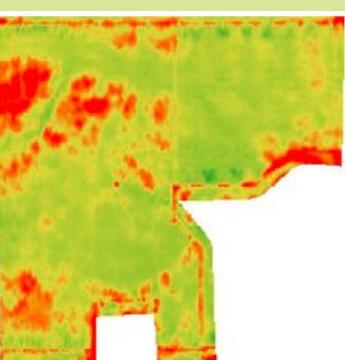
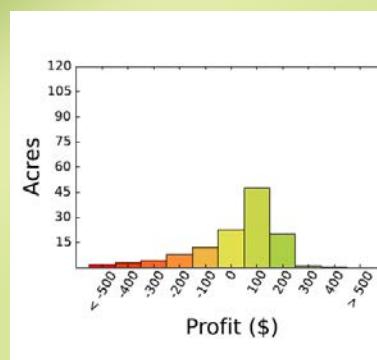
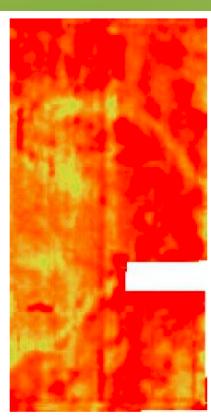
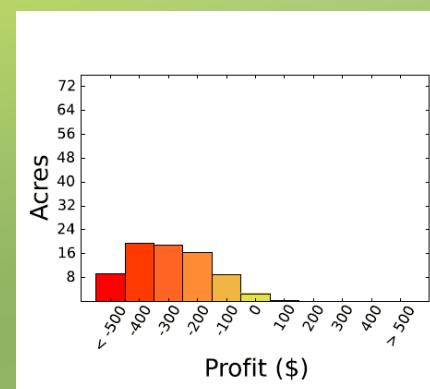
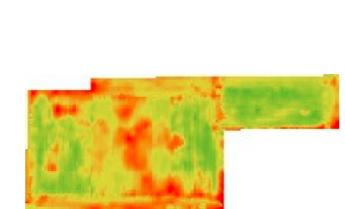
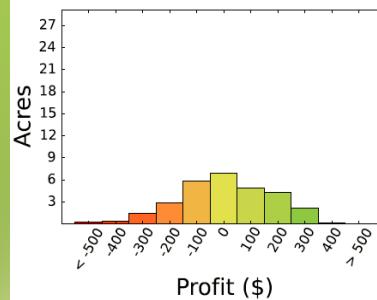
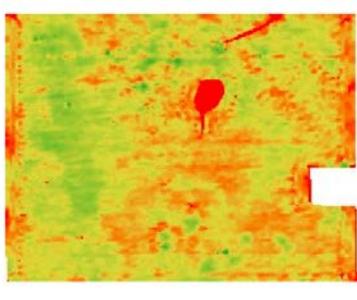
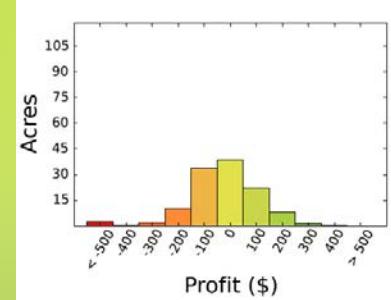
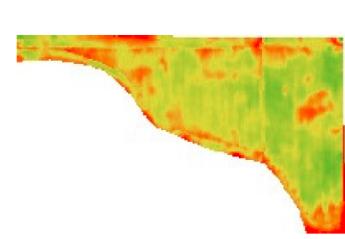
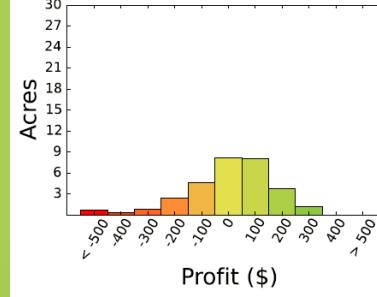
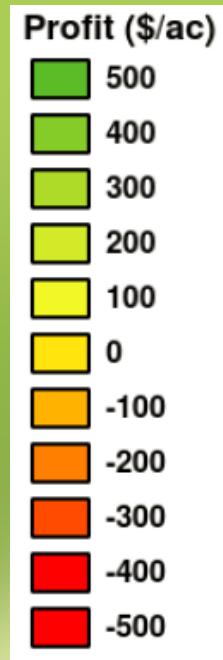
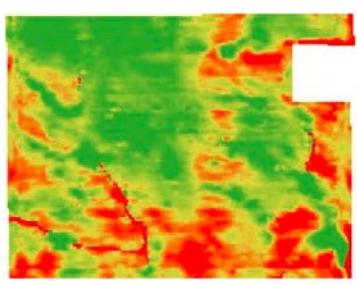
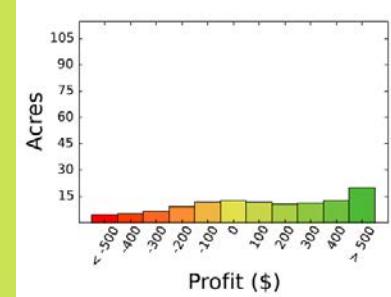


