



Perceptions of Risk from Climate Change: Perspectives of Midwestern Corn Farmers and Advisors

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Introduction

Climate change and associated increases in weather variability pose a significant challenge to agriculture in the U.S., which produces about 40% of the world supply of corn and soybeans. The Useful to Useable (U2U) project seeks to synthesize available weather and climate information and produce new usable tools to improve agricultural decision making, adaptation, and resilience in the face of climate change.

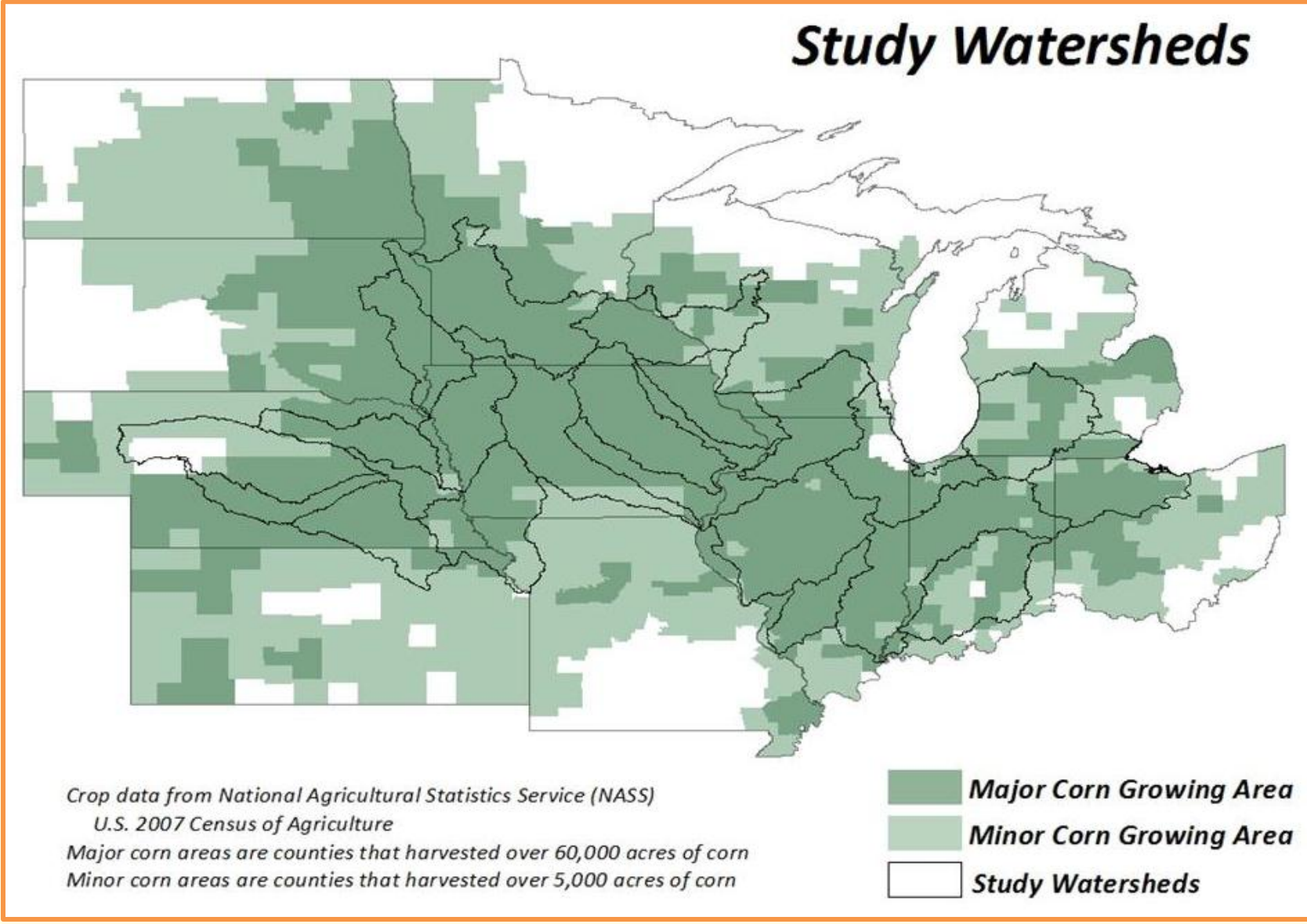
Before producing information and tools for agriculture, it is critical to understand the attitudes and behaviors of Midwestern farmers and those who advise them regarding climate change, weather variability, and adaptation in agriculture. To address the social science component of U2U, two surveys were conducted in the spring of 2012. The first was distributed to farmers across the Corn Belt (n=4778) and is referred to as the Producer survey. The second, Advisor survey, was conducted with several distinct agricultural advisor groups (n=2530) including Certified Crop Advisors, University Extension agents, Agricultural Bankers, Natural Resource Conservation Service employees, Farm Bureau employees, Ag Retailers and others.

