



Great Plains  
Climate Education

Central Great Plains Climate Education Partnership

**KANSAS STATE**  
UNIVERSITY



UNIVERSITY OF  
**Nebraska**  
Lincoln®

- A regional project
- Agricultural producers
- Rural communities
- Rural schools

Rich opportunities for programs catering to differentiated stakeholder needs

# Outline For This Talk

- Overview of our project
- Lessons from focus groups
- Directions for potential future programming



*Central Great Plains Climate Education Partnership*

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PI: Ben Champion, Director of Sustainability, Kansas State University

Co-PI: Chuck Rice, agronomy professor, Kansas State University

Co-PI: Dan Devlin, Director, Kansas Center for Agricultural Resources and the Environment

Co-PI: Roger Bruning, cognitive psychology professor, University of Nebraska, Lincoln

**Senior Personnel:**

John Harrington, Jr. – geography professor, Kansas State University

Dan Kahl – community development extension associate, Kansas State University

Lisa Pytlik Zillig – public policy research professor, University of Nebraska, Lincoln

Jackie Spears – education professor, Kansas State University

Tim Steffensmeier – communications asst. professor, Kansas State University

Shannon Washburn – agricultural communications assoc. professor, Kansas State University

**Support Personnel:**

Amber Campbell Hibbs – project coordinator

Melanie Pechanec – graduate student assistant

# UNL Supplemental Grant Team

- Lisa – project coordinator
- Public Policy Center, University of Nebraska, Lincoln
  - Mr. Tarik Abdel-Monem, J.D., M.P.H., Research Specialist with expertise in public engagement and evaluation research.
  - Dr. Alan Tomkins, Director of the PPC, with expertise in public participation and institutional trust research, and in strategic planning
  - Dr. Nancy Shank, Associate Director of PPC, with expertise in innovation diffusion and strategic planning.
- High Plains Regional Climate Center
  - Dr. Martha Shulski, Director of the HPRCC and expert in the data monitoring, data availability, and data management
  - Dr. Ken Hubbard, Founding Director of the HPRCC, also expert in the data monitoring, data availability, and data management, and director of research at the HPRCC
  - Dr. Qi (Steve) Hu, Climatologist affiliate of the HPRCC, with
- National Center for Research on Rural Education
  - Dr. Gwen Nugent, Director of the Rural Education Leadership Institute and co-PI of the R2Ed project, with expertise in STEM curriculum and professional development.



# Climate Change Education Program (CCEP)

- Establish partnerships
- Increase effective educational programs
- Improve understanding of global climate change

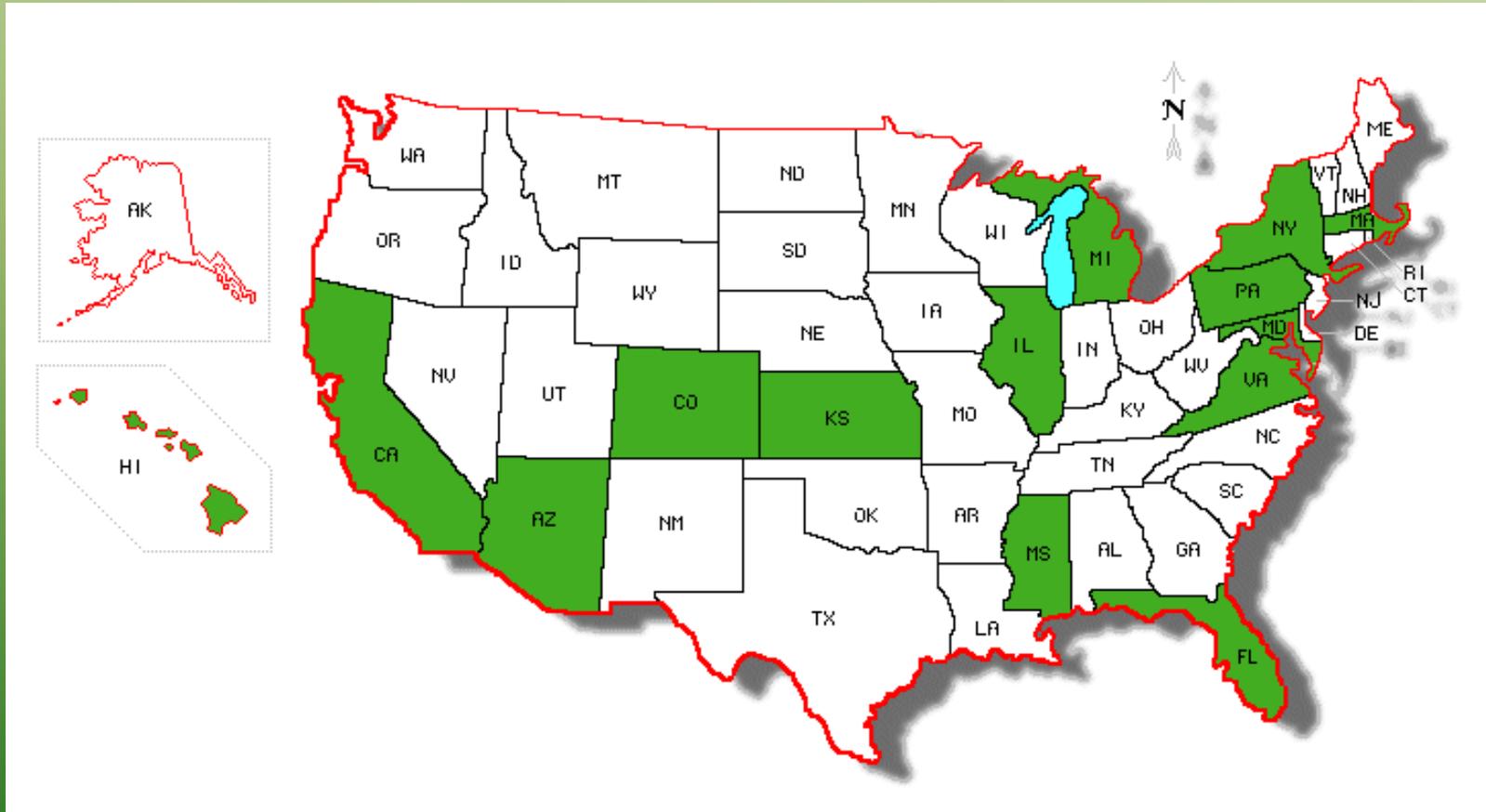
# Three Knowledge Communities

- Climate scientists
- Learning scientists
- Educational practitioners

# Two-Phase Program

- Phase I (CCEP-I)
  - Synthesis
  - Network-building
  - Strategic planning
- Phase II (CCEP-II)
  - Implementation of educational programming

# 15 CCEP-I Awards

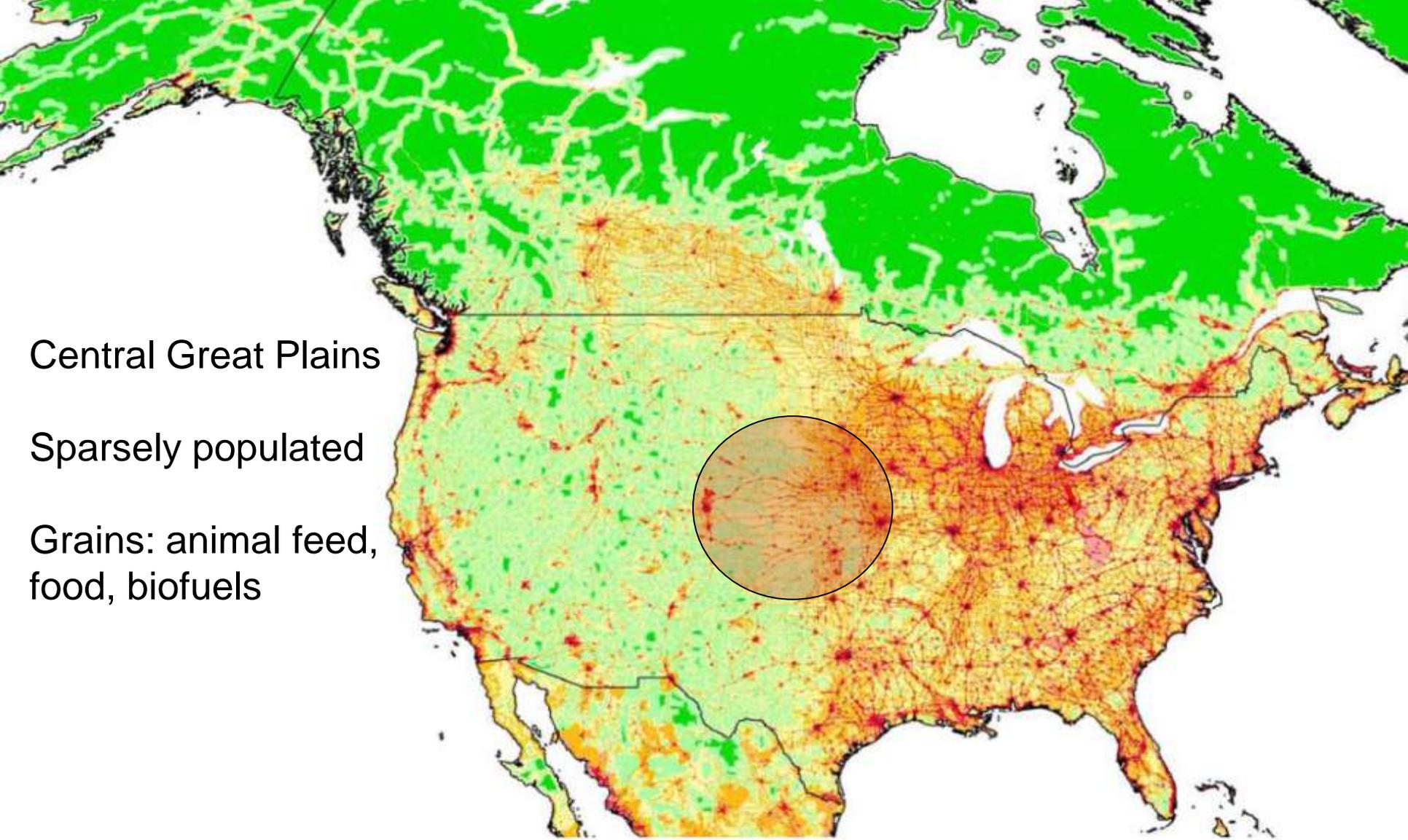


# Our Project

# Central Great Plains Regional Focus

- Economic well being heavily dependent on agriculture
- Need for knowledgeable land managers
- Prepare for the impacts of climate change

