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United States Department of Agriculture
National Institute of Food and Agriculture

Climate Change Beliefs, Concerns, and Attitudes Toward Adaptation and Mitigation among Farmers in the Midwestern U.S.

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This research is part of a regional collaborative project supported by the USDA-NIFA, Award No. 2011-68002-30190:
Cropping Systems Coordinated Agricultural Project: Climate Change, Mitigation, and Adaptation in Corn-based Cropping Systems
Project Web site: sustainablecorn.org

Survey of Farmer Perspectives on Climate Change

Two projects funded by USDA-NIFA

- **Cropping Systems Coordinated Agricultural Project: Climate Change, Mitigation, and Adaptation in Corn-based Cropping Systems (CSCAP)**
- **Useful to Useable (U2U)**

Survey rationale:

- **Agriculture is both vulnerable to climate shifts and a source of the GHGs driving changes**
- **Climate-change related threats to agriculture represent threats to society; calls for adaptation and mitigation strategies increasing**

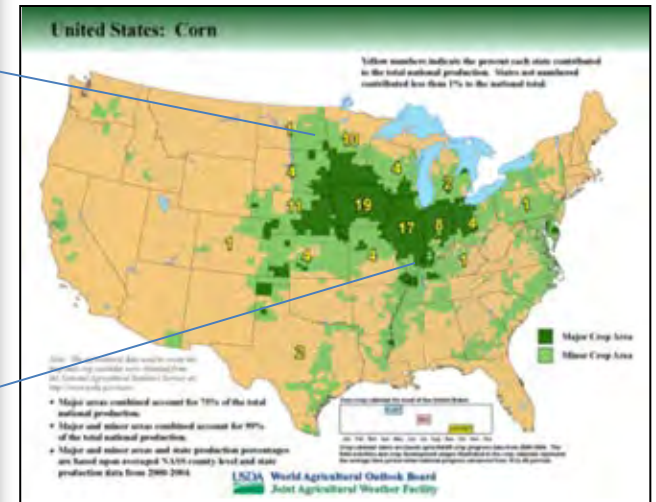
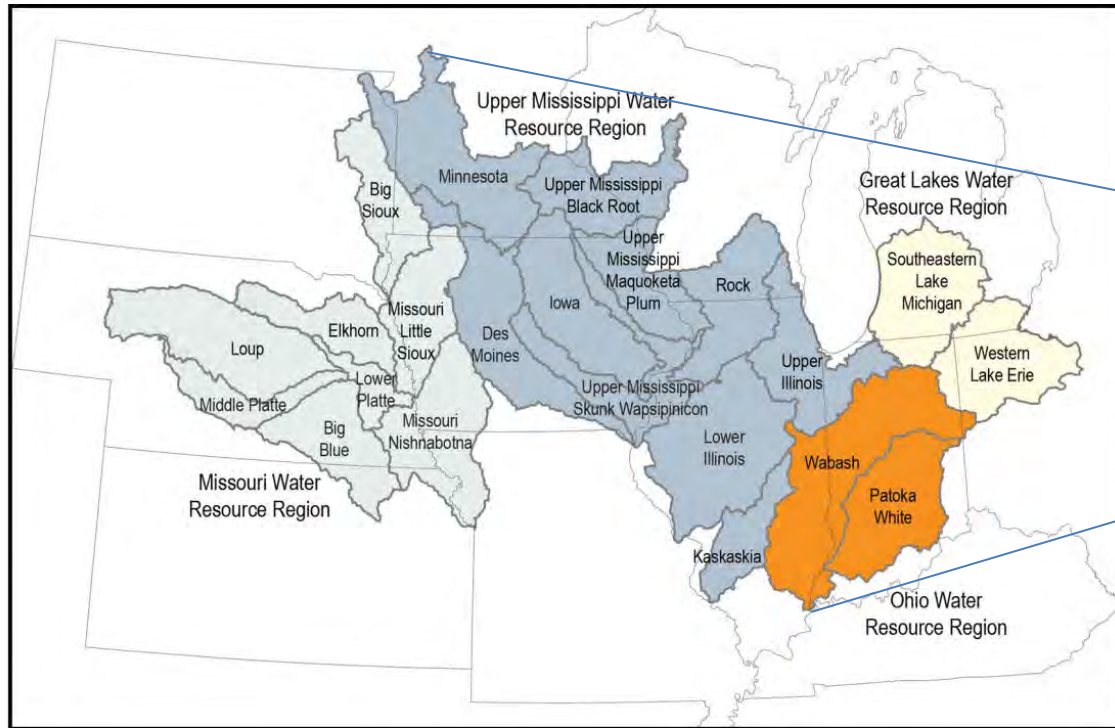
Survey Rationale

- Adjustment to potential natural hazards depends on perceptions of risks, which are mediated by beliefs about (1) the existence of the hazard and (2) its characteristics.
- If farmers do not believe that climate change is happening or do not perceive it as a threat, they will not likely undertake adaptive or mitigative actions
- Need to understand where farmers stand in order to develop effective outreach strategies

Survey Research Questions

- **What are the relationships between farmer beliefs about climate change, perceptions of climate-related risk, and attitudes toward adaptation and mitigation actions?**
 - Do farmers believe climate change is occurring?
 - Are they concerned about potential impacts?
 - Do they support individual and collective adaptive and mitigative action?

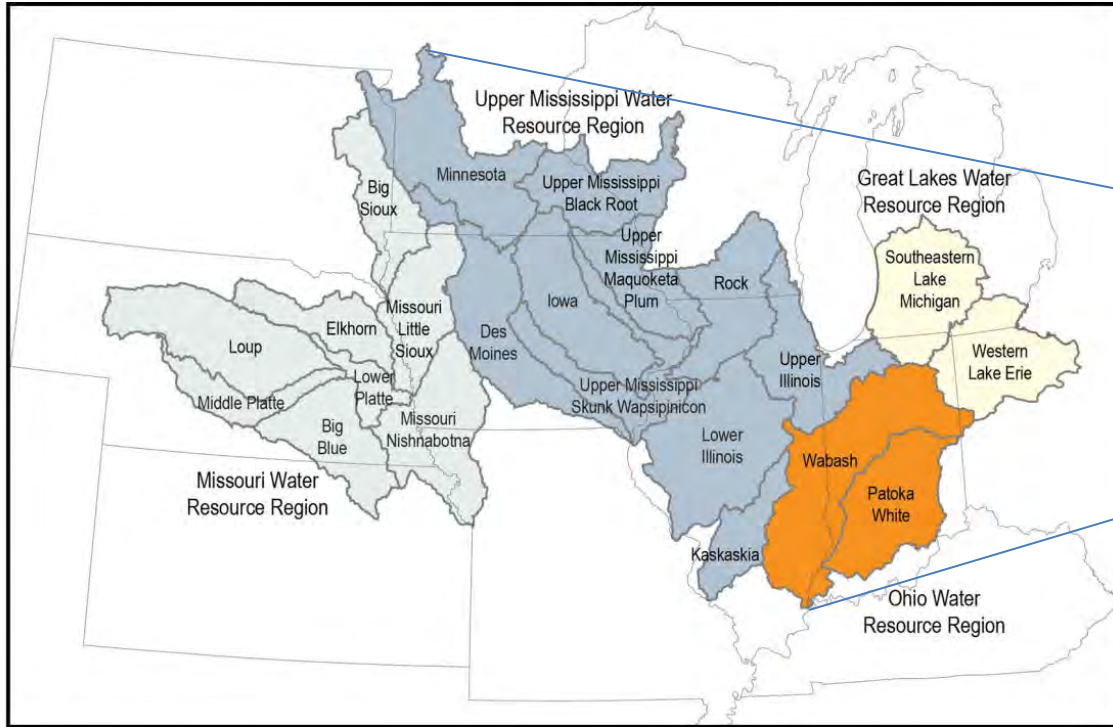
Survey Scope and Scale



Survey design:

