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- Audio check - use the Audio Settings  options to do a sound check
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Getting started with climate change and agriculture: **What do Michigan farmers think?**

Monday, January 25, 2016

Julie E. Doll

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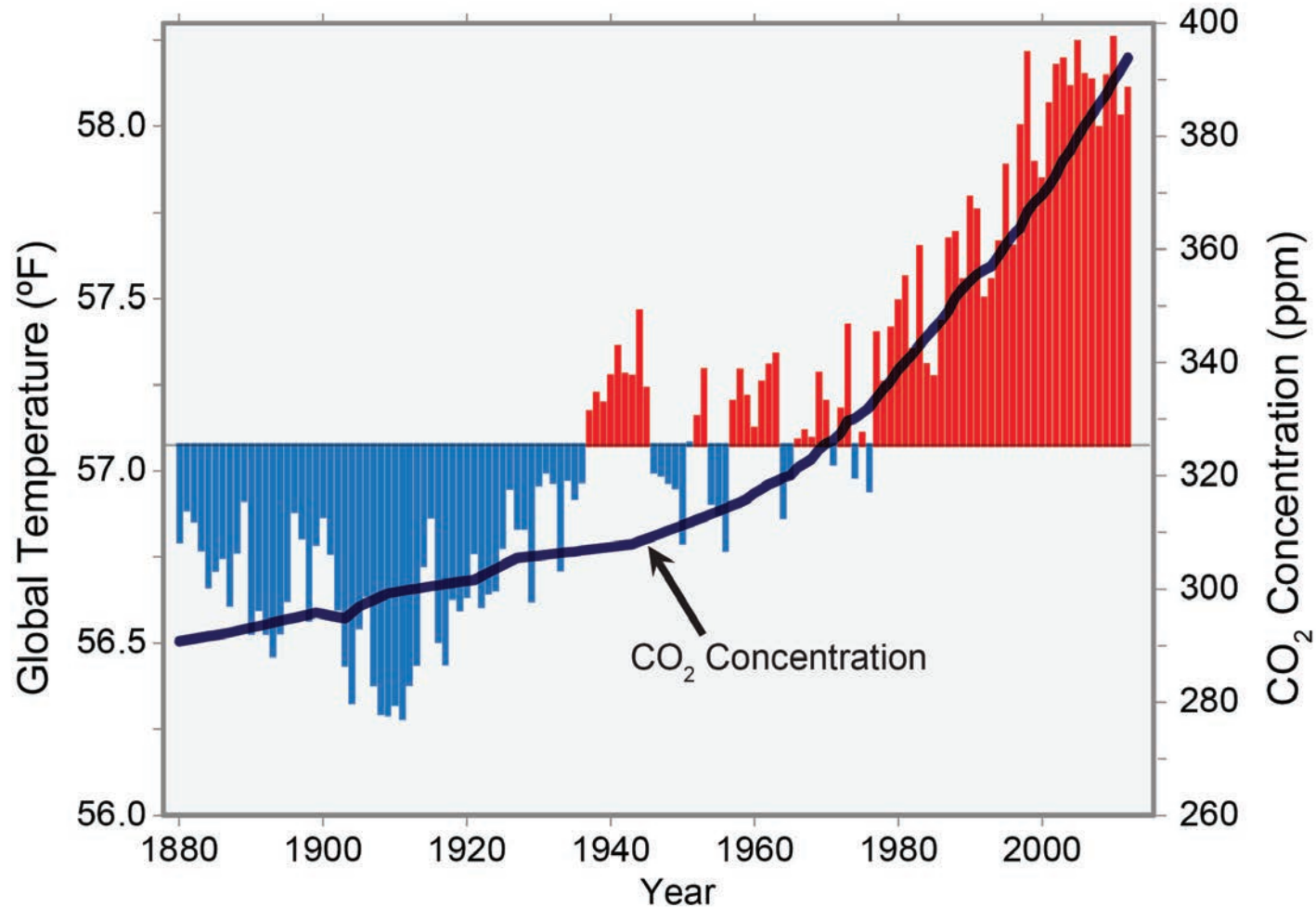