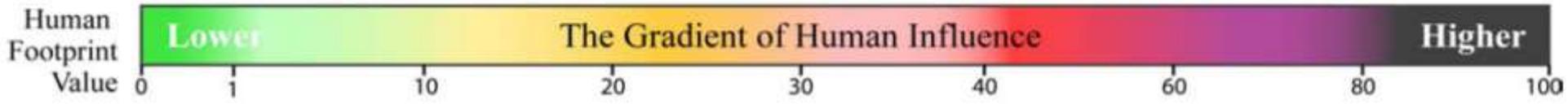




Central Great Plains

Sparsely populated

Grains: animal feed, food, biofuels



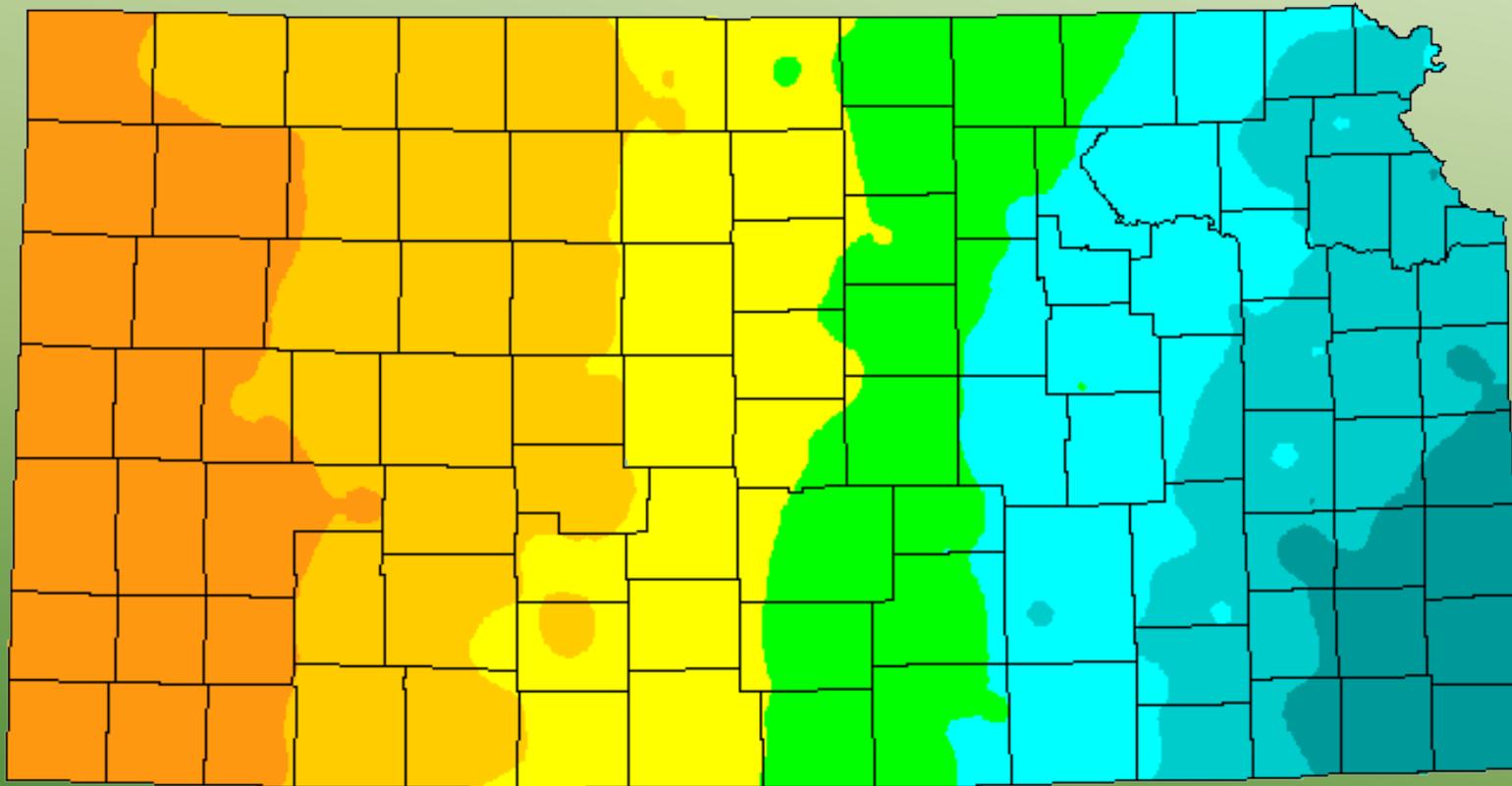
# Uniqueness of CGP-CCEP

- Central Great Plains
  - A region with high stakes in climate vulnerability due to global significance of its agricultural output
  - Also under-represented in public discourse about climate change
- Major focus not just on formal education, but on agricultural producers and rural communities
  - Practitioners and decision-makers

# Average Annual Precipitation

Copyright 2000 by Spatial Climate Analysis Service,  
Oregon State University

## Kansas



### Legend (in inches)

Under 20	32 to 36
20 to 24	36 to 40
24 to 28	Above 40
28 to 32	

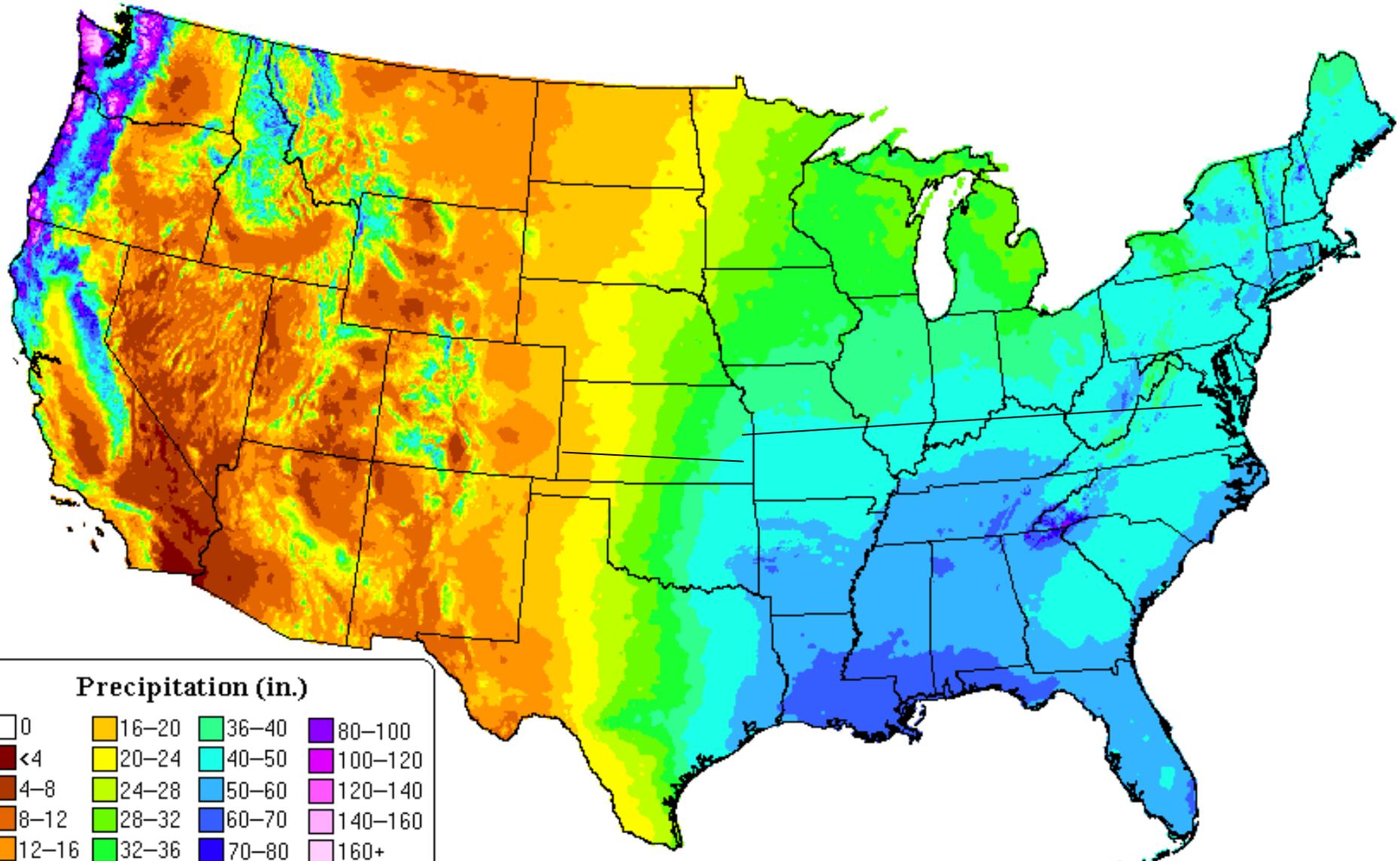
This is a map of annual precipitation averaged over the period 1961-1990. Station observations were collected from the NOAA Cooperative and USDA-NRCS Snotel networks, plus other state and local networks. The PRISM modeling system was used to create the gridded estimates from which this map was made. The size of each grid pixel is approximately 4x4 km. Support was provided by the NRCS Water and Climate Center.

For information on the PRISM modeling system, visit the SCAS web site at <http://www.ocs.orst.edu/prism>

The latest PRISM digital data sets created by the SCAS can be obtained from the Climate Source at <http://www.climatesource.com>

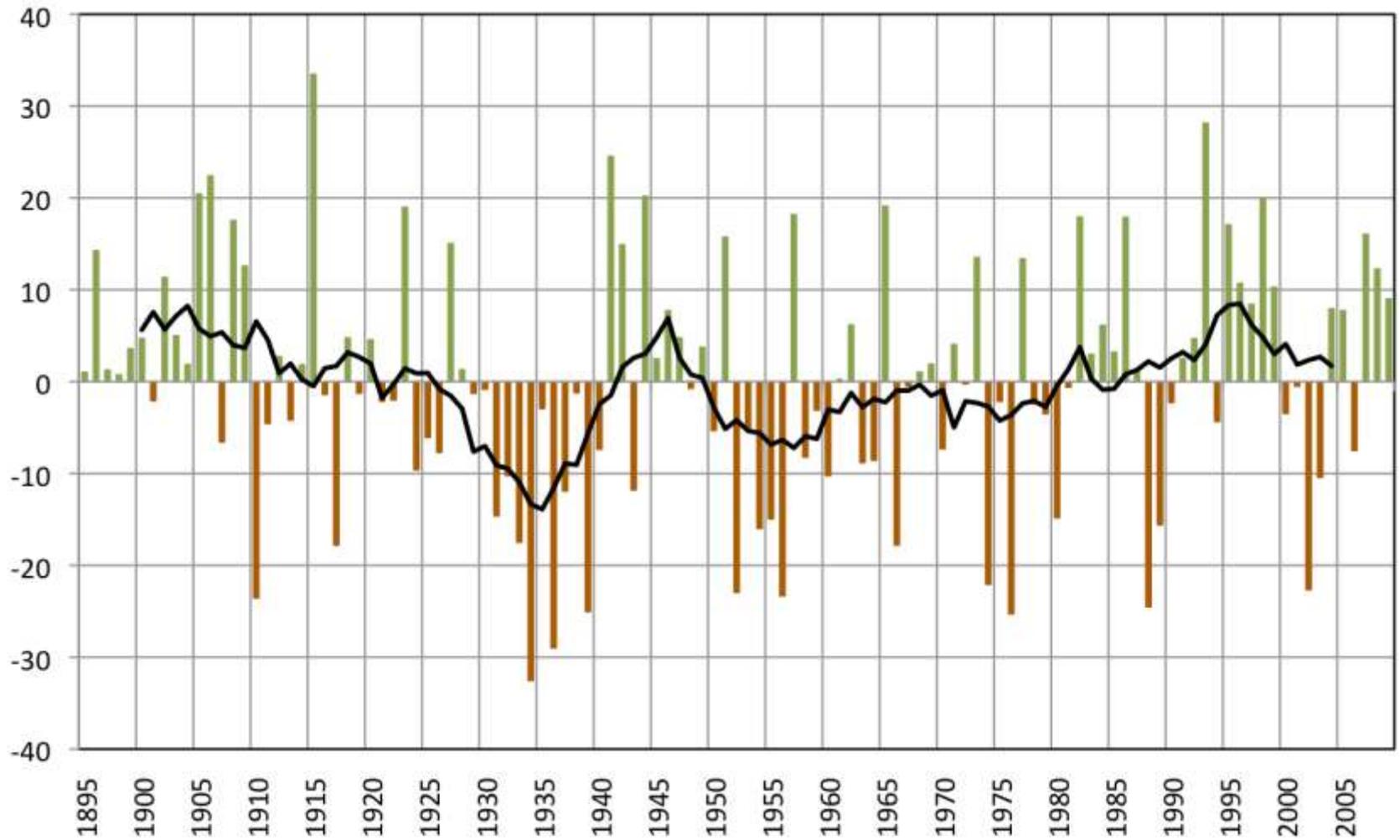
# Precipitation: Annual Climatology (1971–2000)