- Survey conducted by NASS
- Sample stratified by 22 HUC6 watersheds representing ~60% of U.S. corn production
- Larger-scale farmers: \$100k+ Gross Revenue

Survey Scope and Scale



Response rate:

- 4,778 farmers: 26% response rate
- Compared respondents and non-respondents on numerous ag census variables: No differences

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Beliefs

"Please select the statement that best reflects your beliefs about climate change"

Climate change is occurring, and it is caused mostly by human activities	8%
Climate change is occurring, and it is caused more or less equally by natural changes in the environment and human activities	33%
Climate change is occurring, and it is caused mostly by natural changes in the environment	25%
There is not sufficient evidence to know with certainty whether climate change is occurring or not	31%
Climate change is not occurring	4%

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Climate change is occurring 66%

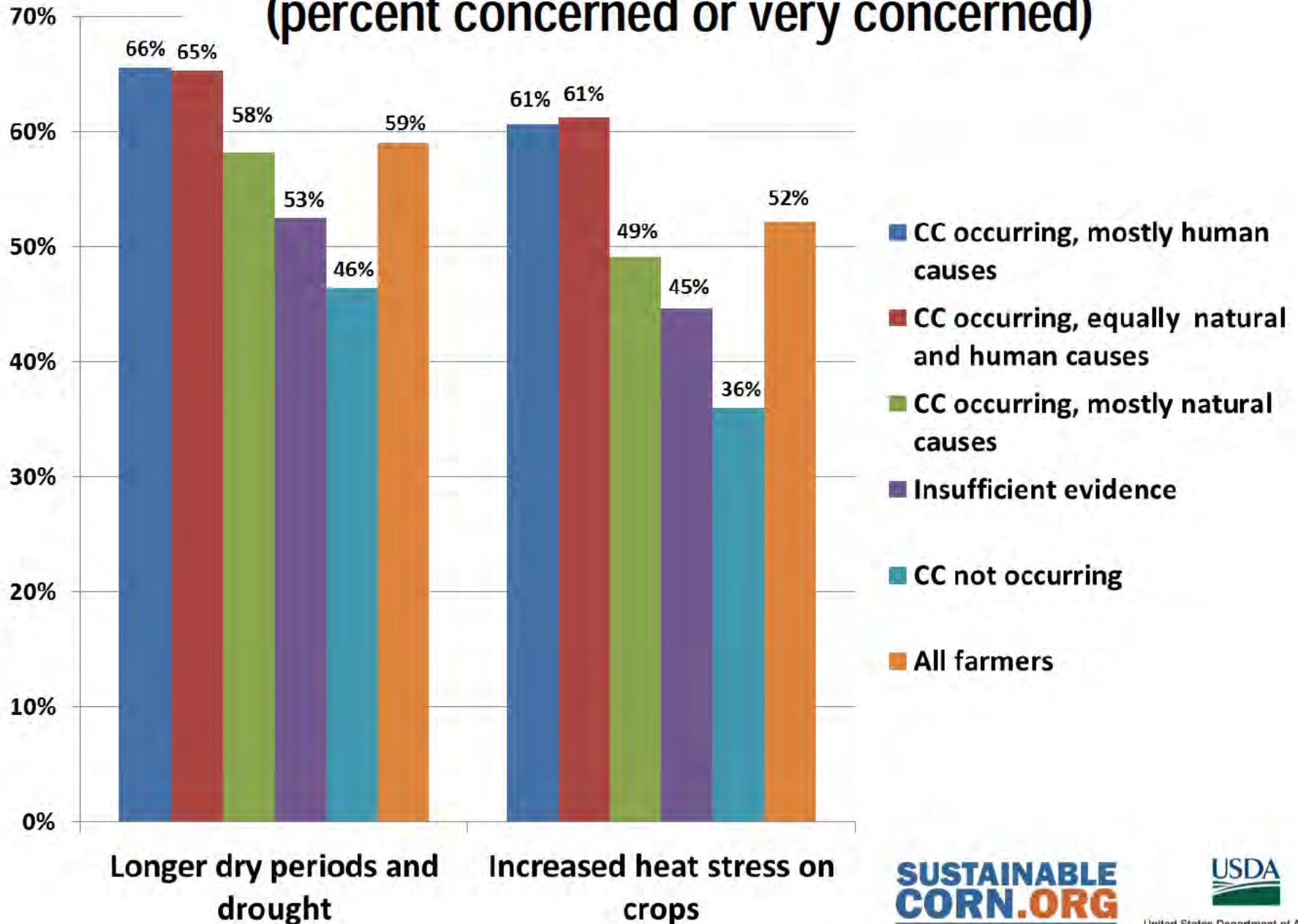
➤ Humans are at least partly responsible 41%

Perceived Risks

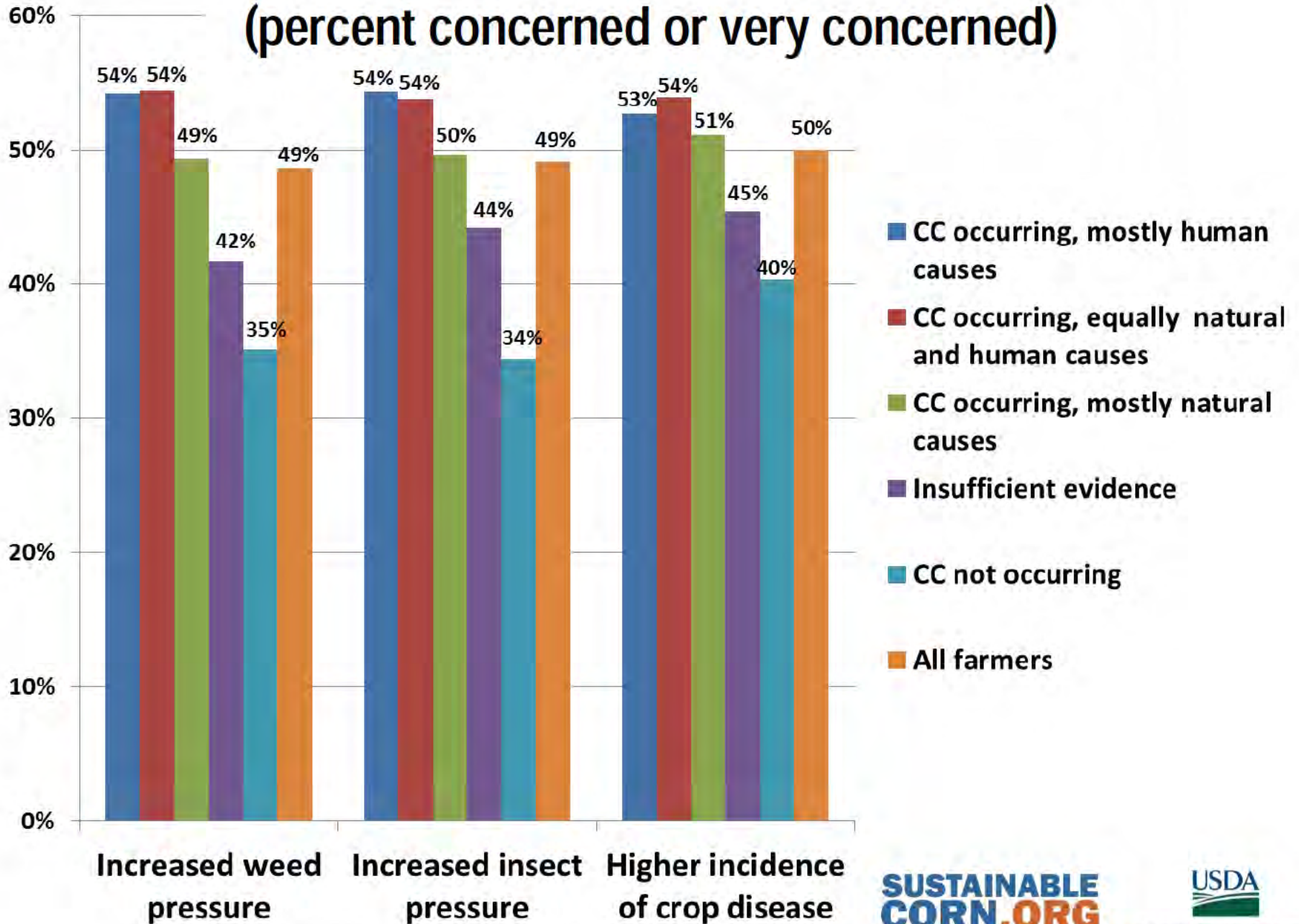
Developed questions based on predicted impacts of climate change on Corn Belt agriculture