Global temperature and carbon dioxide




Kellogg Biological Station Long-term Ecological Research program



KBS LTER
KELLOGG BIOLOGICAL STATION | LONG-TERM ECOLOGICAL RESEARCH

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An Ecosystems Approach to Make
AGRICULTURE SUSTAINABLE AND PROFITABLE

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KELLOGG BIOLOGICAL STATION LONG-TERM ECOLOGICAL RESEARCH (LTER) PROGRAM IS PART OF A NATIONAL NETWORK OF LTER SITES ESTABLISHED BY THE NATIONAL SCIENCE FOUNDATION

KBS LTER research aims to understand the ecology of Midwest cropping systems and agricultural landscapes. We study interactions among plants, microbes, insects, management, and the environment to learn how agriculture can provide both high yields and environmental outcomes that benefit society. [Learn More >>](#)

UPCOMING EVENTS

November 6, 2012 3:00 pm
Executive Committee Meeting

December 3, 2012 9:00 am
Climate change communication training

December 4, 2012 3:00 pm
Executive Committee Meeting

RECENT POSTS

10.16.12 | New website on agriculture and ecology provides user-friendly access, resources

10.10.12 | New fact sheet – Climate Basics

10.2.12 | KBS LTER Graduate Student Fellowships for 2013

RESEARCH HIGHLIGHTS

CLIMATE CHANGE


LANDSCAPE DIVERSITY

SOIL MICROBES

CLEAN WATER

SOIL CARBON

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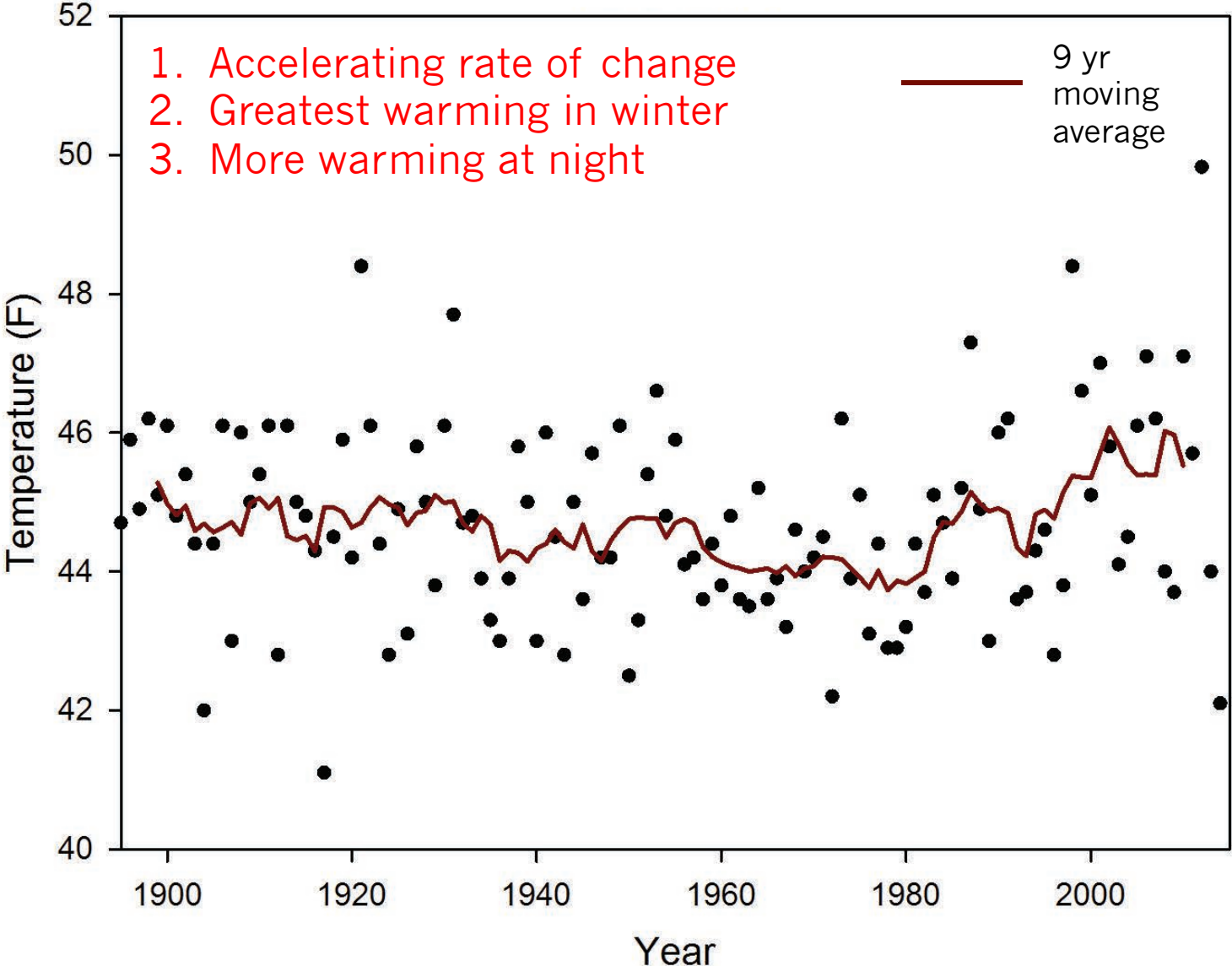
MICHIGAN STATE UNIVERSITY | W.K. Kellogg Biological Station