PRISM: Parameter-elevation Regressions on Independent Slopes Model

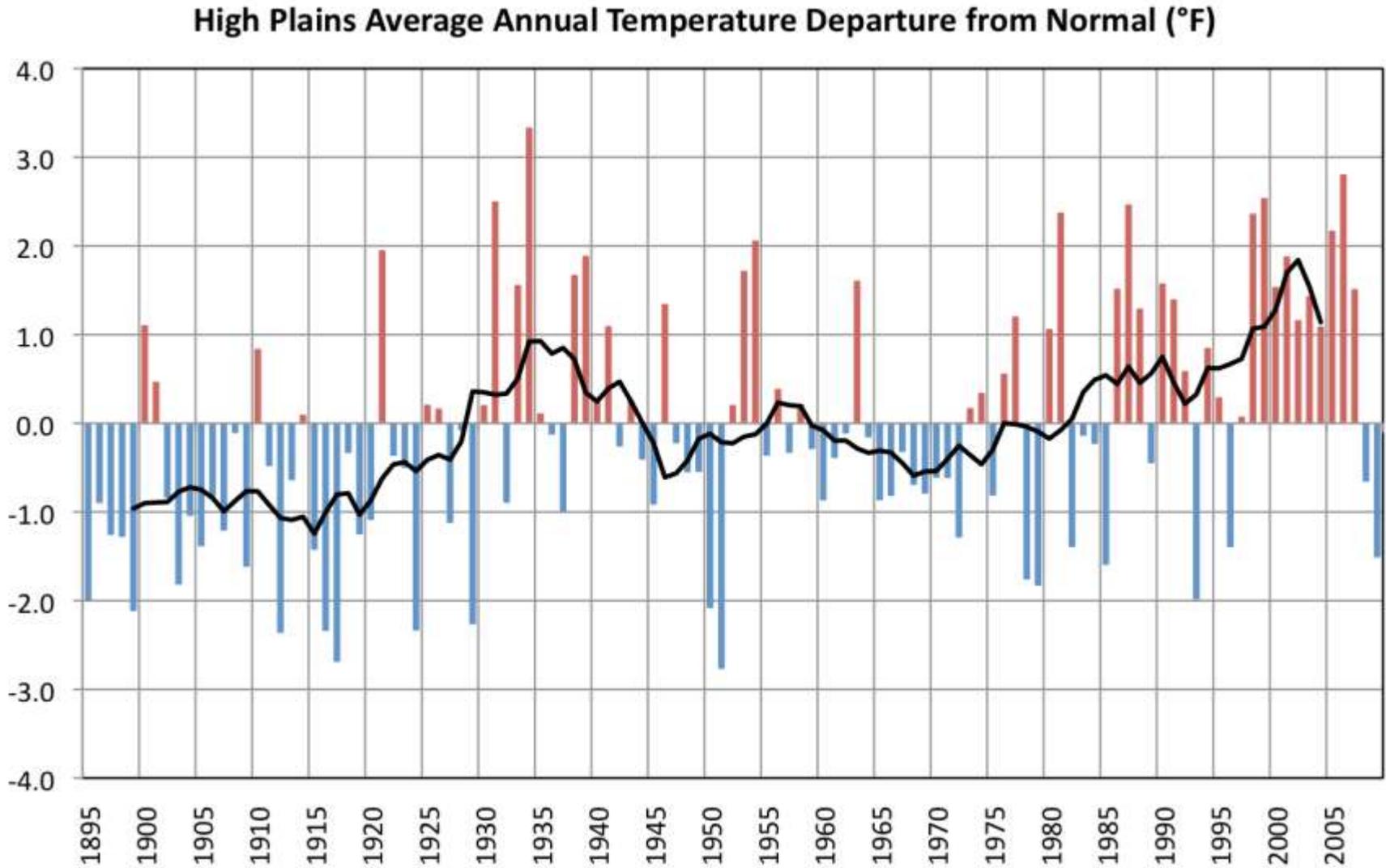


# Precipitation

High Plains Annual Precipitation Departure from Normal (%)



# Temperature



# Mean annual temperature trend

## Konza warming!

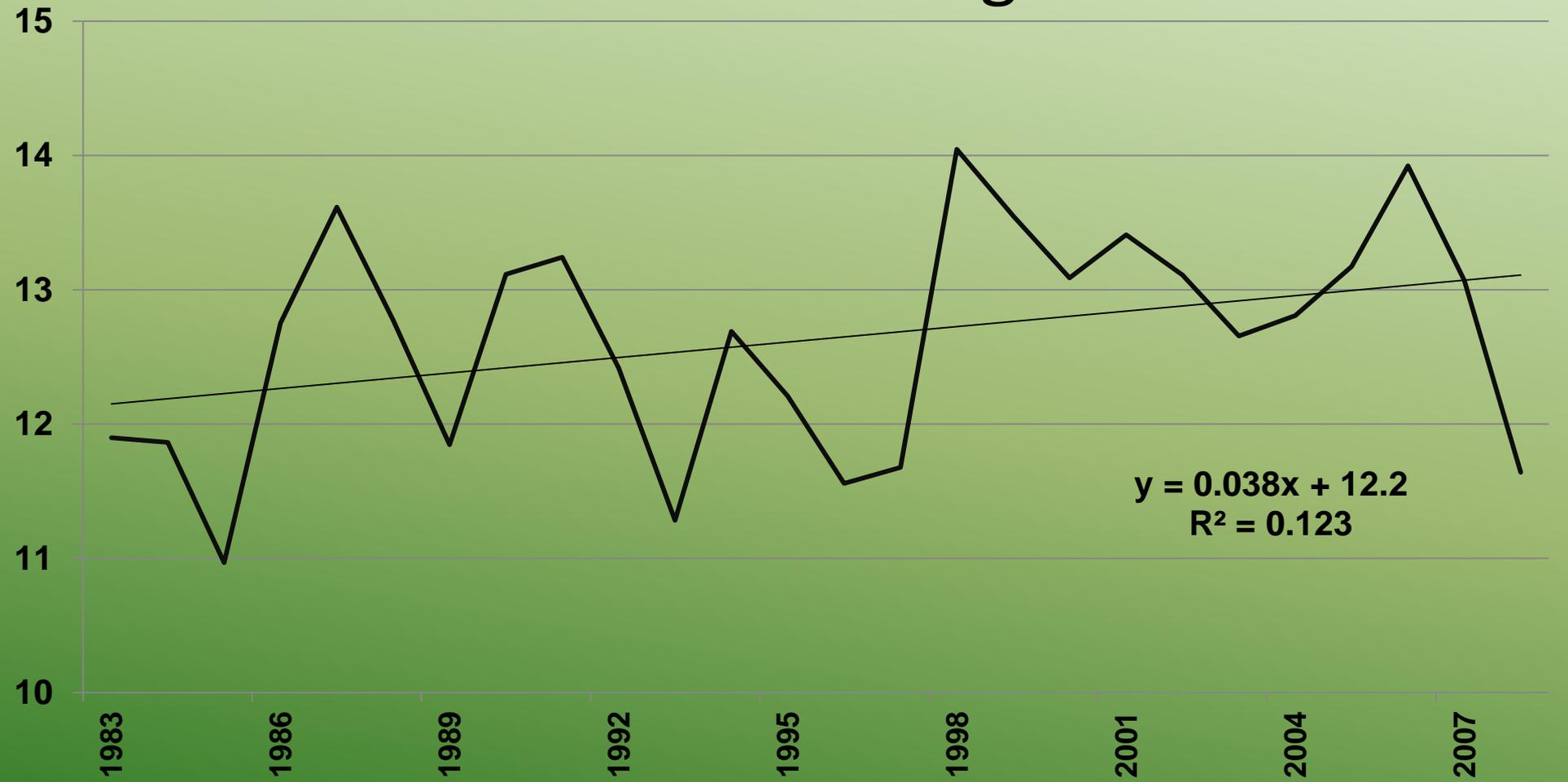
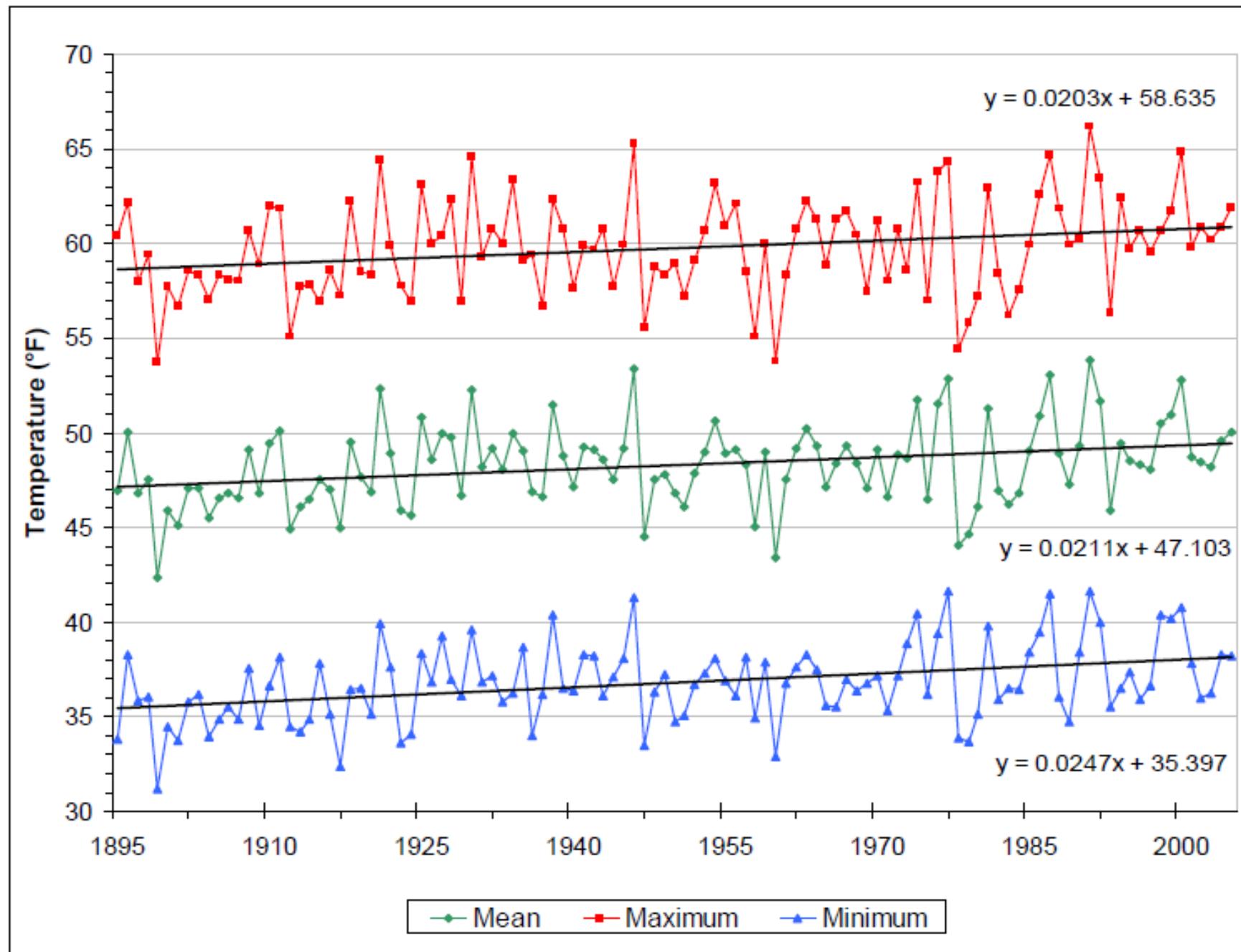