Apply crop models to determine:

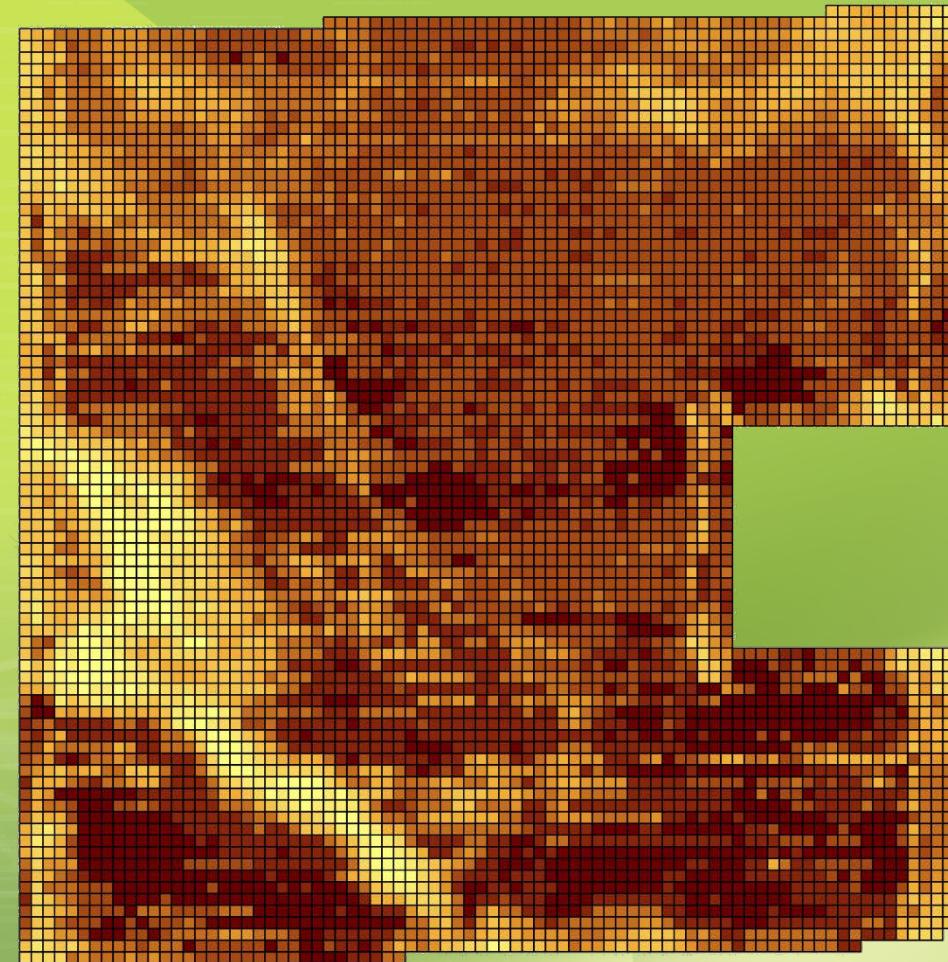
- Subfield population selection
- Subfield variety selection
- Subfield fertilization rates

This was solved with publically available data and a yield map...

