The background is a light green gradient with a pattern of faint binary code (0s and 1s) scattered across it. In the lower-left and lower-right corners, there are silhouettes of trees with bare branches, rendered in a light green color that matches the background.

Improving Environmental Performance through Precision Business Planning

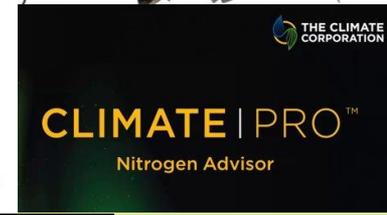
January 19th 2017

David Muth Jr., PhD

Andrew Baskin

Dan Bahe

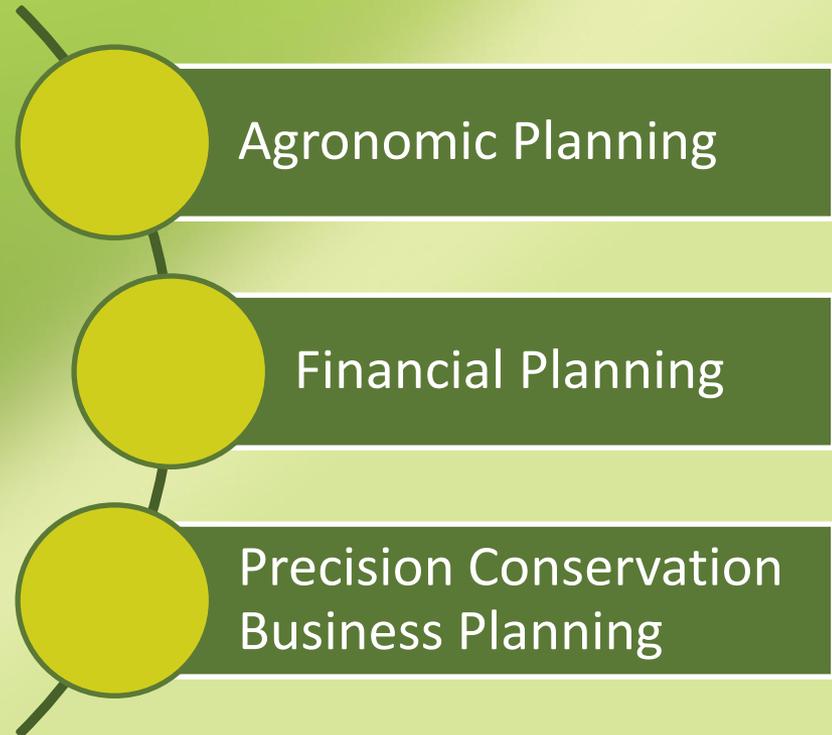
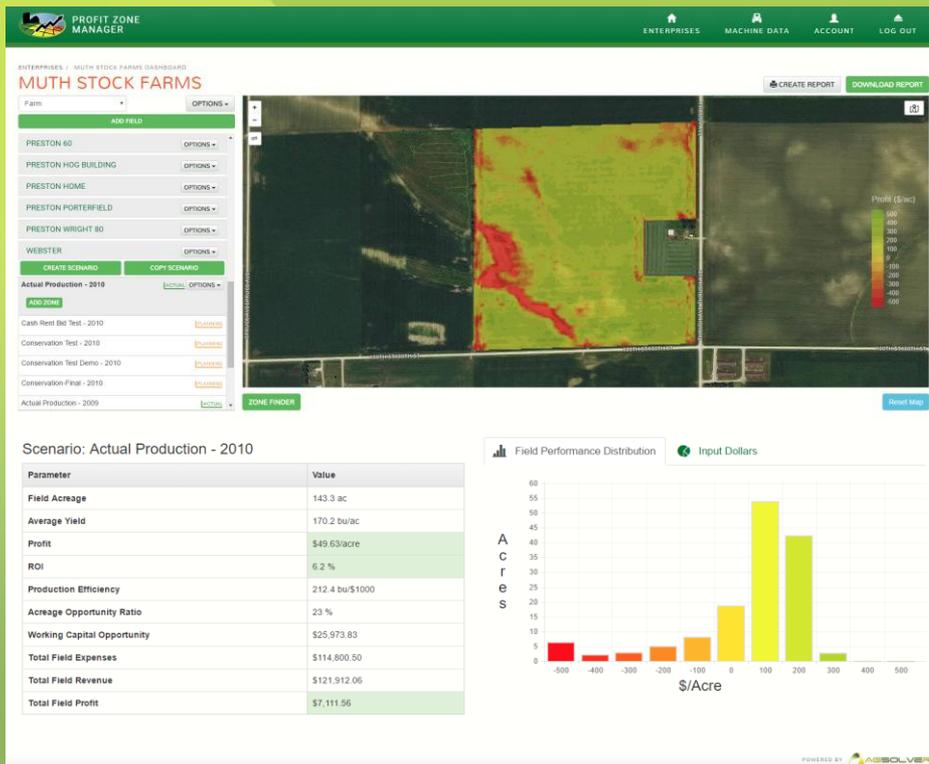
Emerging Ag Information Services



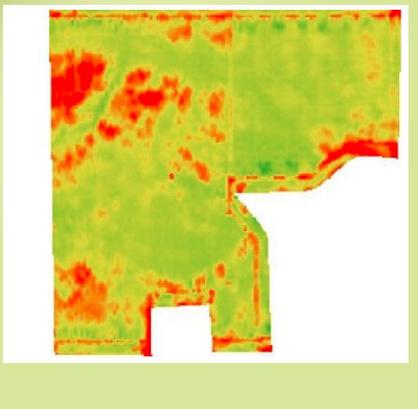
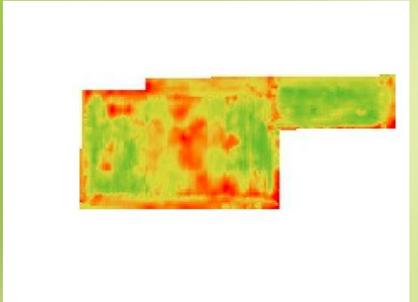
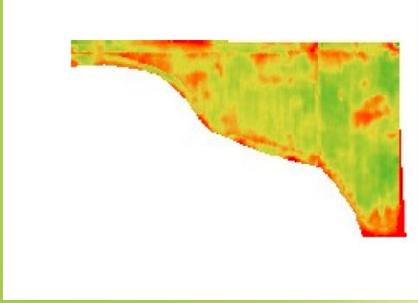
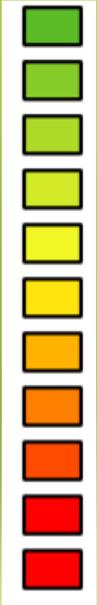
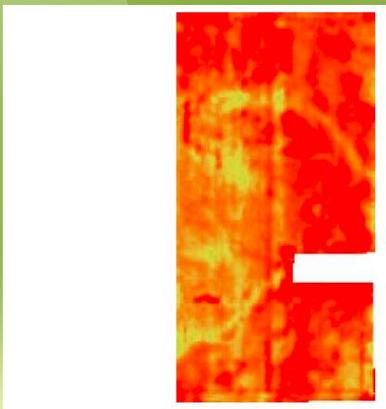
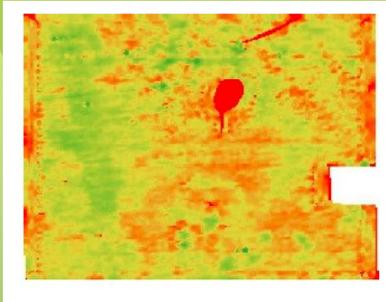
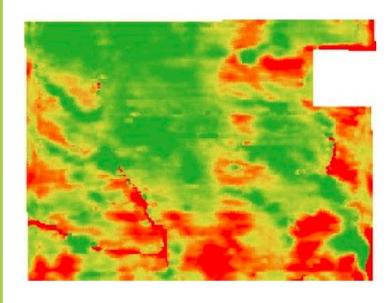
turning data into decisions for agriculture™

