An Application of Economics & Environmental Planning:

The Impacts of Variable Rate Irrigation (VRI) Technology on Net Farm Income

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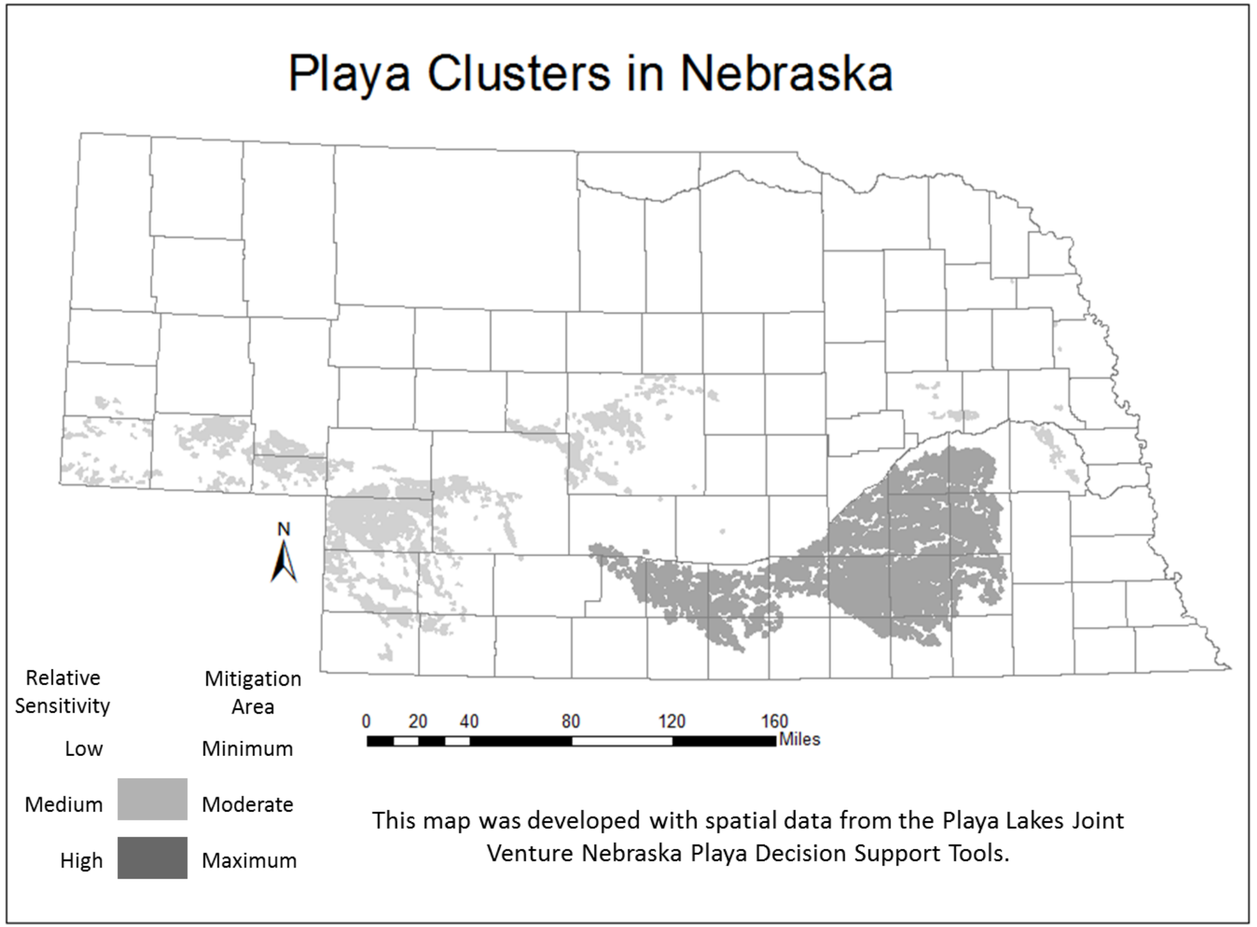
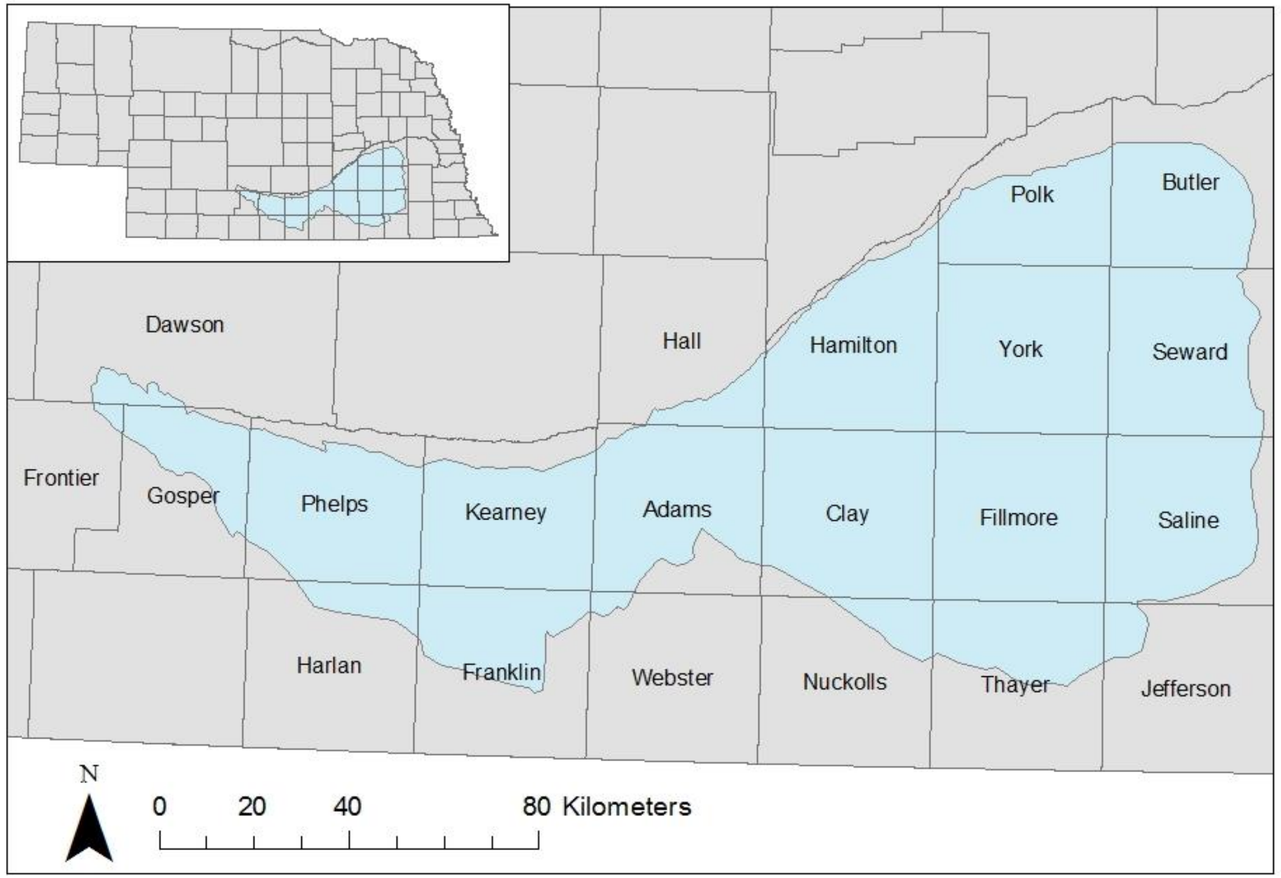
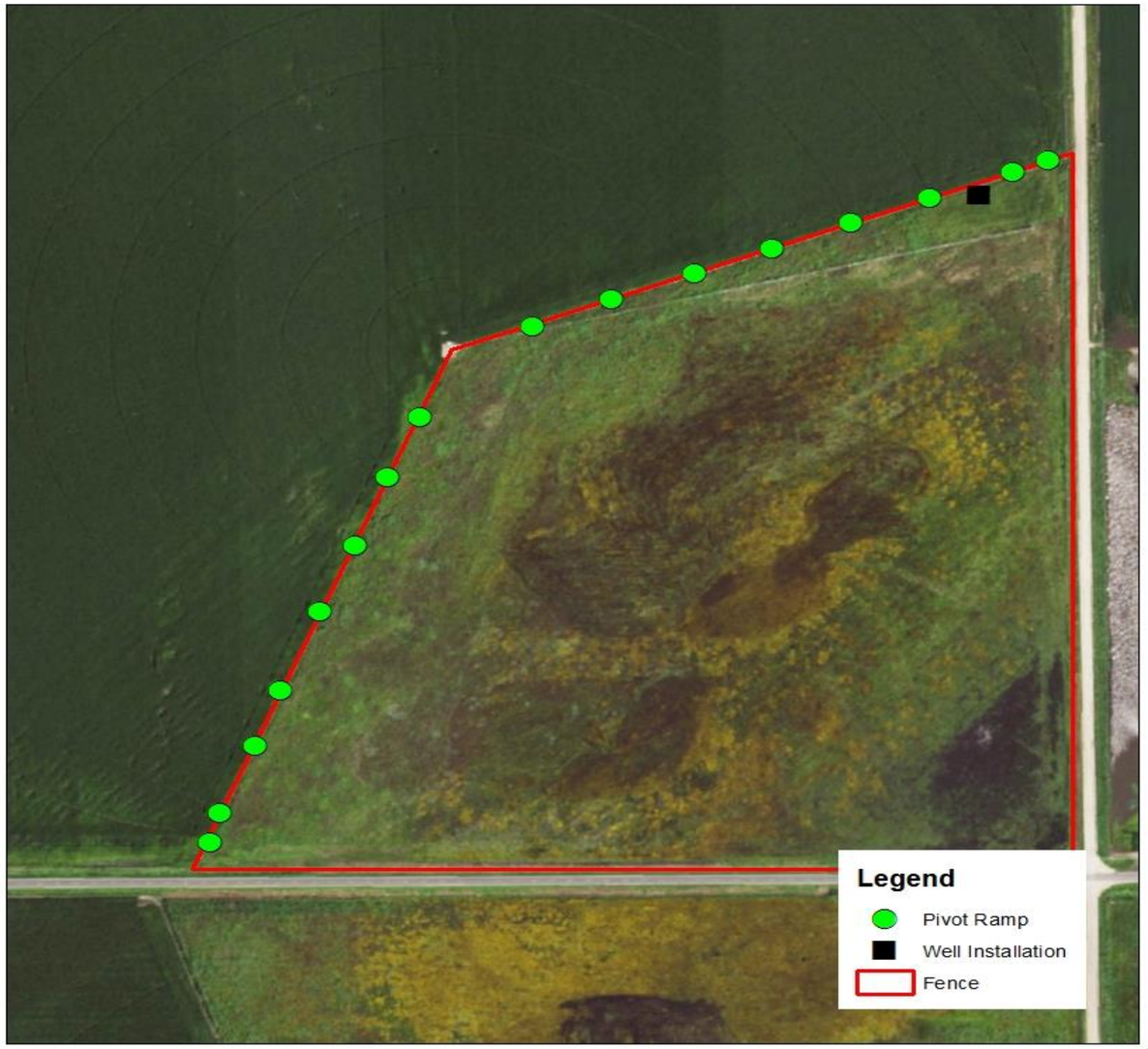
RWBJV Informational Seminar
February 1, 2018





