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Introduction

Land use change between crop and grass cover has been prominent in the Prairie Pothole regions (PPR) of North and South Dakota. Since 1985, producers in both states have converted millions of cropland acres into grassland habitat as part of the Conservation Reserve Program (CRP).

In more recent years, from 2006 to 2011, cropland converted to grassland decreased from 5.0 million to 3.8 million acres in the region with most grasslands converted back to cropland use (Feng, Hennessy, and Miao, 2013). During this same time period, corn and soybean acres in both states saw a considerable surge (Wright and Wimberley, 2013; Reitsma et.al. 2014).

Individual farmers' decision-making processes on land use considerably affects the aggregate agro-ecosystem in the region. Therefore, this study tries to determine some of the major factors that influence farmers' decision-making processes regarding land use in the PPR. The results of study will be relevant for policy making on the agro-ecosystem of the PPR.

Objectives

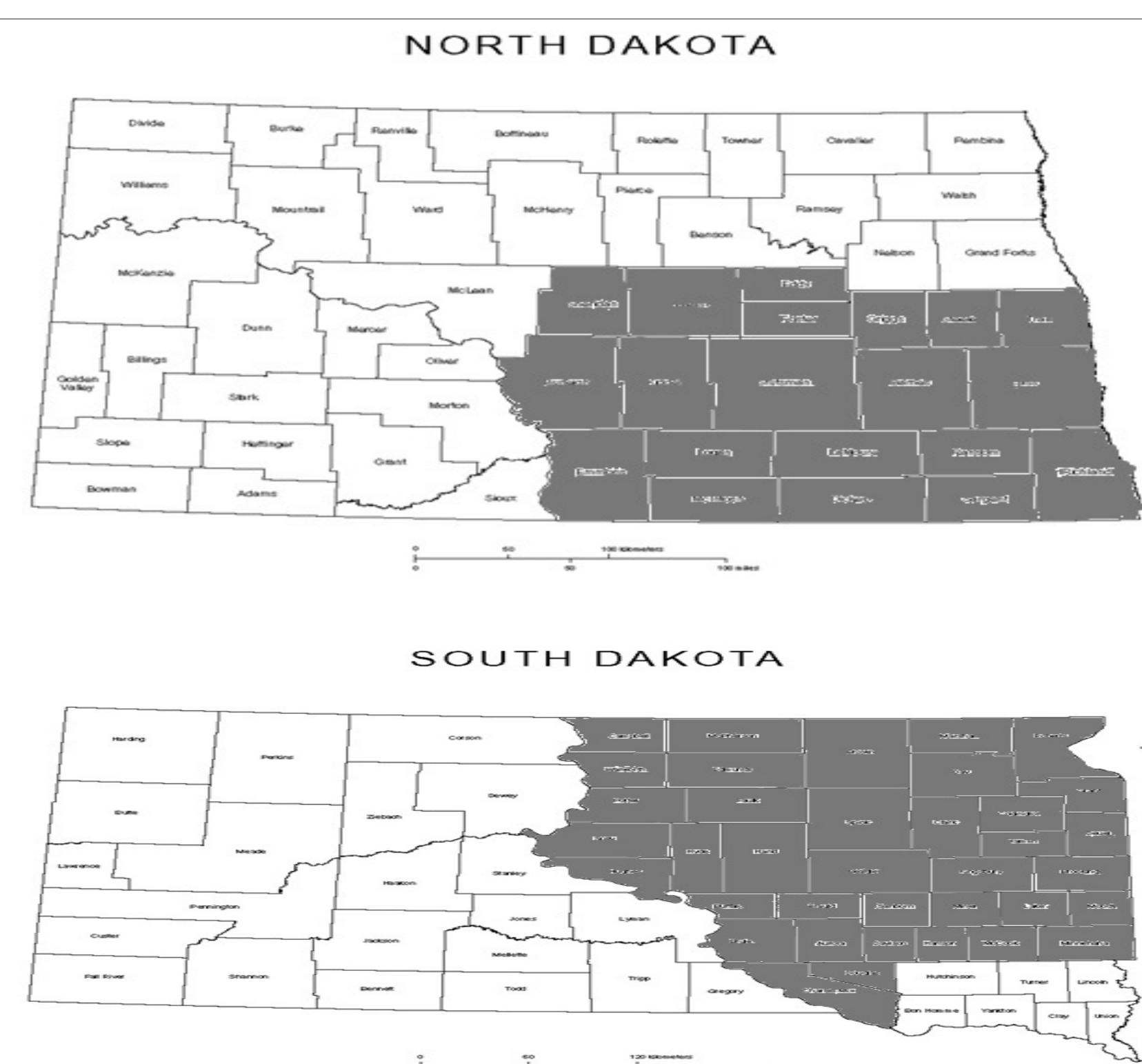
This research conducts a general assessment of the following in the Dakotas: 1) the main drivers of land use change; 2) recent and projected land use patterns; and 3) the evolution of agriculture in the area, using survey data.