Precision Business Planning





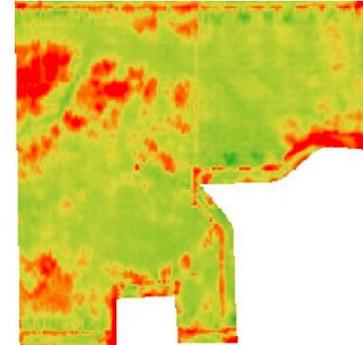
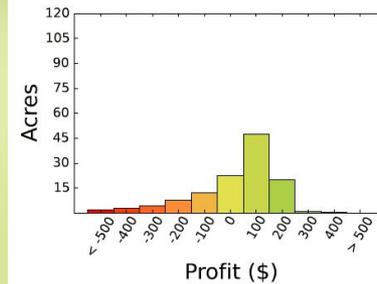
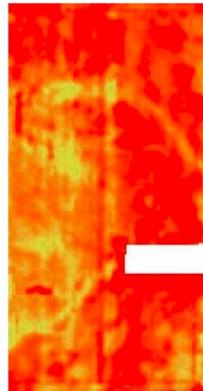
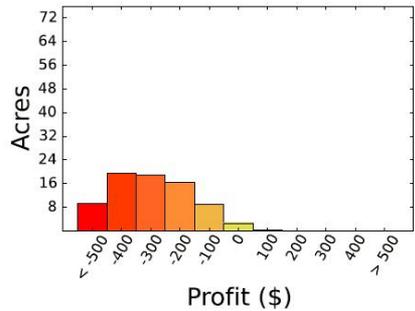
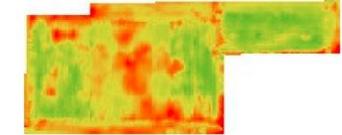
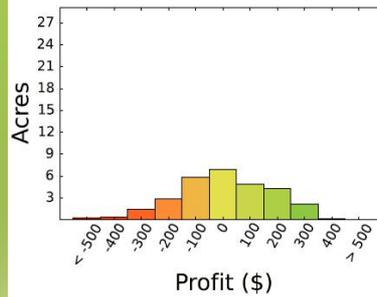
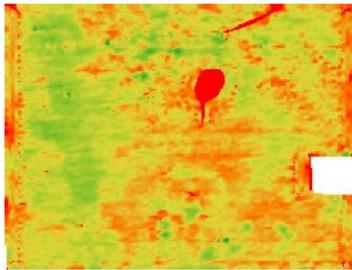
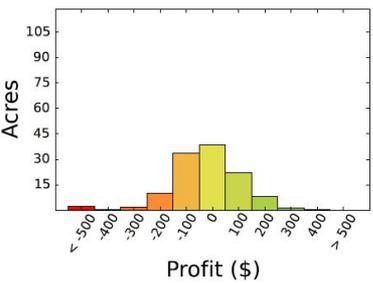
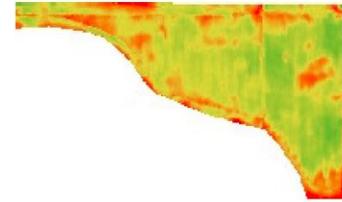
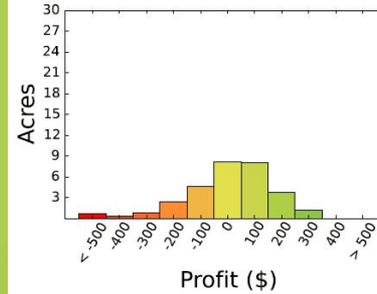
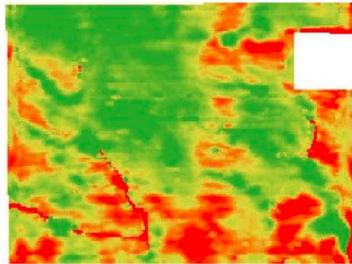
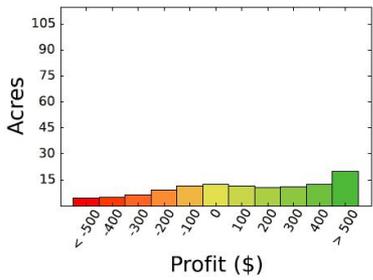
Subfield Variability



Understanding Subfield Profit and ROI



Profit (\$/ac)



Key Message

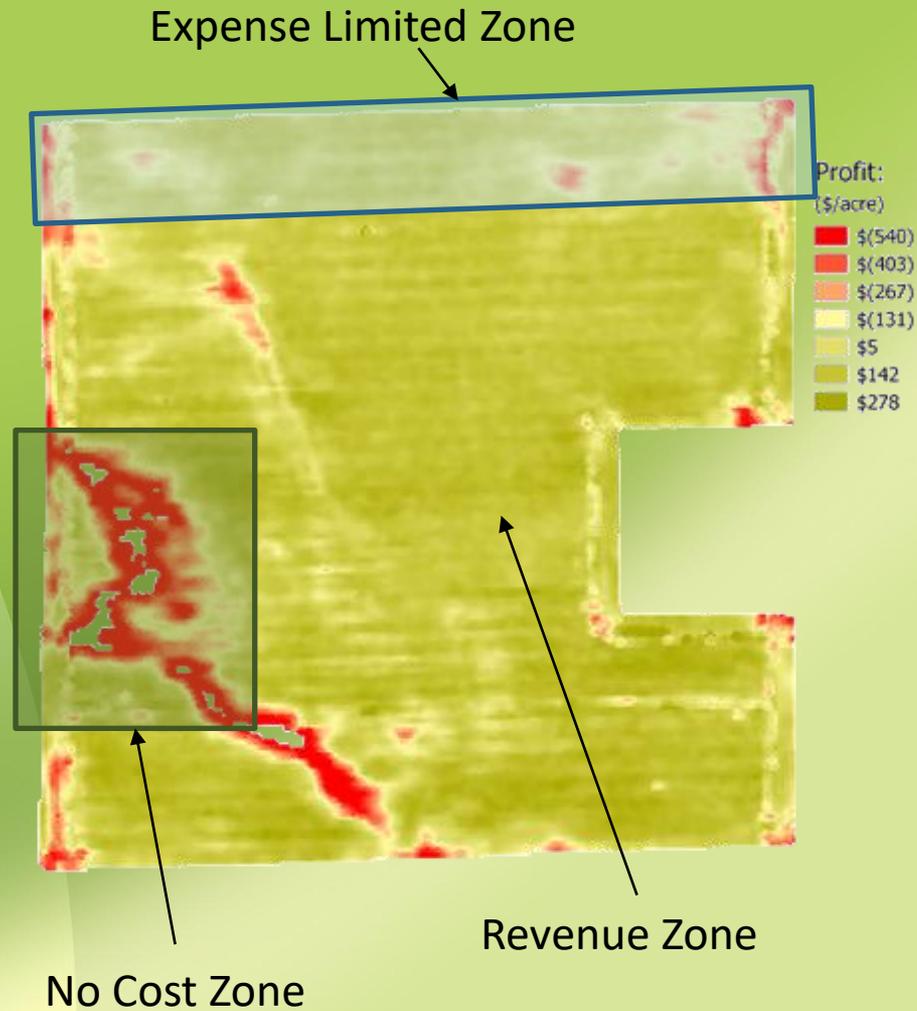


Environmental Performance and Economic Performance are driven by the same goal:

Maximize the output per unit of input



ROI Focused Agronomic Management



Precision Business Planning Workflow



Intelligence
Gathering

Business
Performance
Review

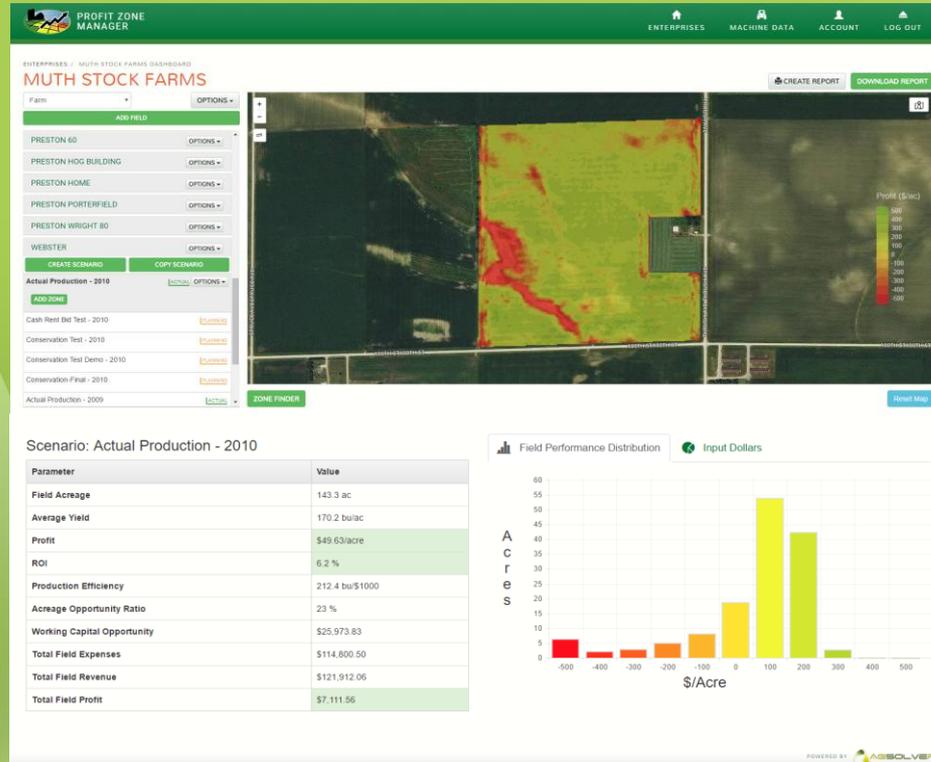
Opportunity
Ratio Analysis

Negative Return
Assessment

Opportunity
Ratio Business
Planning

In-season Plan
Adjustments

Workflow



**PROFIT ZONE
MANAGER™**

Precision Business Planning Workflow – Intelligence Gathering



Intelligence Gathering

Business Performance Review

Opportunity Ratio Analysis

Negative Return Assessment

Opportunity Ratio Business Planning

In-season Plan Adjustments

The screenshot displays the 'Scenario Budget' application interface. At the top, there is a map showing a field with a color-coded overlay. Below the map, the interface is divided into several sections:

- Scenario Budget:** A header with a 'Save' button.
- Copy Budget Template:** A dropdown menu with 'Select Budget Template' and a list of templates including 'ISU Cont Corn Std - 2014', 'CRP Program', 'BT SmartStax Scenario', 'Precision Input Budget', '2013 Basic Corn Template', 'MSF 2015 Base Template', 'MSF 2015 SB Base Template', 'End Gun Zone', and 'State Budgets'.
- Revenue:** A section with a 'Commodity Price' slider set to 4.8 \$/bu and an 'Other Revenue' slider set to 0 \$/acre.
- Expenses:** A section with a table of equipment costs per acre:

Equipment	Cost (\$/acre)
Combine	73.4
Sprayer	32.0
Planter	4.8
Tillage	12.0

- 10 ft resolution business performance
- Three Steps
 1. Define field boundaries
 2. Upload machine data
 3. Set crop budget – 5 min or less