Figure 4.4 – Northeast Kansas Spring Temperatures Trends



## Climate Change Hits Home The Risks to Kansas

Prepared for the Climate and Energy Project of the Land Institute by  
Johannes J. Feddema, Nathaniel A. Brunsell, Trish L. Jackson and Aubrey R. Jones  
Dept. of Geography, Univ. of Kansas, 1475 Jayhawk Blvd, Lawrence, KS 66045  
Contact: [feddema@ku.edu](mailto:feddema@ku.edu) or (785) 864 5534  
October 23, 2008

Summary of research carried out by University of Kansas scientists Drs. Nathaniel Brunsell and Johannes Feddema, and assistants Trish Jackson, Aubrey Jones, and Kelly Logan  
**November 2008**

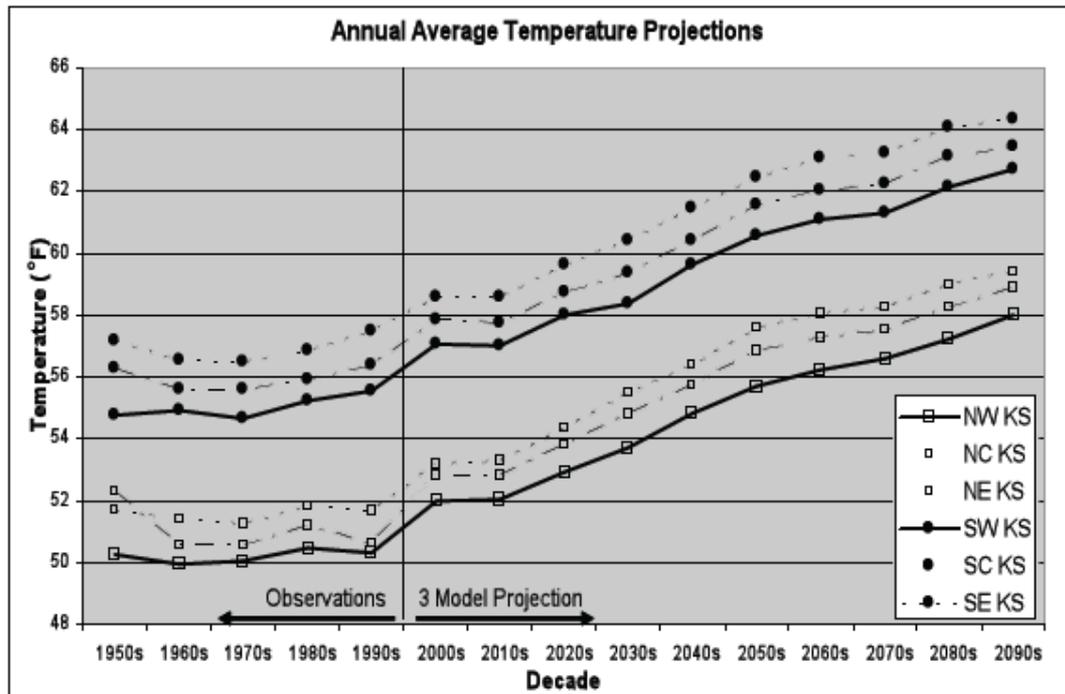
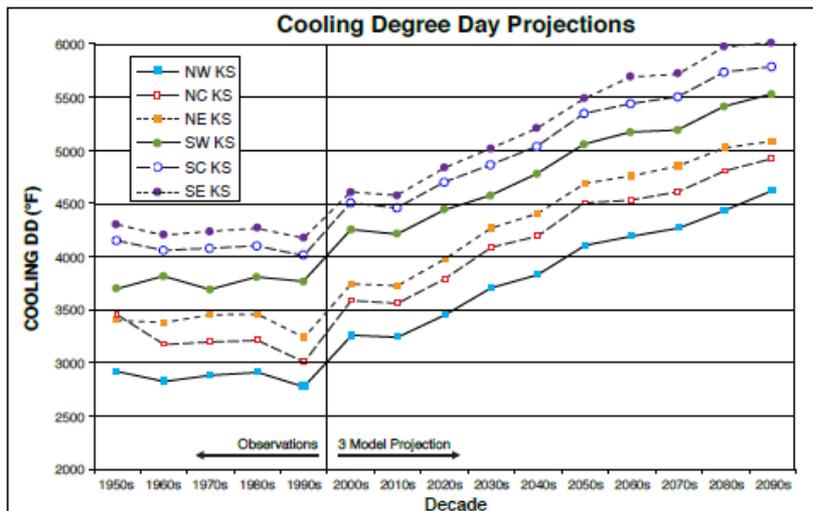
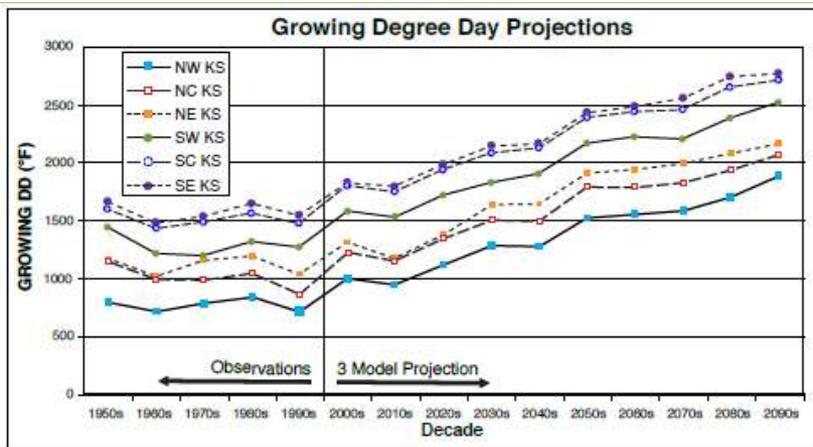


Figure 8. Historical observations (left of the vertical line) and projected temperature changes based on future climate simulations from three global climate models that best simulated the Kansas Climate conditions over the 20<sup>th</sup> Century. Projections are based on middle of the road (IPCC A1B) greenhouse gas emissions scenarios, and are given for 6 regions in the state.

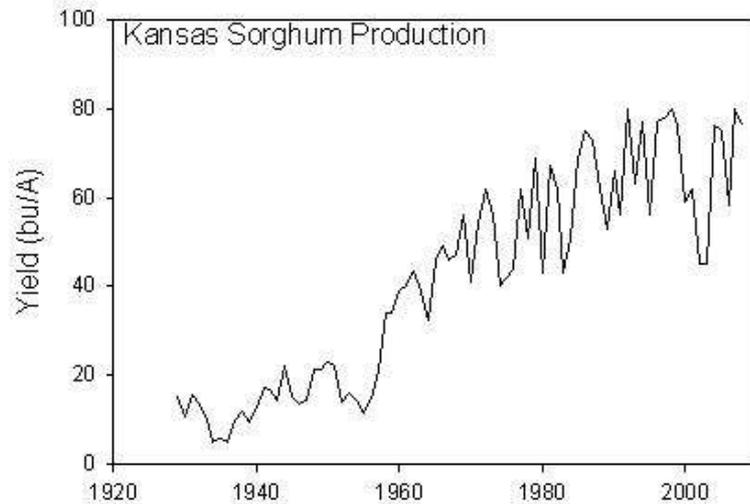
# Climate Change Projections

- Temperature
  - Warming of about 4°F by 2050
  - 8°F or higher by 2090
- Precipitation
  - Drying in summer and autumn
  - Wetter in winter
  - Variation in spring precipitation across region

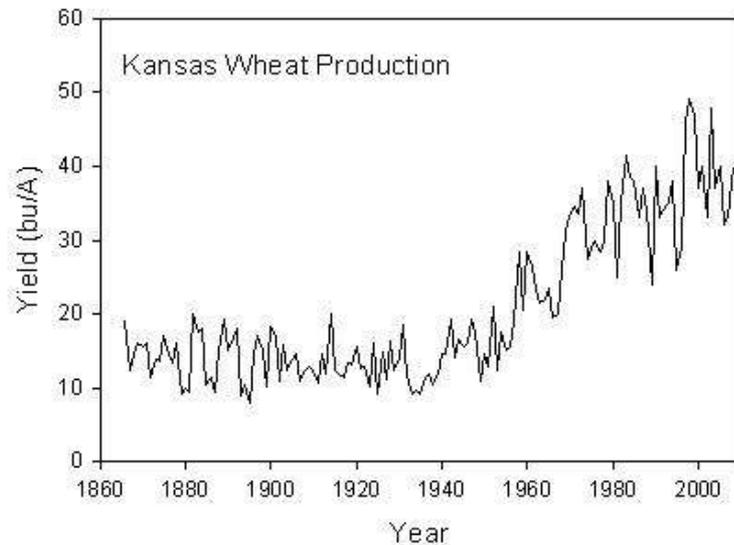
# Longer-Term Prospects

- <http://climatecommunication.org/>

# Variation in Crop Yields



**Sorghum**



**Wheat**





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# Process

- Engagement with each stakeholder group
  - Focus groups primarily
- Development of region-wide partnership
  - K-State and UNL collaboration on action items and strategic planning, exploring further partnerships
- Strategic planning for educational programming
  - Development of educational programs
  - Feedback from stakeholders
  - Phase II proposal development and submission

# Outline

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# Kansas Focus Groups

# 20 Focus Groups Across Kansas

	n	Median Age	% White	% Male
Agricultural Producers	46	56	85	70
Community Members	66	52	91	59
Educators	65	35	86	68

## Demographics:

- Five groups of agricultural producers (total  $n = 46$ ) with a median age of 56, who were primarily white and 70% male
- Eight groups of rural community members (total  $n = 66$ ) with a median age of 52 who were also primarily white, and 59% male
- Seven groups of rural educators ( $n = 65$ ) with a median age of 35 and who, again, were primarily white, 68% male

# Central Great Plains CCEP Partnerships



## Round 1 Stakeholder Meetings

- Community (Purple Circle)
- Educator (Green Triangle)
- Agricultural Producer (Blue Square)
- Interstate Highway (Thick Red Line)
- U.S. Route (Thin Red Line)
- Kansas Boundary (Yellow Outline)



# Agriculture and Community

## Discussion Topics

1. What have been your observations about variations in climate in the last decade? How have you been impacted by variations in climate?
  - Follow up: In what ways, if any, have you responded to the variations in climate?
2. What are the common beliefs and values (or concerns) about trends in weather and climate variation that apply to people across the spectrum?
3. What kinds of information or resources would you like to know about climate variability? What resources and information are important to people in this group?
4. What sources of information regarding climate variations do you use and trust?
5. What are the approaches to talking about climate change that you do appreciate? What are the approaches to talking about climate change that you don't appreciate?