- “How concerned are you about the following potential problems for your farm operation?”
 - Drought and heat
 - Excess water issues
 - Pest and disease issues
 - Nutrient loss
 - Soil erosion

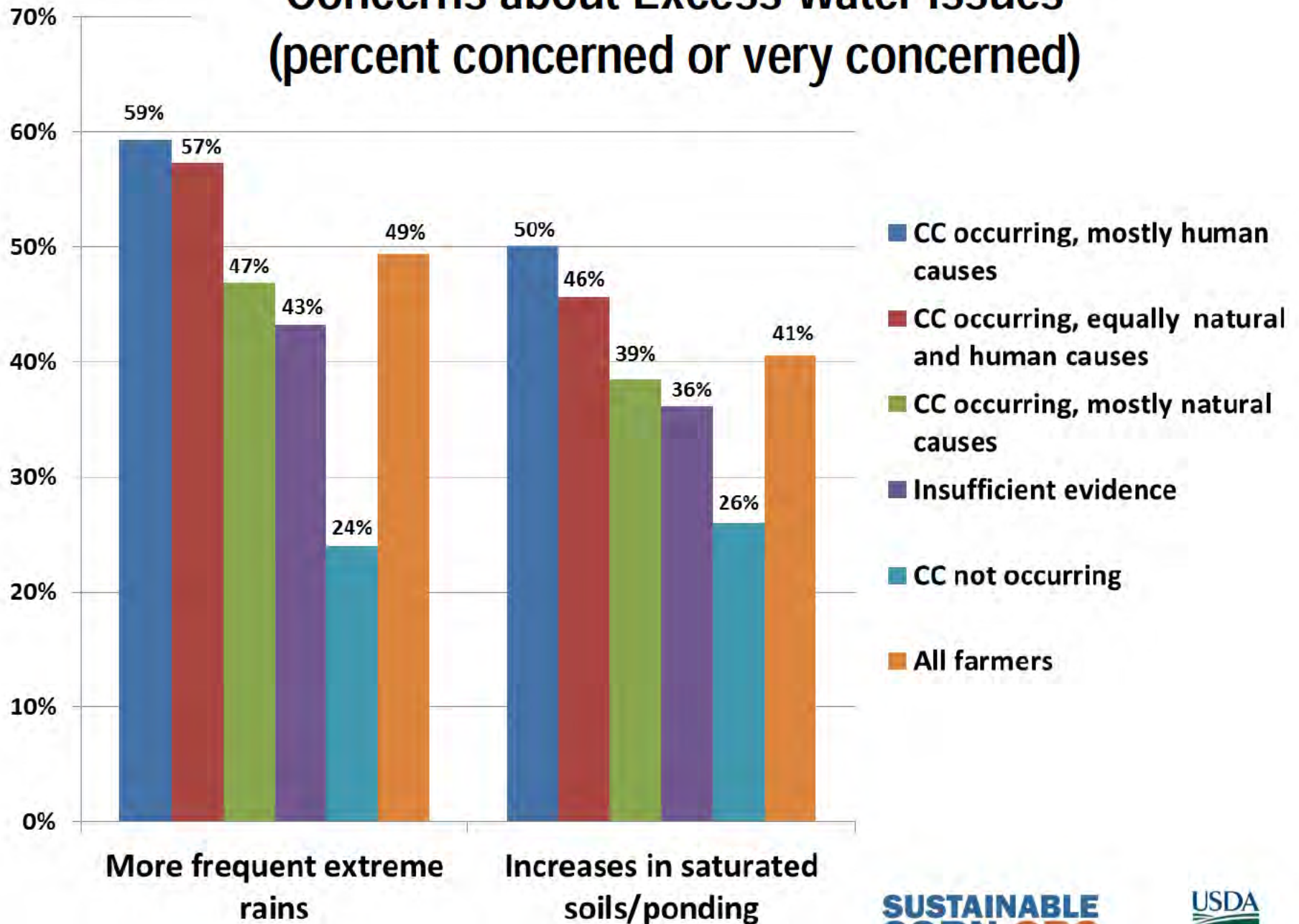
Concerns about Drought and Heat (percent concerned or very concerned)



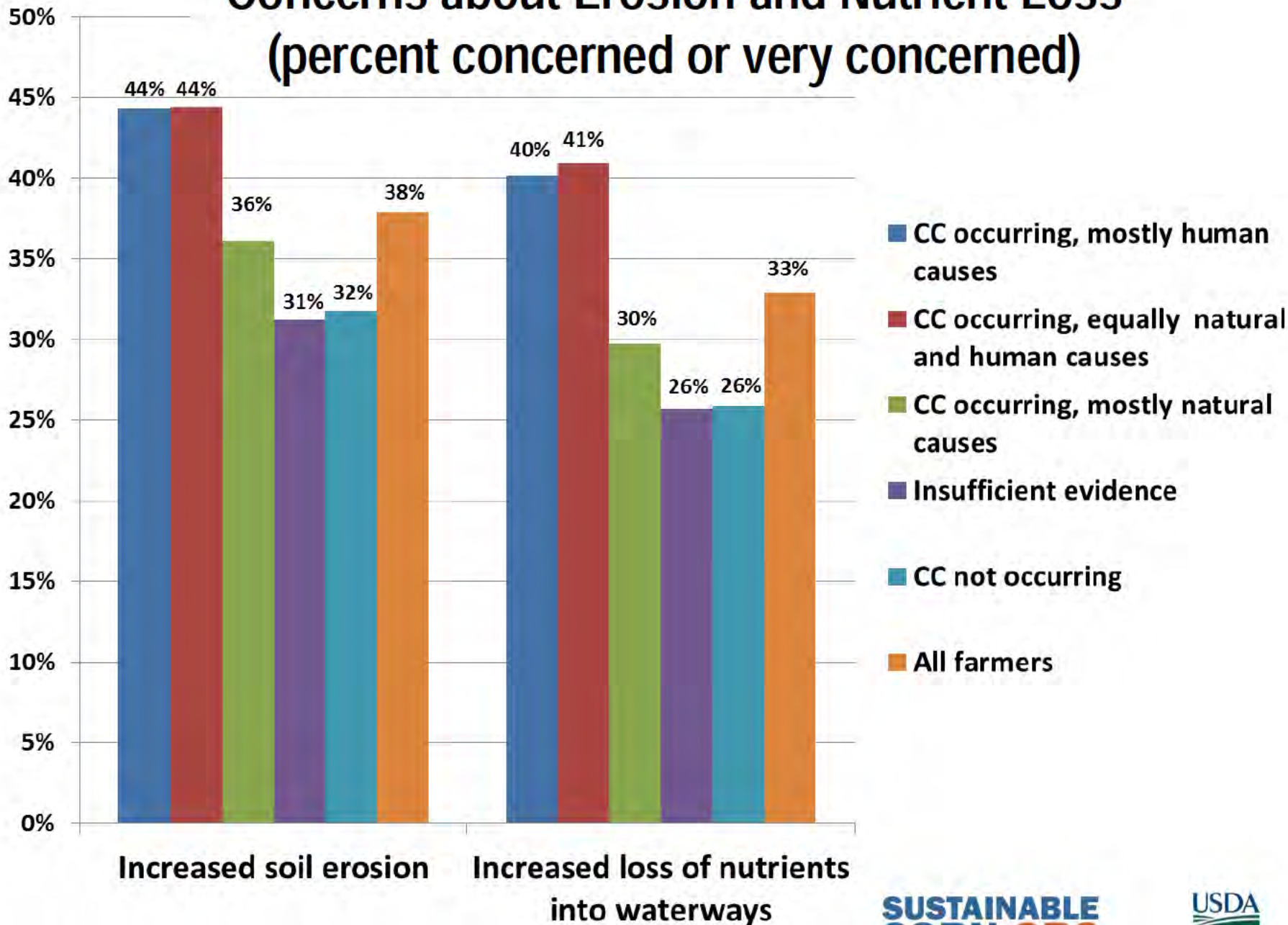
Concerns about Pests and Disease (percent concerned or very concerned)



Concerns about Excess Water Issues (percent concerned or very concerned)



Concerns about Erosion and Nutrient Loss (percent concerned or very concerned)



Most farmers are concerned.