Source: RWBJV. (2017). Playa Clusters in Nebraska [Map]. Nebraska: RWBJV.

Landowner 1



Characteristics	Landowner 1
Pivot Acres	252 (100 = VRI)
Wetland Area	55
Predominant Soil Types	Scott, Butler, & Fillmore
Ponding Frequency	0.91
Crop History	Corn

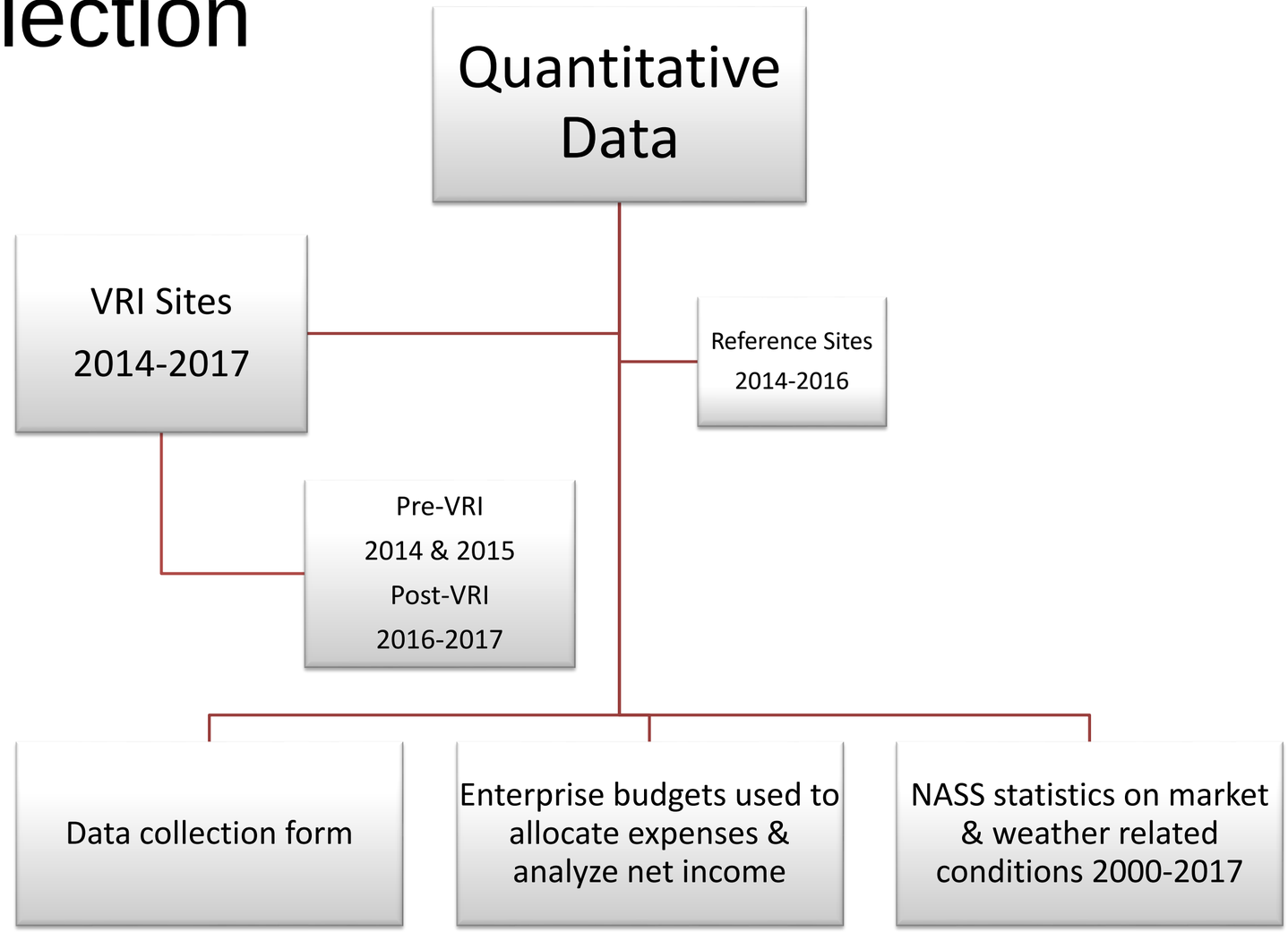
Source: Partners for Fish and Wildlife Program Landowner Agreement. (2016). Rainwater Basin Joint Venture.