For today...

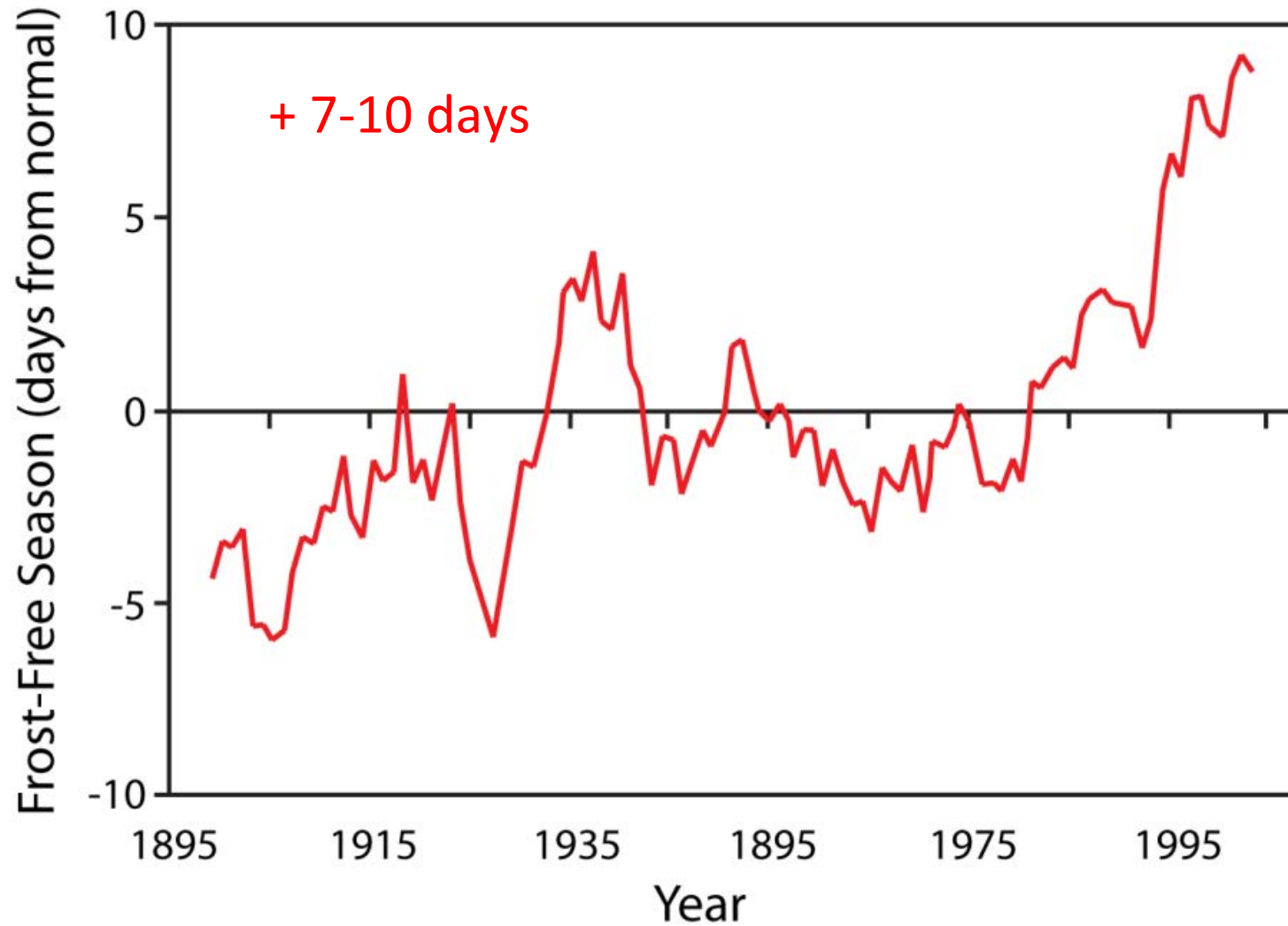
- Michigan climate trends
- Michigan farmer thoughts on climate change
- MSU Extension climate change programming