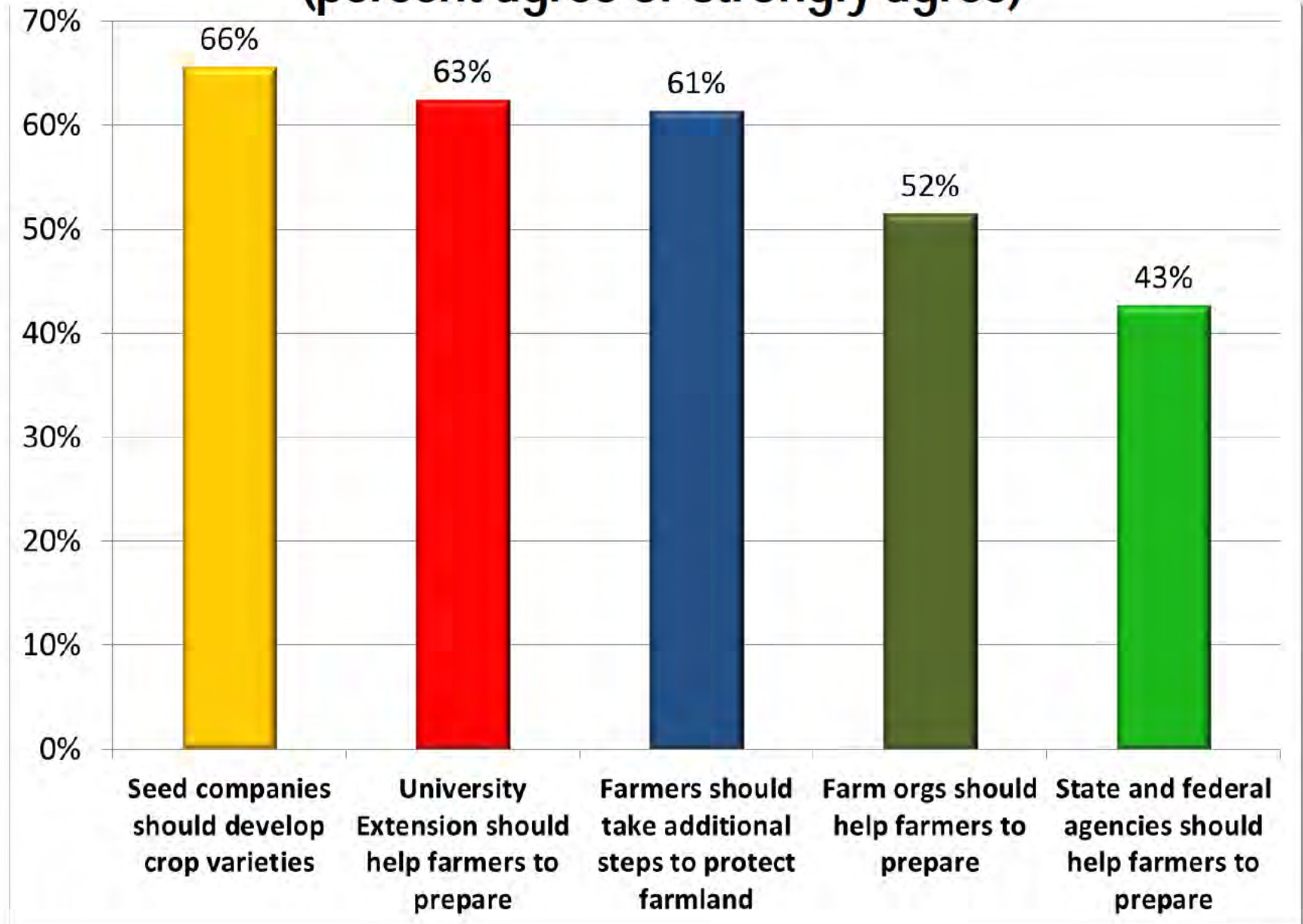
- Drought was the most prevalent concern, with heat, pests and disease, and excess water close behind
- Clear pattern of relationship with climate change belief: Farmers who believe that CC is happening and caused by humans are more concerned

Attitudes toward Adaptation and Mitigation

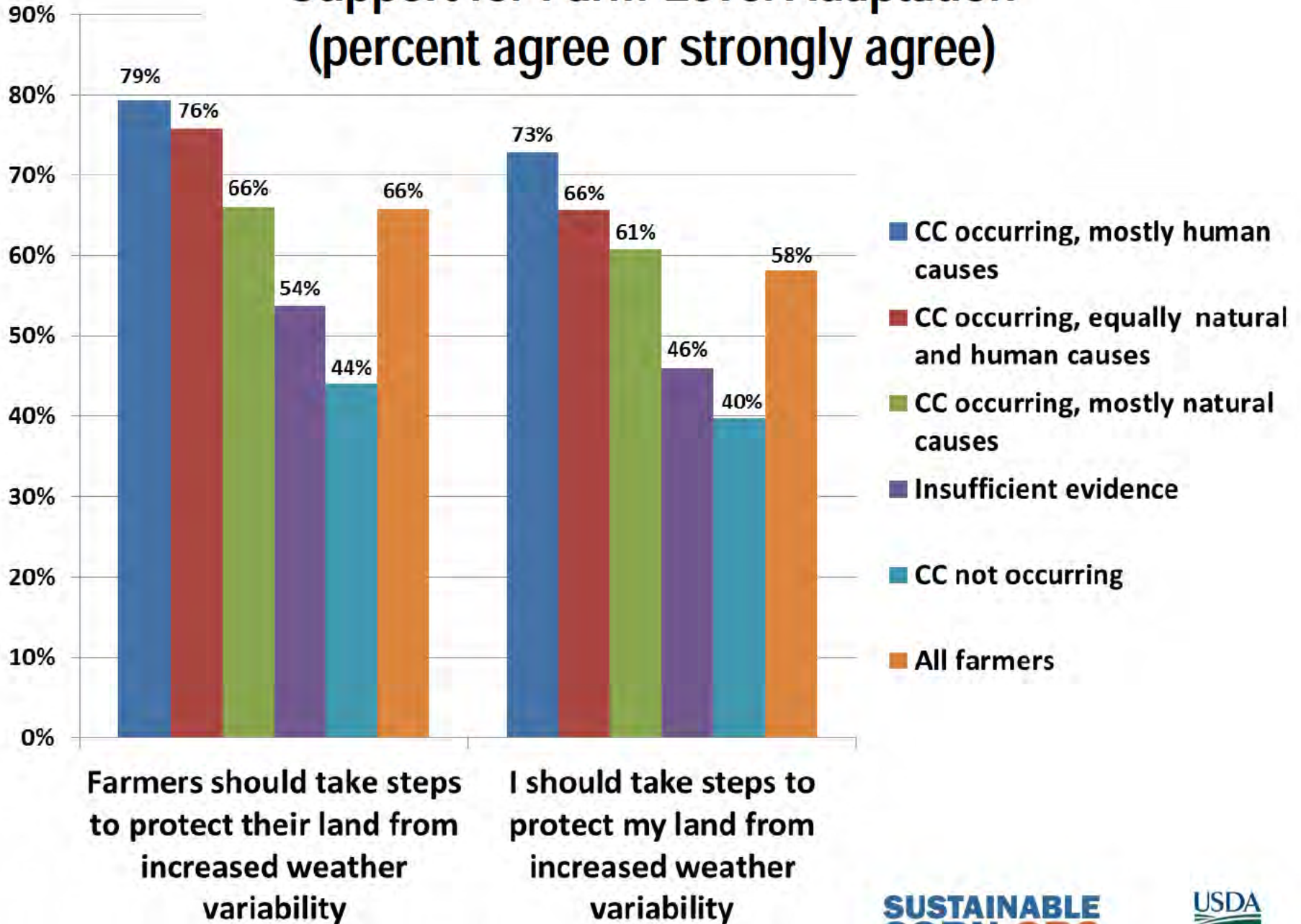
Normative items: What should be done and by whom?