# Educator Discussion Topics

1. Where is climate addressed in your curriculum?
  - Follow-up: What specific courses include this material? What grade level are those courses?
2. Do the current curriculum standards get in the way or offer an entry point for climate education?
3. What are you doing to teach climate change in these courses?
  - Follow-up: Are you including local climate data in your courses?
4. What kind of information do you need to improve your understanding of climate change?
5. What kinds of materials would you prefer to teach climate change?
  - Follow-up: What sources of information do you use and trust?
6. What would be the best way to get this information to you?
7. What concerns have there been by your school system or community about including climate change in your curriculum?

# “6 Americas” in 2010

Alarmed      Concerned      Cautious      Disengaged      Doubtful      Dismissive

July  
2010  
n=2,030



Highest Belief in Global Warming  
Most Concerned  
Most Motivated

Lowest Belief in Global Warming  
Least Concerned  
Least Motivated

*Proportion represented by area*

Source: Yale Project on Climate Change Communication

# 2011



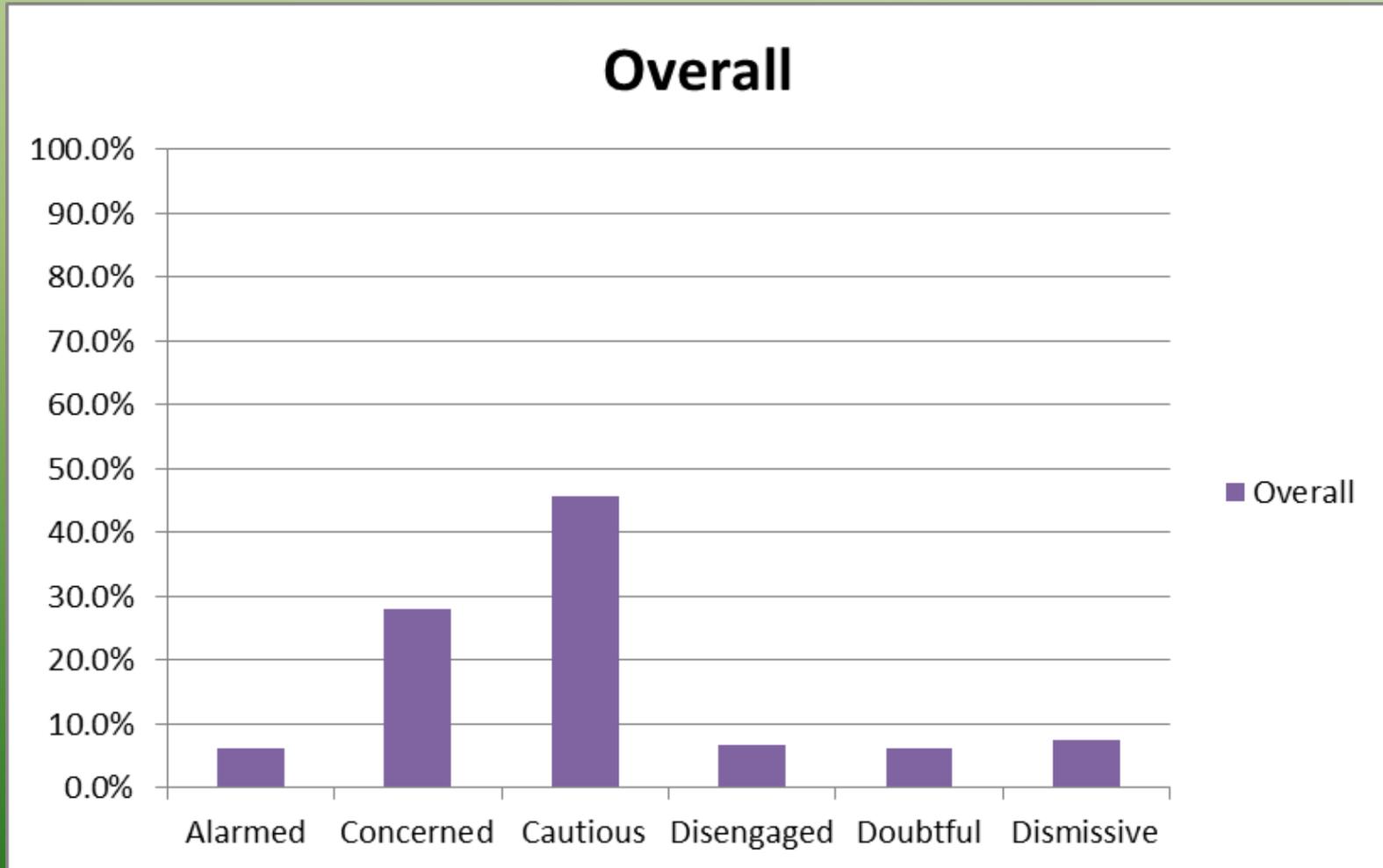
*Proportion represented by area*

Source: Yale / George Mason University

# 2012



# KS Focus Groups

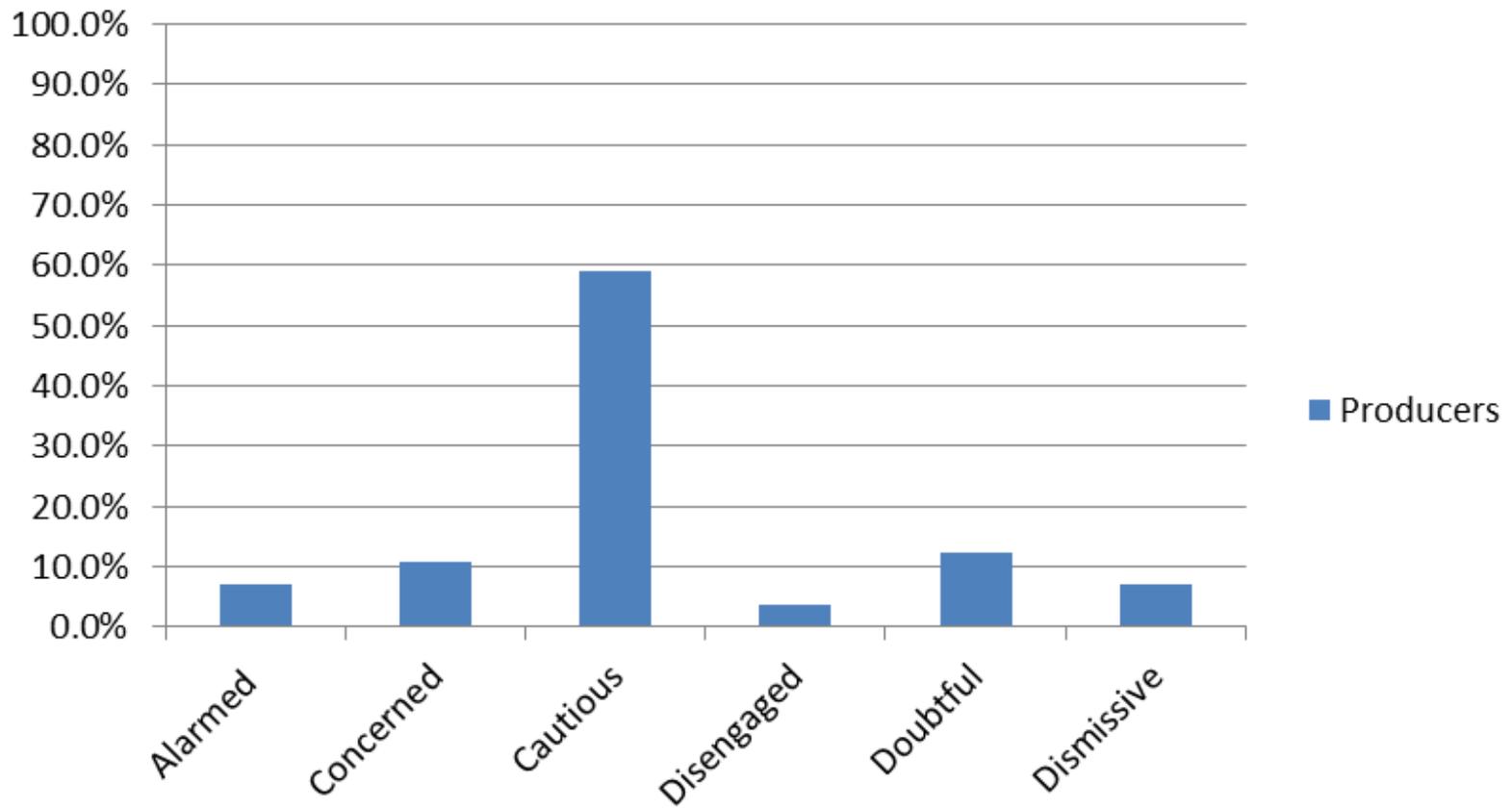


# Overarching Themes

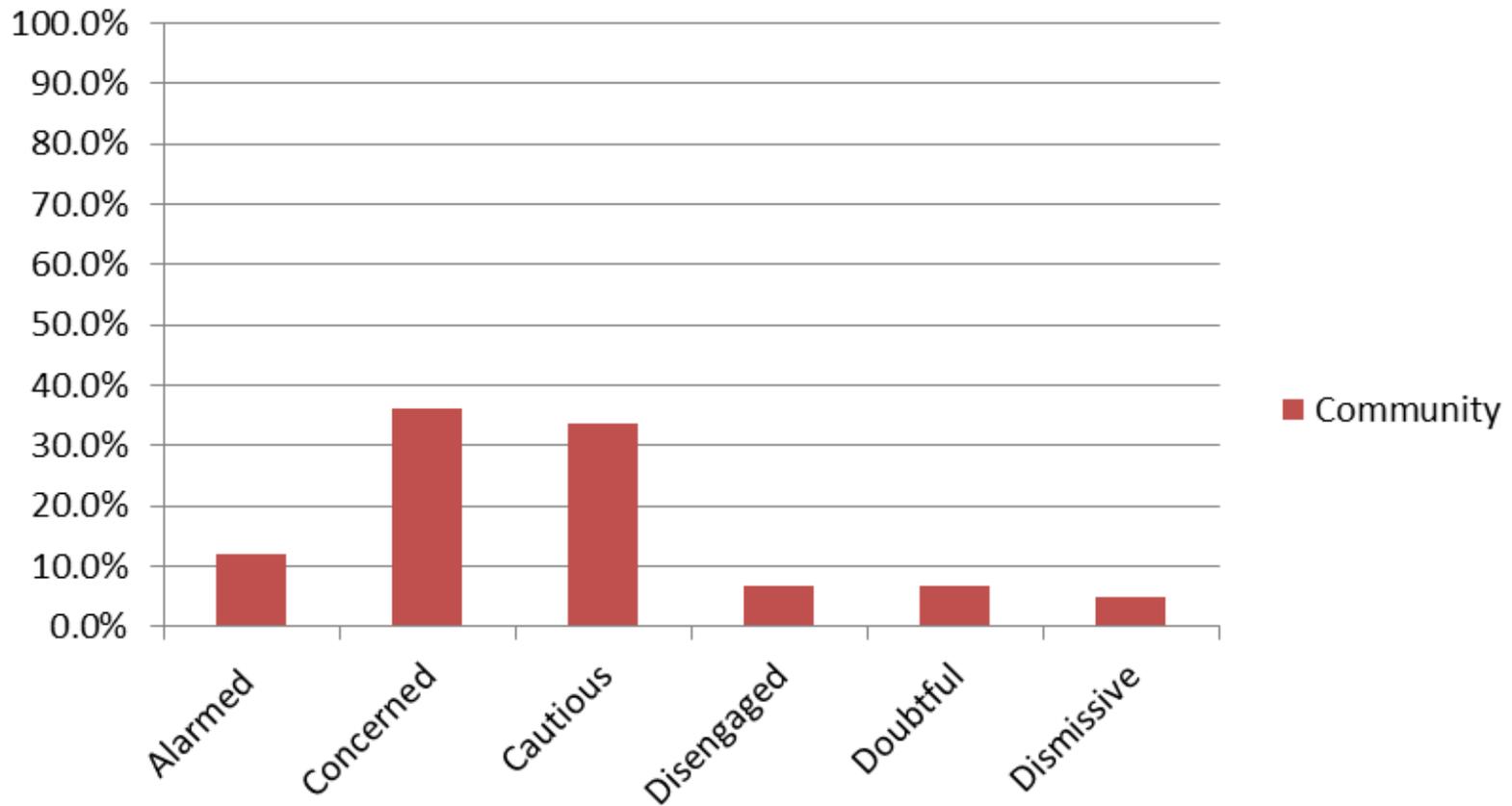
- Trust
- Locally and personally relevant information
- Easy to access information
- Ability to engage with information on their own terms, pointing to:
  - Deliberative public engagement formats
  - Tools that give access to relatively unfiltered data for decision-making and inquiry-based learning

