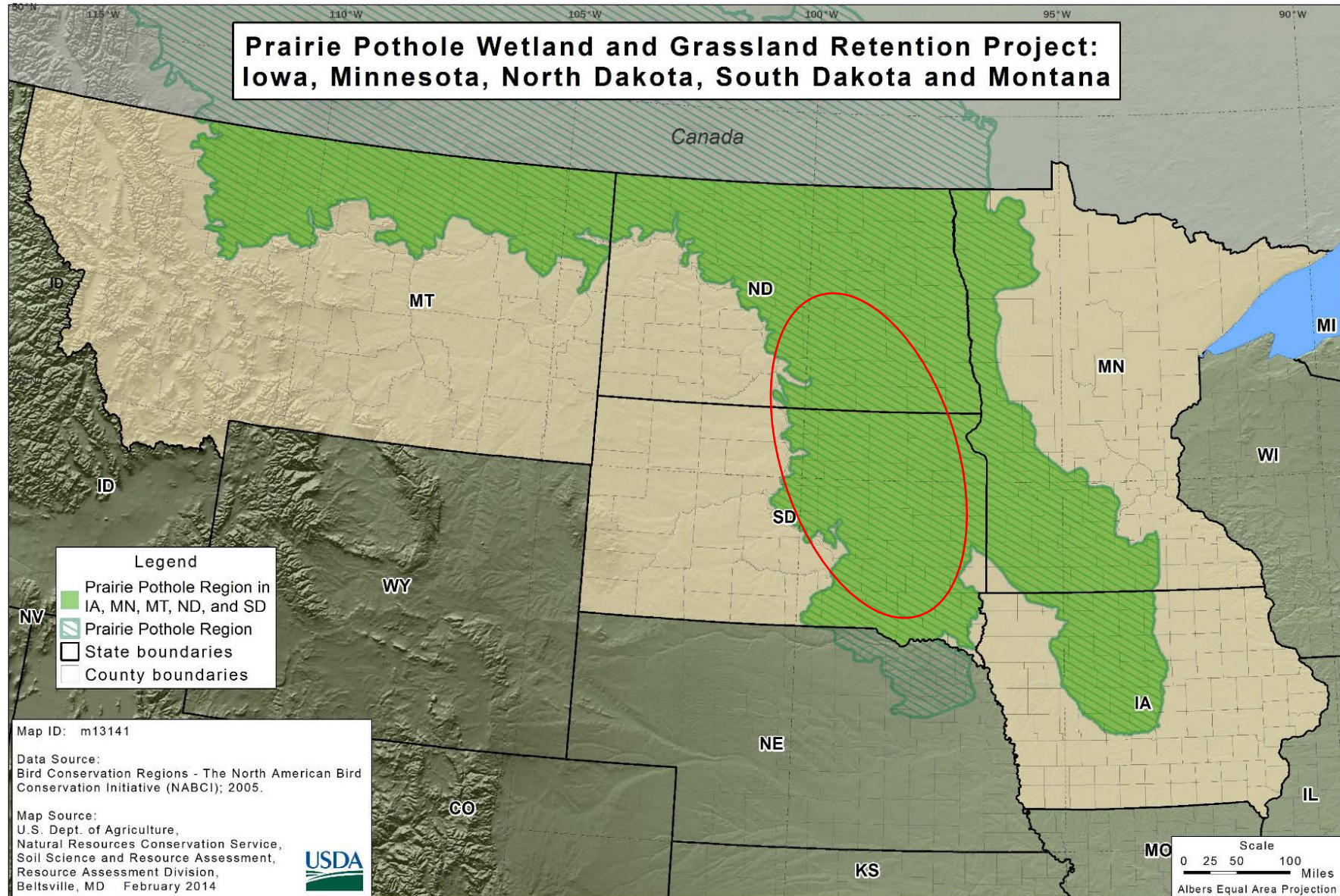


# Farmers' Motivations for Land Conversion in the Prairie Pothole Region of North and South Dakota

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with acknowledgements to 2014 NIFA grant & team,  
Climate Science Center grant & team, Elton Smith Endowment

