

Climate Change Risk Perceptions and Adaptive Strategies among Inland Pacific Northwest Wheat Producers



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Conducted as a component of the *Regional Approaches to Adaptation and Climate Change for Pacific Northwest Agriculture (REACCH)* project, the Social Science Research Unit (SSRU) administered this survey. SSRU is a social science research laboratory within the Department of Agricultural Economics & Rural Sociology (AERS), College of Agricultural & Life Sciences (CALs), and University of Idaho (UI).

The University of Idaho Institutional Review Board approved this project with all survey respondents remaining anonymous (protocol #10-139).

This report and additional supplemental materials are available at socialscience.reacchpna.org.

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EXECUTIVE SUMMARY

In 2011, the *Regional Approaches to Climate Change for Pacific Northwest Agriculture (REACCH)* project brought together three universities and the Agricultural Research Service to study climate change within the inland Pacific Northwest. Specifically, the project was charged *to enhance the sustainability of cereal production systems under ongoing and projected climate change while contributing to climate change mitigation by reducing emissions of greenhouse gasses*. As a subcomponent within the project, a research team from the University of Idaho's Social Science Research Unit and Department of Agricultural Economics and Rural Sociology conducted a representative mail survey of 900 wheat producers of the inland Pacific Northwest. The survey included measures about producers' beliefs about the reality and risks of climate change, pest pressures, wheat production practices, uses of technology, and demographics.

The overall survey results indicate that producers in this region have been highly adaptable and will continue to be. They have adopted many relatively new technologies and continue to innovate by incorporating various sources of information into their production practices. This report provides a selected set of results from the survey that are focused on general climate change perceptions, climate change risk perceptions, and adaptive strategies.

Pacific Northwest wheat producers have diverse production practices as well as perceptions of climate and risks. Several key findings from the survey include:

- a majority of respondents (80%) agreed that they have observed changes in weather patterns over their lifetime, with 36% of respondents answering “strongly agree.”
- a minority of respondents (20%) agreed that human activities are the primary cause of climate change, with a higher percentage (27%) indicating uncertainty, and a slight majority expressing disagreement that humans are the primary cause (51%).
- more respondents perceived climate change policies as posing a high risk (43%) compared to 35% who perceived a high risk from less reliable precipitation.

For farm-level decision-making, producers anticipated needing to make small changes to their practices based on climate change. For instance:

- while very few producers said they were likely to make big changes to their on-farm practices, approximately one third indicated they were likely to make small changes to their cropping system, rotation, and tillage as they relate to climate change effects.

Producers routinely demonstrate high adaptive capacity, which may prepare them for future unknowns and changes. This research includes producers' perspectives within the growing literature on public perceptions of climate change. The results have value to the agricultural industry and network within the region to continue supporting sustainable cereal production.

INTRODUCTION

Despite all the exact unknowns and uncertainties of climate change origins and effects, the reality of shifts in everyday lives and human systems continues to become increasingly clear. Our agricultural systems and anticipated climate change effects deserve research attention for on-farm environmental adaptation as well as minimizing food insecurity risk. Toward that need, this report presents findings from a regionally representative survey — **Inland Pacific Northwest Wheat Producers: Past, Present & Future** — conducted within the *Regional Approaches to Climate Change in Pacific Northwest Agriculture (REACCH)*. The survey contributes to a critical socio-economic research objective of the larger project: to determine social and economic factors influencing agricultural management, technology adoption, and development of policy to improve production efficiency while mitigating greenhouse gas emissions.

METHODS

The Social Science Research Unit (SSRU) conducted a survey of agricultural producers in March 2013 to a random sample of agricultural producers in counties of the REACCH region¹ in the inland Pacific Northwest (IPNW). SSRU defined the population of interest for this survey as individual farm operations that had 50 or more acres of wheat under production at any time between 2009 and 2012. The sample frame, drawn from the National Agricultural Statistics Service (NASS), consisted of 2,000 entries and represented a simple random sample of all eligible farm operations. After eliminating duplicate entries, the final sample frame used for the producer survey consisted of 1,988 unique operations.