Identifying Subfield Profit and ROI: Examples pulled from current reports



Correlating Profit and Sustainability



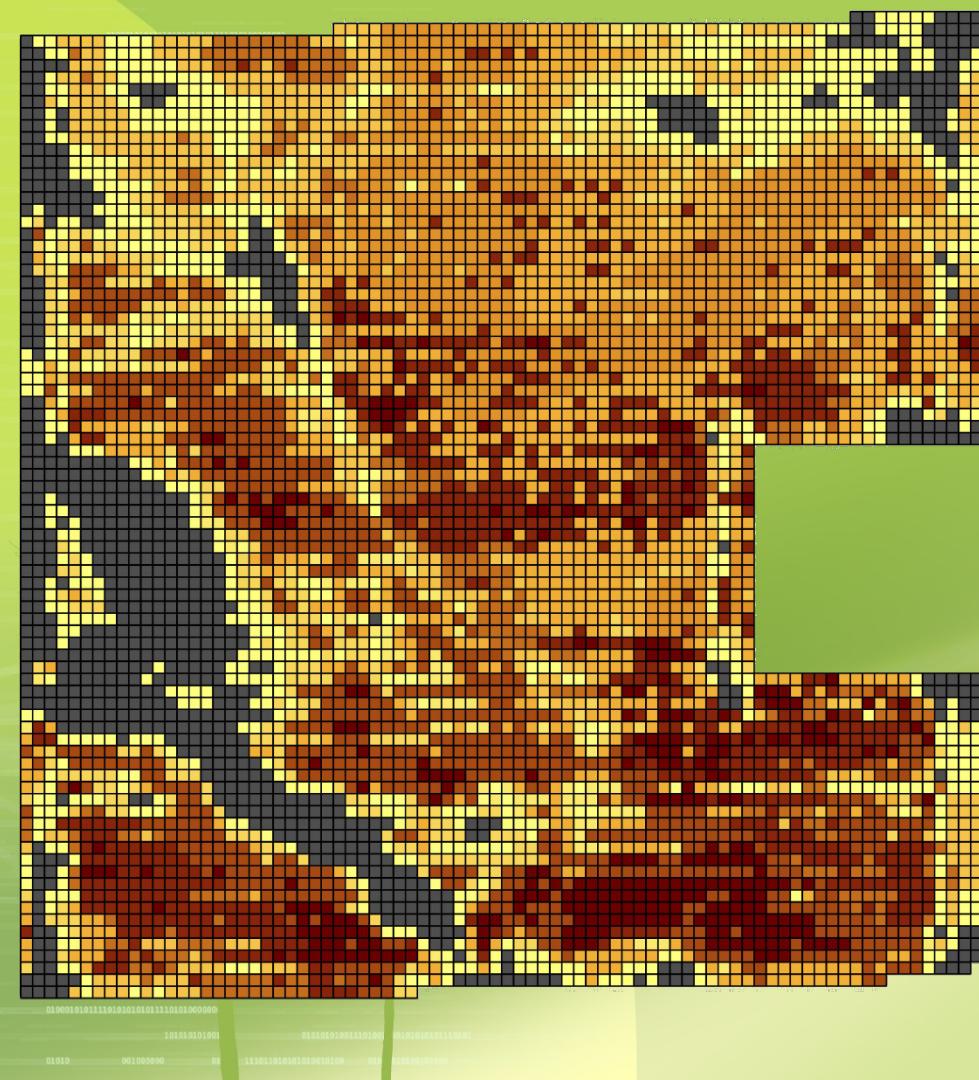
50 Year Profit Average
(\$/acre)

- (933) - (784)
- (784) - (576)
- (576) - (404)
- (404) - (195)
- (195) - (76)
- (76) - 11
- 11 - 101
- 101 - 168
- 168 - 223
- 223 - 611