- “Organizations, agencies, and individuals can do a number of things to prepare for or address potential changes in climate. Please provide your opinions on the following statements.”
- Focus on preparing for “increased weather variability”
 - Farmers
 - Government agencies
 - Farm groups
 - Extension
 - Seed companies

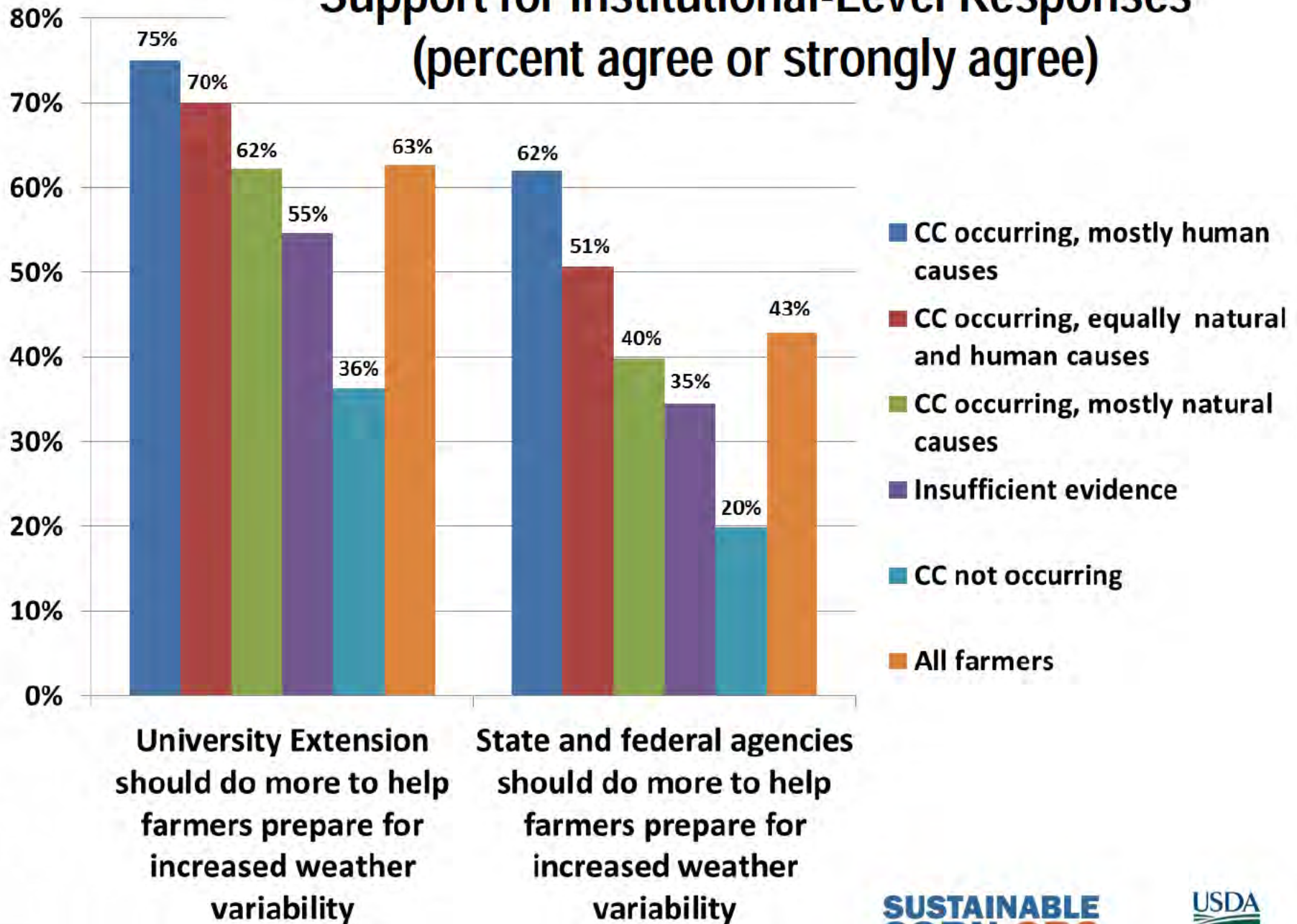
Support for Action to Prepare for Increased Weather Variability (percent agree or strongly agree)



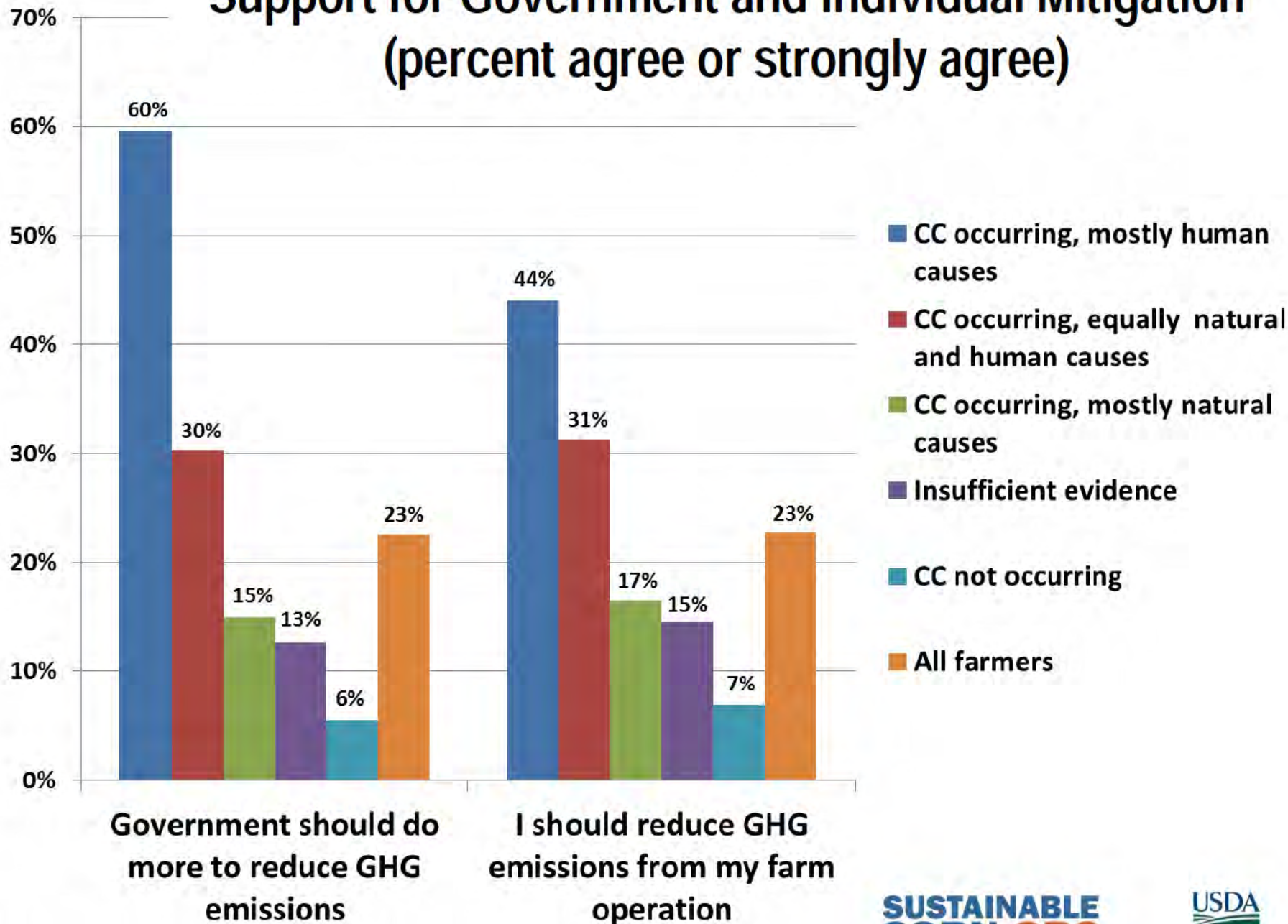
Support for Farm-Level Adaptation (percent agree or strongly agree)