For data collection, SSRU utilized the full Dillman method (Dillman, Smyth, & Christian, 2009), including four mailings and a reminder postcard. SSRU cleaned and weighted data based on county and county aggregates provided by NASS. Four non-deliverables and 38 ineligibles (no longer farming) were received and removed from analysis. A total of 900 completed surveys were received and included in analyses. The final response rate for the survey was 46.2% with a sampling margin of error of +/- 3% at the 95% confidence interval (AAPOR, 2011). The survey instrument asked a variety of questions pertaining to agricultural practices, adoption of technology, sources of information, perceptions of risks associated with climate change, and producers' views on adaptive strategies. In this report, we present descriptive statistics and interpretation of data focused on respondents' perceptions of climate change and associated risks, and potential adaptations to modeled climate scenarios.

¹ The counties included in the sample for this survey include 17 counties in the state of Washington, 7 counties in Idaho, and 9 counties in Oregon.

RESULTS

The frequencies presented in this report were calculated with the “missing,” or non-response, category included. However, this category is not represented in the charts below. Therefore, percentages may not total to 100% in each case. In addition to the frequencies for each response category, we also provide error bars for 95% confidence intervals when appropriate. All written descriptions of percentages have been rounded to the nearest percentile. All graphs show percent response to the nearest tenth of percent.

Perceptions of weather and climate

The survey asked respondents the degree to which they agreed or disagreed with three key statements regarding their personal experience with changes in weather patterns, rising global temperatures, and the role of human activities in climate change (Fig. 1).