Precision Business Planning Workflow

–Business Performance Review



Intelligence Gathering

Business Performance Review

Opportunity Ratio Analysis

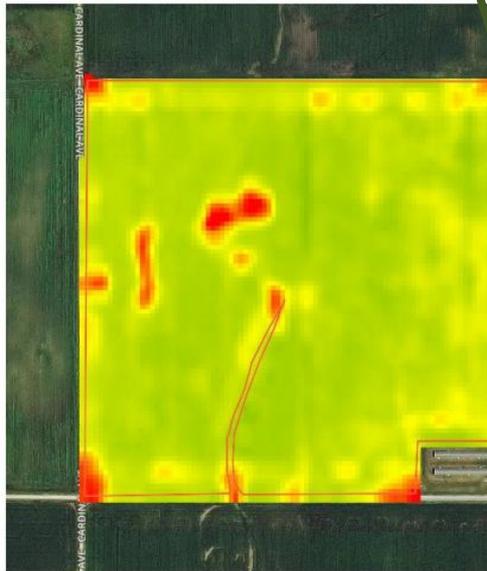
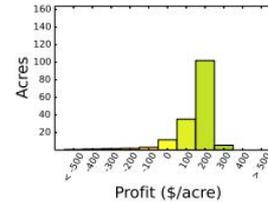
Negative Return Assessment

Opportunity Ratio Business Planning

In-season Plan Adjustments

Preston Hog Building: Actual Production: 2015

Parameter	Value
Field Acreage	152.55ac
Average Yield	200.73bu/ac
Profit	\$150.43/acre
ROI	18.28 %
Total Field Expenses	\$125,562.41
Total Field Revenue	\$148,510.81
Total Field Profit	\$22,948.39



< 2015 Enterprise Performance

Field	Acreage	Revenue	Expenses	Profit	Profit/Acre	ROI
Total	2055.36	\$ 1,820,431.49	\$ 1,623,926.08	\$ 196,505.41	\$ 95.61	12.10 %
Preston Hog Building	152.55	\$ 148,511.96	\$ 125,563.39	\$ 22,948.57	\$ 150.43	18.28 %
Lakin Fox East	41.14	\$ 39,946.07	\$ 33,858.96	\$ 6,087.11	\$ 147.98	17.98 %
Preston 60	54.58	\$ 52,915.95	\$ 44,922.72	\$ 7,993.23	\$ 146.46	17.79 %
Building Site	71.28	\$ 67,697.71	\$ 58,667.19	\$ 9,030.52	\$ 126.70	15.39 %
Preston Wright 80	79.22	\$ 51,050.86	\$ 44,269.65	\$ 6,781.21	\$ 85.60	15.32 %
Preston Porterfield	149.30	\$ 141,559.81	\$ 122,886.84	\$ 18,672.96	\$ 125.07	15.20 %
Lakin Franke	396.31	\$ 348,556.89	\$ 304,443.16	\$ 44,113.73	\$ 111.31	14.49 %
Hanson West	30.61	\$ 19,523.86	\$ 17,107.60	\$ 2,416.26	\$ 78.92	14.12 %
West 40	44.14	\$ 41,282.68	\$ 36,334.93	\$ 4,947.76	\$ 112.08	13.62 %
Lakin Sieple North	32.78	\$ 30,525.73	\$ 26,982.18	\$ 3,543.55	\$ 108.10	13.13 %
Brandt West	69.24	\$ 64,178.59	\$ 56,994.24	\$ 7,184.35	\$ 103.76	12.61 %
Freverts	37.59	\$ 34,338.45	\$ 30,943.81	\$ 3,394.64	\$ 90.30	10.97 %
Preston Home	71.90	\$ 65,638.76	\$ 59,177.30	\$ 6,461.46	\$ 89.87	10.92 %

Precision Business Planning Workflow – Opportunity Ratio Analysis



Intelligence Gathering

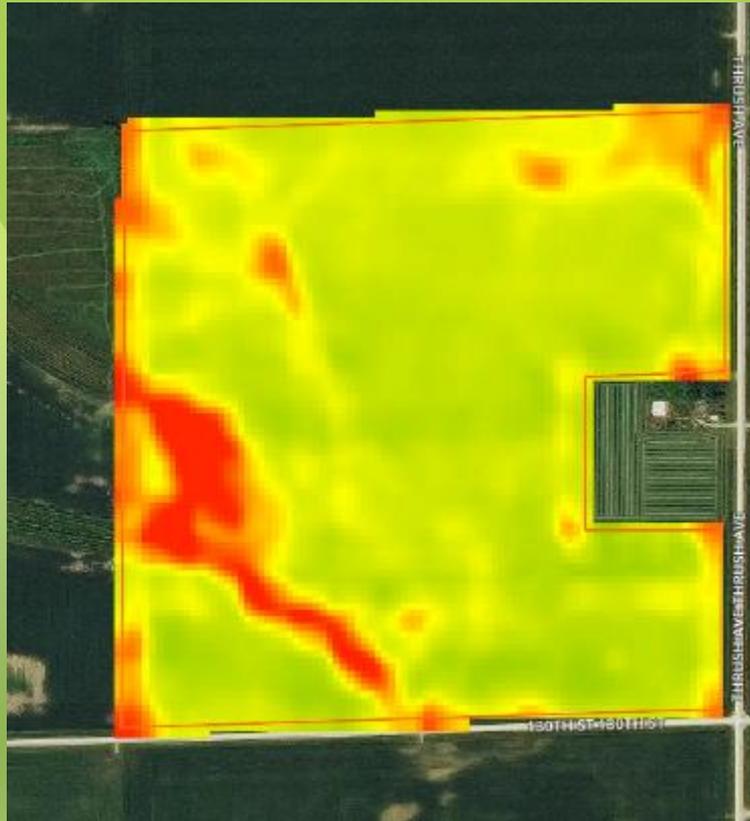
Business Performance Review

Opportunity Ratio Analysis

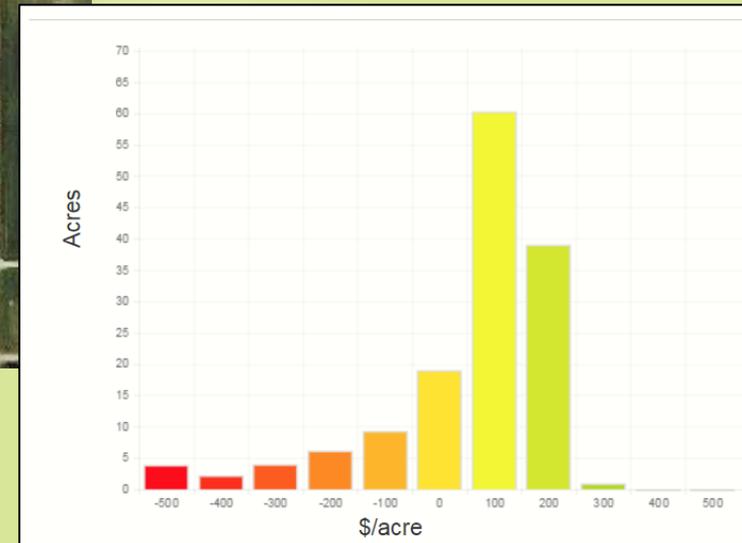
Negative Return Assessment

Opportunity Ratio Business Planning

In-season Plan Adjustments



Parameter	Value
Field Acreage	143.26ac
Average Yield	170.94bu/ac
Profit	\$53.56/acre
ROI	6.69 %
Production Efficiency	213.37 bu/\$1000
Loss Ratio - Land	0.23
Loss Ratio - Capital	\$26,083.96
Total Field Expenses	\$114,766.44
Total Field Revenue	\$122,439.50
Total Field Profit	\$7,673.06



Precision Business Planning Workflow – Negative Return Assessment



Intelligence
Gathering

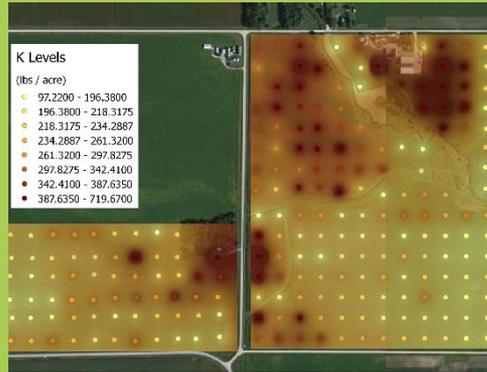
Business
Performance
Review

Opportunity
Ratio Analysis

**Negative
Return
Assessment**

Opportunity
Ratio Business
Planning

In-season Plan
Adjustments

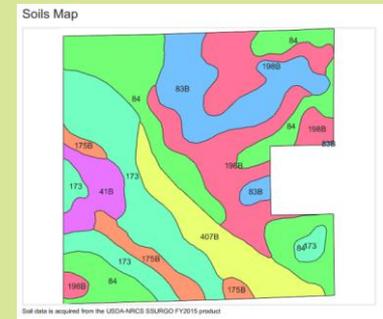
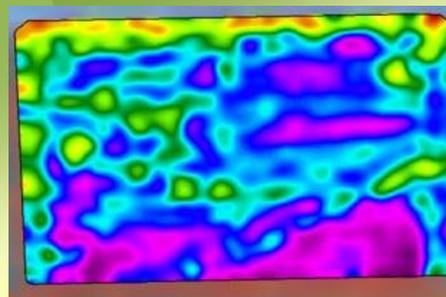