Support for Institutional-Level Responses (percent agree or strongly agree)



Support for Government and Individual Mitigation (percent agree or strongly agree)



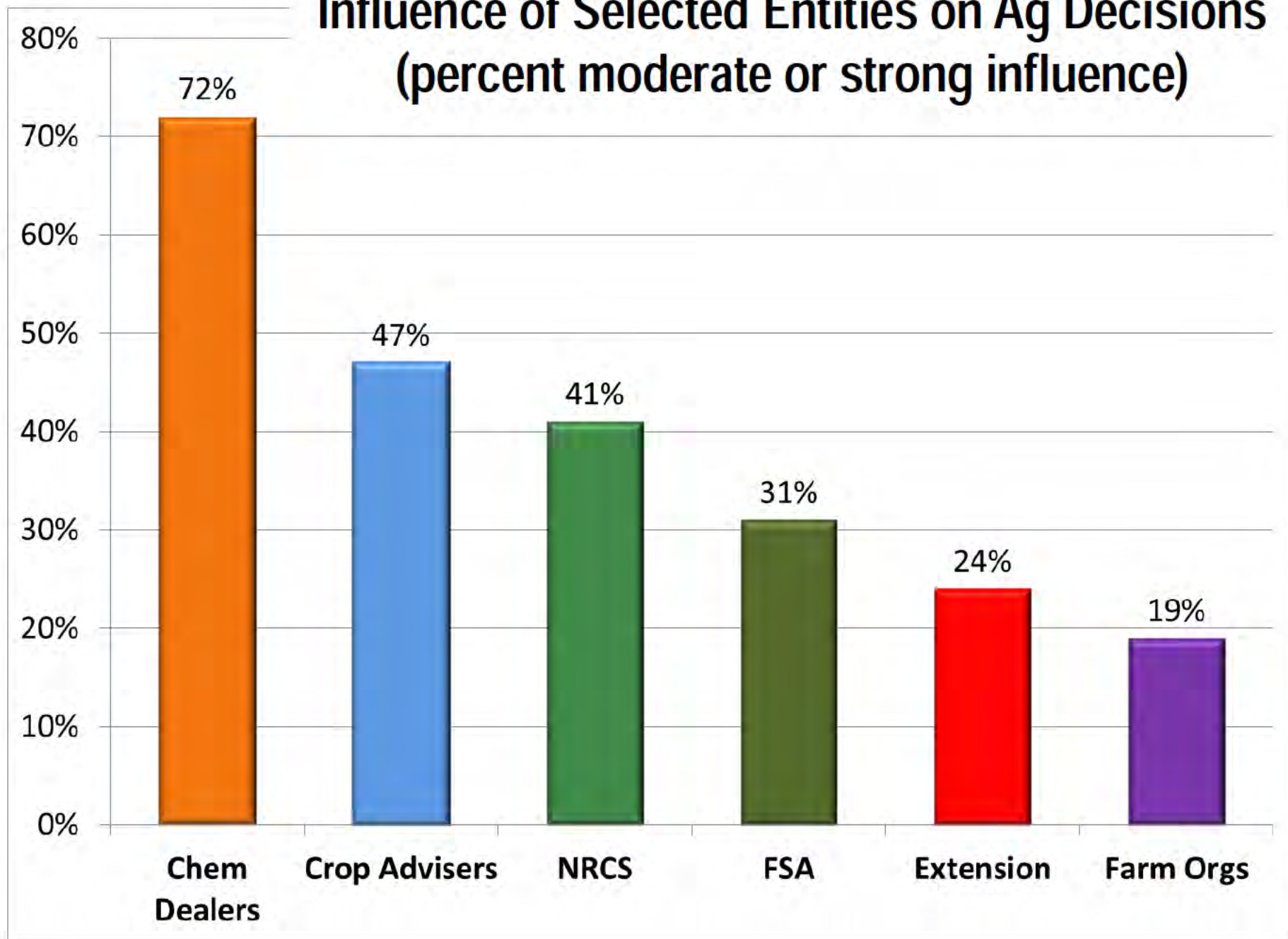
Adaptation or mitigation?

- Most farmers support adaptation actions, especially individual-level, but also institutional-level
- Most farmers do not support government or individual action on GHGs, except those who believe that humans are primary cause of climate change
- Relationship pattern between climate change belief and support for adaptation and mitigation action same as for perceived risk