# Prairie Pothole Region

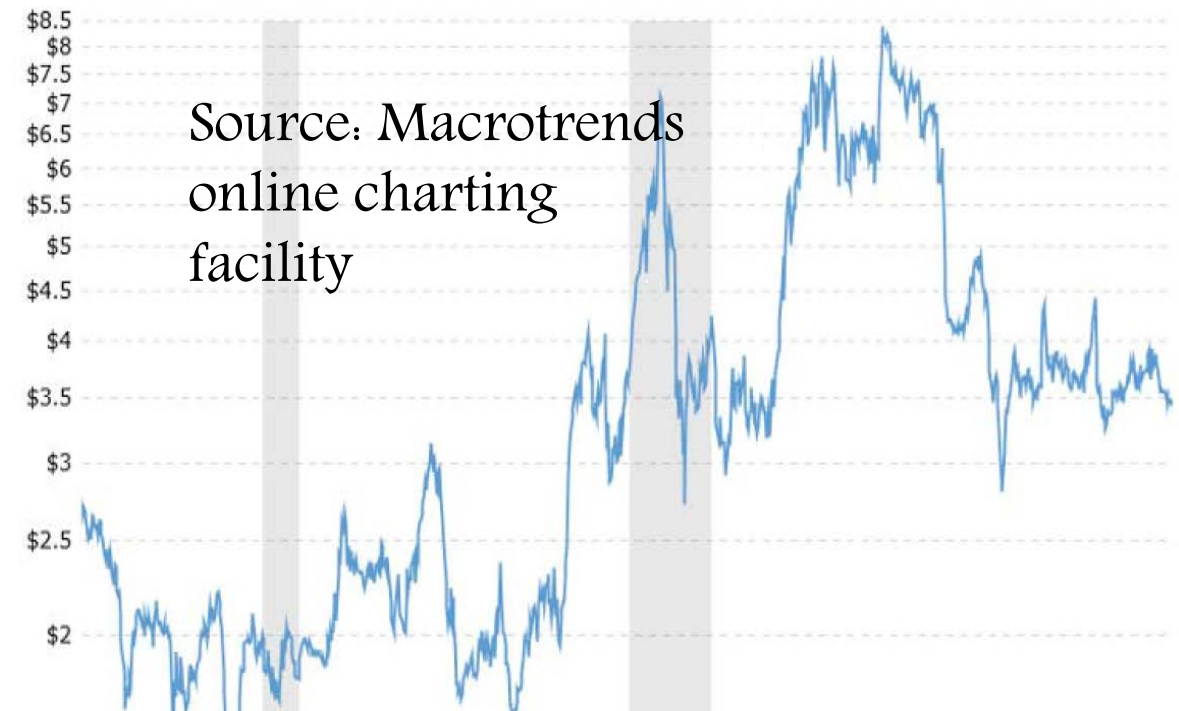


Source:  
USDA  
National  
Resources  
Conservation  
Service



# Land conversion in PPR

- Many factors contribute to conversion of grassland to cropland
  - High crop prices
  - Technological advances
  - Risk management tools
  - Changing climatic conditions – may be more favorable for crop production