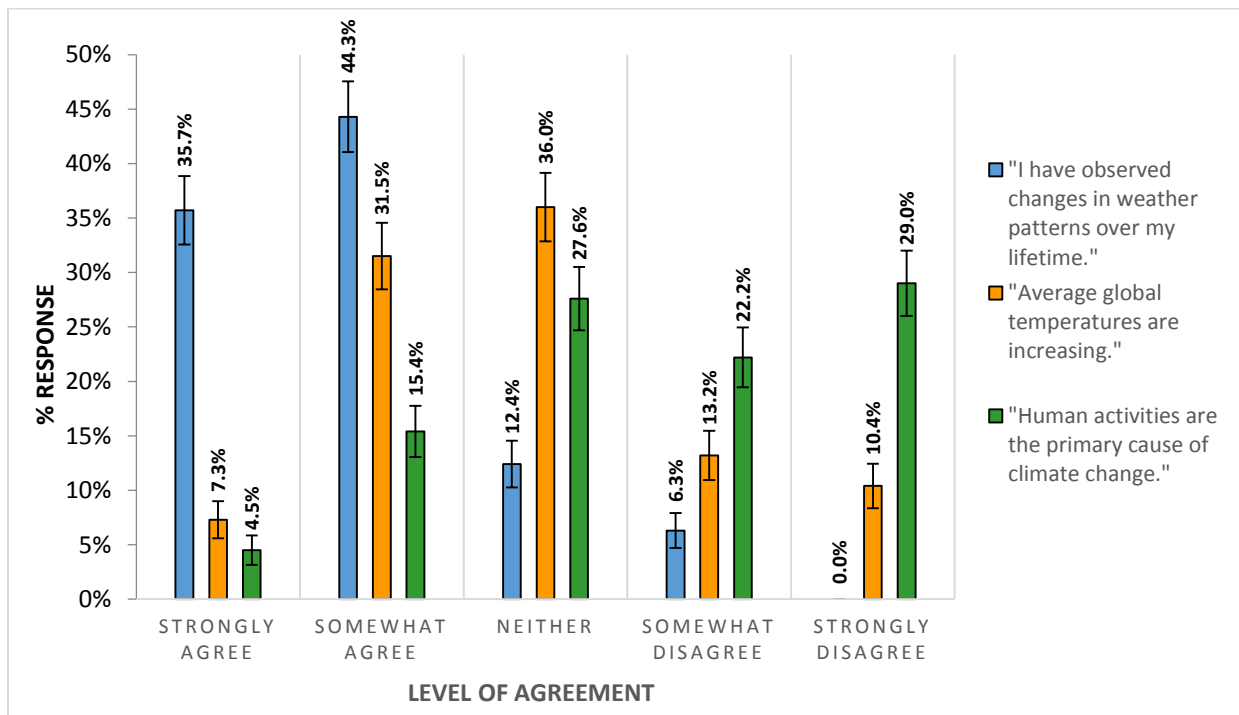


Figure 1- General beliefs regarding weather patterns, rising temperatures, and cause of climate change

Most notably, a majority of respondents (80%) agree at least somewhat that they have observed changes in weather patterns over their lifetime, with 36% of respondents answering “strongly agree.” Comparatively, fewer respondents (38%) noted agreement, to some level, that average global temperatures are increasing. However, a small proportion of producers in the survey (20%) agreed that human activities stand as the primary cause of climate change. Additionally, 28% of respondents displayed uncertainty with this statement and a slight majority (51%) disagreed, at least to some degree. These combined results reveal an interesting combination of perceived effects of climate change among producers.

Climate change risk perceptions

Risk posed by changing conditions

The survey also asked producers to gauge the level of risk posed by changes in various conditions pertaining to farm management and production. A majority of respondents perceived changes in economic factors such as cost of inputs (66%) and unstable crop prices (62%) as posing high risk to their operations (Fig. 2). Interestingly, more respondents perceived climate change policies as posing a high risk (43%) than less reliable precipitation (35%).