Summary

50 Year Yld Ave:	170	bu/acre
50 Year Yld STD:	38	bu/acre
Profit Average:	\$47	\$/acre
Profit STD:	\$235	\$/acre
Years Profitable Ave:	31	
Years Profitable STD:	14	
Percentage of Field Profitable:	74%	

Correlating Profit and Sustainability



50 Year Profit Average

Adjusted Ins Prem-Int Rates

Release Acres Below (250)

(\$/acre)

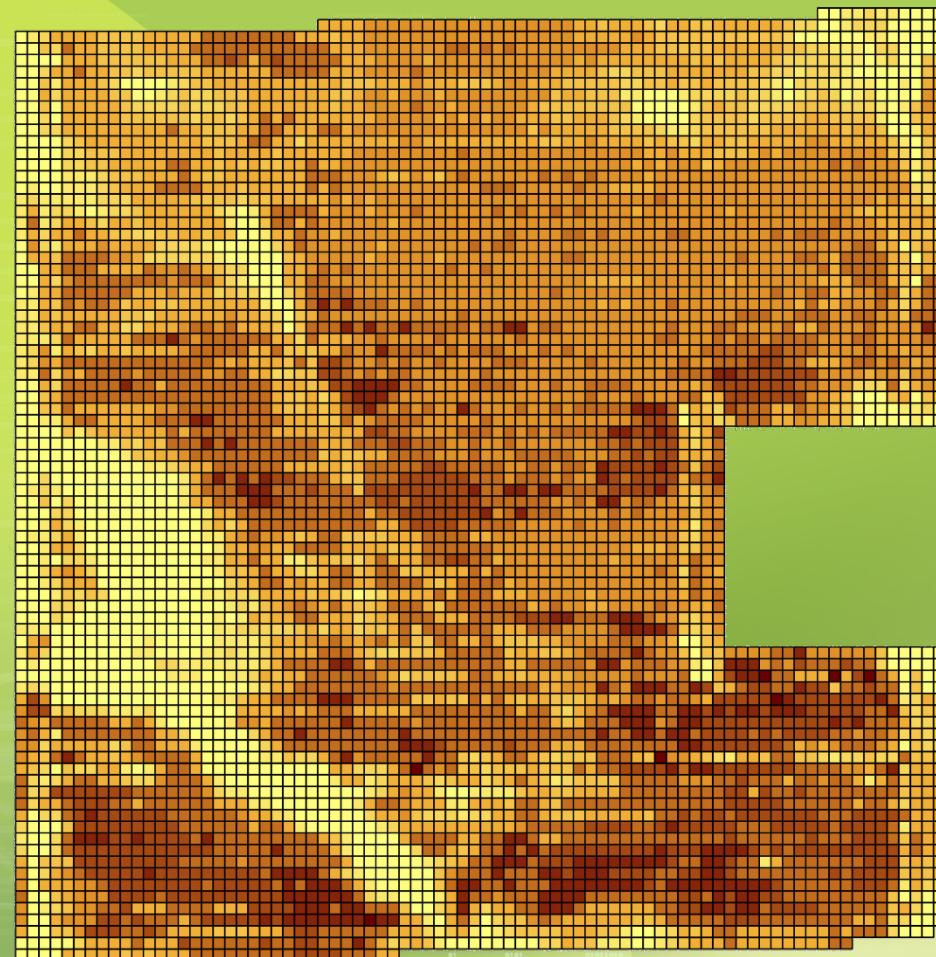
- No Row Crop
- (239) - (58)
- (58) - 0
- 0 - 16
- 16 - 42
- 42 - 101
- 101 - 107
- 107 - 134
- 134 - 158
- 158 - 224
- 224 - 577

Summary

Discontinue ops on areas with ave loss > \$250/acre with risk adjusted ins prem's and int rates

Profit Average:	\$76	\$/acre
Profit STD:	\$124	\$/acre
Percentage of Field Profitable:	72%	
Percentage of Field Used Profitable:	81%	

Correlating Profit and Sustainability



50 Year Profit Average

Adjusted Ins Prem - Int Rates

New Biomass at (200)

(\$/acre)