2012 2014 2016

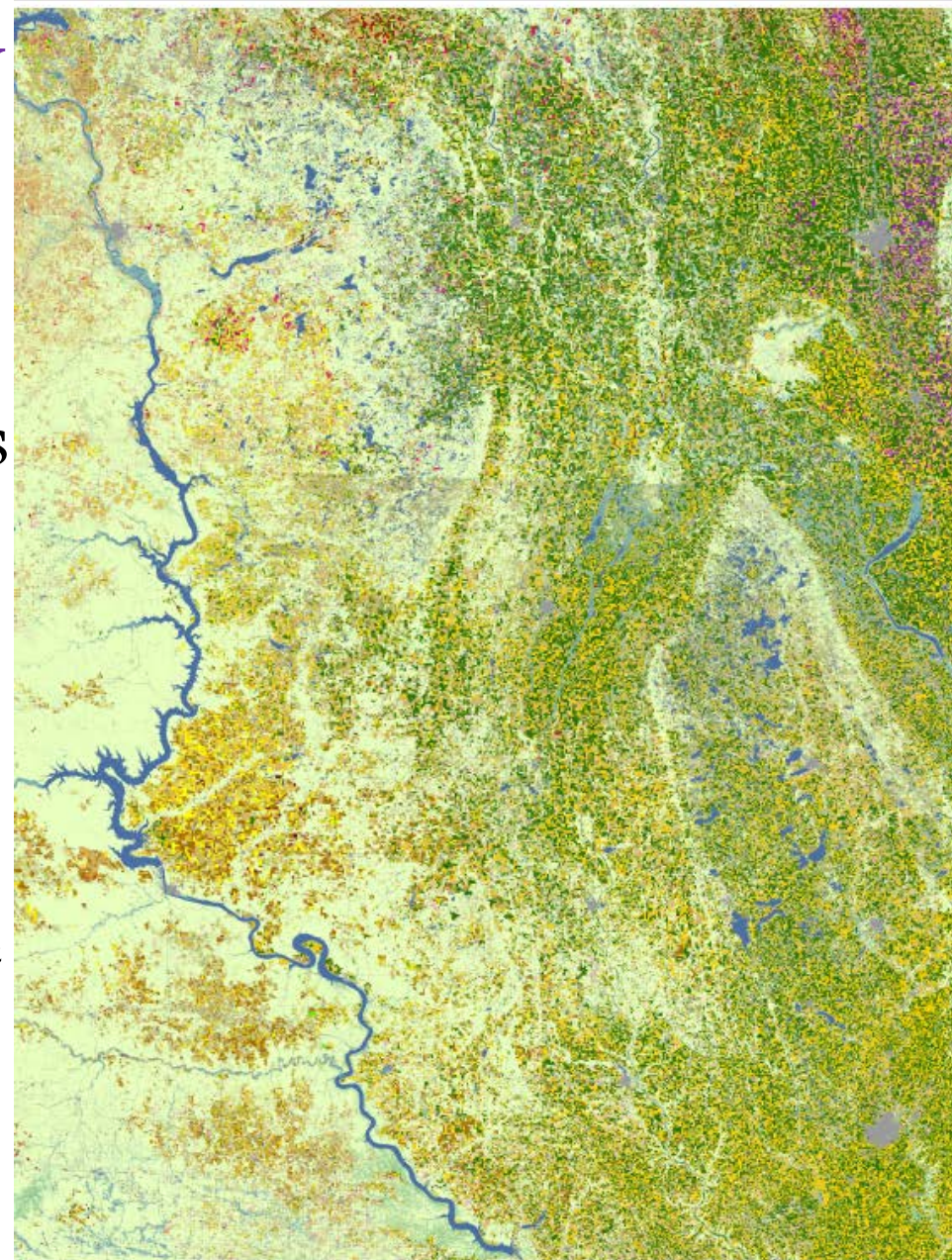
# Surveys of farmers

- ❖ Two surveys of farmers in the area, asking about their land conversion decisions
  - ❖ 2015 mail survey
  - ❖ 2016 focus group meetings/survey
- ❖ Purpose of both was to gain insight into farmers' land use decisions
- ❖ What factors do they consider when converting or not?
- ❖ How important are non-economic factors?