Landowner 2

Characteristics	Landowner 2
Pivot Acres	105
Wetland Area	70
Predominant Soil Types	Scott, Fillmore, & Massie
Ponding Frequency	0.73
Crop History	Corn, grassland, pasture

Source: Partners for Fish and Wildlife Program Landowner Agreement. (2016). Rainwater Basin Joint Venture.

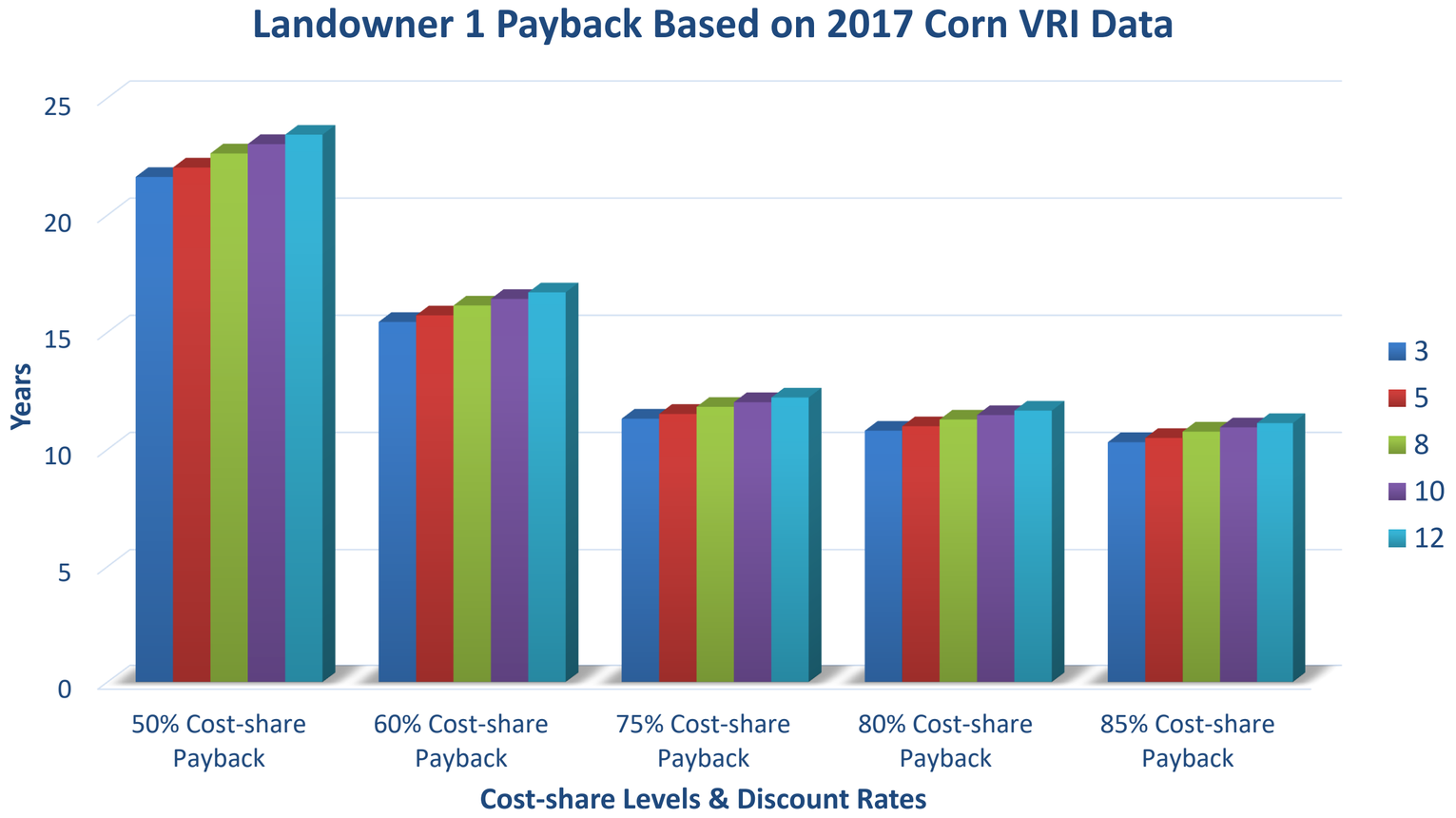
Data Collection



Crop Input Costs

1. Revenue & Yield
2. Seed & Fertilizer
3. Irrigation
4. Maintenance
5. Machinery
6. Overhead management
7. Labor
8. Property Taxes or Cash Rent