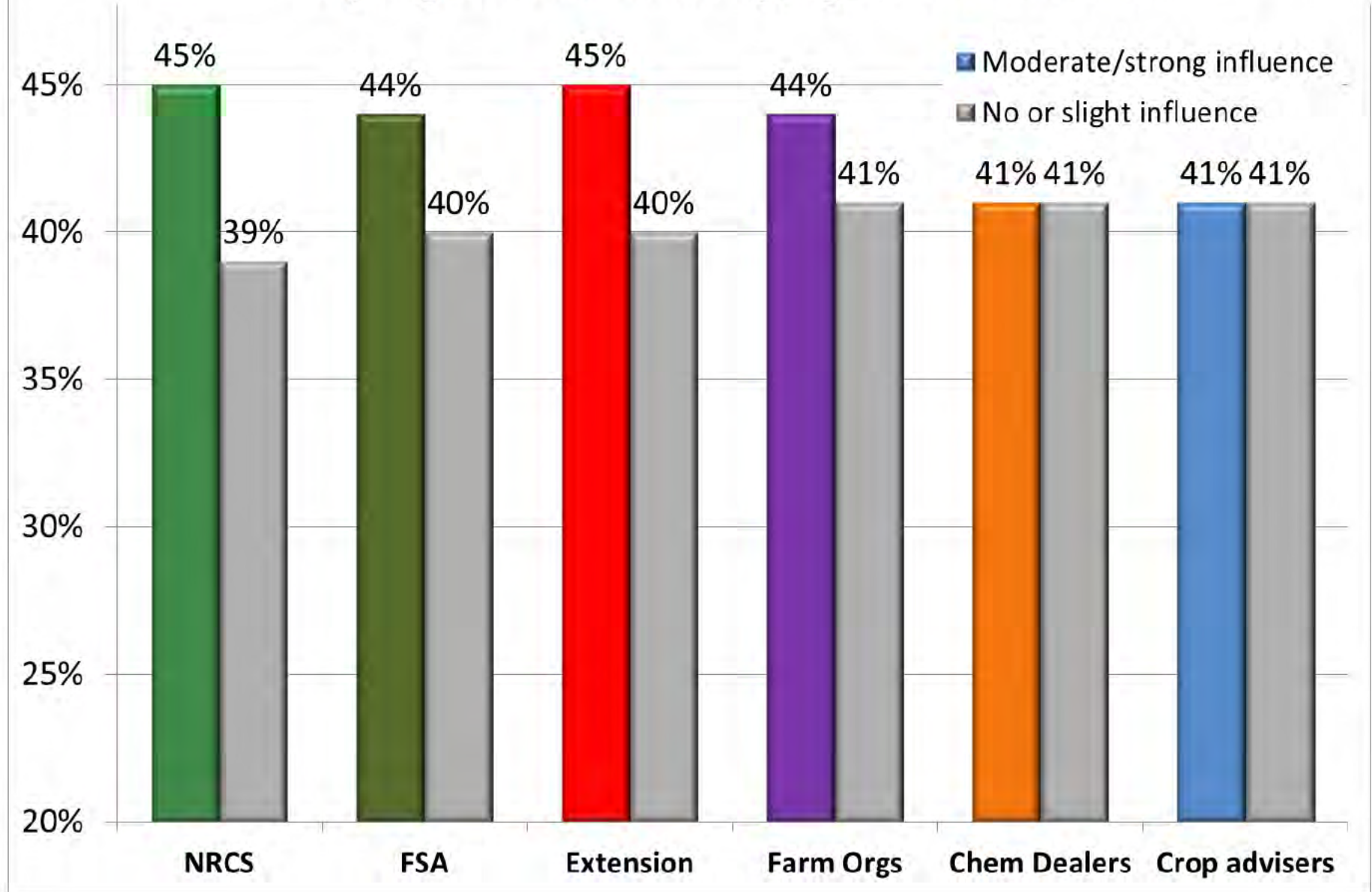
Influence of Key Organizations

- Many factors influence farmer decision making
- Individuals, private sector, public agencies
- Asked "Please indicate how influential the following groups and individuals are when you make decisions about agricultural practices and strategies." Scale from "no influence" to "strong influence."
- NRCS, FSA, Extension, Ag chemical dealers, farm organizations, other farmers, etc.

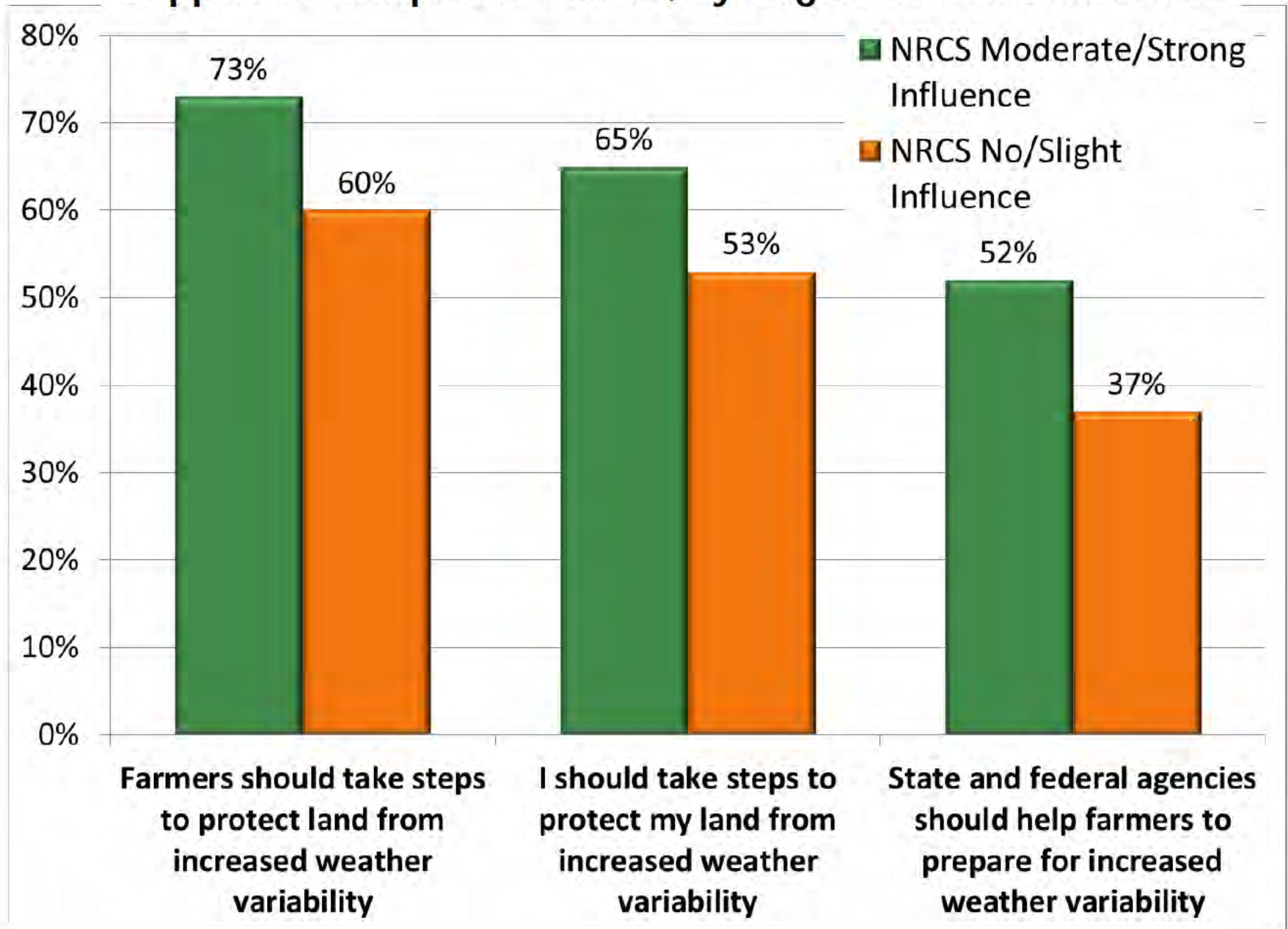
Influence of Selected Entities on Ag Decisions (percent moderate or strong influence)



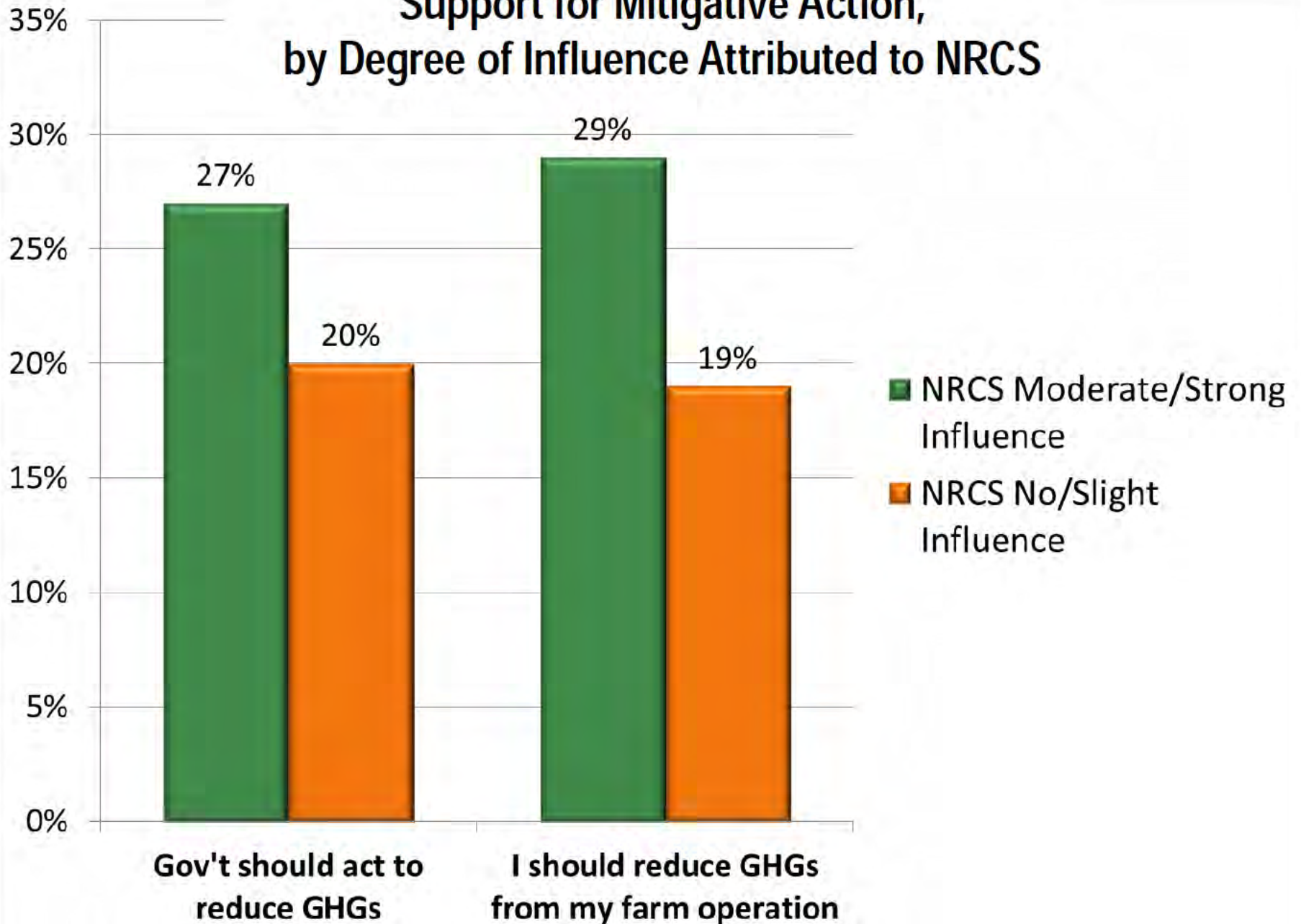
Percent belief that climate change is occurring and due mostly or equally to human activity, by level of influence