## 2015 Survey

- Survey of N. & S. Dakota farmers conducted in 2015
  - Over 1,000 farmers completed the survey
  - 37 SD counties, 20 ND counties represented
  - All but 1 farm were east of Missouri River



Land Cover Categories  
(by decreasing acreage)

### AGRICULTURE\*

- Grass/Pasture
- Soybeans
- Corn
- Spring Wheat
- Fallow/Idle Cropland
- Winter Wheat
- Sunflowers
- Alfalfa
- Sugarbeets
- Barley
- Dry Beans
- Sorghum
- Oats
- Millet
- Peas
- Flaxseed

### NON-AGRICULTURE\*\*

- Open Water
- Developed/Open Space
- Herbaceous Wetlands
- Wetlands
- Developed
- Deciduous Forest

- ❑ Asked farmers about the factors determining land use decisions
- ❑ Factors broadly categorized into
  - ❑ Prices & policies (Y1–Y2 crop and input prices, Y3 crop insur., Y4 labor avail.)
  - ❑ Technology (Y5 drought-tol. seed, Y6 pest mgmt practices, Y7 yield genetics, Y8 better equipment)
  - ❑ Env't concerns (Y9 wildlife, Y10 weather/climate patterns)
- ❑ Farmers were asked whether factors had high, medium, low impact

## 2015 Survey



Ecological Economics

journal homepage: [www.elsevier.com/locate/ecolecon](http://www.elsevier.com/locate/ecolecon)