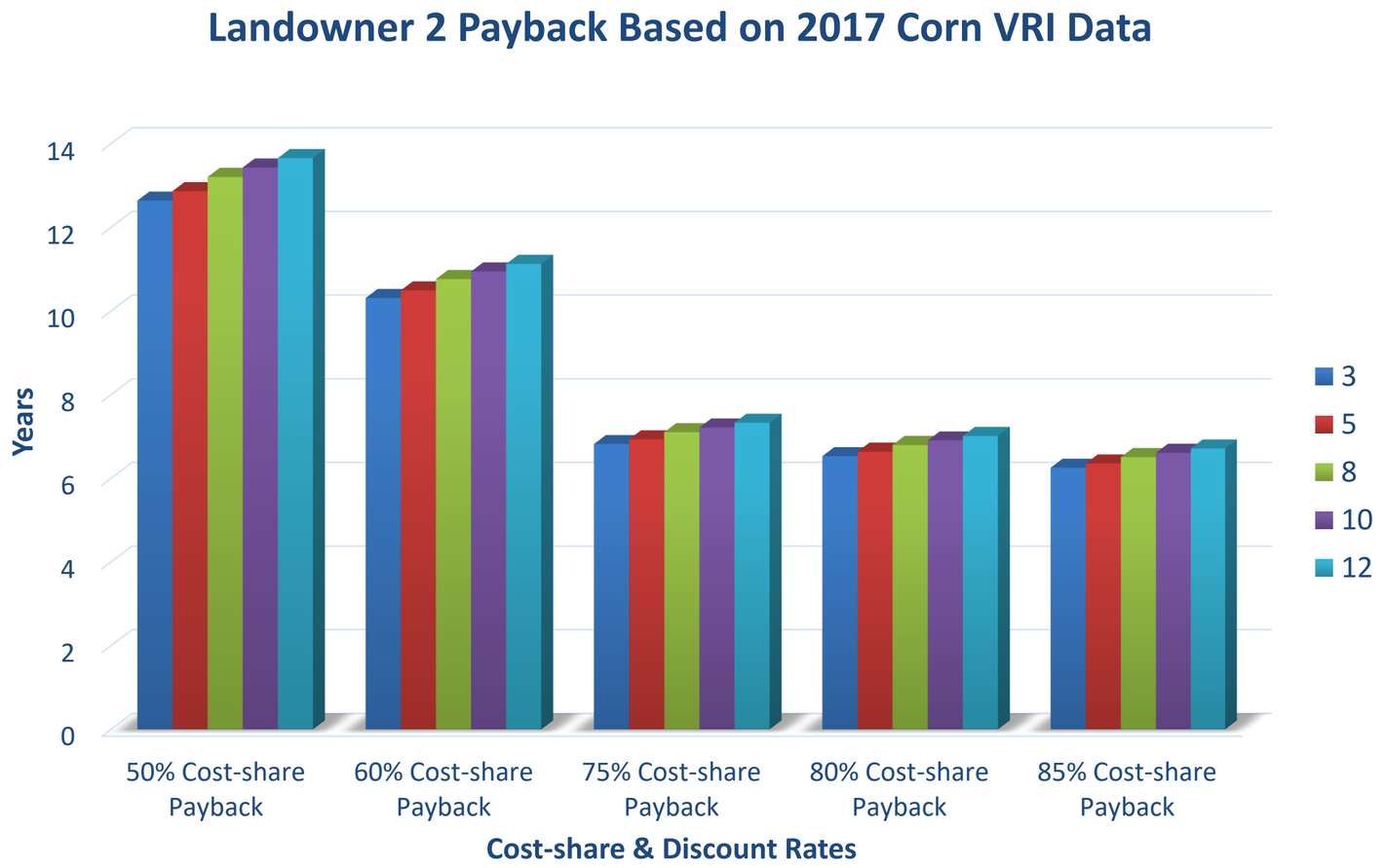
Landowner 1



2017

Price Differential: $23.00/ac.
VRI Yield: 172 bu./ac.
Non-VRI Yield: 172 bu./ac.