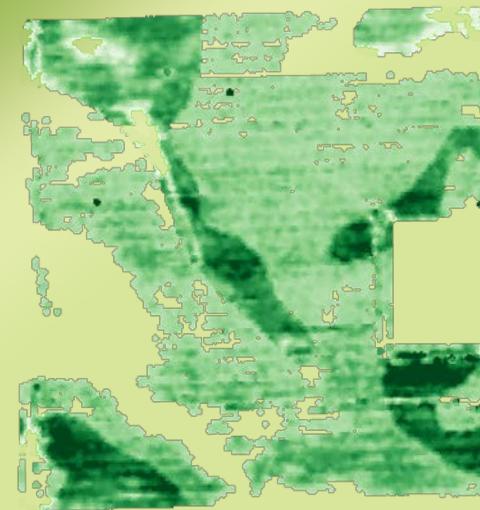
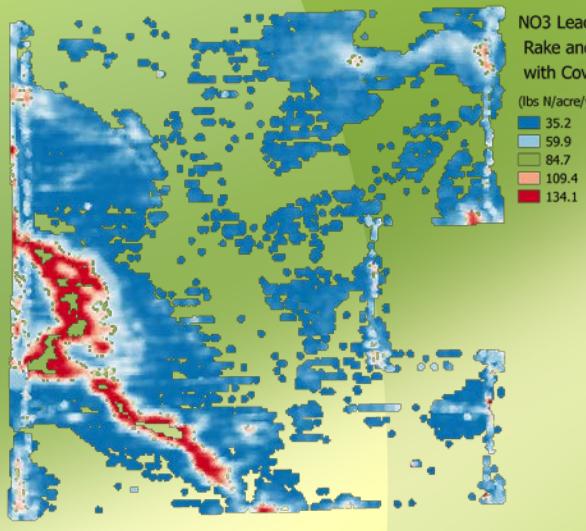
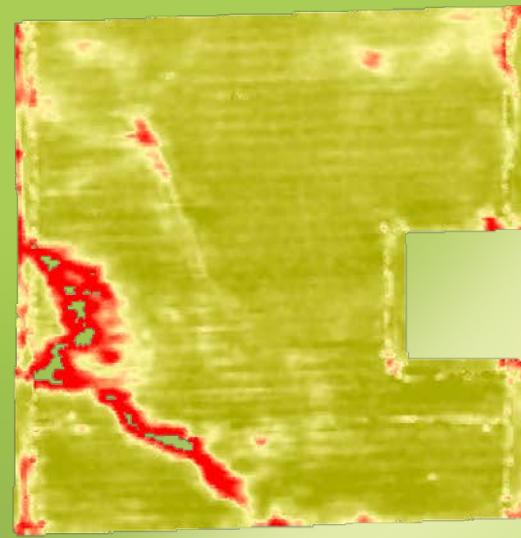
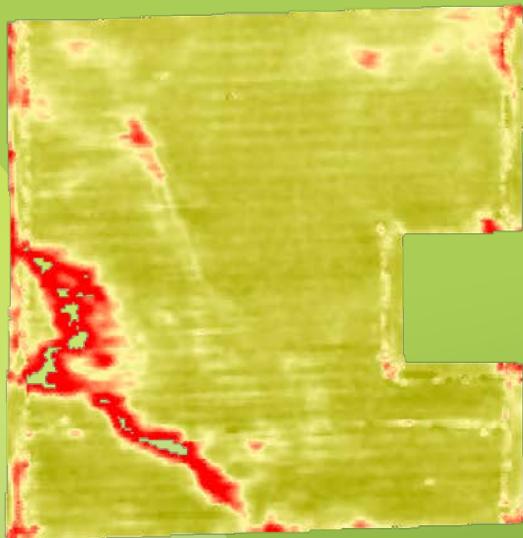
- (200) - (171)
- (171) - (107)
- (107) - (48)
- (48) - 33
- 33 - 125
- 125 - 167
- 167 - 249
- 249 - 292
- 292 - 376
- 376 - 637

Summary

New production at loss >
\$200/acre with adjusted ins prem's
and int rates

Profit Average:	\$105	\$/acre
Profit STD:	\$149	\$/acre
Percentage of Field Profitable:		
	79%	