This poster will highlight findings from both surveys. My focus is on farmers’ and their advisors’ beliefs about climate change, perceptions of changing weather and impacts on agriculture, the need for agricultural adaptation, and the types of adaptations being considered and implemented. These surveys indicate that most producers and their advisors believe that climate change is happening, but opinions vary on what is causing the climate to change. Midwestern farmers' and advisors' have distinct beliefs about climate issues and adaptation in agriculture. Implications for outreach and dissemination of climate change adaptation information are discussed as well as next steps for further analysis and research.

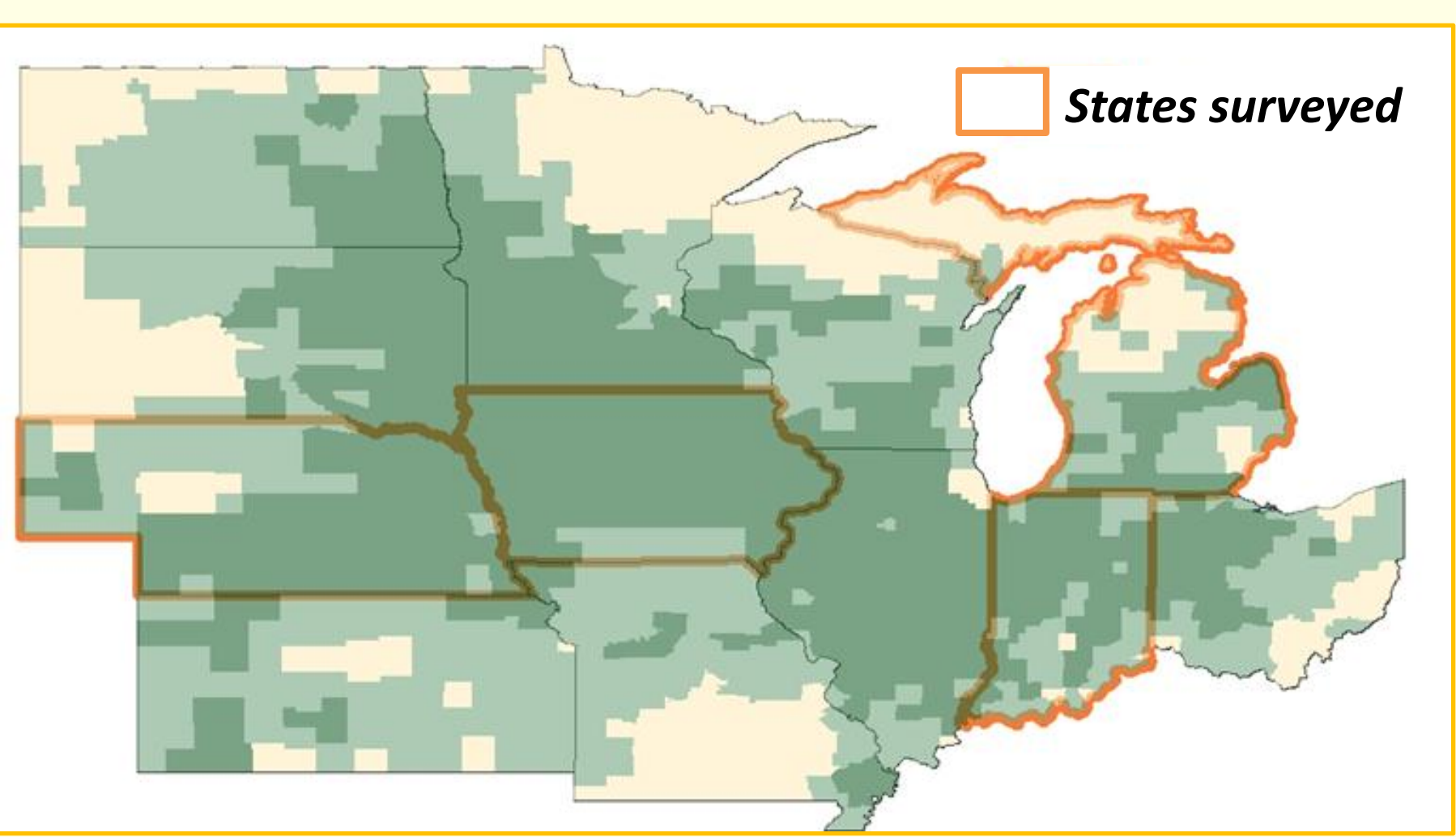
Research Questions

- RQ1:** What do Midwestern corn farmers and their agricultural advisors believe about climate change?
- RQ2:** How concerned are Midwestern corn farmers and advisors with the risks from weather variability, climate change, and its potential impacts? Are climate change beliefs related to concern with climate change and potential impacts?
- RQ3:** What are Midwestern corn farmers and advisors views on agricultural adaptation to changing weather and climate?
- RQ4:** Which adaptation strategies are Midwestern corn farmers currently implementing and which are they considering for the future?