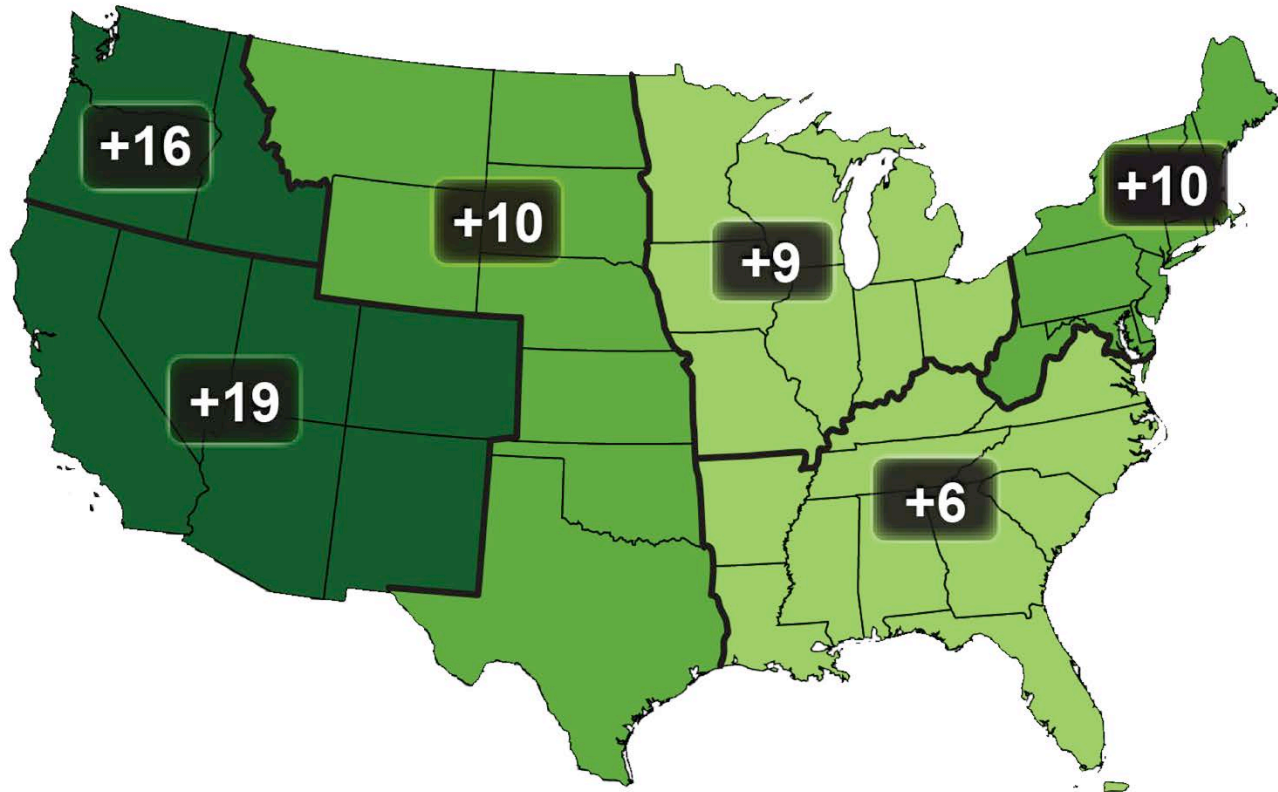
Annual temperatures, Michigan (1895-2014)