Agronomic
Issues



Land
Improvement

Working Capital
Allocation



Precision Business Planning Workflow – Negative Return Assessment



Intelligence Gathering

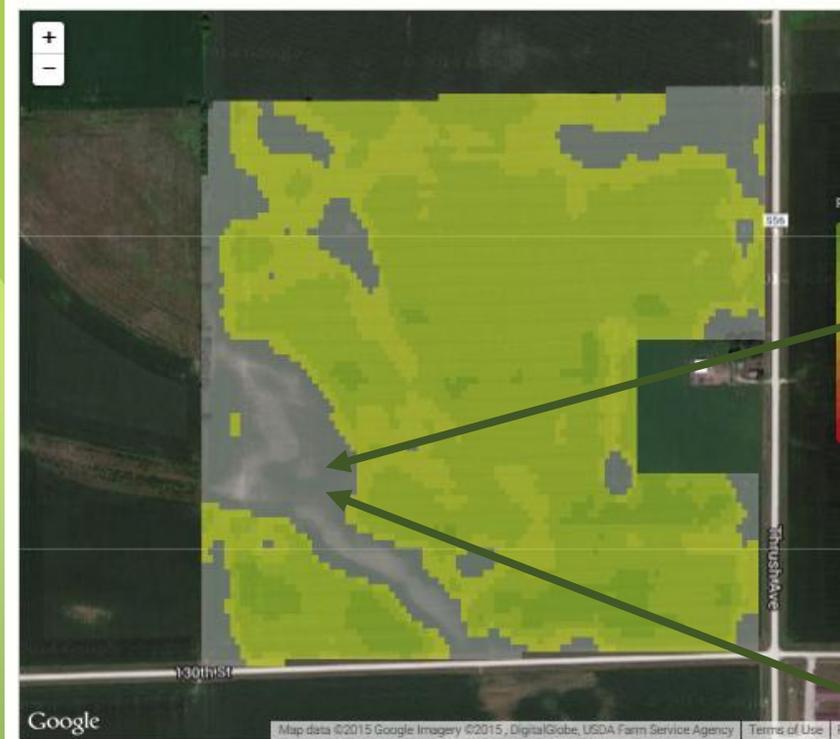
Business Performance Review

Opportunity Ratio Analysis

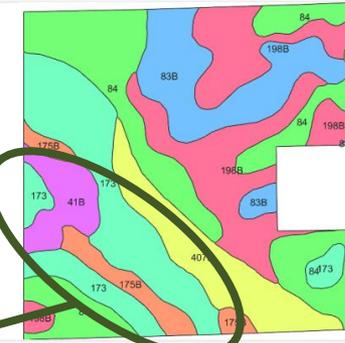
Negative Return Assessment

Opportunity Ratio Business Planning

In-season Plan Adjustments



Soils Map



Soil data is acquired from the USDA-NRCS SSURGO 2014 product.

Code	Soil Description	Acres	% of Field	Non-Irr Class	CSR	CSR2	NCCPI
84	Clyde silty clay loam, 0 to 3 percent slopes	37.4	25.8		88	90	0.86
198B	Floyd loam, 1 to 4 percent slopes	29.9	20.6		89	89	0.86
173	Hoopston fine sandy loam, 1 to 3 percent slopes	29.8	20.5		55	72	0.67
83B	Kernon loam, 2 to 5 percent slopes	19.0	13.1		90	91	0.84
407B	Schley loam, 1 to 4 percent slopes	15.1	10.4		81	73	0.85
41B	Sparta loamy fine sand, 2 to 5 percent slopes	7.0	4.8		36	39	0.43
175B	Dickinson fine sandy loam, 2 to 5 percent slopes	7.0	4.8		51	51	0.55
Weighted Average					76.7	80.1	0.78

Map Details

State: IA
 County: Cerro Gordo
 QQQ: SENWSE
 Location: 18-94N-19W
 Township: Dougherty township
 Acres: 145.1

Zone Finder

Reset Map

Zone Finder

Highlight the Return on Investment for Your Field Average



Filter Clear

Topographical Map



Image data provided by USGS

Precision Business Planning Workflow

–Opportunity Ratio Business Planning



Intelligence
Gathering

Business
Performance
Review

Opportunity
Ratio Analysis

Negative Return
Assessment

**Opportunity
Ratio Business
Planning**

In-season Plan
Adjustments

Agronomic
Decisions

Land
Improvement

Precision
Management

Alternative
Low Cost
Revenue

Precision Business Planning Workflow – Opportunity Ratio Business Planning



Intelligence Gathering

Business Performance Review

Opportunity Ratio Analysis

Negative Return Assessment

Opportunity Ratio Business Planning

In-season Plan Adjustments



Scenario: Actual Production

Parameter	Value
Field Acreage	143.3 ac
Average Yield	170.2 bu/ac
Profit	\$49.63/acre
ROI	6.2 %
Production Efficiency	212.4 bu/\$1000
Acreage Opportunity Ratio	23 %
Working Capital Opportunity	\$25,973.83
Total Field Expenses	\$114,800.50
Total Field Revenue	\$121,912.06
Total Field Profit	\$7,111.56



Scenario: Conservation-Final

Parameter	Value
Field Acreage	143.3 ac
Average Yield	179.2 bu/ac
Profit	\$93.85/acre
ROI	12.6 %
Production Efficiency	239.7 bu/\$1000
Acreage Opportunity Ratio	22 %
Working Capital Opportunity	\$19,494.23
Total Field Expenses	\$107,085.95
Total Field Revenue	\$120,534.99
Total Field Profit	\$13,449.04

Precision Business Planning Workflow –Management Zone Development



Intelligence
Gathering

Business
Performance
Review

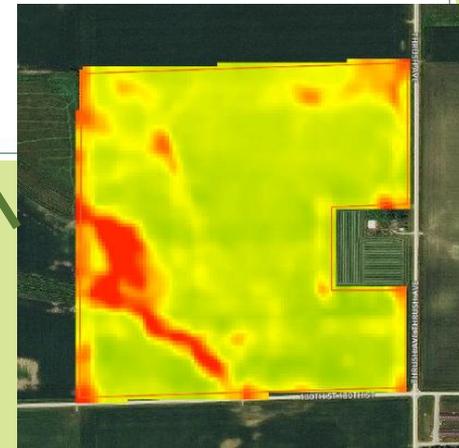
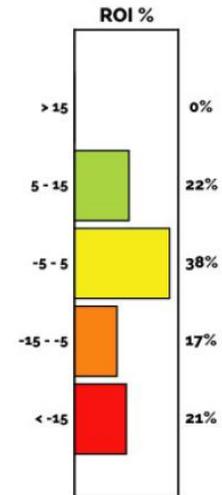
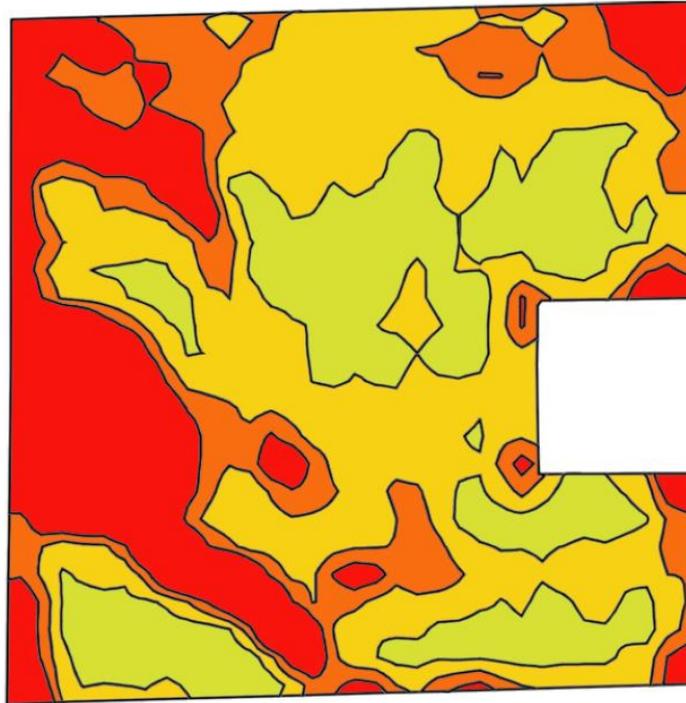
Opportunity
Ratio Analysis

Negative Return
Assessment

Opportunity
Ratio Business
Planning

In-season Plan
Adjustments

ROI Zones



Financial Planning: Precision Credit Report



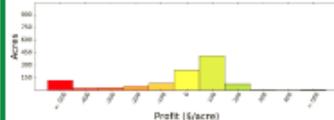
Enterprise Agronomic Credit Summary

Enterprise Summary

- 27% of acres operated at expected loss
- \$172,640 potential misallocated working capital
- 4.1% expected ROI
- \$37,048 maximum annual loss
- 6 fields expected profitable
- 4 fields expected not profitable
- Ownership - 4 fields, 312 acres
- Leased - 6 fields, 708.3 acres

Financial Summary

Parameter	Value
Acreage	1020.3 ac
Average Yield	168.9 bu/ac
ROI	4.1 %
Production Efficiency	233.8 bu/\$1000
Acreage Opportunity Ratio	27 %
Working Capital Opportunity	\$172,640
Total Expenses	\$737,494
Total Revenue	\$767,718
Total Profit	\$30,224
Profit	\$29.62/ac

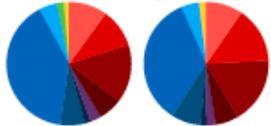


Maximum Loss - Working Capital Risk

Working Capital Committed	Guaranteed Revenue	50% RP	55% RP	60% RP	65% RP	70% RP	75% RP	80% RP	85% RP
		\$316,003.15	\$348,483.47	\$380,163.78	\$411,844.10	\$443,524.41	\$475,204.73	\$506,885.04	\$538,565.36
\$737,494.00	Maximum WC Risk	\$405,690.85	\$369,010.54	\$367,330.22	\$336,649.91	\$360,969.59	\$362,369.28	\$330,606.96	\$196,908.65
	WC Run Rate	1.5	1.7	1.8	2.0	2.2	2.5	2.8	3.3

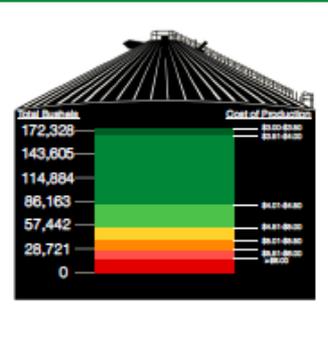
Enterprise Benchmarking

Current Profile Regional Benchmark



Expense	Regional Benchmark	Current Profile
Equipment	\$75.30	\$73.30
Fuel	\$113.00	\$73.74
Harvest	\$137.66	\$111.32
Herbicide/Fungicide	\$47.00	\$44.00
Insecticide	\$19.90	\$21.30
Interest	\$12.30	\$11.24
Bean Drying/Heating/Marketing	\$99.30	\$98.13
Land	\$213.00	\$200.81
Labor	\$37.06	\$34.43
Overhead	\$5.00	\$13.30
Custom Hire	\$0.00	\$0.00
Other	\$18.00	\$10.00
Total	\$756.96	\$738.10

Cost of Production & Marketing



Prepared by AgSolver, Inc.