### Determinants of Motives for Land Use Decisions at the Margins of the Corn Belt

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# 2015 Survey Results

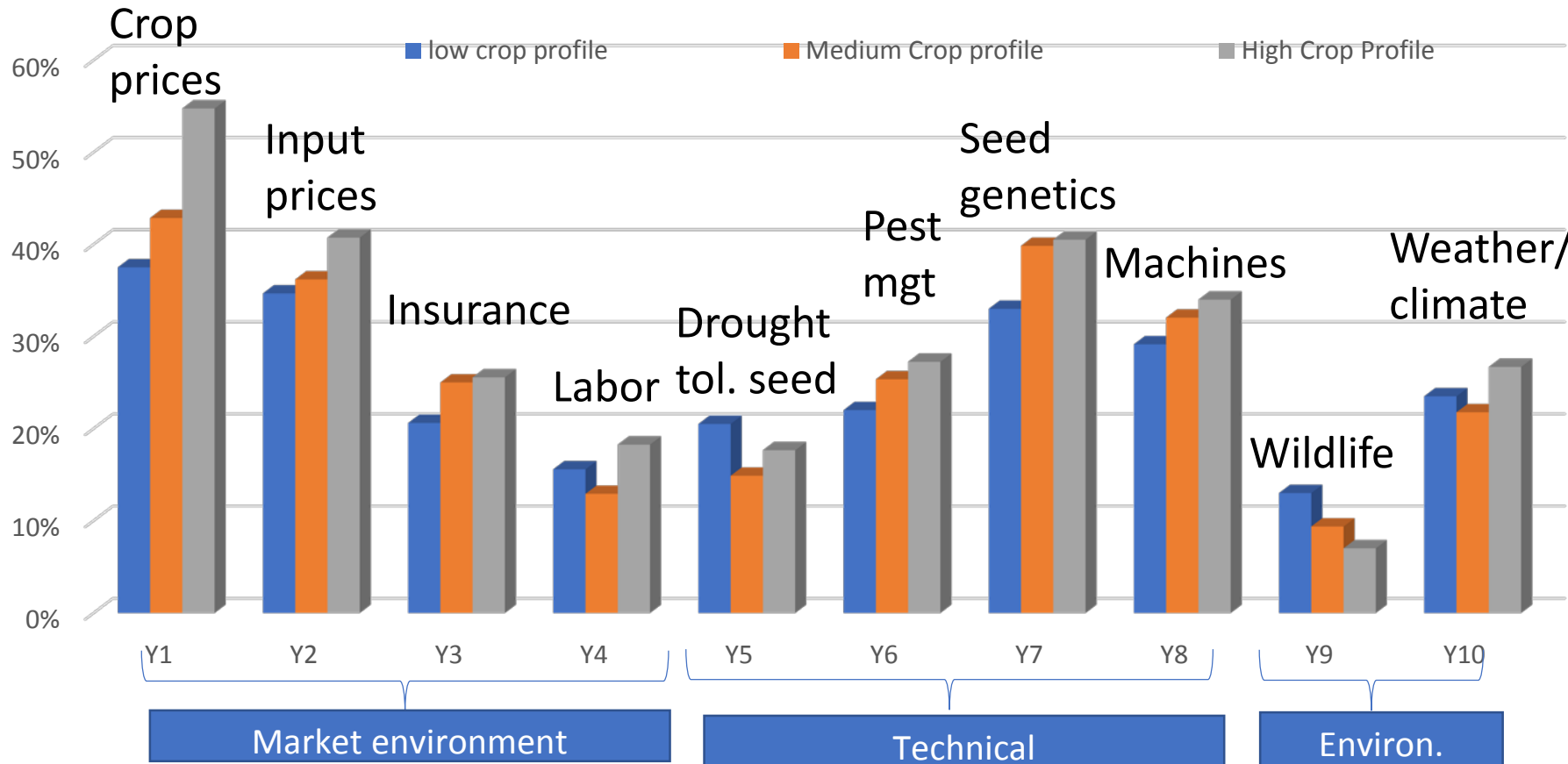
**Table 2**

Descriptive statistics for the motive variables.

	Variable	N	Mean
Prices and policy	Y <sub>1</sub>	1010	2.190 1
	Y <sub>2</sub>	1002	2.079 2
	Y <sub>3</sub>	1003	1.788
	Y <sub>4</sub>	1004	1.514
Technology	Y <sub>5</sub>	1004	1.606
	Y <sub>6</sub>	1003	1.838
	Y <sub>7</sub>	1006	2.114 3
	Y <sub>8</sub>	1006	1.941 4
Environmental concerns	Y <sub>9</sub>	1002	1.416
	Y <sub>10</sub>	1007	1.766 7

- Factors relating to crop prices and yield improvement most often listed as those with the highest impact on farmers' land use determinations
- Environmental & weather/climate concerns most often having a low impact. But note rank 7