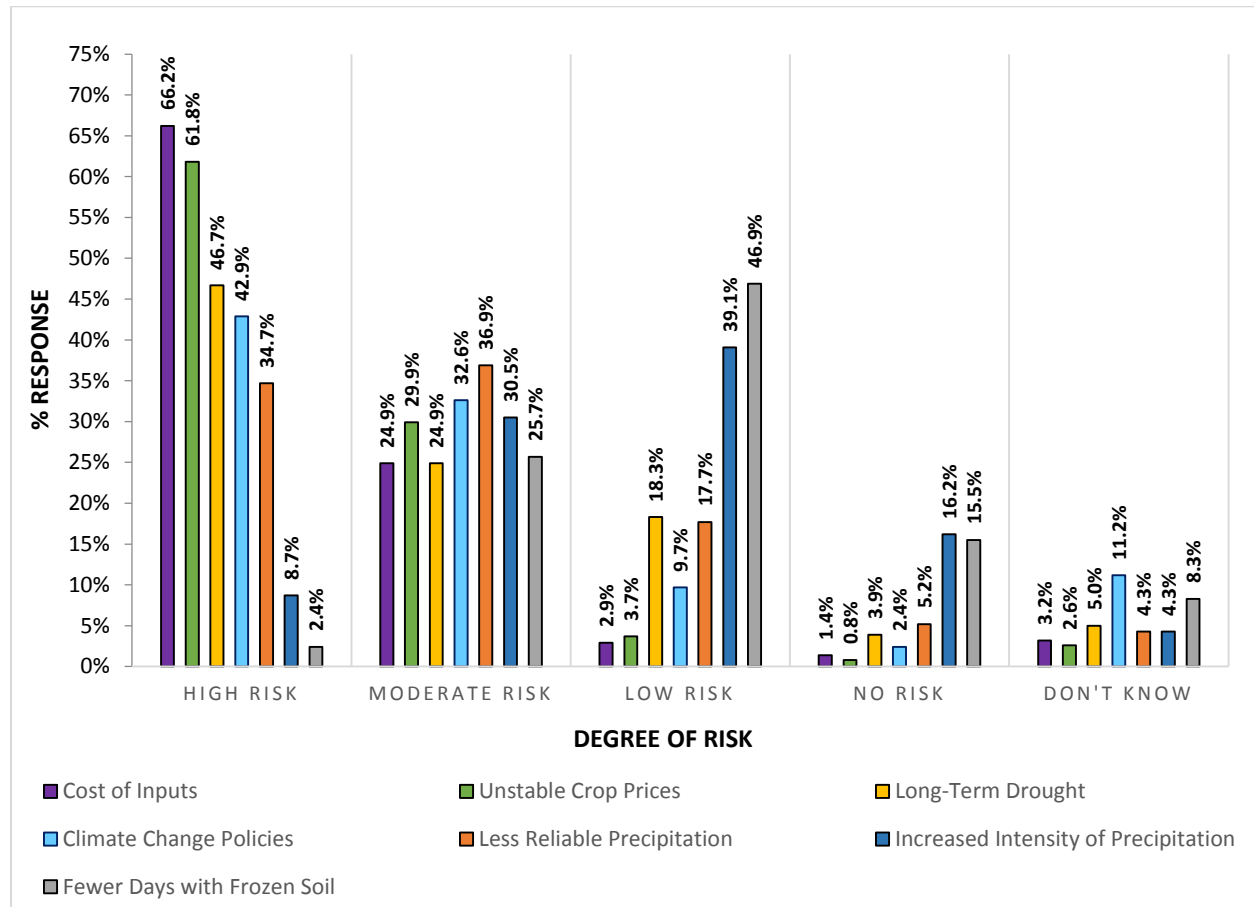


Figure 2- Perceived risk posed by changes in agricultural production conditions

Regarding weather-related factors, 72% of respondents perceived both long-term drought and less reliable precipitation as posing high or moderate risk to their operation. Comparatively, respondents perceived little or no risk from increased intensity of precipitation and fewer days with frozen soil, despite potential deleterious effects on soil conservation and erosion. Overall, producers responded that the cost of inputs and unstable crop prices pose the greatest risk to farm operations, confirming the importance of economic indicators to farm operators.

Environmental and economic risks to farm production

The survey also posed respondents with questions about how they perceived environmental and economic risks. Some risk questions used an example climate change scenario (Fig. 3) to ask about effects of changing conditions of farm production in their growing region.

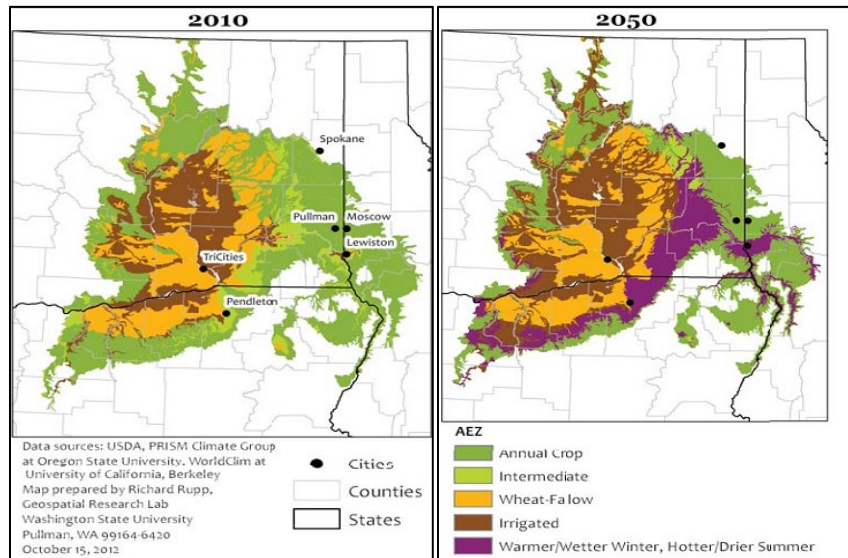


Figure 3- Climate change scenario referenced in the survey

More respondents perceived moderate or high degree of economic risk than environmental risk to production (55% and 38%, respectively) (Fig. 4). Most notably, a much greater percentage of respondents perceived the economic risk to farm production as high compared to environmental risk (16% and 5%, respectively). Lastly, 39% of respondents indicated “low” environmental risk to farm production posed by the climate change scenario while 34% perceived a “moderate” level of environmental risk.