Growing season length in Michigan



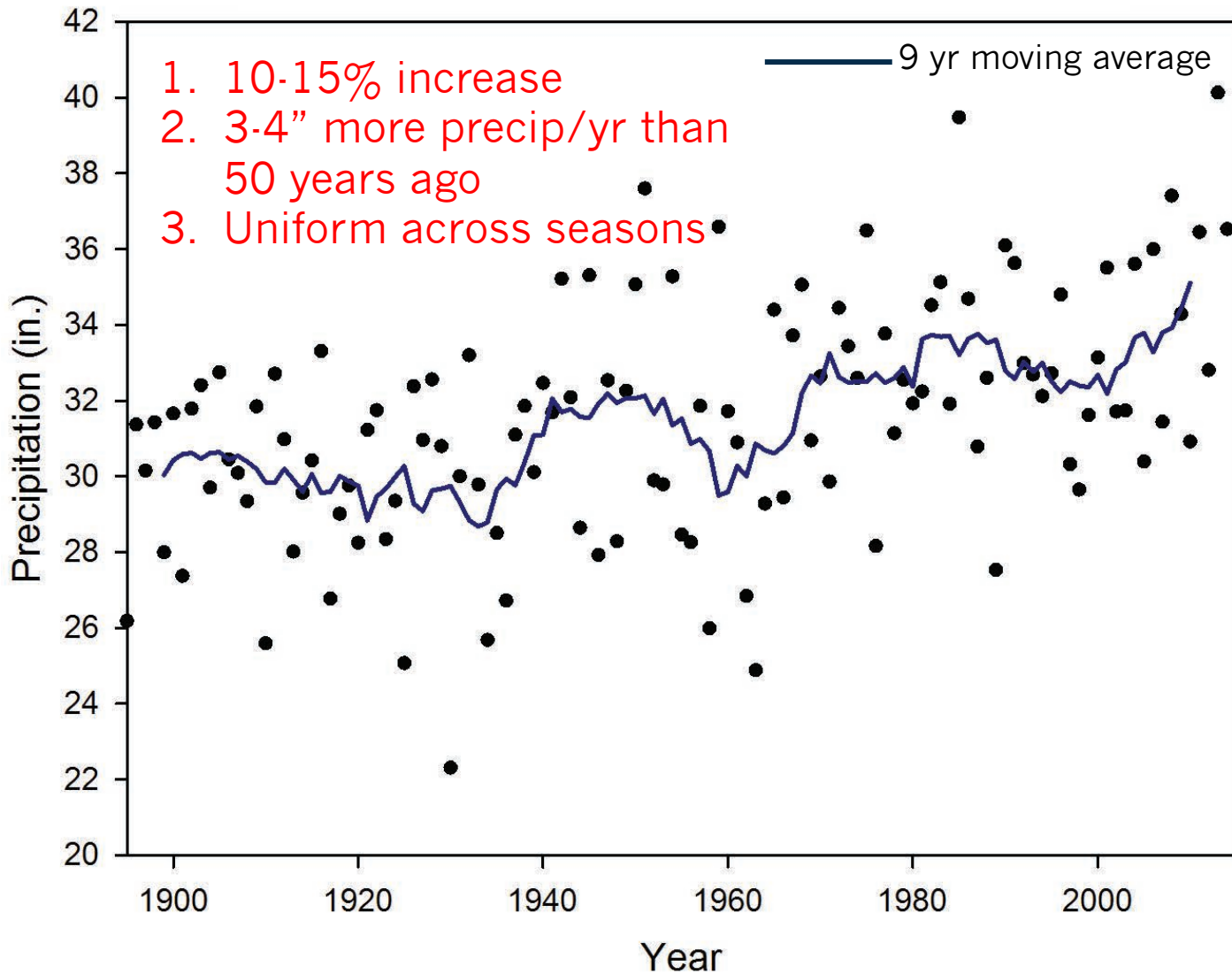
Observed increase in frost-free season length