Data and Methods

The study region consists of 37 counties in South Dakota and 20 counties in North Dakota located in the PPR where: (1) corn, soybeans and wheat are the dominant crops, and (2) considerable land use change and land use conversion has occurred in the past 10 – 20 years (see maps below). A mail survey was conducted in March and April, 2015. Data collected from 1,026 producer respondents (36% response rate) are the basis of this study (Luri, 2015).

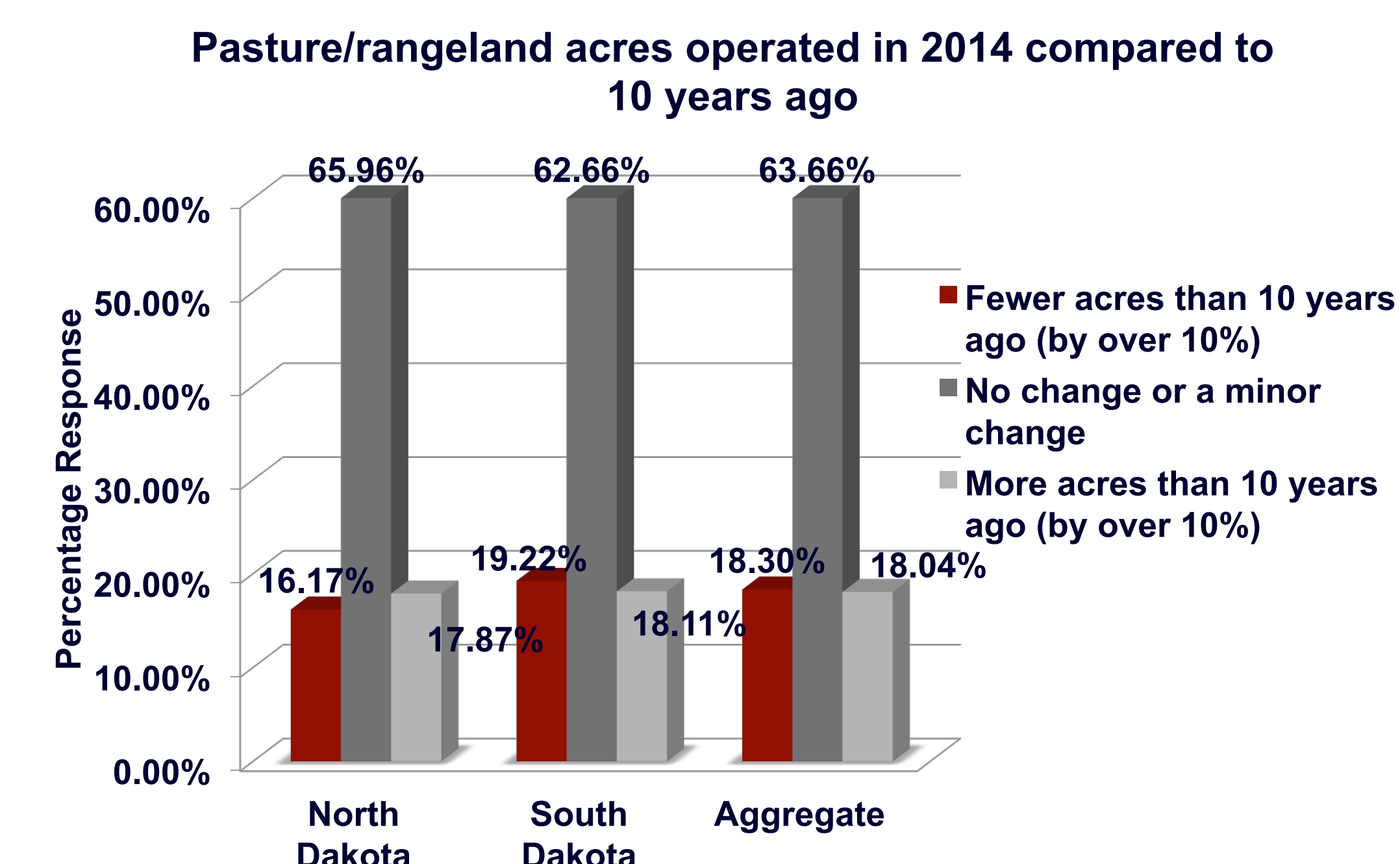
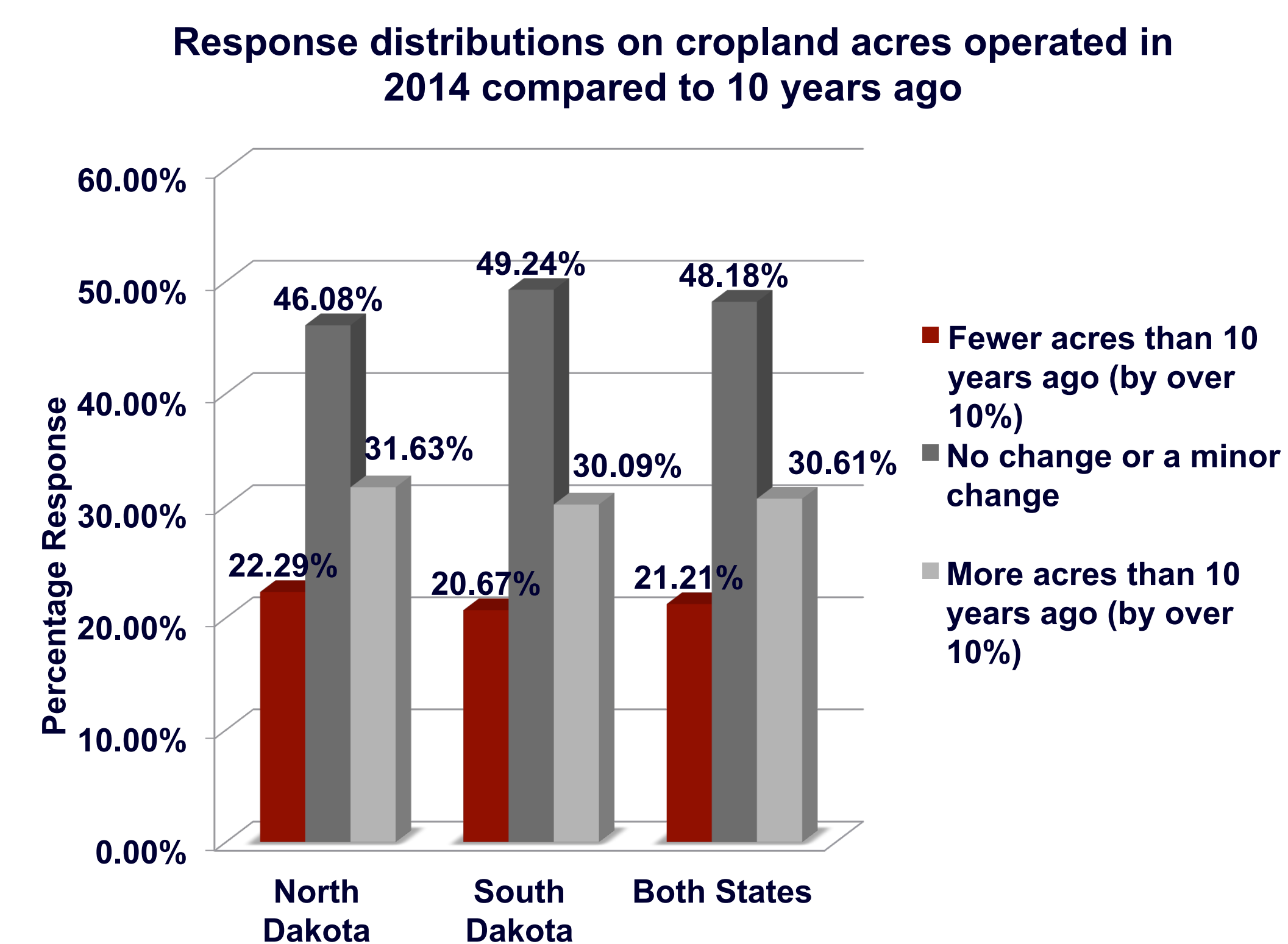
Survey respondents were most representative of full-time farmers with no off-farm employment and who were not retired (87% of sample) and farms with at least \$50,000 of gross farm sales and more than 260 acres operated (95% of sample).