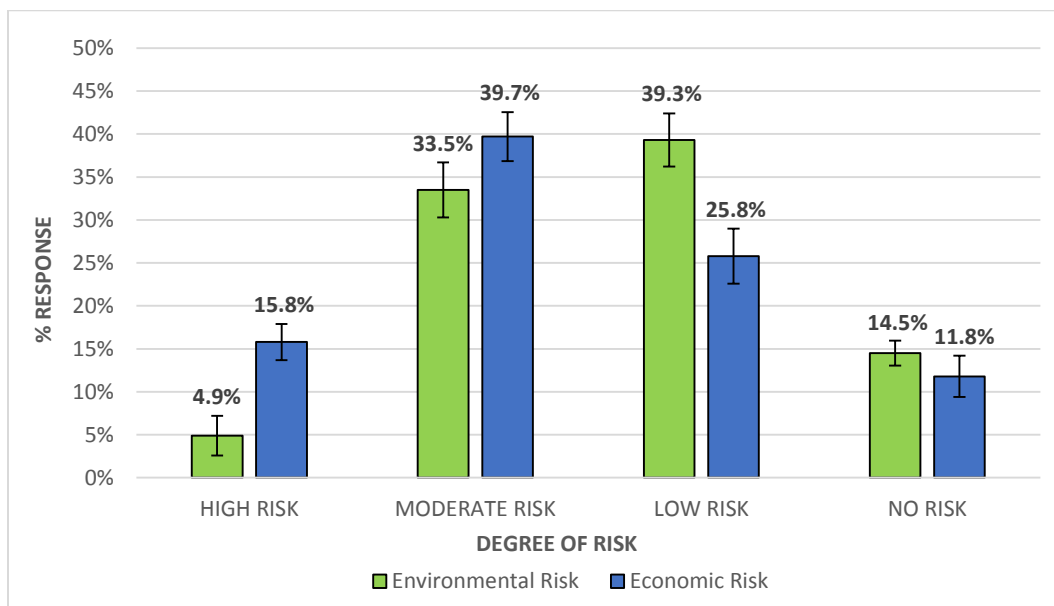


Figure 4- Perceived environmental and economic risks to farm production based on climate change scenario

Adaptation to climate change

On-farm climate change adaptation

The survey explored producers' expectations about having to modify their farm operations in response to climate change. One key metric asked respondents their level of agreement with the statement, "I will have to make serious changes to my farming operation to adjust to climate change." Very few (2%) strongly agreed with this statement, though 19% of respondents somewhat agreed (Fig. 5). Over 40% of respondents somewhat or strongly disagreed that they would have to make serious changes due to climate change. Over 35% of respondents, however, remained uncertain with regards to the need for major on-farm adaptation to climate change.