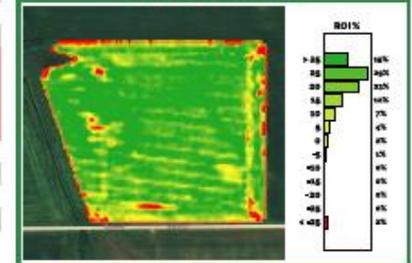
2015-08-26

Business Performance

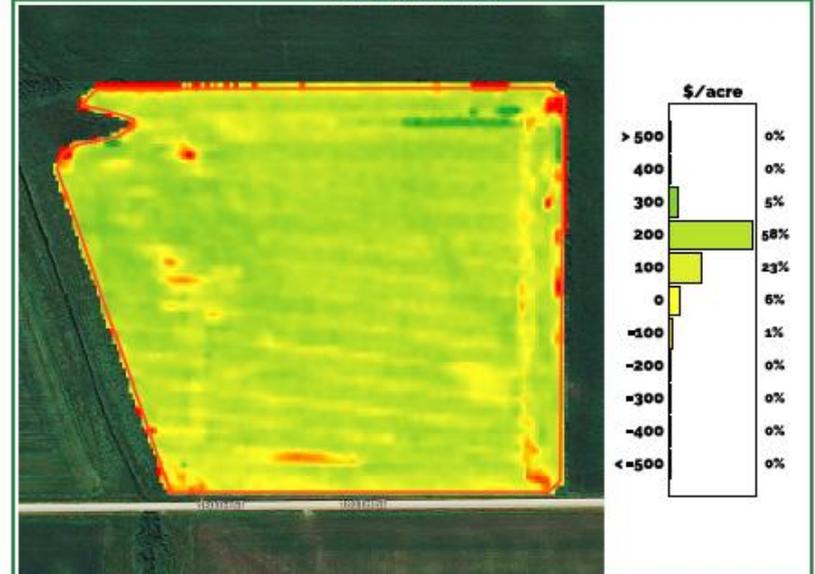
Muth Stock Farms : Lakln : Fox East : Actual Production : 2015

Parameter	Value
Field Acreage	411 ac
Average Yield	201.5 bu/ac
ROI	18.7 %
Production Efficiency	244.7 bu/\$1,000
Acreage Opportunity Ratio	6 %
Working Capital Opportunity	\$2,054.78
Total Expenses	\$33,858.97
Total Revenue	\$40,191.48
Total Profit	\$6,332.51
Profit	\$153.94/ac

Return on Investment



Profitability Distribution



Prepared by AgSolver, Inc.



2015-08-31

Adding Context to Environmental Performance Impacts

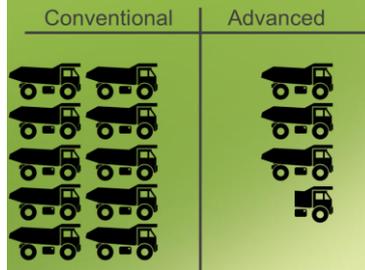


	Conventional Management	Advanced Management
Annual Soil Loss (tons of soil)	204	69
Annual Soil Carbon Change (lbs C)	8,137	44,341
Annual Nitrate Loss (lbs NO3)	7,779	3,442
Annual CO2 Loss (lbs CO2)	751,311	717,169

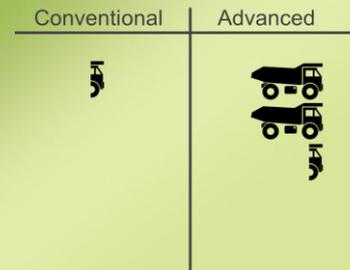
Scenario: Conservation-Final

Parameter	Value
Field Acreage	143.3 ac
Average Yield	179.2 bu/ac
Profit	\$93.85/acre
ROI	12.6 %
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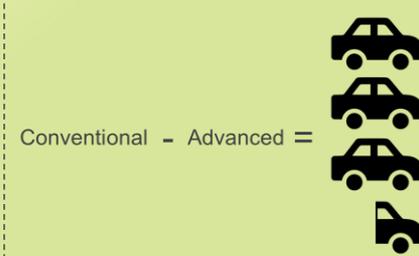
Soil Erosion



Soil Carbon



CO₂ Gas Flux



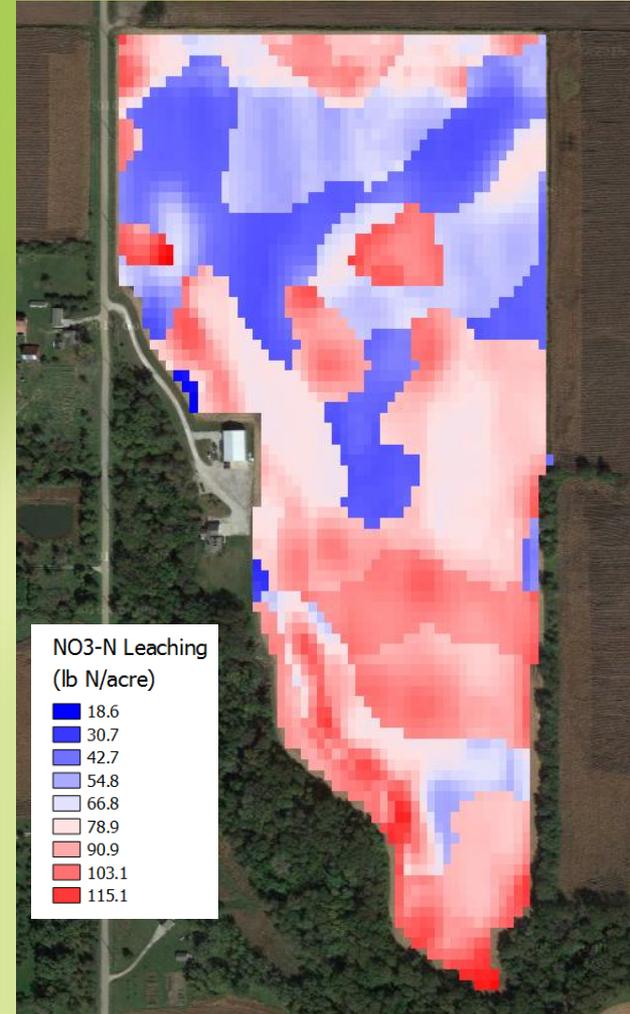
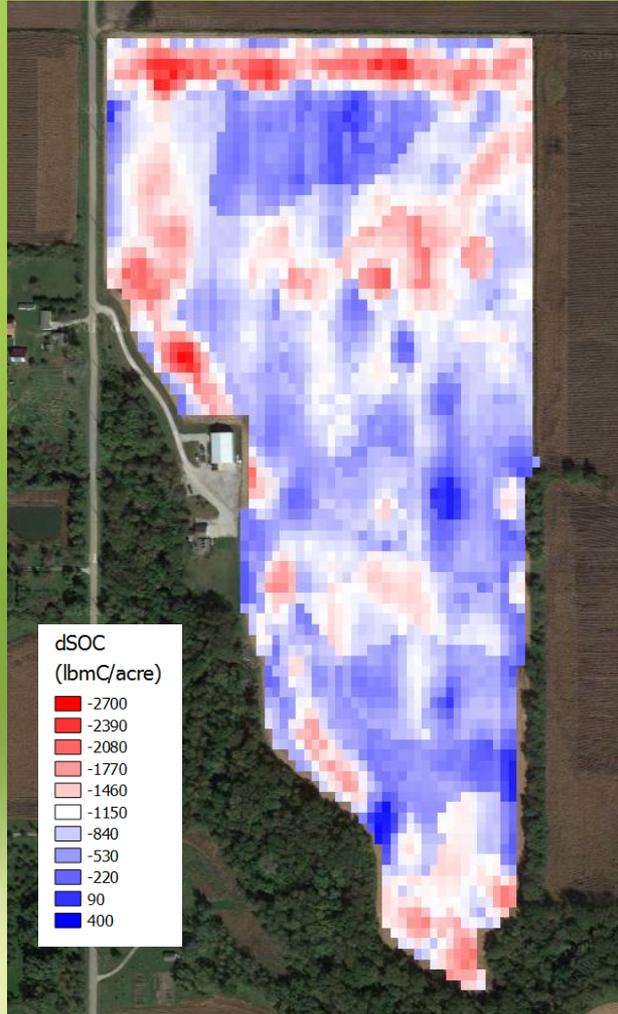
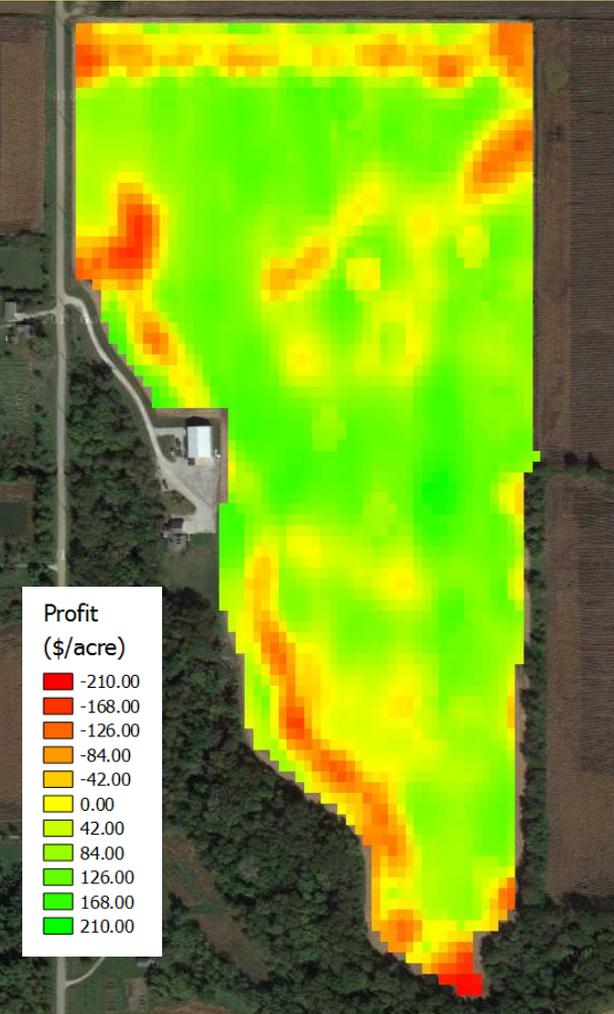
Environmental and Business Performance Analysis