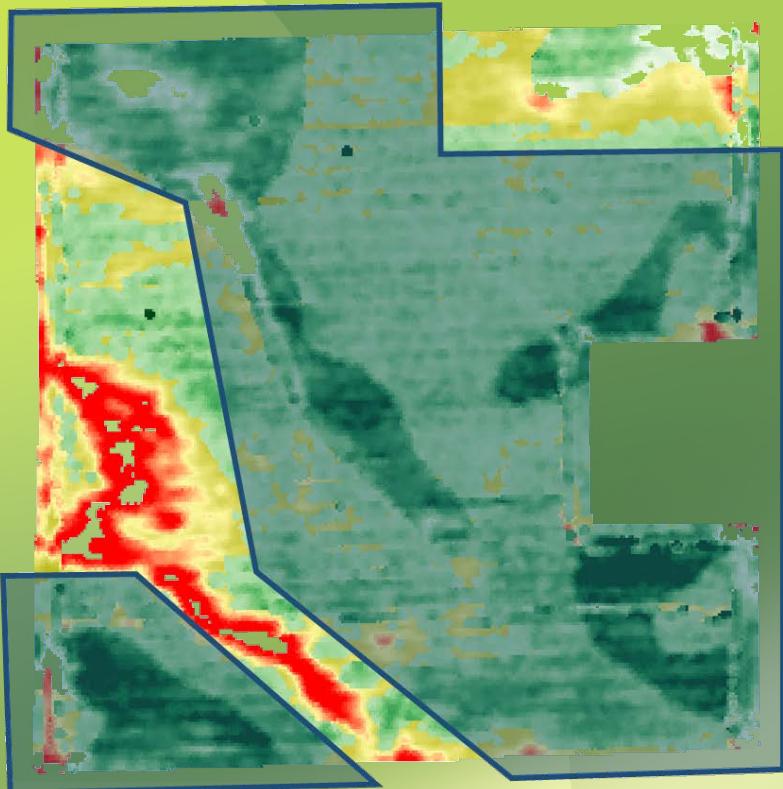
Operationalizing



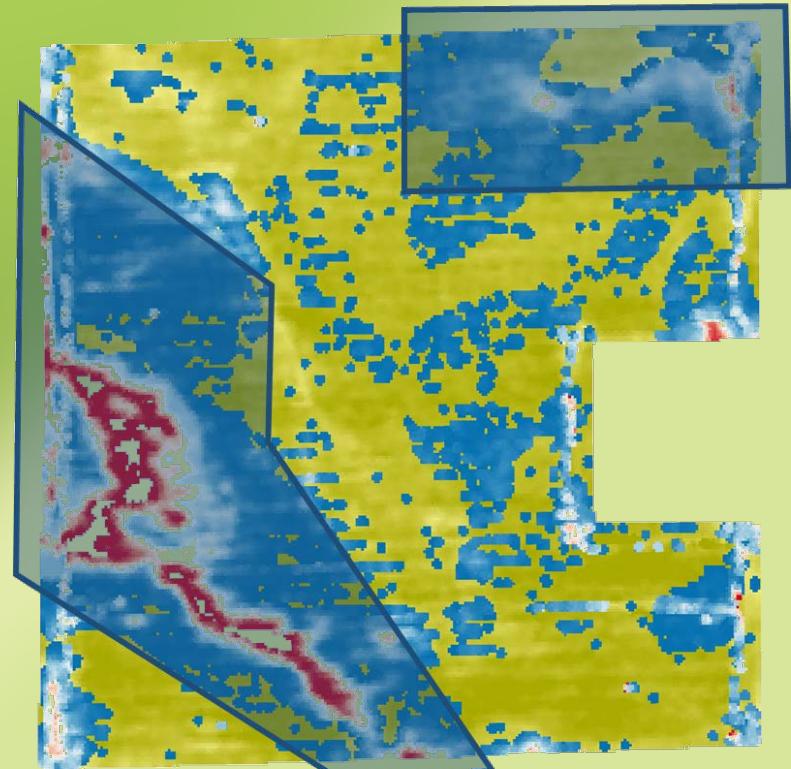
Operationalizing



Stover Removal Management Zones



NO₃ Leaching Mitigation Management Zones