Producer Survey Area



Advisor Survey Area



Results

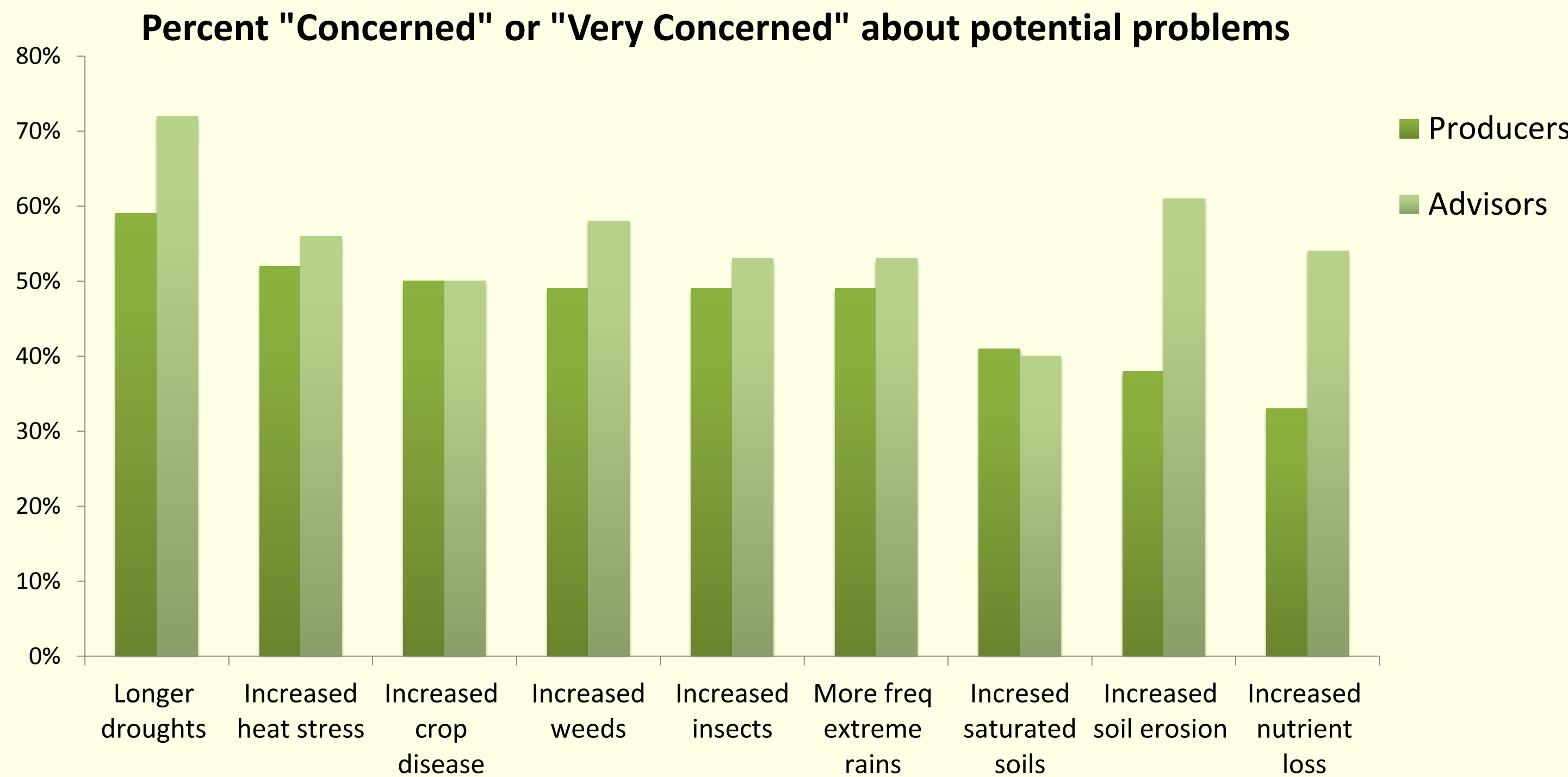
RQ1: Climate change beliefs

	Farmers	Advisors
Climate change is occurring, and it is caused <u>mostly by human activities</u>	8%	13%
Climate change is occurring, and it is caused <u>equally</u> by <u>natural</u> changes in the environment and <u>human</u> activities	33%	37%
Climate change is occurring, and it is caused <u>mostly by natural changes</u> in the environment	25%	25%
There is <u>not sufficient evidence</u> to know with certainty whether climate change is occurring or not	31%	23%
Climate change is <u>not occurring</u>	4%	2%

RQ2: Perceptions of risk from climate change

Survey question	Producer Agreement/ Disagreement	Advisor Agreement/ Disagreement