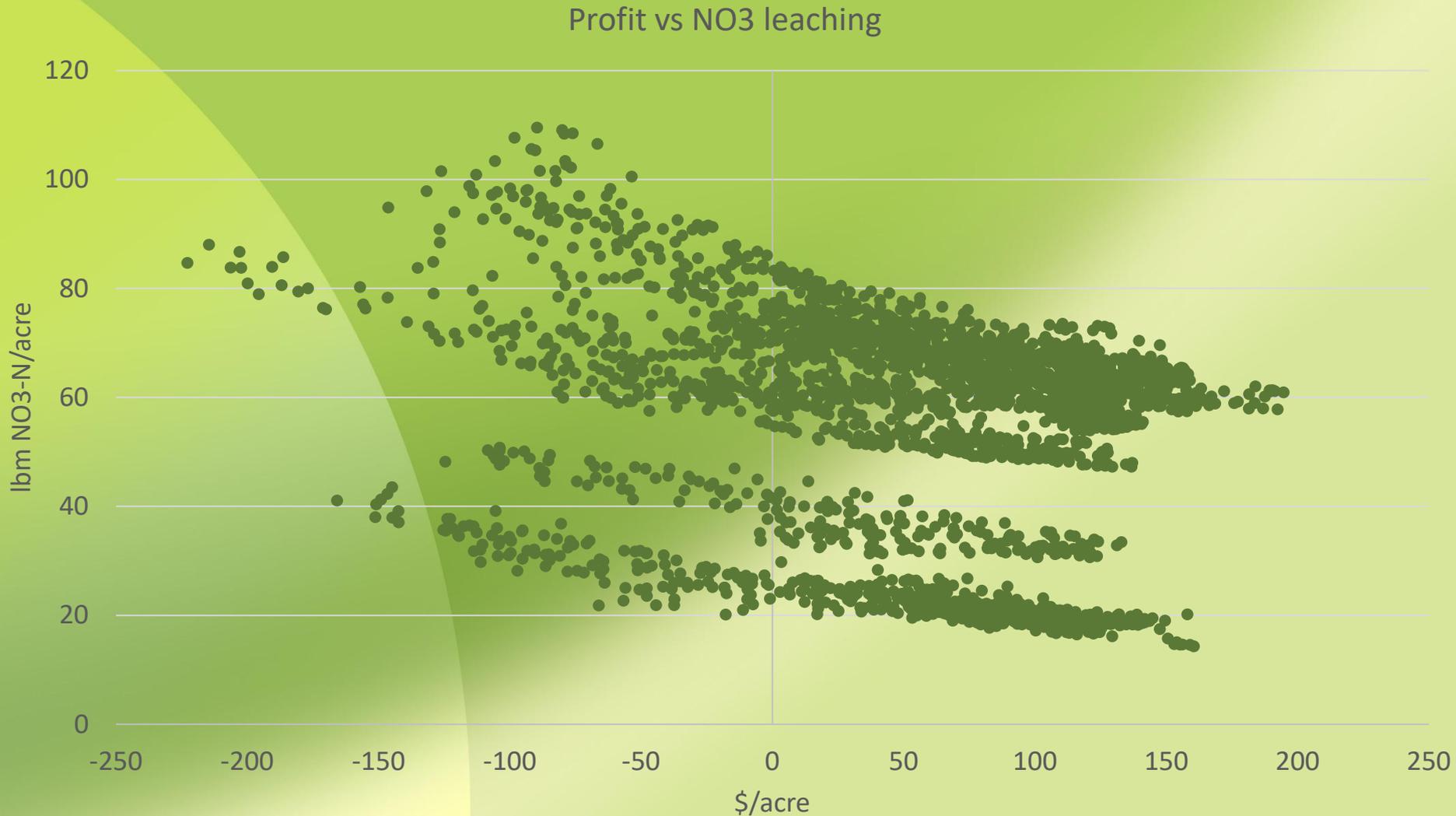
Subfield Profit

SOC change

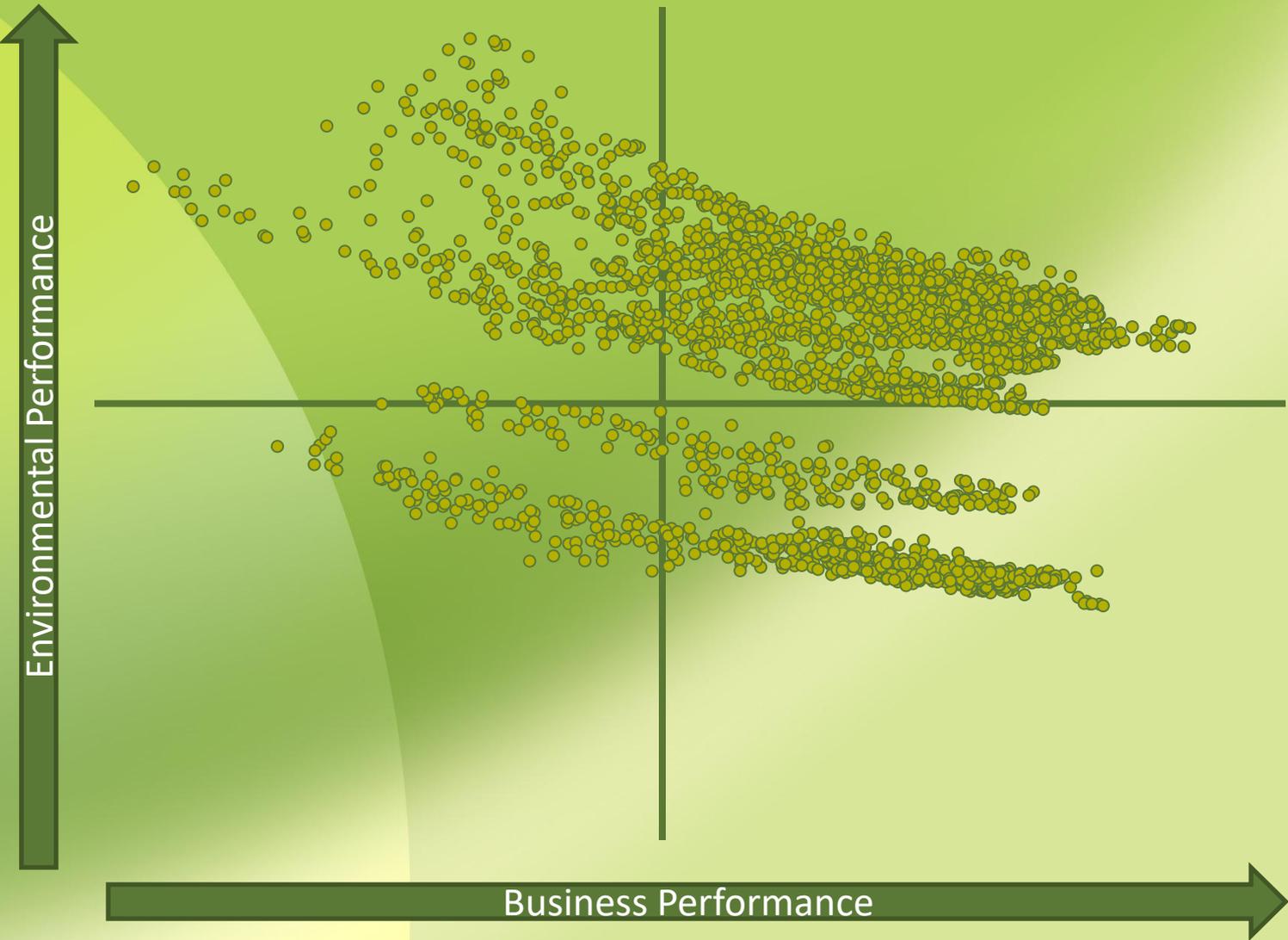
NO₃ leaching (lb N/acre)