Landowner 2



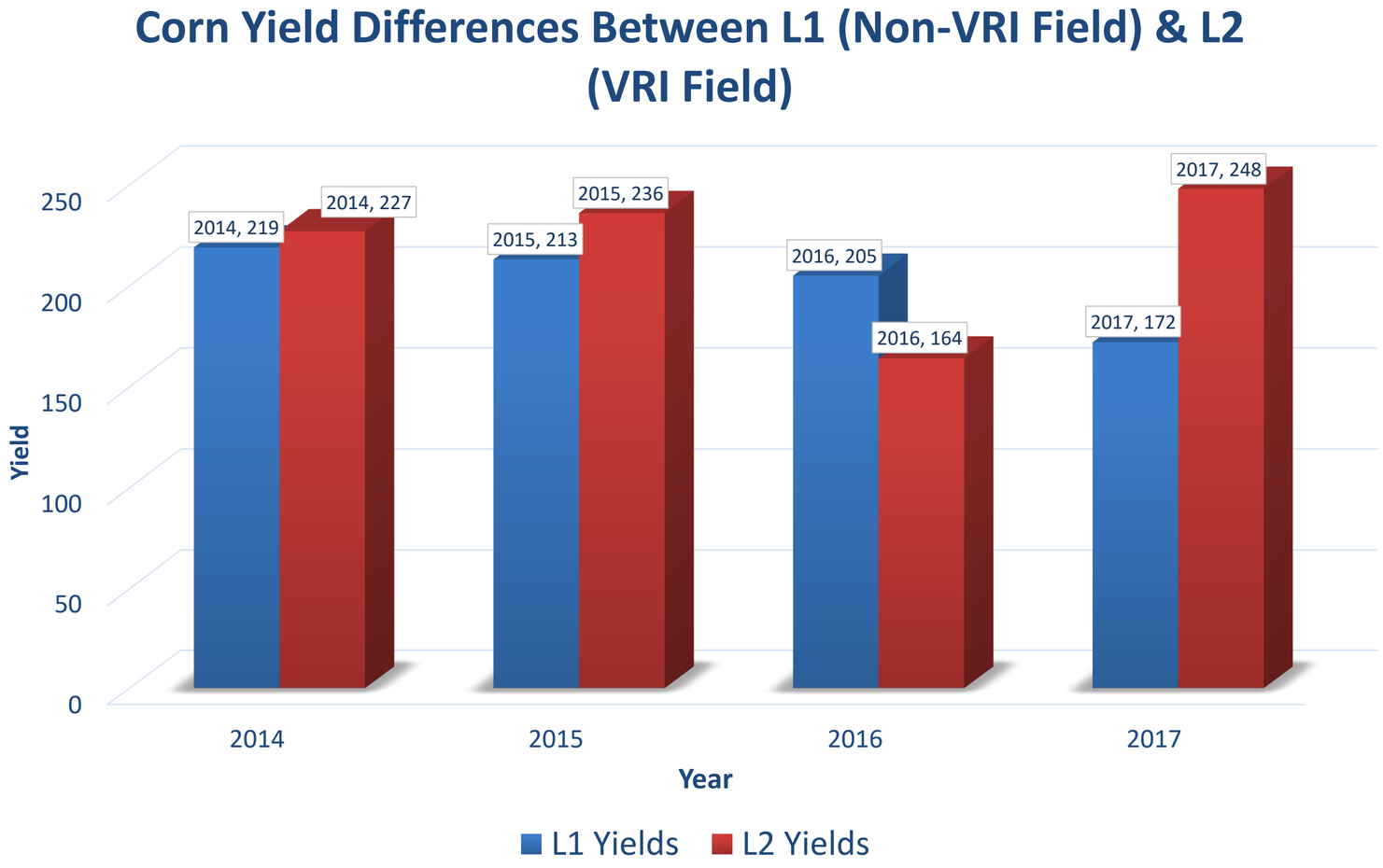
2017

Price Differential: $33.81/ac.
VRI Yield: 248 bu./ac.
Non-VRI Yield: N/A

Changes in Yield

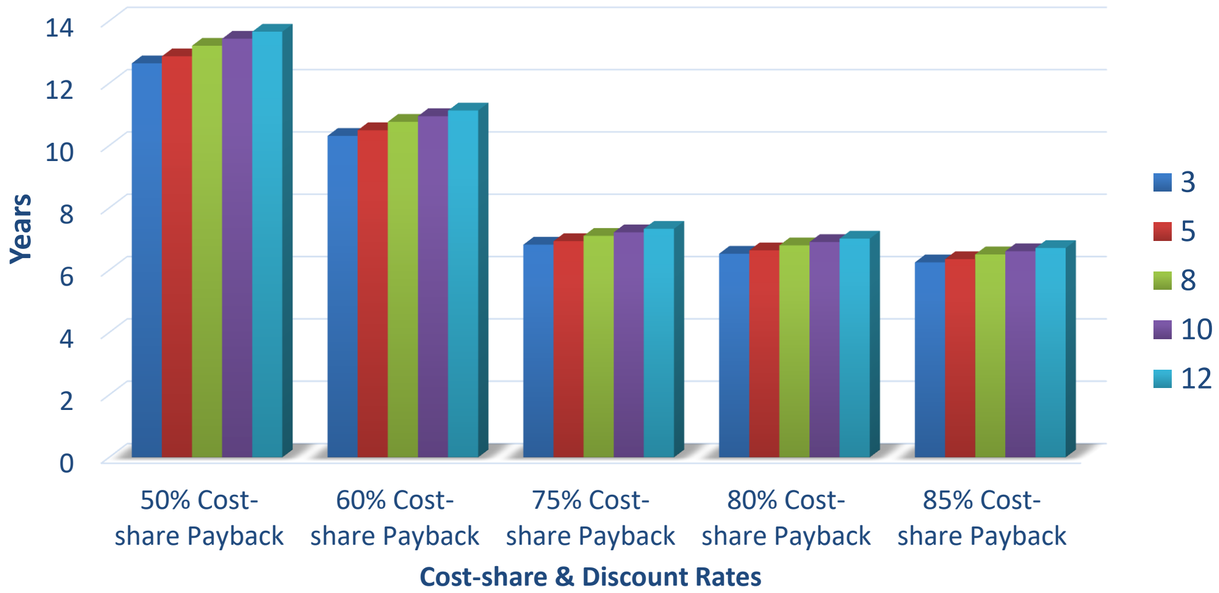
Year	Percent Difference between L1 & L2
2014	3.65%
2015	10.80%
2016	-20.00%
2017	44.19%

Pre & Post VRI	Percent Change in Yield between L1 & L2
Pre-VRI	7.23%
Post VRI	12.09%



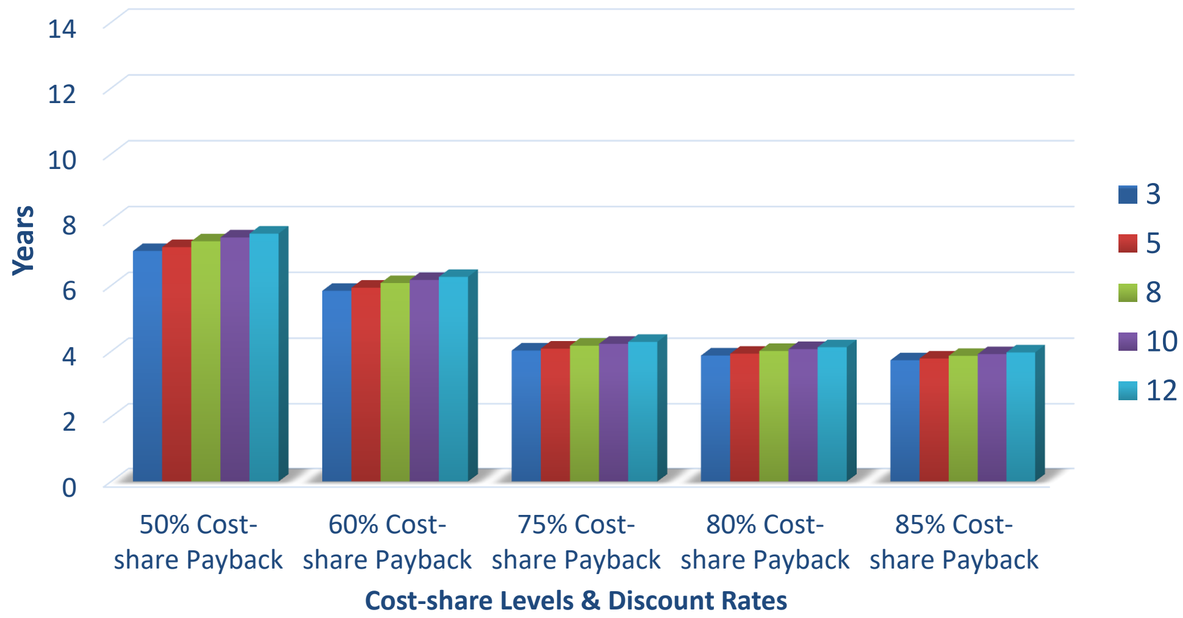
Landowner 2 – 10% Price & Yield Increase

Landowner 2 Payback Based on 2017 Corn VRI Data



Price Differential: $33.81/ac.
Market Price: $3.10
Yield: 248 bu./ac.