Support for Adaptation Action, by Degree of NRCS Influence



Support for Mitigative Action, by Degree of Influence Attributed to NRCS



NRCS, Farmers, and Climate Change

- More than 40% of farmers indicate that their ag decisions are moderately or strongly influenced by NRCS
- Farmers who are influenced by NRCS are more likely to believe that climate change is occurring and caused by humans
- Farmers who are influenced by NRCS are more likely to support adaptation and mitigation actions

Best Management Practice Use

- Provided a list of 17 practices including grassed waterways, terraces, filter strips, cover crops, reduced tillage, no-till, etc. and asked farmers to indicate whether or not they were using them.
- Simple count, no data on extent of use.
- Developed a summative index

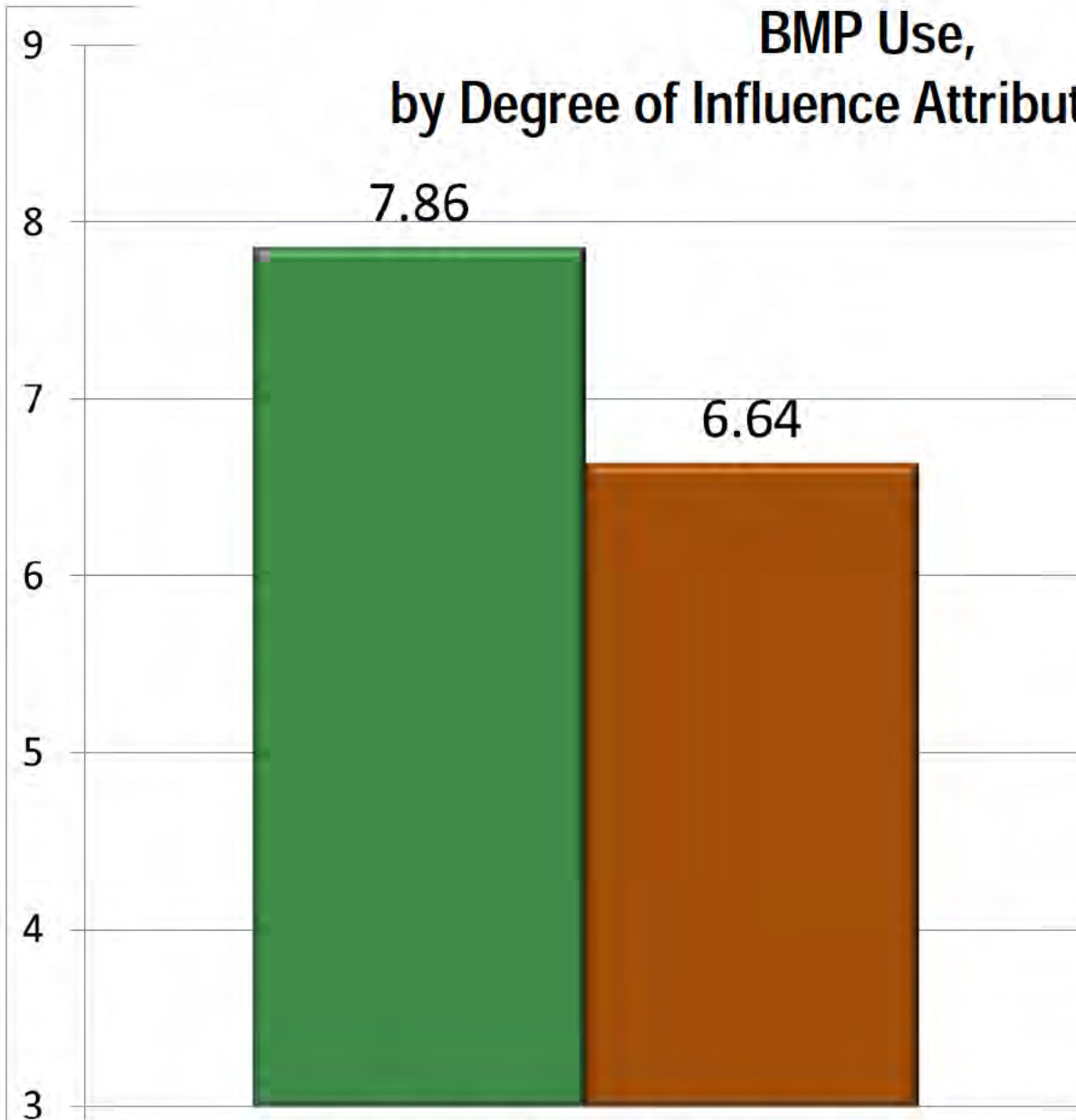
BMP Use, by Degree of Influence Attributed to NRCS

7.86

6.64

- NRCS Moderate/Strong Influence
- NRCS No/Slight Influence

Practice index: Use of 17 key practices



Take-Home Points

- Many farmers are concerned about predicted climate change-related threats to Corn Belt agriculture
 - Risk perception varies greatly, associated with belief
- Many support individual-level adaptation: Adaptation is what farmers do
- Many also support institutional adaptive action, thought somewhat more supportive of Extension than gov't
 - However, uncertainty and disbelief associated with lower support
- Most farmers do not believe that climate change is caused by human activity
 - Mitigation through GHG reduction is unpopular, except among farmers who believe that humans are main cause of climate change
 - Many conservation practices and strategies have both adaptive and mitigative properties: cover crops, reduced tillage, nitrogen management, etc.
- NRCS influential among many farmers, and those farmers tend to be more open to action to adapt to increasing weather variability

Next Steps for CSCAP

- **Conducting in-depth interviews with 200 farmers**
 - Detailed understanding of how they think about climate change and potential impacts
 - Use of/perspectives on key adaptive and mitigative practices
- **Developing typologies to inform more effective engagement with farmers: who is concerned, who is not?**
 - How to translate concern into action?
 - How to address lack concern?
 - How to communicate effectively about preparing for potential impacts of climate change
- **Development of programming and materials that resonate with farmers without alienating those with differing perspectives**

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