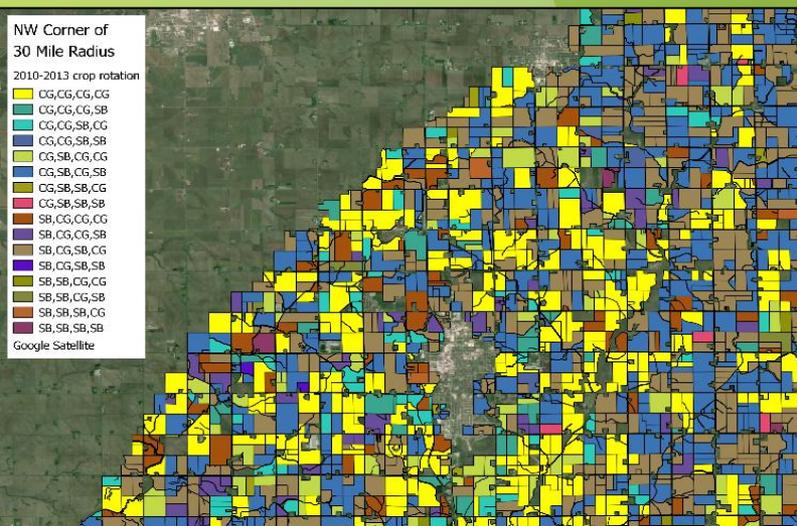
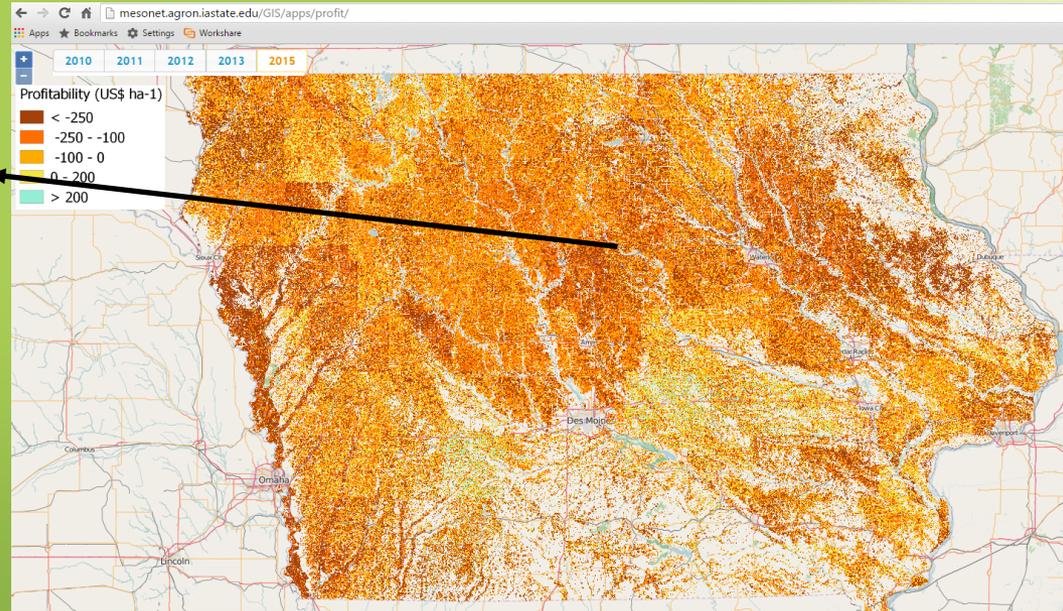
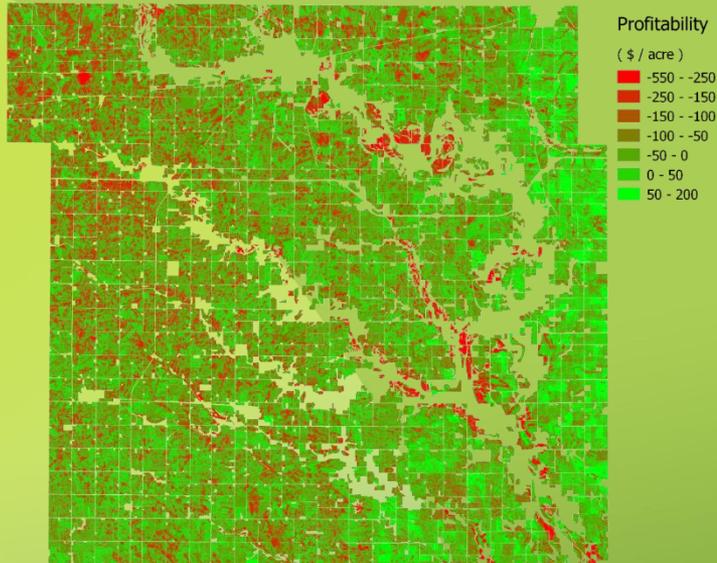
How Does Soil Health Focused Management Pay?



Quantifying the Business Case for Soil Health Focused Management



Identifying the Opportunities



- Between 2-3 million acres annually at an expected loss
- Over \$1B annually in misallocated working capital

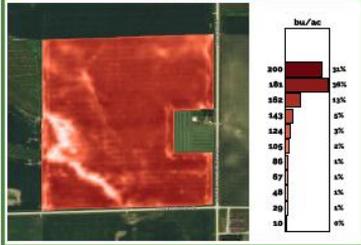
Management Zone Development



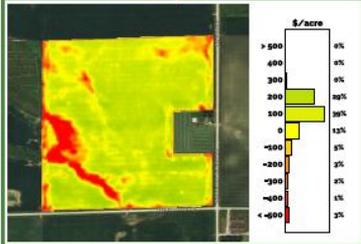
Field Report Card

Parameter	Value
Field Acreage	143.3 ac
Average Yield	170.5 bu/ac
ROI	6.4 %
Production Efficiency	212.8 bu/\$1,000
Acreage Opportunity Ratio	22 %
Working Capital Opportunity	\$25,635.23
Total Expenses	\$114,800.50
Total Revenue	\$122,137.83
Total Profit	\$7,337.33
Profit	\$51.20/ac

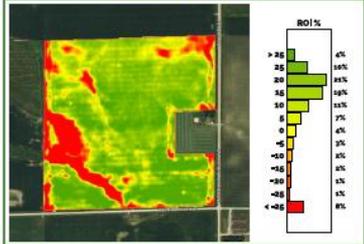
Field Yield



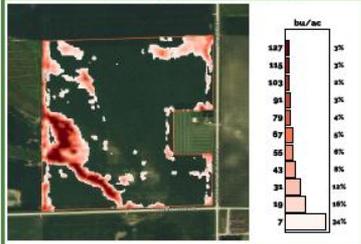
Profitability Distribution



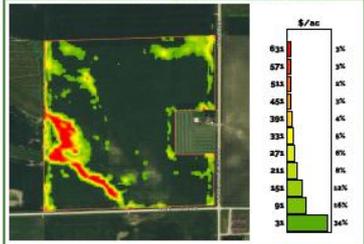
Return on Investment



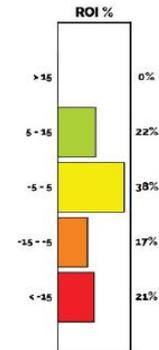
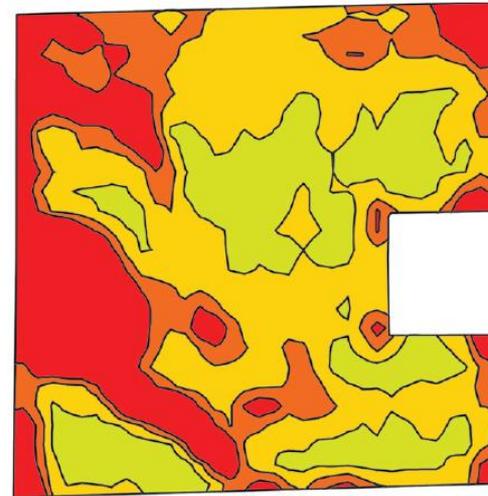
Yield Increase Needed to Breakeven



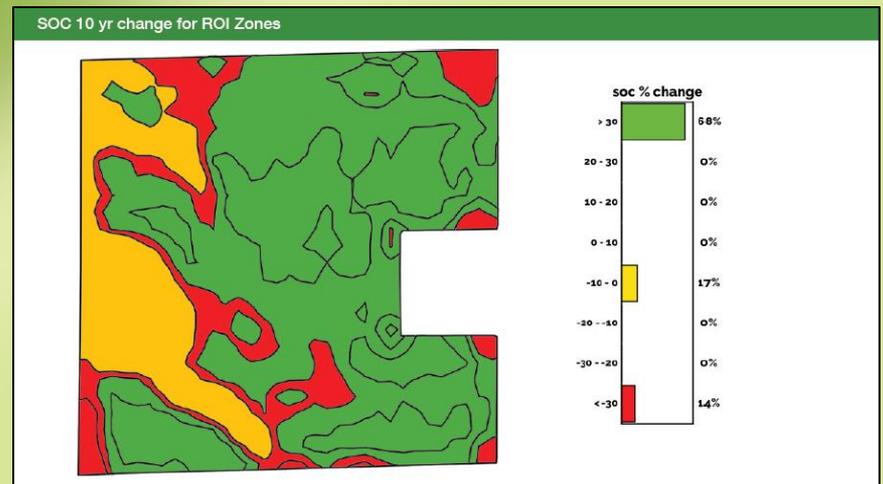
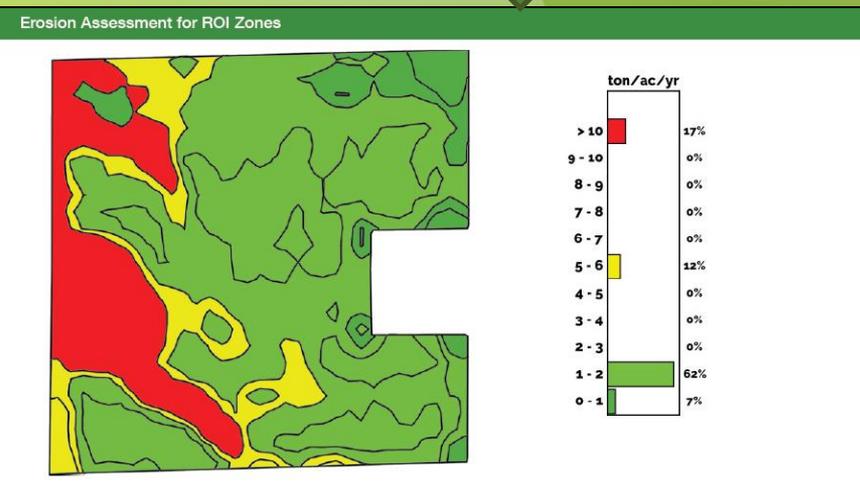
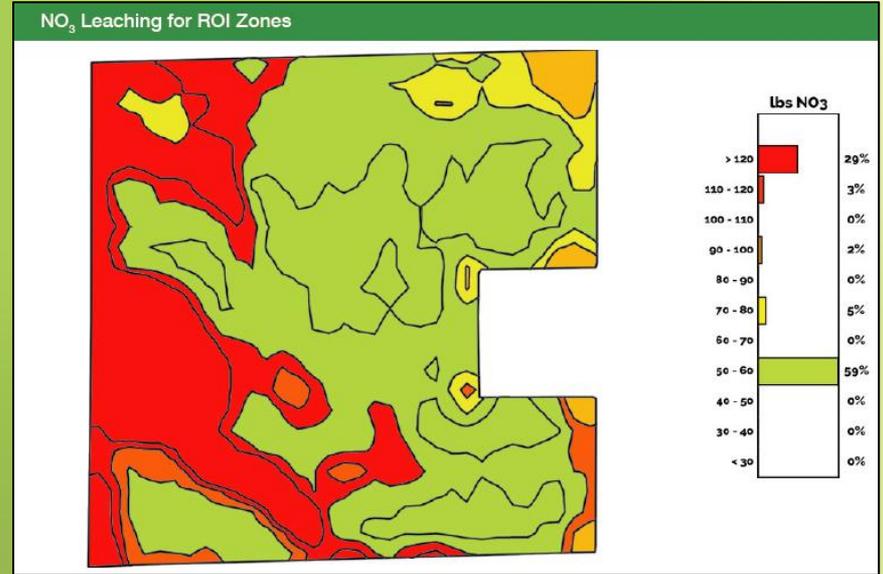
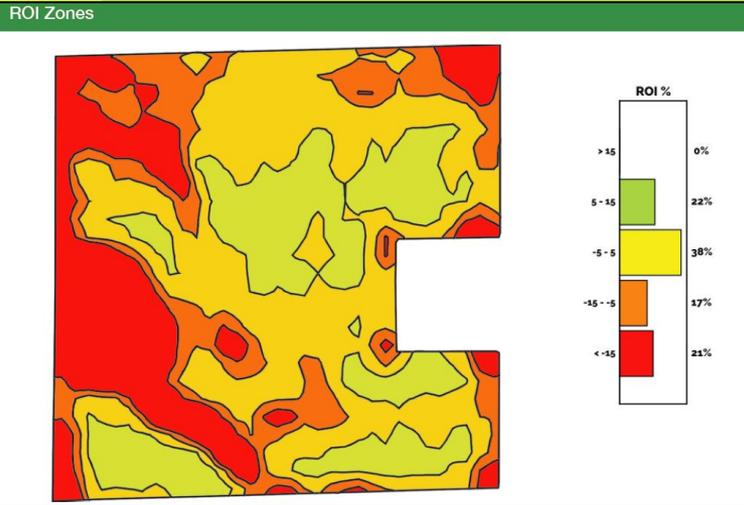
Expense Reduction Needed to Breakeven