Driving Sustainable Agronomic Decisions through ROI



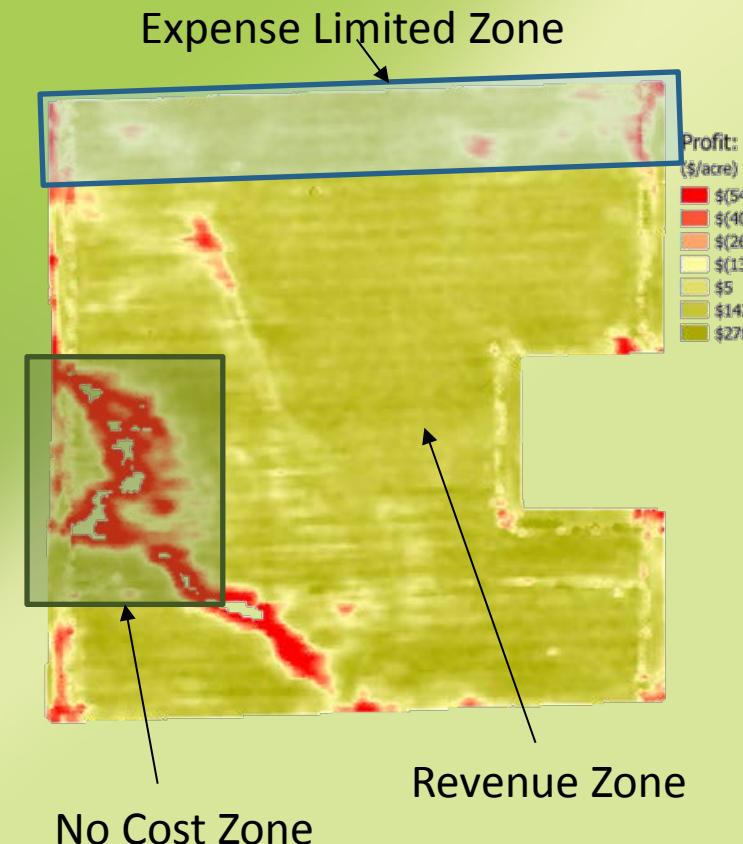
Not all acres can perform at a level justifying high input costs

Three performance zones:

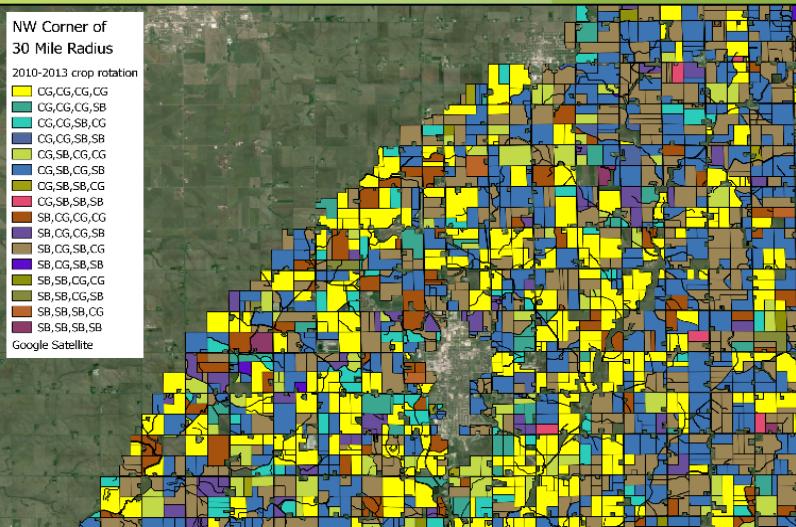
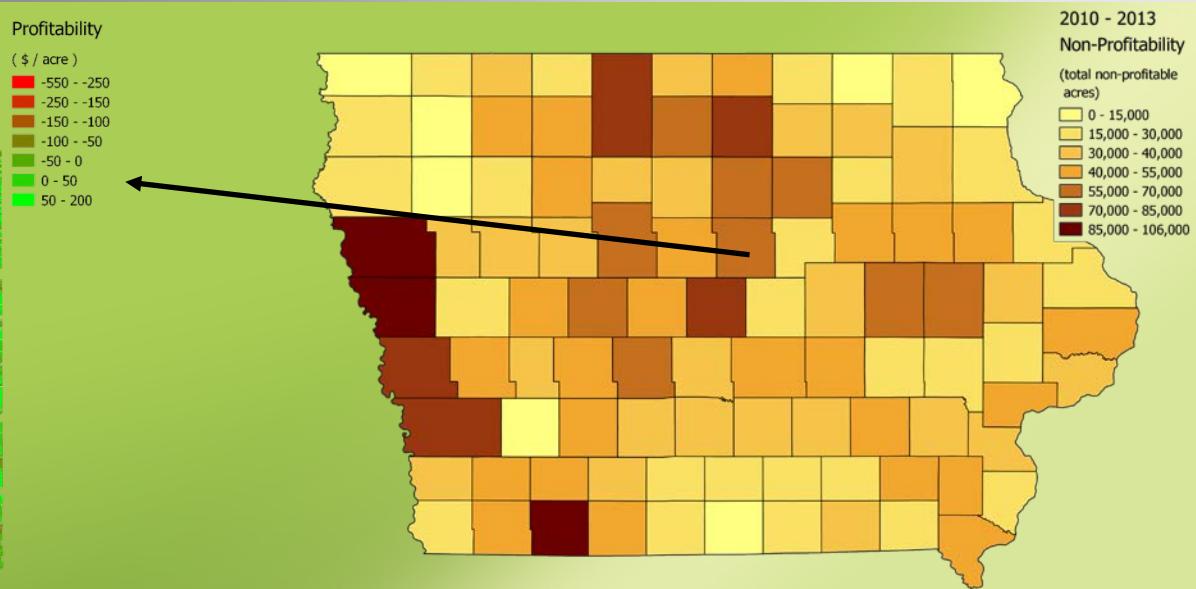
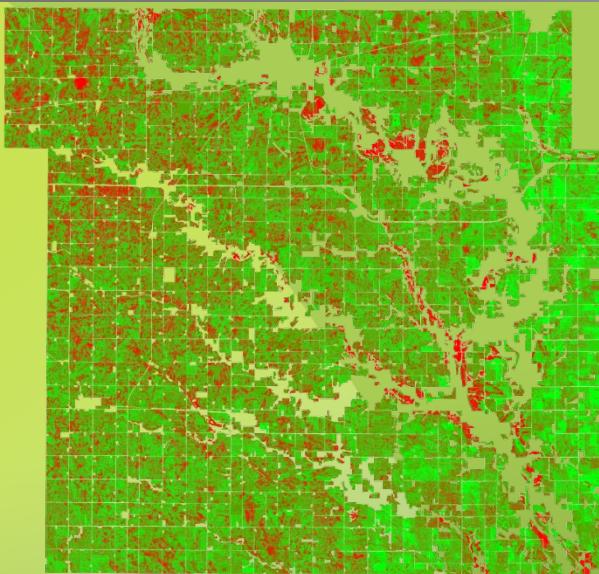
- Revenue: aggressively pursue yield
- Expense Limited: retail and agronomic choices within expense limit
- No cost: no historic ROI potential – find alternative uses, USDA programs, conservation practices

Objectives:

- Leverage grower intuition with quantified thresholds at the right scale, i.e. for Zone X, \$350/ac inputs requires 175 bu, is that reasonable...
- Couple the agronomic plan to the financial plan – crop insurance, lender, landlord



Identifying the Opportunities: Profitability



Year	Acres not profitable	Acres with loss >\$200/acre
2010	6,960,494	1,999,639
2011	5,785,424	1,564,059
2012	16,282,478	3,476,371
2013	10,384,392	1,821,062
All 4 Years	4,836,364	1,259,901

Questions?