# 2015 survey results – impact of factors on land use decisions, *STATED HIGH IMPACT*

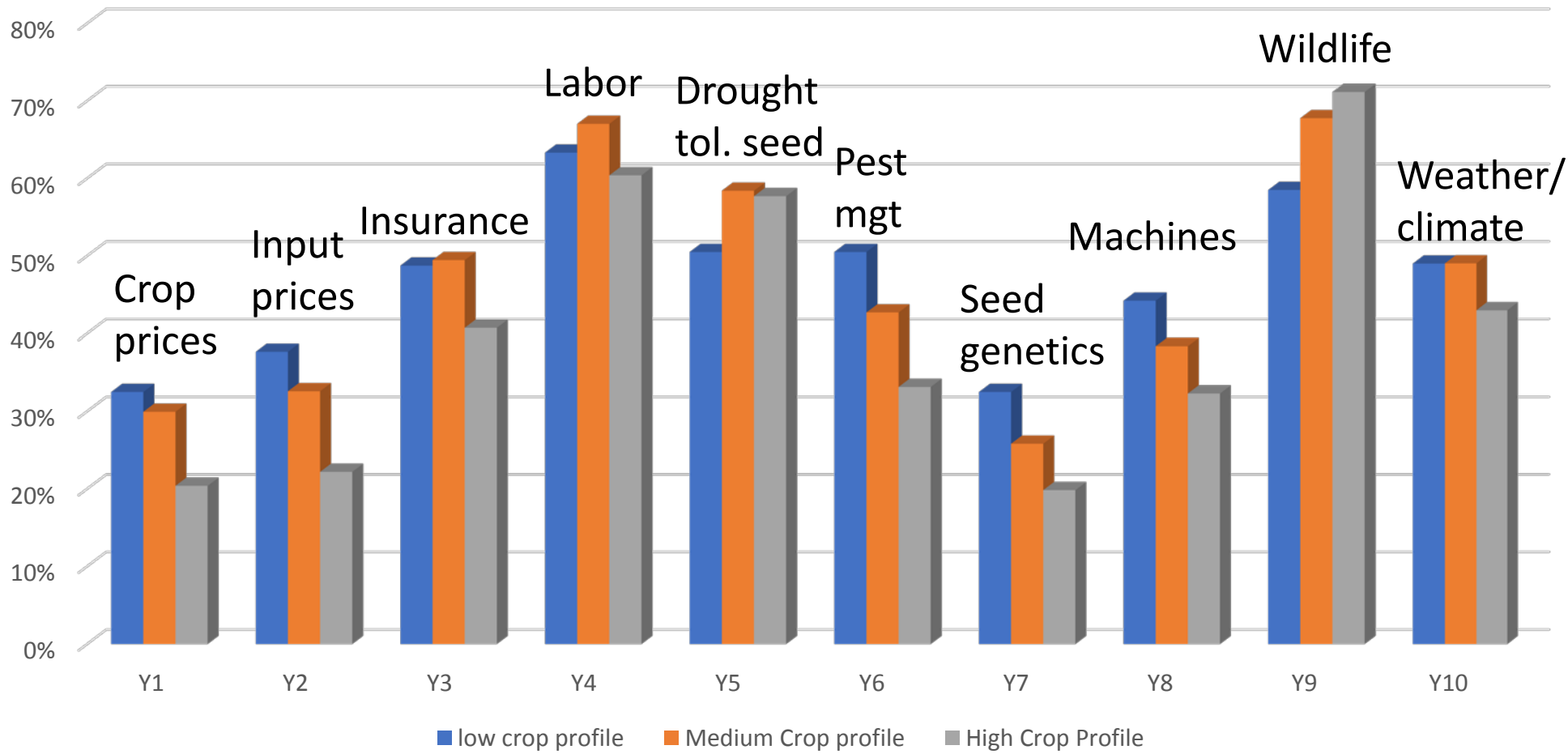


Question: How much impact has each of the following farm-related issues had on changes you have made in the way you use your agricultural land?