ROI Zones



Precision Conservation Business Planning



Questions?

Introduction to on the ground projects



Resource Concerns Meet Poor Financial Performance



Simply stated, a Precision Conservation Business Plan does the following:

1. Identifies land areas where conservation resource concerns align with poor financial performance
2. Evaluates the financial outcomes of conservation practice options at a high resolution on the landscape



Scenario: Actual Production - 2010

Parameter	Value
Field Acreage	143.3 ac
Average Yield	170.5 bu/ac
Profit	\$51.20/acre
ROI	6.4 %
Production Efficiency	212.8 bu/\$1000
Acreage Opportunity Ratio	22 %
Working Capital Opportunity	\$25,642.83
Breakeven Commodity Price	\$4.70
Total Field Expenses	\$114,800.50
Total Field Revenue	\$122,137.83
Total Field Profit	\$7,337.33



Scenario: Conservation-Final - 2010

Parameter	Value
Field Acreage	143.3 ac
Average Yield	179.2 bu/ac
Profit	\$94.23/acre
ROI	12.6 %
Production Efficiency	239.8 bu/\$1000
Acreage Opportunity Ratio	22 %
Working Capital Opportunity	\$19,117.36
Breakeven Commodity Price	\$4.17
Total Field Expenses	\$107,085.95
Total Field Revenue	\$120,588.95
Total Field Profit	\$13,503.00

PROFITABILITY AND
CONSERVATION ARE
SYNERGISTIC

1. Increased Profit/Acre **\$43.03**
2. Increased ROI by **6.2%**
3. Reduced Breakeven Price **\$0.53**
4. Spent **\$7,714.55**
5. Made **\$6,165.67**



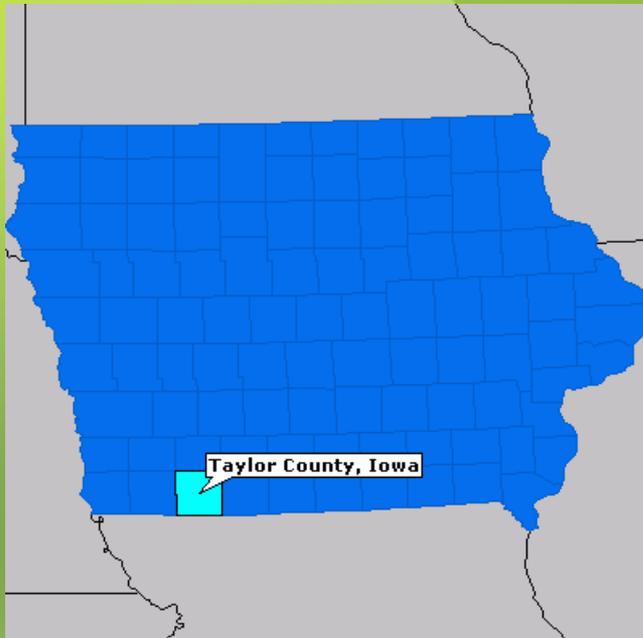
Our Role in Delivering Precision Business Planning

Pheasants Forever has a 30 plus year tradition of providing technical and financial assistance to farmers and other landowners. Precision Business Planning simply continues this commitment to working side by side with farmers and doing so with 21st century cutting-edge technology. Through both Pheasants Forever chapter contributions as well as through outside grants, Pheasants Forever secures additional resources to reduce the cost of the Profit Zone Manager product subscriptions to farmers. Pheasants Forever hire and train Precision Business Planning Specialists to increase the technical capacity to deliver the consultations. Their talented team of Farm Bill Wildlife Biologists provide the insights and recommendations on voluntary local, state, and federal programs to assist farmers in increasing their profitability and sustainability.

What is the project? Encouraging producers to adopt conservation practices to reduce nutrient loss, increase the overall productivity of the field, and improve soil health on side hills all while increasing profitability.

Project Scope:

- 25 growers over 3 years
 - 15 Growers in process
 - 44 interested



By the Numbers

60%

Total county acres in row crop

47%

County row crop acres unsuitable for production

18%

County row crop acres not turning a profit

Project Incentives

- Crop to Pasture/Hay: \$250/acre, 5 year agreement
- Soil Builder: \$60/acre
- Terraces: 50-75% Cost Share
- Free AgSolver 1 year subscription

NRCS – Precision Conservation Business Planning



- Increased to 11 states
- Project initiated in all states

Sign Up Progress

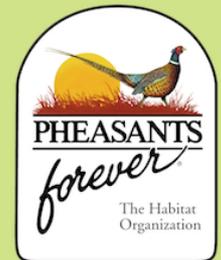
- 67 growers in process
 - 23 – data received
 - 52 – contracts received
 - 15 – contracts in process

State	Current Participants	Target Participation
Delaware	2	6
Idaho	9	10
Illinois	12	20
Iowa	8	20
Michigan	8	5
Ohio	10	25
Pennsylvania	6	4
Washington	6	4
Indiana	-	8
Oregon	5	12
Wisconsin	-	6



- **Regulatory certainty:** certified producers are deemed to be in compliance with any new water quality rules or laws during the period of certification
- **Recognition:** certified producers may use their status to promote their business as protective of water quality
- **Priority for technical assistance:** producers seeking certification can obtain specially designated technical and financial assistance to implement practices that promote water quality

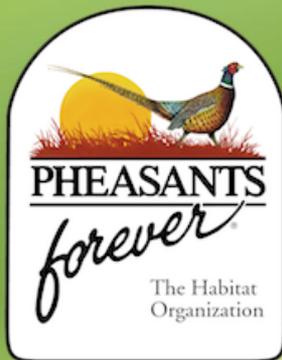
- Initiated 1/15/2017
- 5 growers pilot project





5 grower project

- Initiated 1/15/2017



A New Way of Thinking



Using the Profit Zone Manager software app, the Pheasants Forever Farm Bill Wildlife Biologist and the OSU farm managers were able to identify the “negative return” acres (acres farmed unprofitably) and validate their initial concerns. They were also able to identify additional areas that could be enrolled in conservation reserve programs to increase profitability. The majority of these acres were located around the perimeters of the fields adjacent to the woodlots and fencerows.

- A total of 35.5 acres were enrolled into CRP quail buffer (CP33).
- A total of 19.96 acres were enrolled into CRP (CP38E) State Acres for Wildlife Enhancement (SAFE). These areas will be planted during spring 2017 to a Native Warm Season Grass and Pollinator mix containing species that are beneficial not only to pheasants but also to pollinators.



The zone (8.9 acres) in one of the analyzed fields used to create the boundary for the conservation plan



“During these tight-margin years, Profit Zone Manager is an essential tool in helping us make money-saving decisions.”

– Tim Recker, Arlington, IA



“The ROI mapping concept of being able to take my ROI and see it mapped out over 18 years of my GPS data was a huge benefit to my operation.”

– Adam Chipman, Harlan, IA

“We were able to extrapolate the footages by utilizing the PZM technology of creating fields and exporting these shapefiles. The local USDA, NRCS, and FSA offices were able to use these shapefiles to create boundaries for the areas being enrolled into CP33 and provide a revenue projection down to the penny accuracy.”

– Michael Retterer,
Pheasants Forever Farm Bill Wildlife Biologist

Questions?