10% Increase in Market Price and Yield for Corn



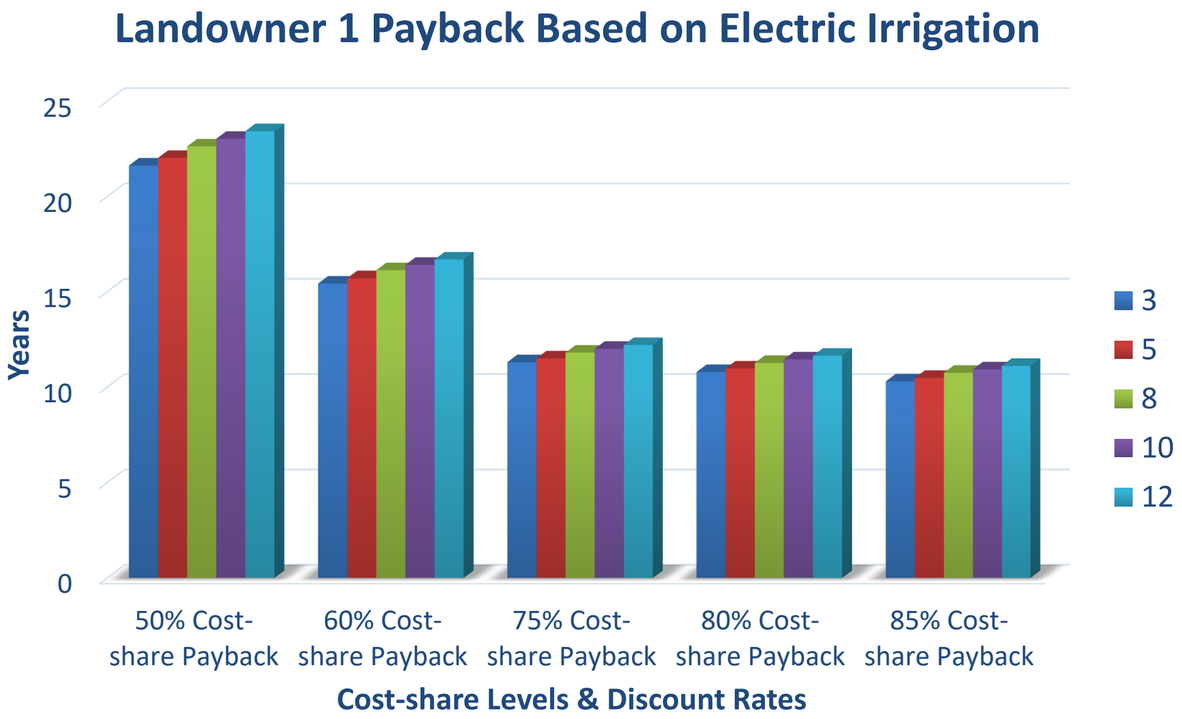
Price Differential: $65.03/ac.
10% Price Increase: $3.41
10% Yield Increase: 272.8 bu./ac.

Landowner 2 Marginal Benefit without Landowner 1 Maintenance Costs in 2017

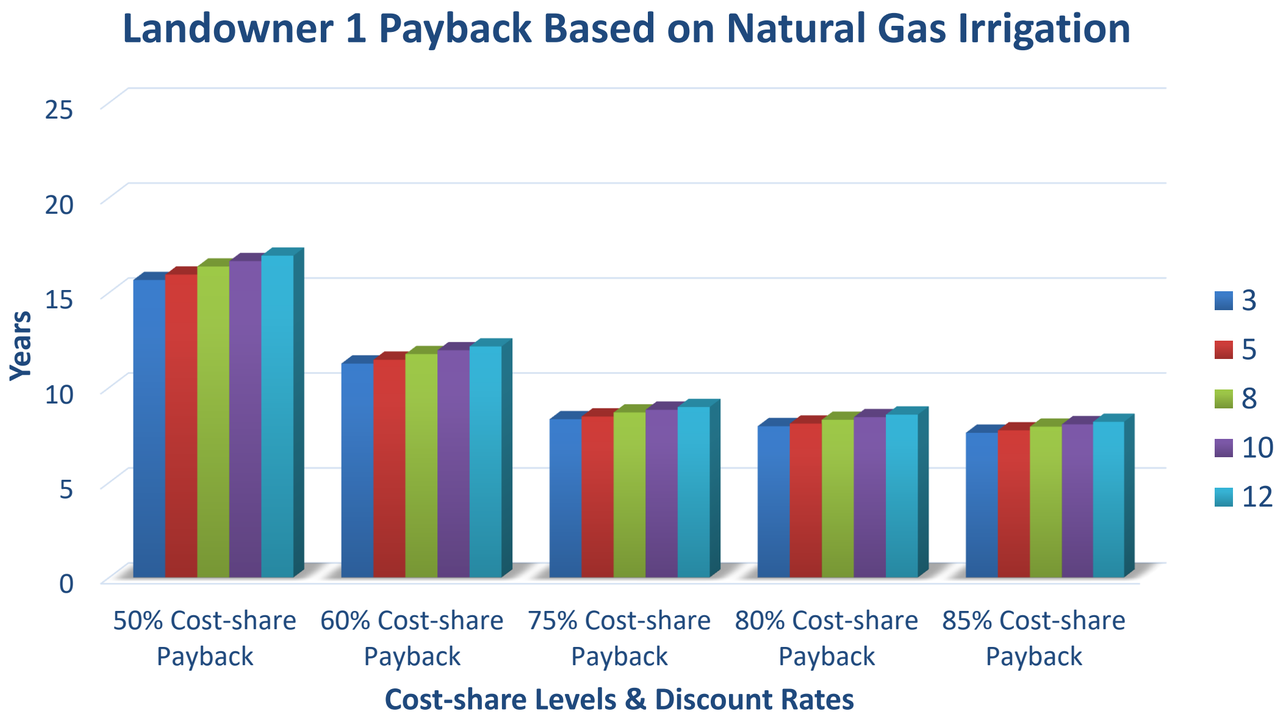
	Comparison with Maintenance Costs – No Change in Price & Yield	Comparison without Maintenance Costs – Averaged Price & Yield
Price Differential	Landowner 2 – $33.81/ac.	No Benefit