<i>Climate change is not a big issue because human ingenuity will enable us to adapt to changes</i>	26% D/SD; 43% Uncertain; 31% A/SA	45% D/SD; 34% Uncertain; 20% A/SA
<i>Changes in weather patterns are hurting my farm operation/the farmers I advise</i>	46% D/SD; 39% Uncertain; 16% A/SA	37% D/SD; 45% Uncertain; 18% A/SA
<i>Extreme weather events in recent years have affected my long-term management goals/of corn producers I advise</i>	50% D/SD; 29% Uncertain; 21% A/SA	32% D/SD; 37% Uncertain; 32% A/SA

*Chi-Square tests showed that each of the above questions were significantly related to climate change beliefs (p < 0.001)

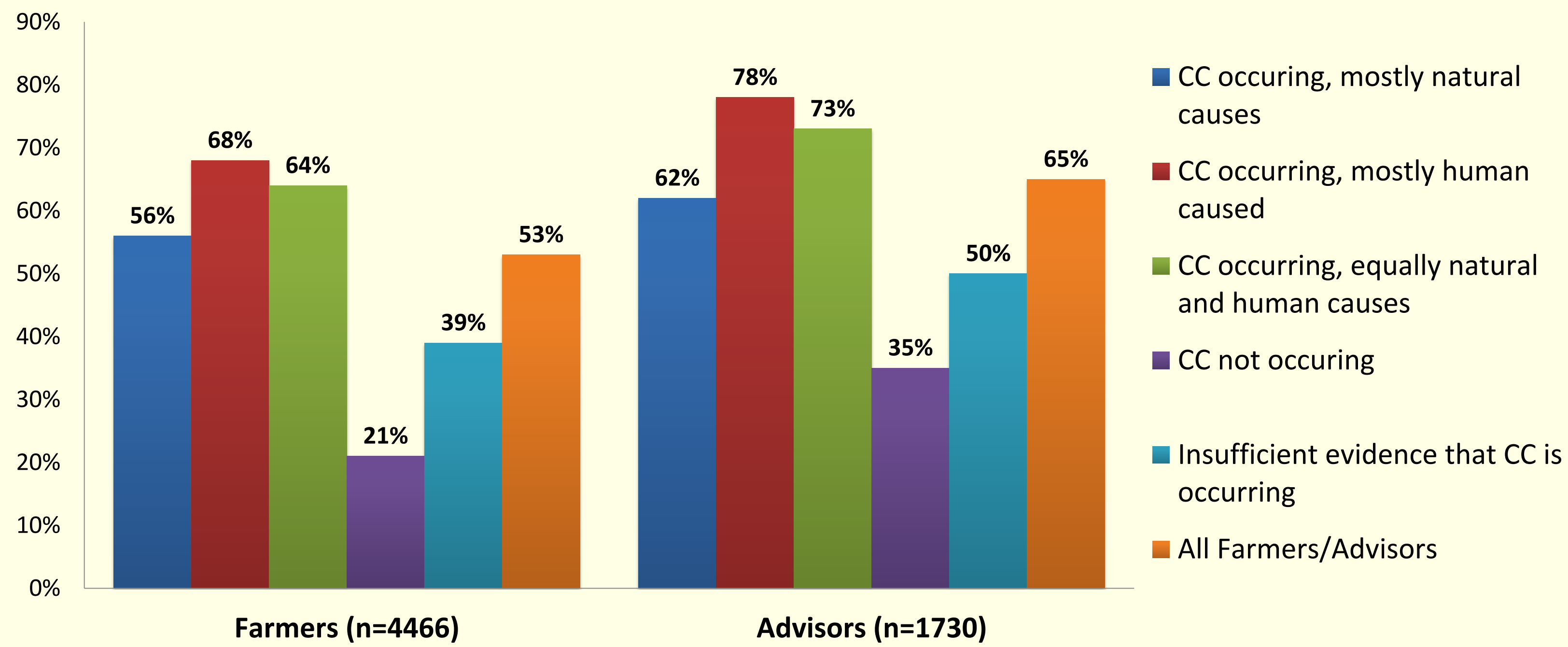


* Producers’ level of concern with each potential impact varied significantly based on climate change beliefs (ANOVA: p <0.001)