Low profile: < 50% land in crops, high profile  $\geq 90\%$  in crops



# 2015 survey results – impact of factors on land use decisions, *STATED LOW IMPACT*



Low profile: <50% land in crops, high profile  $\geq 90\%$  in crops

# 2015 Survey, Weather

- Hidden in aggregate weather response is clear south–north gradient

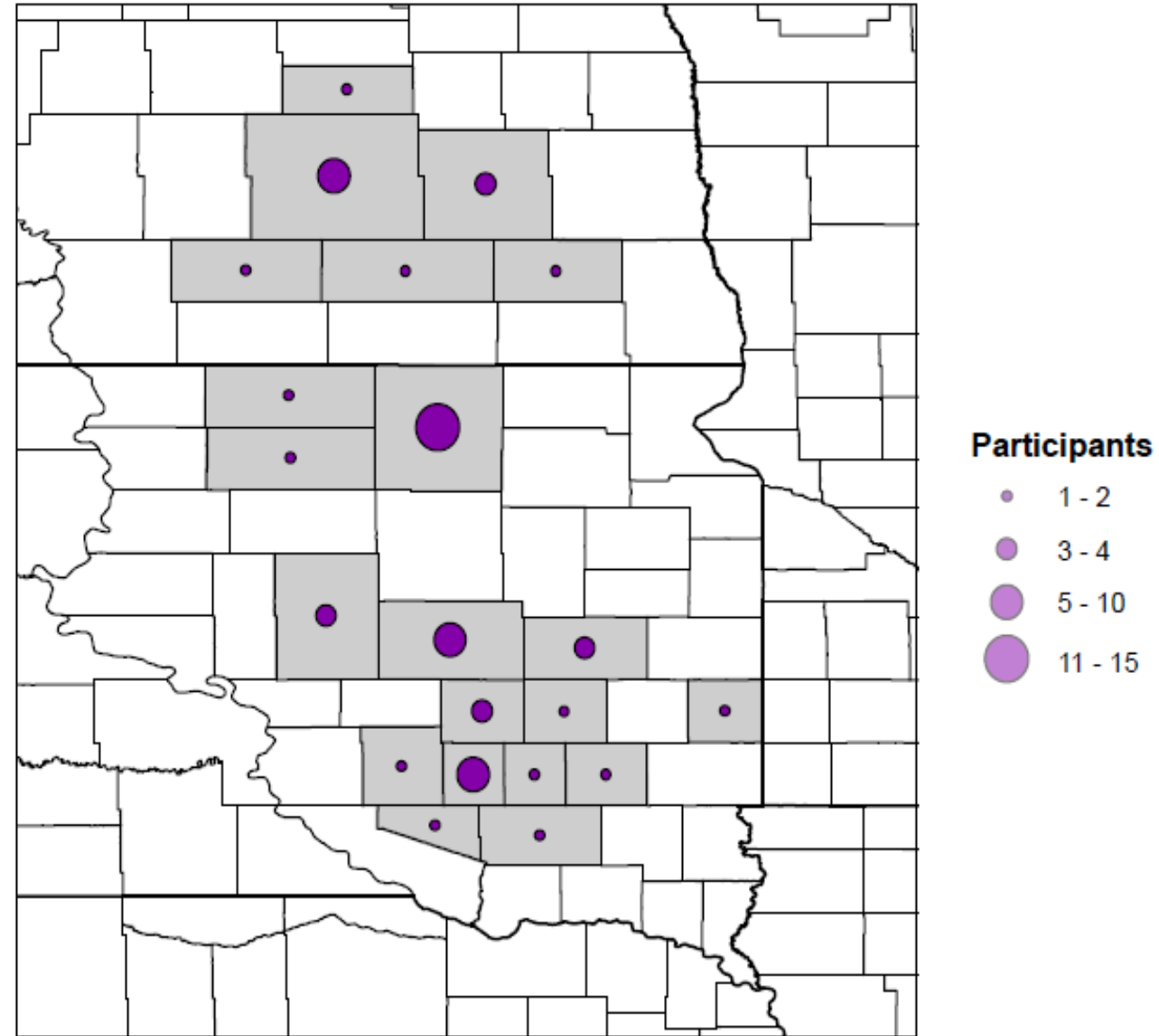
**Table 5**  
Ordered logit model regression results on environment queries.

Variables	Improving wildlife habitat, $Y_9$	Changing weather/climate patterns, $Y_{10}$
Intercept 3	− 13.430*	− 13.162
Intercept 2	− 11.876*	− 11.832
% LCC = 4, 1 mile radius	0.002	0.004
% slope ≤ 3, 1 mile radius	0.000	0.003**
Farm size (1000 acres)	− 0.004	− 0.001
Tenancy index	0.022	0.076
Age	− 0.042	− 0.051
Latitude	− 0.072	0.179***
Longitude	0.148**	0.037
Percent concordant	53.2	58.2

Note: One, two and three stars represent, respectively, 10%, 5% and 1% levels of statistical significance.

## 2016 survey

- Subsequent survey conducted in early 2016
  - Focus of second survey was farmers' land use decisions
- Survey was conducted at focus group meetings with ~20 farmers in each location
- All meeting locations were along James River Valley, in areas of high grassland to cropland conversion in recent years





# 2016 survey

- Survey asked farmers about
  - Farm characteristics
  - Farming practices
  - Land conversion in the preceding ten years (since 2006)
- Farmers were asked open-ended questions about what they consider when making land use and land conversion decisions
- Also collected information on conversion costs
  - Reliable estimates unavailable from other sources
  - Allow for estimates of returns to conversion

## 2016 survey – summary

- 76 farmers attended
- Almost 60% had converted some of their land from either CRP or grass to cropland in preceding ten years (45 of 76)
- 27% had converted grassland to cropland (21 of 76 participants)
  - Converted land had been in grass for an average of 29 years
  - 6 instances of native grassland conversion
  - Mean/median parcel size 269/153 ac. (range, 10–2,500 ac. Mean = 153 ac. if 2,500 parcel removed)

## Conversion costs, (Jim Faulstich 2011 comment)

§(Converted) Conversion costs for land converted, previous 10 years

§(Didn't) Costs estimates for land they would be most likely to convert

Mean per acre conversion cost	
CRP to crop	\$74.15
Grass to crop	\$85.73

§ Conversion costs broken down (labor, capital, etc.)