Landowner 1 Maintenance Costs in 2017 - $25,986

Scenario 1: Natural Gas for VRI Acres instead of Electricity

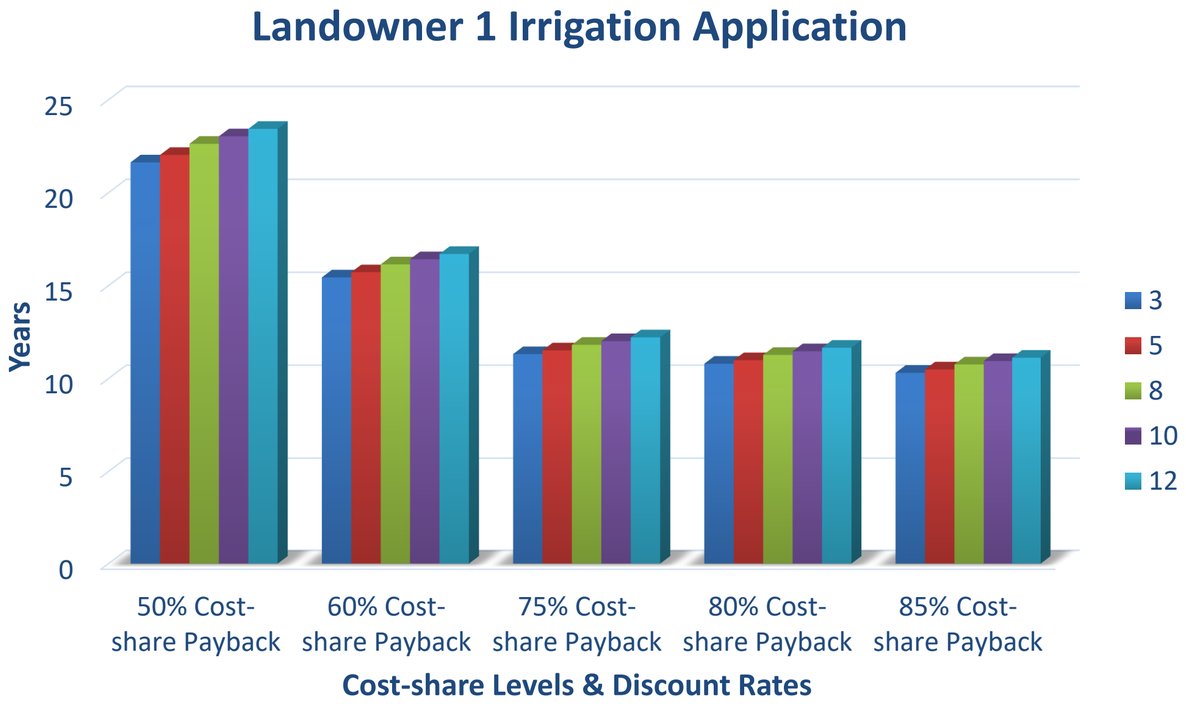


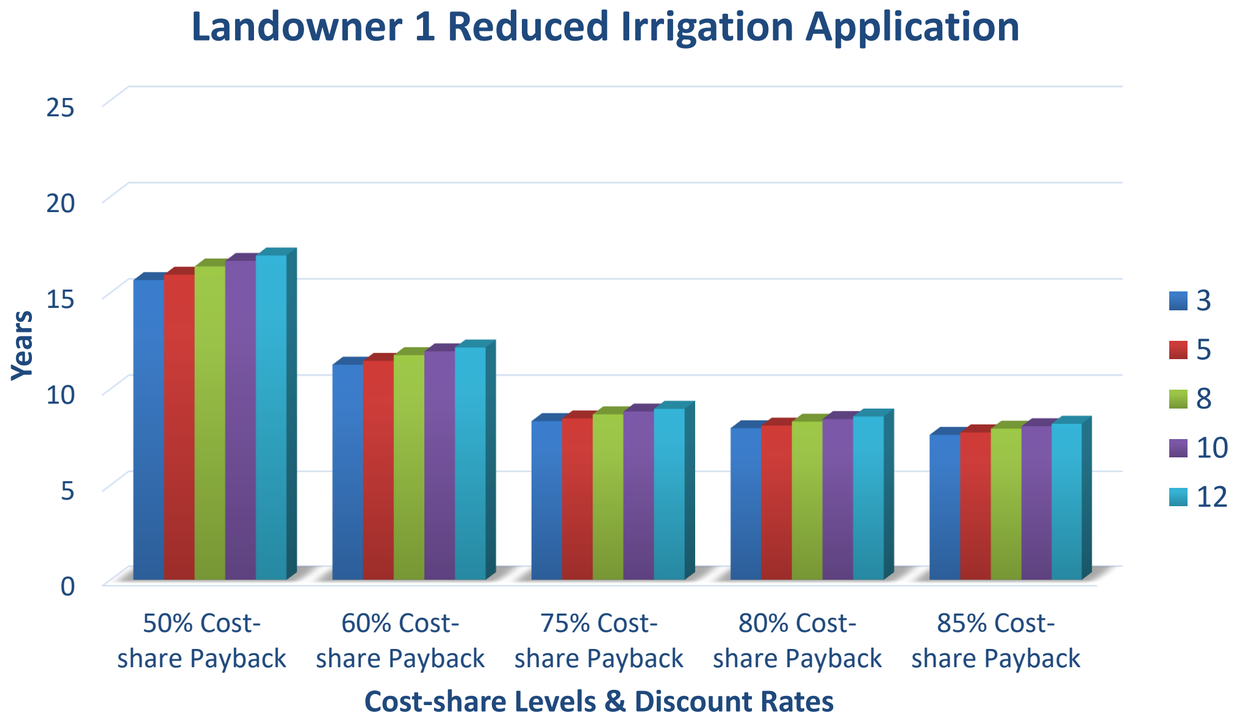
Marginal Benefit
Price Differential: $23.00/ac.



Marginal Benefit
Price Differential: $32.37/ac.

Scenario 2: Reduced Irrigation Application



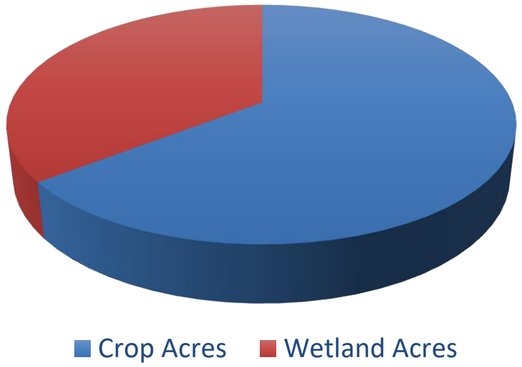


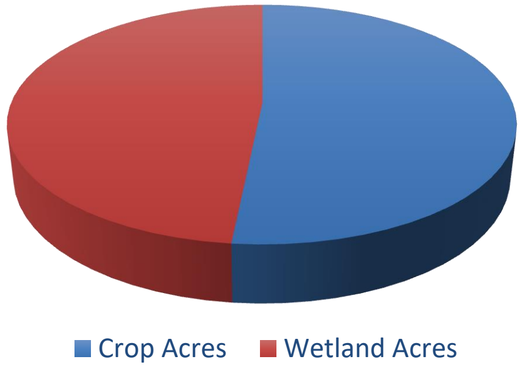
Marginal Benefit
Price Differential: $23.00/ac.
Original Application Rate: 2.25 inches

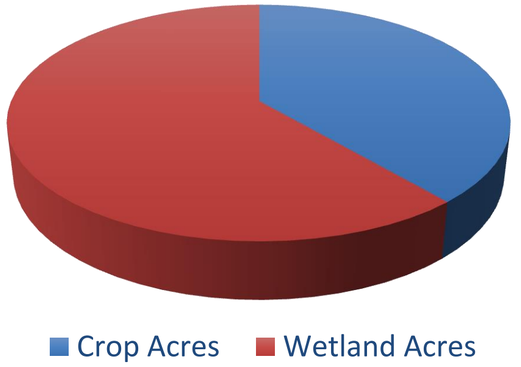
20% Reduction
Price Differential: $29.00/ac.
20% Reduction Rate: 1.8 inches

Landowner 1 Grazing Opportunities

VRI Crop Acres	Wetland Acres	Grazing Revenue	Per Acre Crop Benefit	Per Acre Net Income
100	55	$4,230.00	$42.30	$34.00
80	75	$5,767.50	$72.09	$61.00
60	95	$7,305.50	$121.76	$108.00