* Advisors’ level of concern with each problem varied significantly based on climate change beliefs (ANOVA: most p < 0.001; insects p <0.01; weeds p <0.05)

RQ3: Views on Adaptation

Percent who Agree or Strongly Agree: “Changing my practices to cope with increasing climate variability is important for the long-term success of my farm.” “...the farmers I advise.”



RQ4: Producer Adaptation – Modified question used by Hogan et al. (2011): “Activities you might do in your farm operation to manage weather or climate related risks” (n=4778)

Adaptation strategy	Most checked option	2 nd most checked option
Purchase additional/adjust crop insurance	Doing as part of short-term risk management (38%)	Doing as part of long-term risk management (20%)
Implement in-field conservation practices	Doing as part of long-term risk management (35%)	Doing as part of short-term risk management (28%)
Add new technologies	Not doing but considering (38%)	Doing as part of long-term risk management (20%)

*Most common response for the remaining 8 strategies was “Not doing and don’t plan to do”

Discussion/Conclusions

- 65% of Midwestern farmers and 75% of advisors believe that some form of climate change is happening, but they vary on the role of human activities.
- The data from these surveys show that climate change beliefs are related to concern with impacts of climate change on agriculture, and beliefs about the importance of adaptation.
- Most farmers have not implemented and are not planning to implement risk management strategies that could help them adapt to climate change.
- Farmers and advisors who believe climate change is mostly or about equally human caused tended to place higher importance on agricultural adaptation.
- Farmers and advisors who believe that climate change is not occurring or there is too much uncertainty placed significantly lower importance on agricultural adaptation.
- Results from this research can inform adaptation outreach efforts in the following ways:
 - Deemphasize the causes of climate change—more likely to succeed if you can connect with belief that climate is changing and that adaptation is important, rather than trying to change their views about the cause.
 - When possible, tie adaptation options to the specific impacts farmers/advisors were most concerned about—drought and heat stress to crops/drought and erosion.

Future work

My next steps will be to conduct regression analysis to explore the relationships between different variables and to predict adaptation attitudes and behaviors based on climate change beliefs and risk perceptions. I’m also interested in exploring the roles of the availability heuristic and confirmation bias in the connections between farmers’ perceptions of recent weather and their beliefs about climate change. Additionally, I will examine in more detail differences in beliefs between different types of advisors (i.e. conservation vs. profit oriented) and the relationship between climate change beliefs and trusted sources of information.

I plan to explore interesting and confusing findings from the surveys through in-person qualitative interviews with Indiana corn farmers and advisors. Through these interviews, I will examine in more depth how these agricultural decision makers think about weather-related impacts, climate change, and adaptation.

Methods

Two surveys were conducted in the spring of 2012 that included items to address the above research questions. The first was a mail survey of 18,700 farmers across 22 of the top corn producing watersheds in the U.S. These contiguous watersheds contain about 65% of U.S. corn acreage and span 11 states (Natl. Ag. Stat. Serv., 2009). The producer survey was designed by a team of social scientists, with input from climate scientists, from universities across the Corn Belt. The survey was administered by the National Ag Statistics Service. 4,788 surveys were completed for a response rate of 26%.

The survey of about 7,770 Corn Belt agricultural advisors (including University Extension agents, Certified Crop Advisors, Agricultural Bankers, NRCS staff, SWCD staff, Farm Bureau employees etc.) was conducted in four states—Indiana, Iowa, Michigan, and Nebraska. The advisor survey instrument contained many of the same questions as the producer survey, but was administered online via email invitation. 2,249 responses were received, for an approximate response rate of 29%. The Advisor survey was also sent to University Extension agents in 12 Corn Belt states. Surveys were sent to about 570 Extension Agents in these states, and 186 responses were received.

Statistical analysis was conducted using SPSS.

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References

Hogan, A, Berry, H.L., Ng, S.P. and Bode, A. 2011. “Decisions made by Farmers that Relate to Climate Change.” *Agricultural Science*, 23(1):36-39.
National Ag Statistics Service (NASS). 2009.