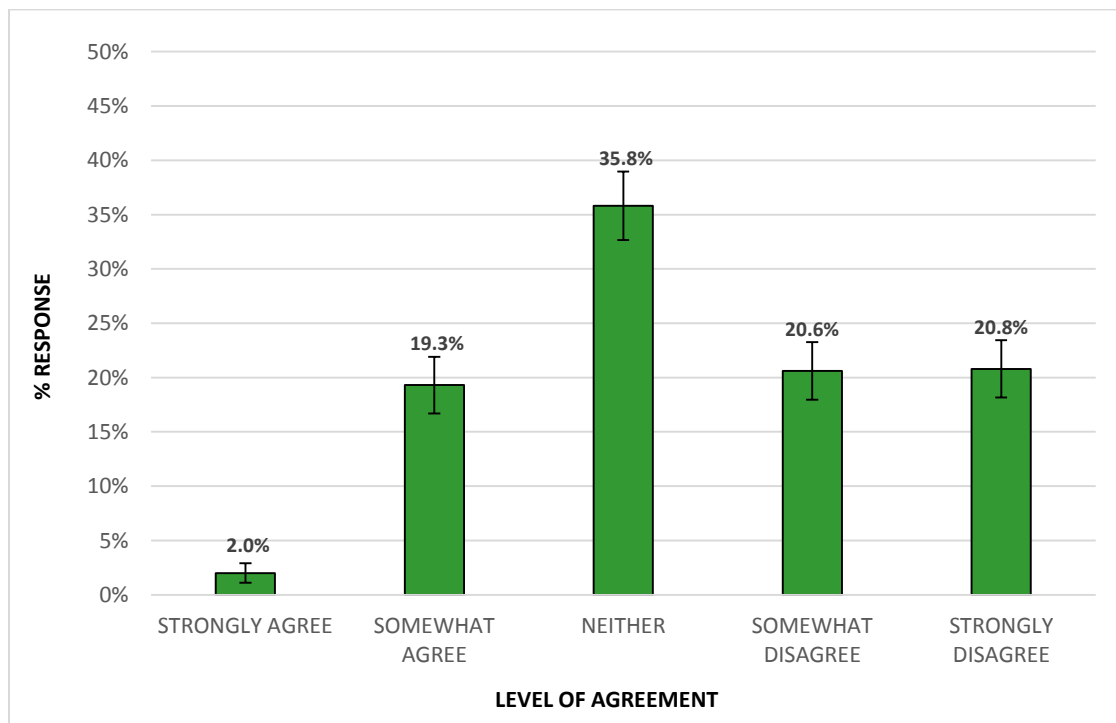


Figure 5- Level of agreement about expected need to make serious changes to farming operations to adjust to climate change

Changes to operation practices based on climate change scenario

Using predictions from the climate change scenario on page 7, the survey also asked respondents to indicate the level of change they would likely make to certain on-farm practices or decisions as a result of changes in conditions. As shown in Figure 6, very few respondents (17%) stated they would make big changes in any of their practices due to the scenario presented in Figure 3. More respondents were likely to make a big change to their crop insurance (6%) than any other practice. This result could relate to the previous finding in which a majority of respondents perceived risk from changes in economic factors (see Fig. 2) as well as economic risk to farm production as high (see Fig. 4). In general, most respondents indicated they were likely to make small or no changes to practices based on the information presented to them.