	Labor	Equipment	Materials	Other
CRP to crop	\$15.10	\$33.42	\$26.69	\$18.78
Grass to crop	\$15.41	\$36.35	\$30.74	\$22.70



# Change in land value after conversion

	Change in land value	Change in rental value	Change in net returns
CRP to crop	\$862	\$72	\$79
Grass to crop	\$1,254	\$79	\$120

Mean per acre conversion cost	
CRP to crop	\$74.15
Grass to crop	\$85.73

§ Reported conversion costs much less than increase in land value

§ CONVERSION COSTS COULD BE RECOVERED IN ~1 YEAR!!!!

# Net present value of changes in land value upon conversion

- § Reported changes in land value imputed from NPV model and change in net returns, using their reported 4.8% interest rate to discount

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	Perpetuity
CRP to crop	\$1,563
Grass to crop	\$2,651

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- § County level estimates, from rental values in Janssen et al. 2015 land value report

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	Perpetuity
Low prod. crop less high prod. hay	-\$839
Low prod. crop less high prod. range	-\$86

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# Importance of factors

	Mean comment frequency			
	CRP to crop		Grass to crop	
	Converted	Didn't	Converted	Didn't
Profit/other economic concerns	0.87	0.82	1.10**	0.73**
Land characteristics	0.53	0.67	0.33**	0.76**
Farm operation needs	0.20	0.30	0.29	0.27
Stewardship	0.27	0.21	0.24	0.22
Lifestyle	0.13	0.20	0.19	0.18
Soil quality	0.07	0.16	0.14	0.15
Risk	0.00*	0.15*	0.10	0.13
Wildlife protection	0.07	0.11	0.10	0.11
Landlord	0.02***	0.20***	0.10	0.04
Other	0.13	0.07	0.05	0.14



# Probability of converting

	CRP to crop	Grass to crop
Total farm acres (/1000)	0.072***	0.048**
Years farming (/10)	0.082	-0.098**
Education	0.093*	-0.153**
Importance of non-profit factors	-0.051	-0.057
All or majority acres owned	0.030	0.107
All or majority acres leased	0.199***	0.106
Comment frequency		
Profit	-0.014	-0.007
Stewardship	-0.254**	-0.178***
Lifestyle	-0.110*	-0.070
Land characteristics	-0.140**	-0.129*
Observations	61	68

# Comparisons

- ❑ Results from 2015 and 2016 surveys are consistent
  - ❑ Profit and other economic factors reported to have the most influence on farmers' land conversion decisions
  - ❑ Concern for wildlife/environment reported to be comparatively less important
- ❑ Farmers who have not converted land to cropland suggest that land quality/cultivation potential is main impediment
- ❑ Also consistent with 2015 survey – marginal land more responsive to economic factors
- ❑ Stewardship weighs heavily on minds of many

# Conversion decision

## Profit comparisons vs. actions

		Profit maximizing action	
		<i>Convert</i>	<i>Not convert</i>
Actual action	<i>Convert</i>	Observed	NOT OBSERVED
	<i>Not convert</i>	Observed	Observed



# Policy Issues

- ❑ This reluctance has to do with stewardship and not wildlife or ecological concerns. How to manage it to better address public policy goals?
- ❑ Care is needed. Need to understand motives. Programs that seek to monetize a matter of values may backfire.
- ❑ Casual view of how USFWS easement managers do it is that they do quite a good job in these areas.

*Thank you.*

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*Questions?*