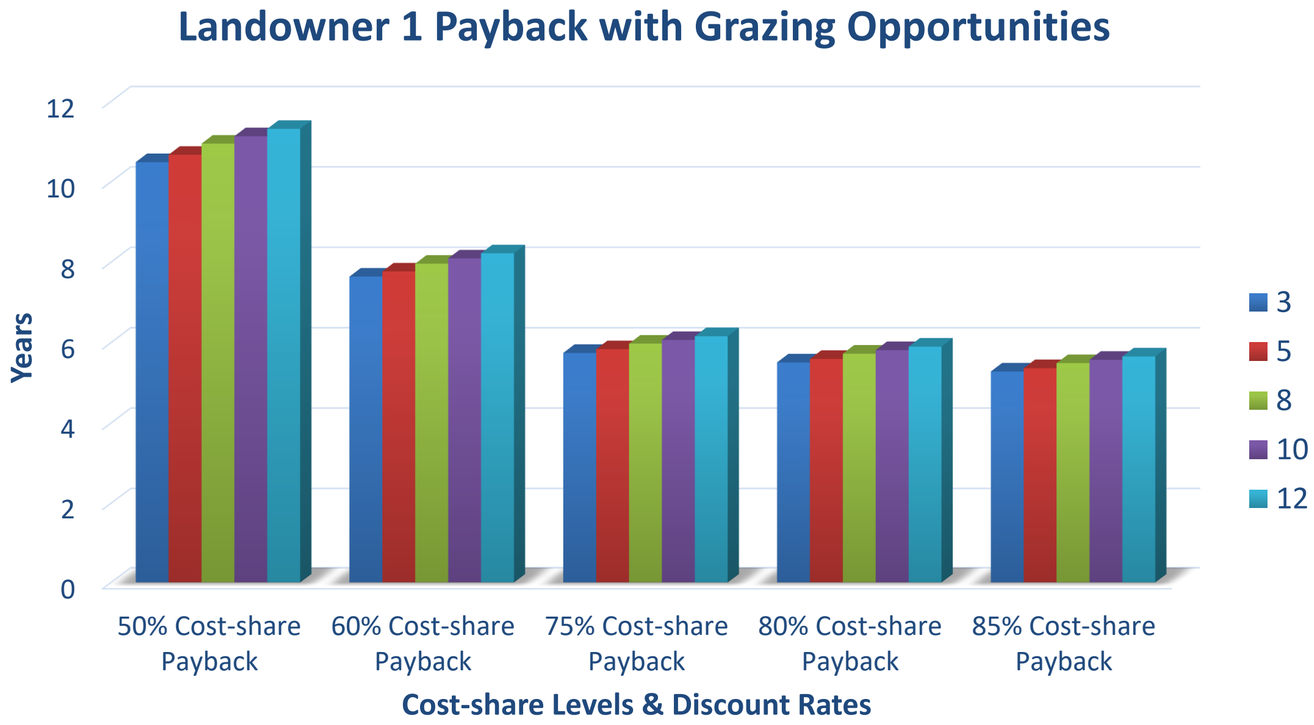






Alternative Grazing Opportunities

VRI Crop Acres	Wetland Acres	Grazing Revenue	Per Acre Crop Benefit	Per Acre Net Income
100	55	$4,230.00	$42.30	$34.00
80	75	$5,767.50	$72.09	$61.00
60	95	$7,305.50	$121.76	$108.00

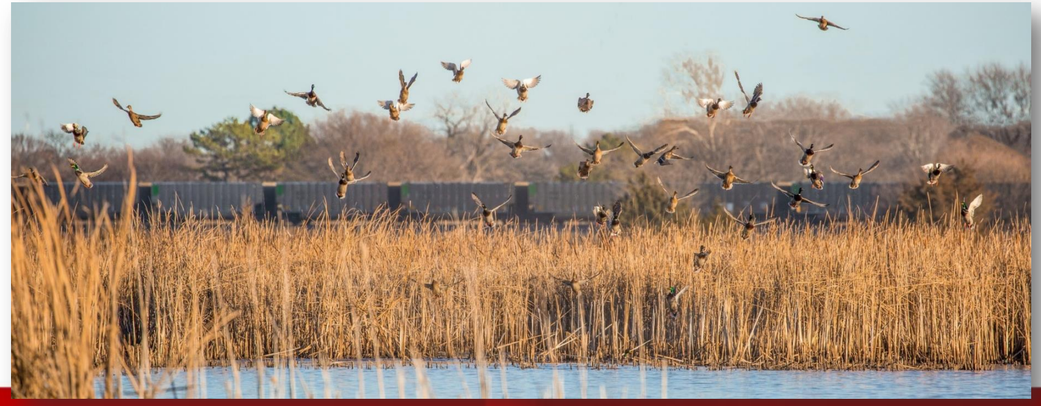


Marginal Benefit

Price Differential: $50.00/ac.

Takeaways:

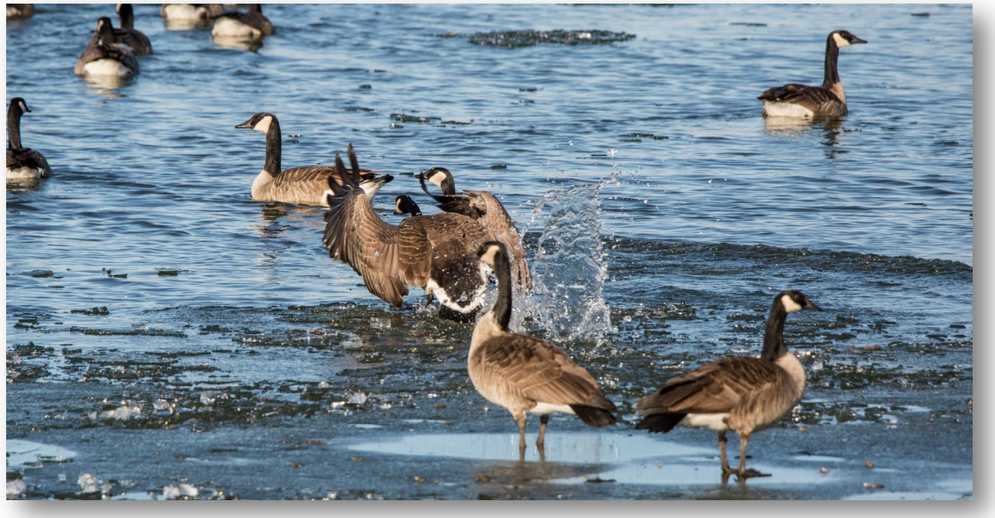
1. More time is necessary to fully learn how to use the technology
2. Grazing is critical for profitability of this investment
3. Altering yield, market, and irrigation variables; shows profitability at some levels of cost-share assistance
4. Some variables cannot be controlled (market fluctuations)
5. Results do not include social/conservation benefits of wetland restoration



Source: Joel Jones. (2016). White Street Photography.

Further Research:

1. Larger sample size
2. Longer tracking period
3. Consistent & detailed information is imperative for further analysis



Source: Joel Jones. (2016). White Street Photography.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