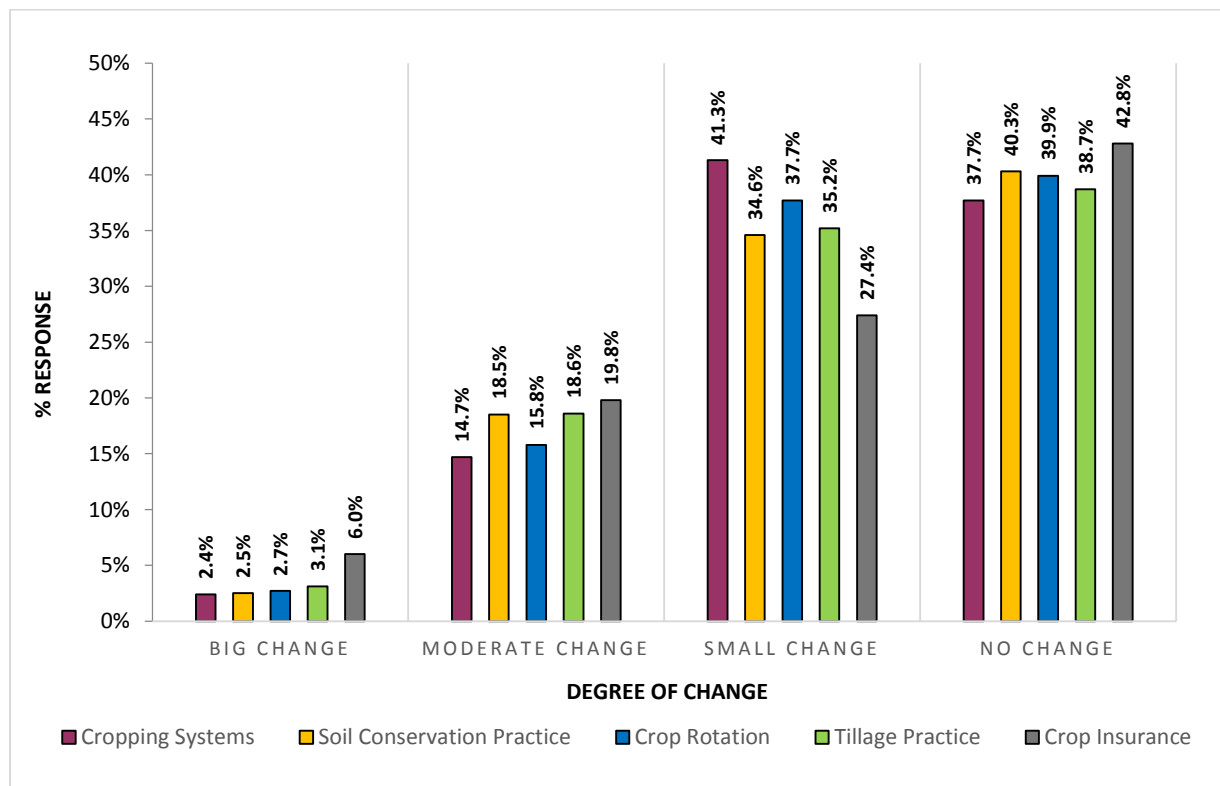


Figure 6- Degree of expected change in practices based on climate change scenario

Specifically, crop insurance is a complex system and it currently provides security against weather- and market-related failures via government programs. In comparison with other practices, crop insurance appears as a bimodal distribution about the perceived need to make changes. That is, it is the category in which greater percent of producers will likely make big (6%) and moderate changes (20%) as well as no change (43%).

Crop rotation includes testing new varieties and crops. Changes in climate could enable new crops and decrease the capacity to grow certain current crops. Such changing conditions would likely occur gradually, which could account for producers indicating cropping system and crop rotation as the areas in which they would make small changes (41% and 38%, respectively).

CONCLUSION

In general, respondents in this survey agreed that they have observed changes in weather patterns during their lifetimes and to a lesser degree, agreed that average global temperatures have increased. However, a much smaller proportion of respondents indicated similar levels of agreement with the idea that human activities are a primary contributor to climate change.

With respect to perception of climate change and associated risks, respondents appeared particularly attuned to the economic risks posed by changes in production conditions. However, in the context of climate change, substantively fewer producers indicated a perceived need to make *major changes* in their agricultural practices. This result likely occurs in part due to the fact that changes to practices of this kind remain capital intensive, or alternatively, that they have *already made major adaptations* for conservation. For example, tillage strategies have evolved to conserve fuel, labor, and soil by reducing erosion. Another possible explanation for this result is that, having routinely managed many risks as an expected part of farm operations, producers may not necessarily perceive new or unique effects because of climate change. Lastly, this response may be consistent with the result that only a minority of producers believe human activities primarily cause climate change. In subsequent reporting, more complex analyses will further explore these relationships in a multivariate context.

Overall, producers exhibit some uncertainty about the cause of climate change and its risks. Understanding these limitations will be important as producers continue to address not only weather in their day-to-day practices, but also long term shifts in climate regimes that could change production options and risk management. As one respondent noted in describing the difference between weather and climate, “Weather is seasonal and is always changing from season to season and year to year. No two years have been the same in my farming acres. Climate is what you have in your area.” Given that this variability also impacts a producer’s livelihood, producers will likely continue to adapt in response to the shifts in their farming experiences and conditions.

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