PytlikZillig, L, Steffensmeier, T., et al. (2012) "*Fostering Climate Change Education in the Central Great Plains.*" *The International Journal of Environmental, Cultural, Economic and Social Sustainability (forthcoming)*

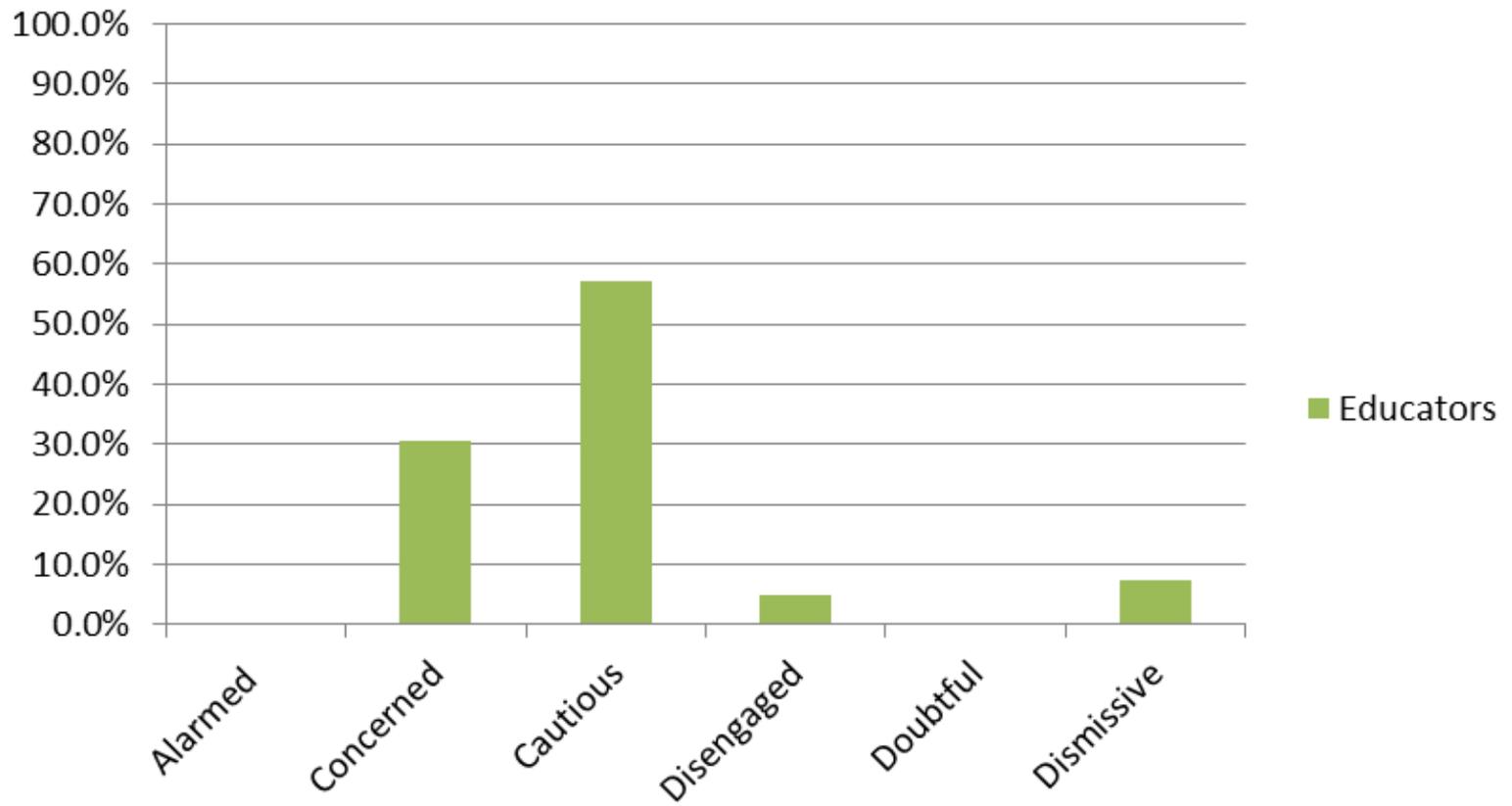
# Producers



# Community



# Educators



# Producer qualitative results

- Impacts
  - Operational Management
  - Business Finances
  - Personal Lives
- Attitudes Re: Climate Change Information
  - Needs to be unbiased; Extension, NOAA, NWS as trusted sources
  - Locally-based data related to agricultural needs
  - Producer-oriented conferences good venues
  - Lots of conflicting information out there
- Attitudes toward Climate Education
  - Educators should be objective
  - Need to “show proof” and not come with assumptions
  - Allow learners to validate information on their own terms, allow them to work with data

# Community qualitative results

- Impacts
  - Financial Impacts
  - Future Generations
- Information and Resource Needs
  - Concern that what is presented as data is actually interpretation of data
  - Widespread concern about bias based on greed, politics, etc.
  - Confusion about public discourse and “debate”
- Trusted Sources
  - Land-grant universities, some governmental agencies (NOAA, NWS)
  - General distrust of government and other organizations driven by “agendas”

# Community qualitative results

- Approaches to Climate Education
  - Politicized “debate” is not appreciated
  - Positive solutions encouraged rather than blame, guilt, alarmism
  - Unbiased data presented in easy to understand ways is desired
  - Space to make up their own minds whether or not climate change and how serious it is
  - Discussion of individual actions available for personal agency/power to make a difference

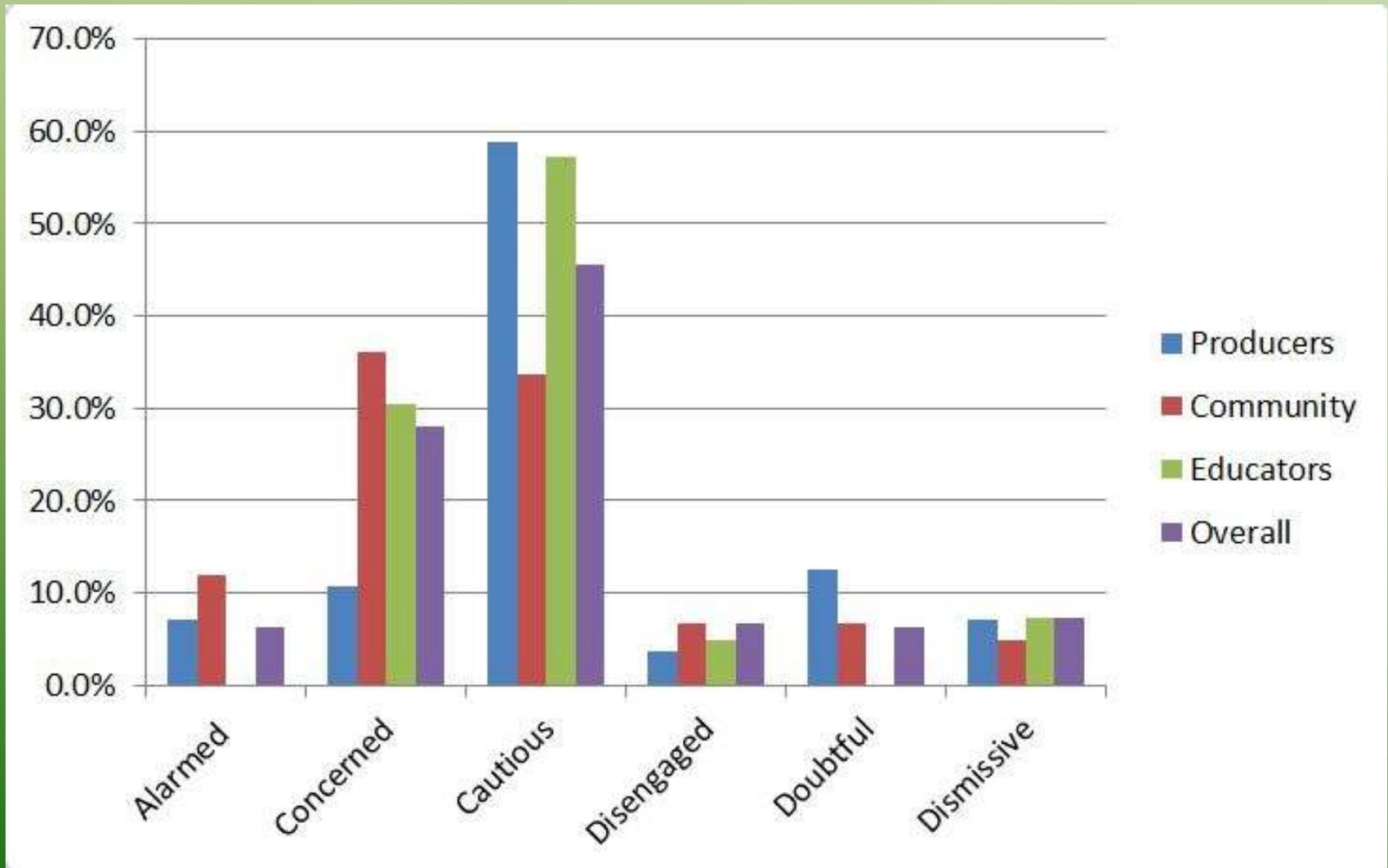
# Educators qualitative results

- Existing classroom content
  - Some science and agriculture teachers currently use climate content and climate change for learning activities
  - Can be used with existing science standards and as critical thinking exercises
- Information and Resource Needs
  - Unbiased, depoliticized information difficult to find and challenge for students to access
  - Need guidance from National Science Standards and state standards to help shape lessons
  - Information must be applicable to student lives
  - Materials vetted by a trusted source, like Extension, NOAA, USDA