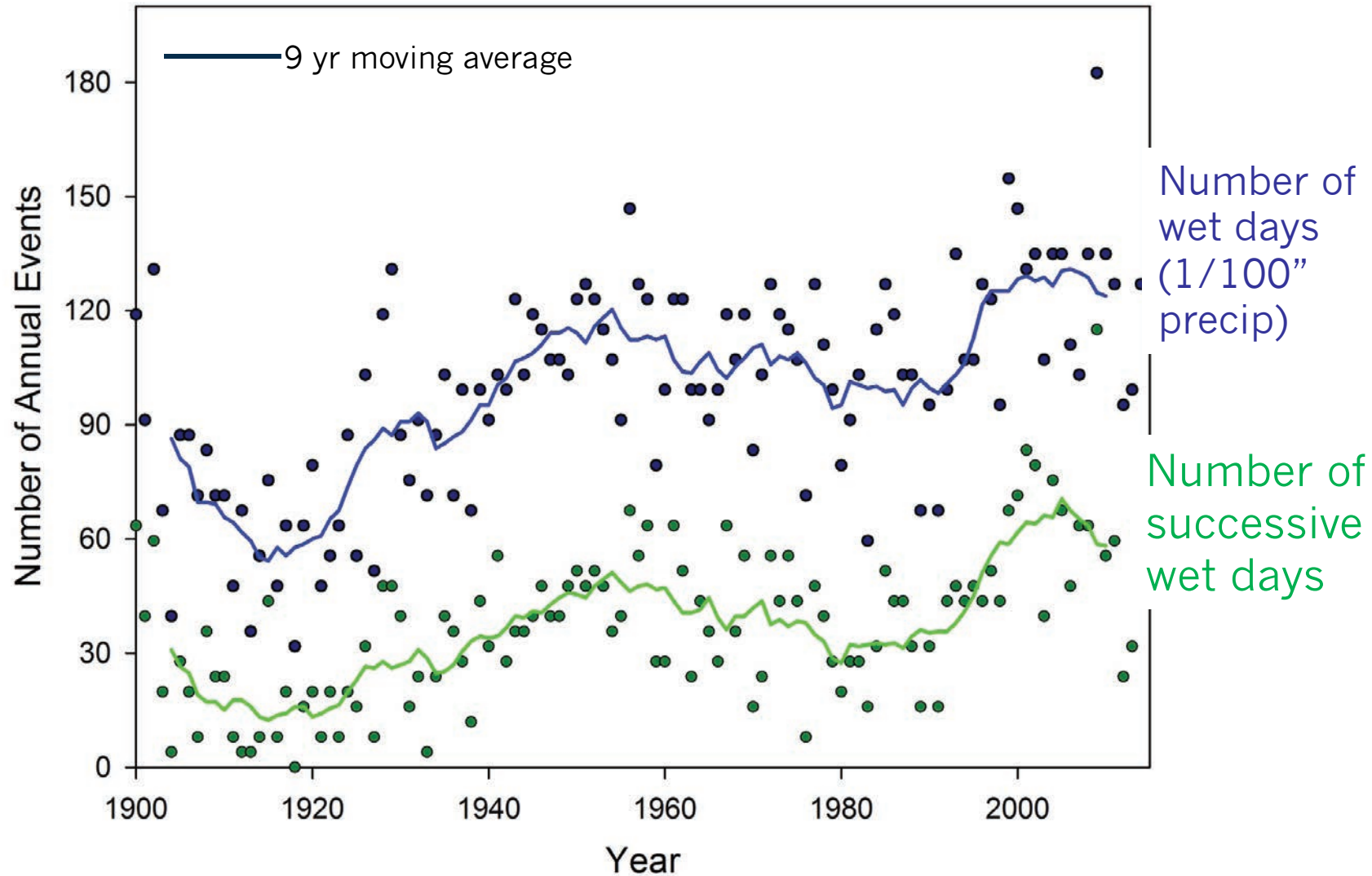
Change in Annual Number of Days



Annual precipitation, Michigan (1895-2014)