Fundamental descriptive and correlation analysis are used to analyze producers' responses in this study.



Results

Changes in Cropland and Pasture Acres



Land Conversion by Respondent Farmers

- More than half (54%) of respondents were involved in land use conversion decisions implemented from 2004 – 2014

Percentage of respondents — by overall land use conversion decisions

- Grass to crop only decisions: 26%
- Crop to grass only decisions: 14%
- Both types of conversions: 14%

by specific grassland to cropland conversion decisions

- Tame grass to cropland: 15.2%
- Native grass to cropland: 14.0%
- CRP to cropland use: 23.0%

CONVERT grass to cropland 40.0%

Many respondents used multiple ways of converting grassland (tame, native, CRP) to cropland use

Grassland to cropland conversion is more active in the central regions of both states compared to the eastern regions

Grass to crop conversion rate (as % of 2014 cropland acres) was 7.2% in both states.

There is also some conversion of crop to grass. The estimated net conversion rate of grass to crop is 5.1% of cropland acres in ND and 4.7% in SD

Major Land Use Decision Factors in the Last Decade

Farm related decision factor:	Rank	% of respondents listing item as "most important"
Changing crop prices	1 st	50.3% of responses
Changing input prices (seed, fert., chem)	2 nd	15.2%
Improved crop yields	3 rd	10.8%
Changing weather / climate	4 th	6.9%
More efficient crop equipment	5 th	5.9%
Crop & revenue insurance	6 th	3.7%
Pest management practices	7 th	2.9%
Labor availability problems	8 th	2.6%
Improving wildlife habitat	9 th	1.9%
Availability of drought-tolerant seed	10 th	1.8%

Relative Impact (1-5 scale) of Decision Factors: All vs. CONVERT Respondents

Decision Factor:	Rank	ALL farmer - mean value	CONVERT farm mean value
Changing crop prices	1 st	3.24	3.47 **
Increased crop yield	2 nd	3.09	3.22 **
Changing input prices	3 rd	3.09	3.17
More efficient crop equipment	4 th	2.84	3.09 **
Pest management practices	5 th	2.65	2.75
Crop & revenue insurance	6 th	2.58	2.67
Changing weather / climate	7 th	2.54	2.57

Summary – Drivers of Land Use Change

- Changing crop prices, changing input prices and increased crop yields were the top 3 factors
- Efficient crop equipment, pest mgt. practices, crop insurance, and changing weather/climate were the next four factors
- CONVERT farmers assigned higher impact values to all decision factors.

Perceptions on Changes in Weather and Infrastructure to Support Corn and Soybean Production between 2004 and 2014

- Most producers indicated infrastructure to support corn or soybean production had greatly increased, while infrastructure to support wheat or cattle production has not changed much in past 10 years.
- A majority of producers indicated that current temperatures, precipitation patterns and drought cases have not changed much in the last 10 years and would be similar in the next 10 years. However, for respondents projecting changes in the future were much more likely to project higher temperatures, less precipitation, more occurrence of drought and less flooding.

Other Major Results

- Farmers in the study region operate more acres of cropland compared to 10 years earlier. Corn and soybean acres have increased on most farms.
- Most farmers in ND and SD indicated grasslands within their local area decreased in the last 10 years, while corn and soybean acres increased.
- More CRP land was converted to cropland in both states compared to tame and native grasslands.
- Grassland to cropland conversion is more active in the central regions of both ND and SD compared to the eastern regions
- Forty percent of respondents converted some grassland to cropland use in the past 10 years. These CONVERT farms were considerably larger than other respondent farms.

- Economic factors (crop prices and input prices), followed by technology factors and policy factors were the main drivers of land use decisions.

Conclusion

Overall, producers project more land use stability in the next 10 years than in the past 10 years. This result is partly due to uncertainty about future crop and livestock prices, farm program provisions, renewable energy policies, agricultural technology changes and other factors that affect land use decision making.

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Acknowledgements

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