# Educators qualitative results

- Approaches to Climate Change Education
  - Must not point fingers or blame, keeping the conversation positive
    - “The first thing to shut kids down is their parents are bad people because they’re producing CO2.”
  - Cross-curriculum engagement needed
  - Prefer peer-to-peer dissemination through professional networks
  - Field-tested lessons highly valued

# Comparative graphic



# Nebraska Focus Groups

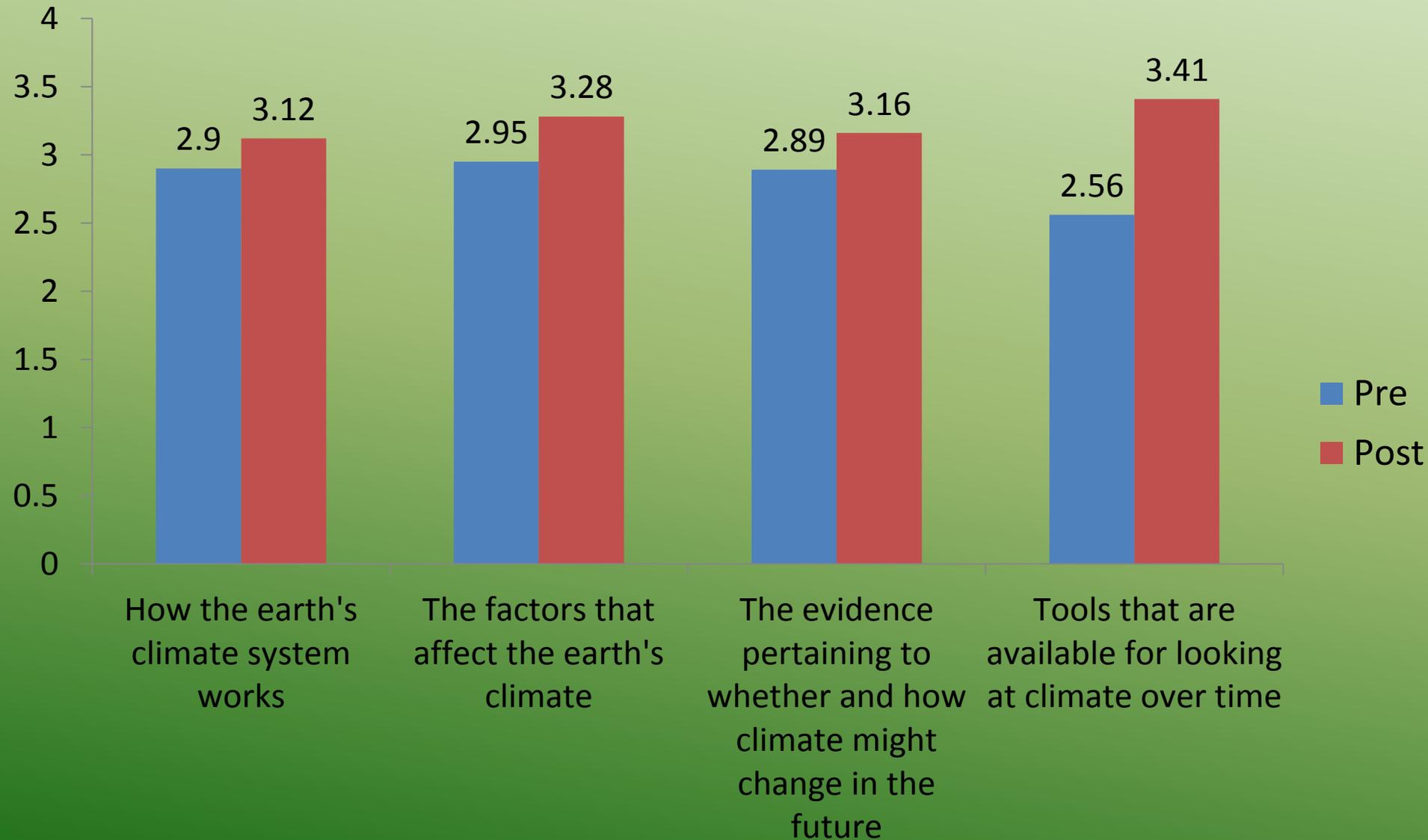
# Nebraska Focus Group Methods

- 6 focus groups
- Pre/Post measures, Climate education, Discussion
- Targeting 3 audiences (n=121)
  - Primarily female (63%)
  - White (97%)
  - 50 years+ (75%)
  - Bachelor's degree+ (71%)

# Focus Group Inquiries

- Did focus groups lead to positive outcomes?
  - Did they gain knowledge?
  - Did they change attitudes?
- What recommendations for climate education?
  - How do they currently seek information about the climate?
  - What sort of further information do they want?

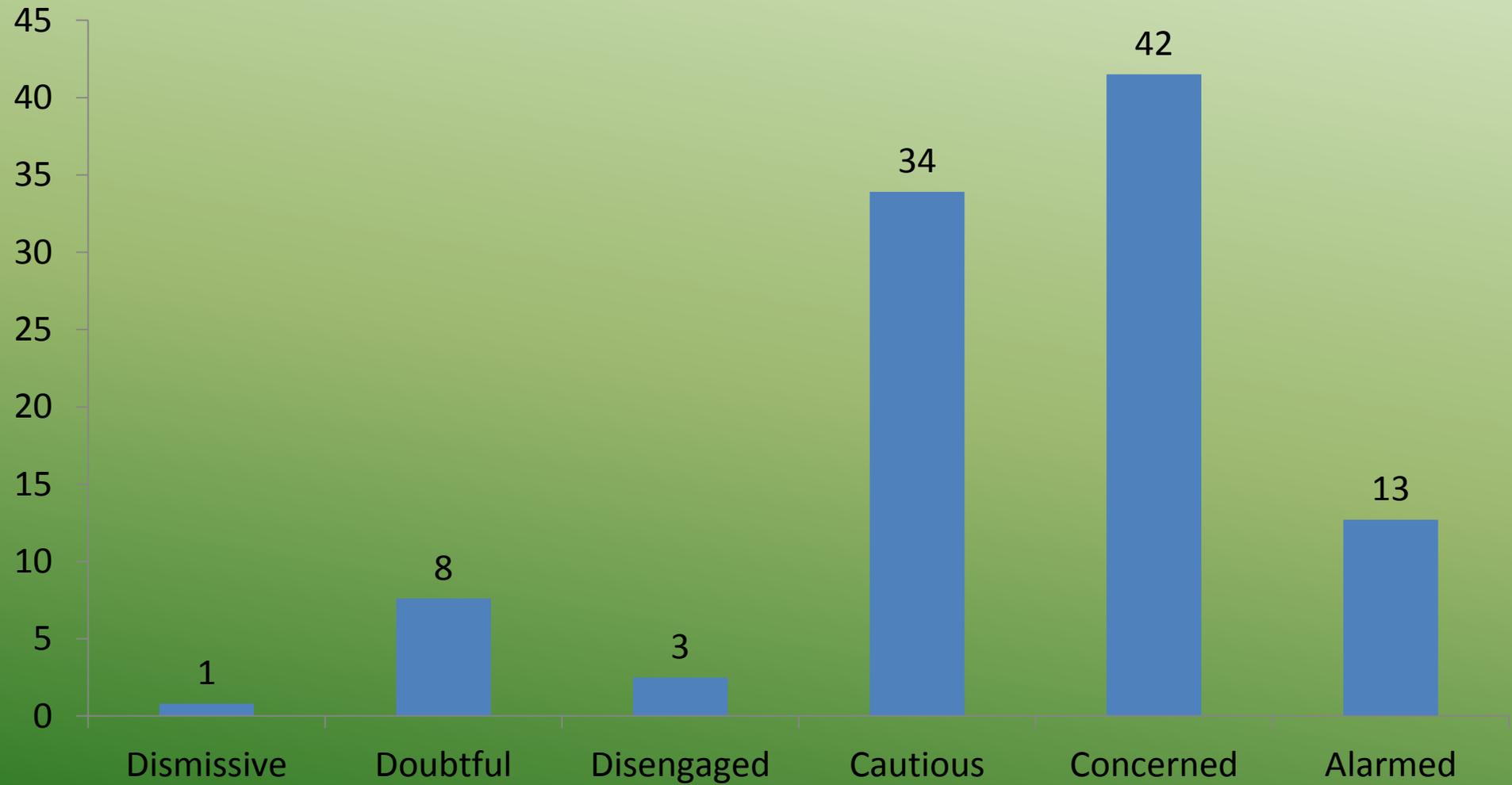
## Self-Assessment of Knowledge Gain



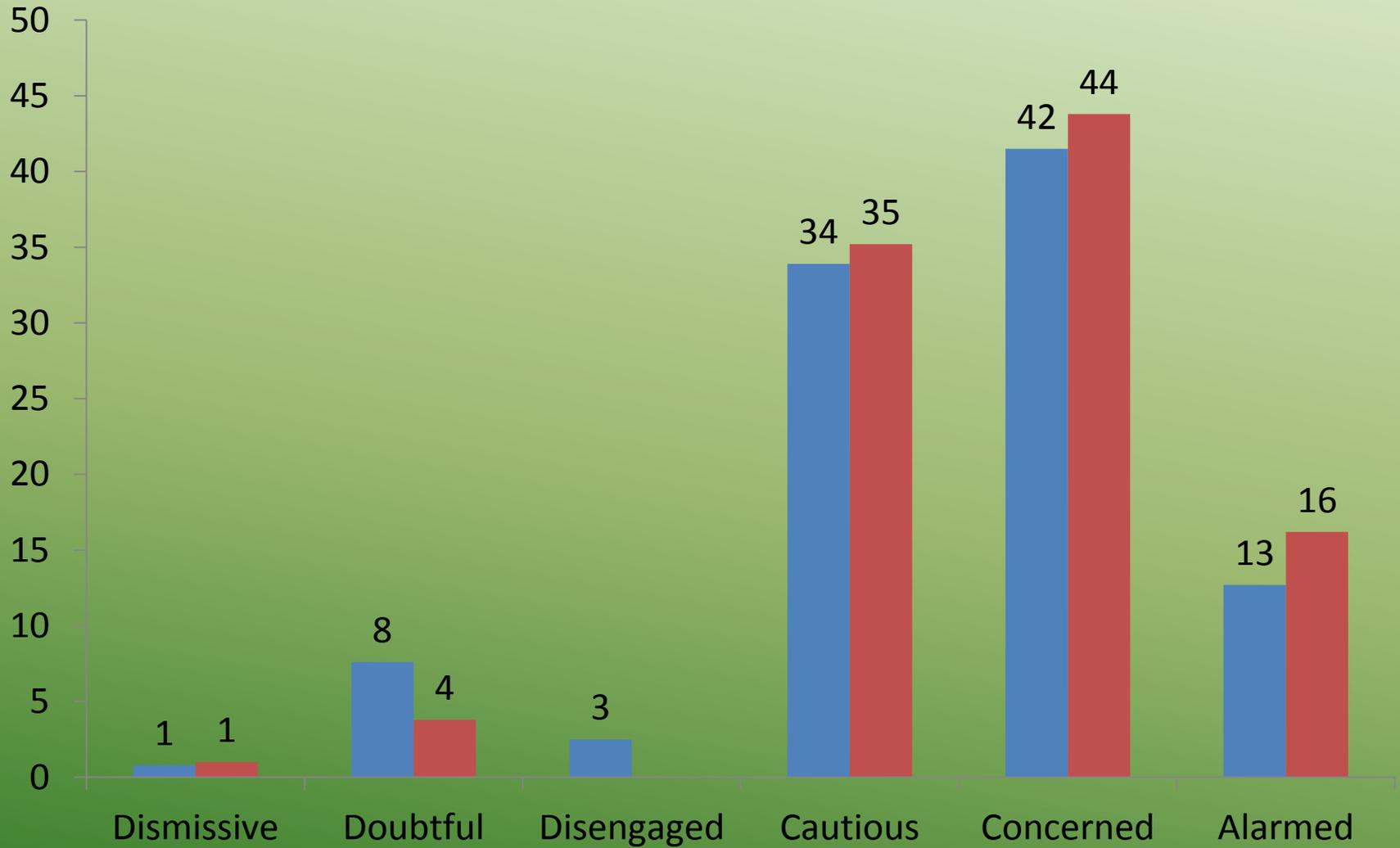
# Assessment of Knowledge (Leiserowitz, Smith, Marlon, 2010)

	Statement	Mean	SD	t	df	p
Pair 1	Climate means the average weather conditions in a region.	-.078	1.316	-.520	76	.605
Pair 2	The Earth's climate is colder now than it has ever been before.	-.208*	.592	-3.078	76	.003*
Pair 3	Weather often changes from year to year	.052	.887	.514	76	.609
Pair 4	Climate and weather mean pretty much the same thing.	-.195	1.193	-1.433	76	.156
Pair 5	Climate changes have played an important role in the advance or collapse of some past human civilizations.	-.026	.606	-.376	76	.708
Pair 6	Compared to the climate of the past million years, the last 10,000 have been unusually warm and stable.	-.091	1.183	-.674	76	.502
Pair 7	The Earth's climate has been pretty much the same for millions of years.	-.078	1.097	-.623	76	.535
Pair 8	The decade from 2000-2009 was warmer than any other decade since 1850.	-.753*	.861	-7.679	76	.000*
Pair 9	Climate often changes from year to year.	-.143	1.421	-.882	76	.380
Pair 10	The Earth's climate is warmer now than it has ever been before.	.481*	1.177	3.584	76	.001*
Pair 11	Climate change will cause some places to get wetter, while others will get drier.	-.286*	.646	-3.881	76	.000*
Pair 12	Scientists can't predict the weather more than a few days in advance – they can't possibly predict the climate of the future.	-.130	1.018	-1.120	76	.266
Pair 13	The Earth's climate has changed naturally in the past; therefore humans are not the cause of climate change.	-.286*	1.202	-2.087	76	.040*
Pair 14	The Earth is actually cooling, not warming.	-.403*	.950	-3.721	76	.000*
Pair 15	Weather means the average climate conditions in a region.	-.013	1.610	-.071	76	.944
Pair 16	Climate change is happening, but will be more beneficial than harmful	-.182	1.035	-1.541	76	.127

## 6 Americas: Pre



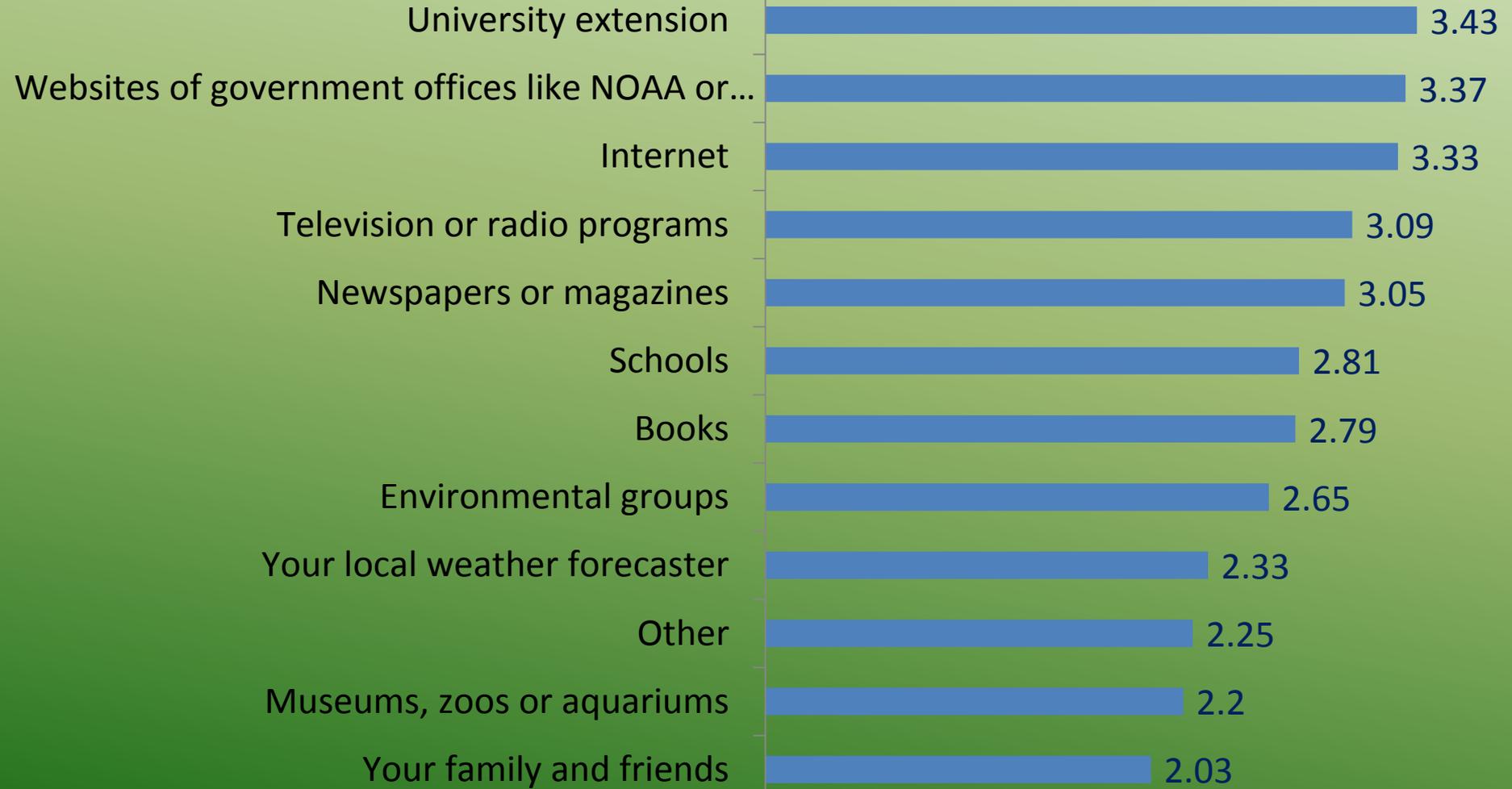
## 6 Americas: Pre/Post



- ( $M = 4.43, SD = 1.165$  at t1;  $M = 4.65, SD = .951$  at t2);  $t(101) = -2.753, p = .007$ .

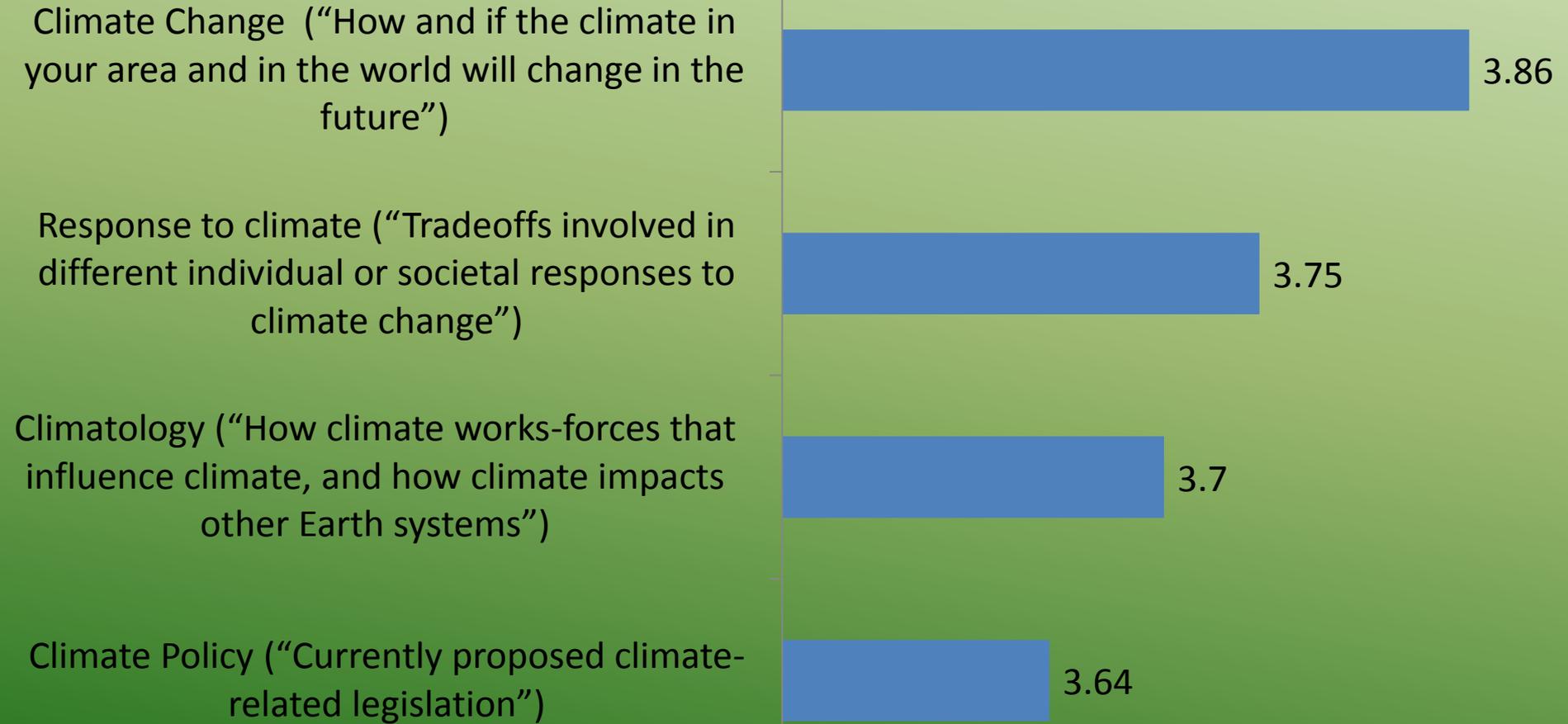
# Preferred Information Sources

0 0.5 1 1.5 2 2.5 3 3.5 4



## Desired Information

3.5 3.55 3.6 3.65 3.7 3.75 3.8 3.85 3.9



# Outline

- Overview of our project
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# Program Concepts

# Inquiry-Based Education

- Need to let learners engage with climate content on their own terms
- Structured engagement with content needs to allow inquiry according to learner-specific needs

# Social Learning is Important

- Peer-to-peer dissemination
  - Educator professional networks
  - Producer-oriented conferences and existing programming
  - Community conversations and public deliberation

# Personal Agency is Critical

- Community focus groups wanted practical ideas for individual actions for impact
- Producers and Educators have professional capacities to act and desire educational models that will empower their decision-making

# Education Program Options

- Extension professional development
- Statewide Extension program development
- Public deliberation and community workshops
- Decision support for rural community leaders and agricultural producers
- Citizen science
- Teacher workshops and professional development
- Teacher peer-to-peer curriculum development



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Thank You!



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