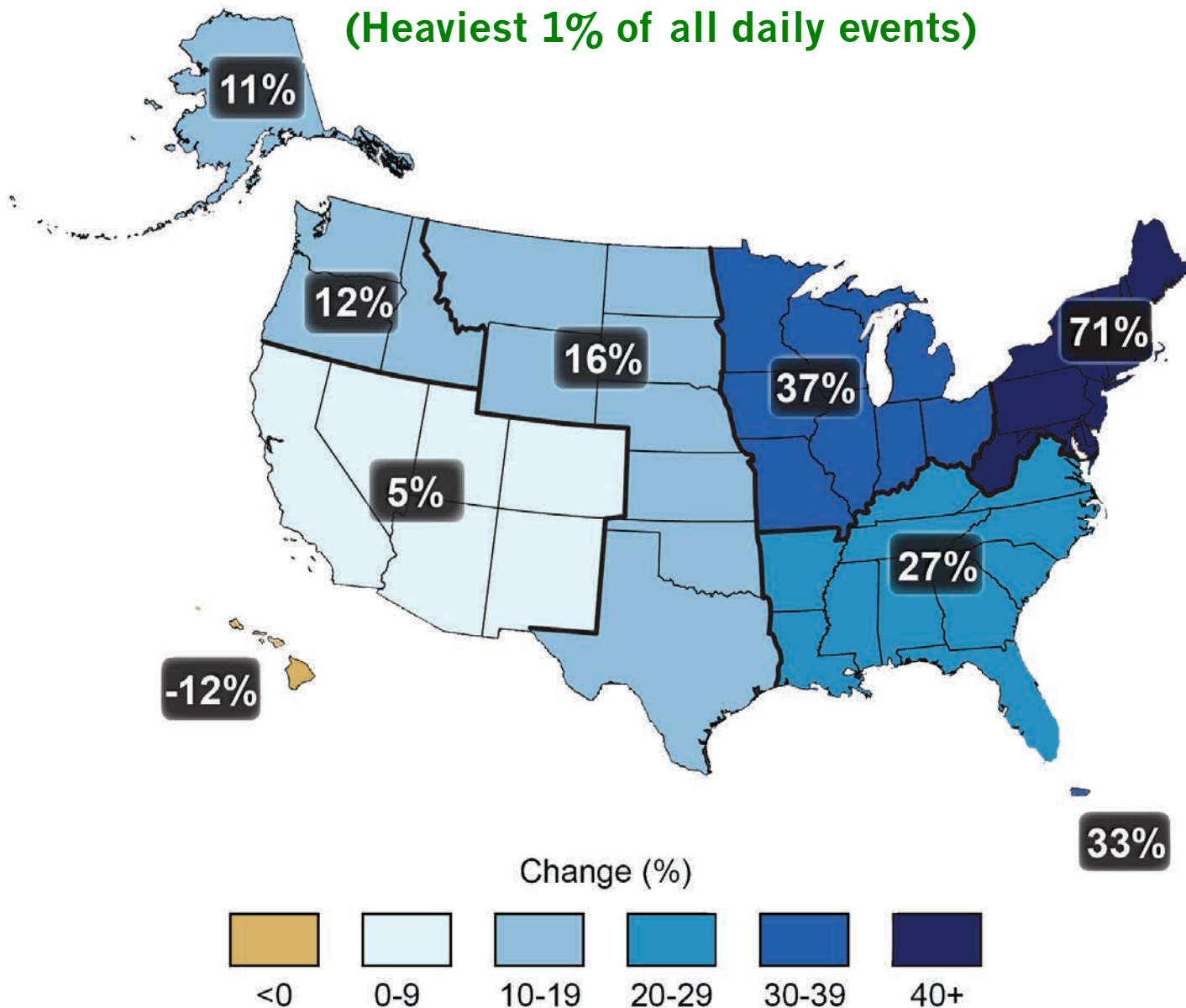


Frequency of wet days and wet/wet days: Traverse City, MI (1900-2014)



Observed change in very heavy precipitation (1958-2012)

(Heaviest 1% of all daily events)



Climate change effects on field crops

Change

- Temperature
- Cloud cover
- Precipitation
- Carbon dioxide levels
- Extreme events



Crop effects

- Plant growth and development
- Planting and harvest times
- Weed, disease, & insect outbreaks
- Irrigation needs
- Soil and water quality

Projected changes for Midwest

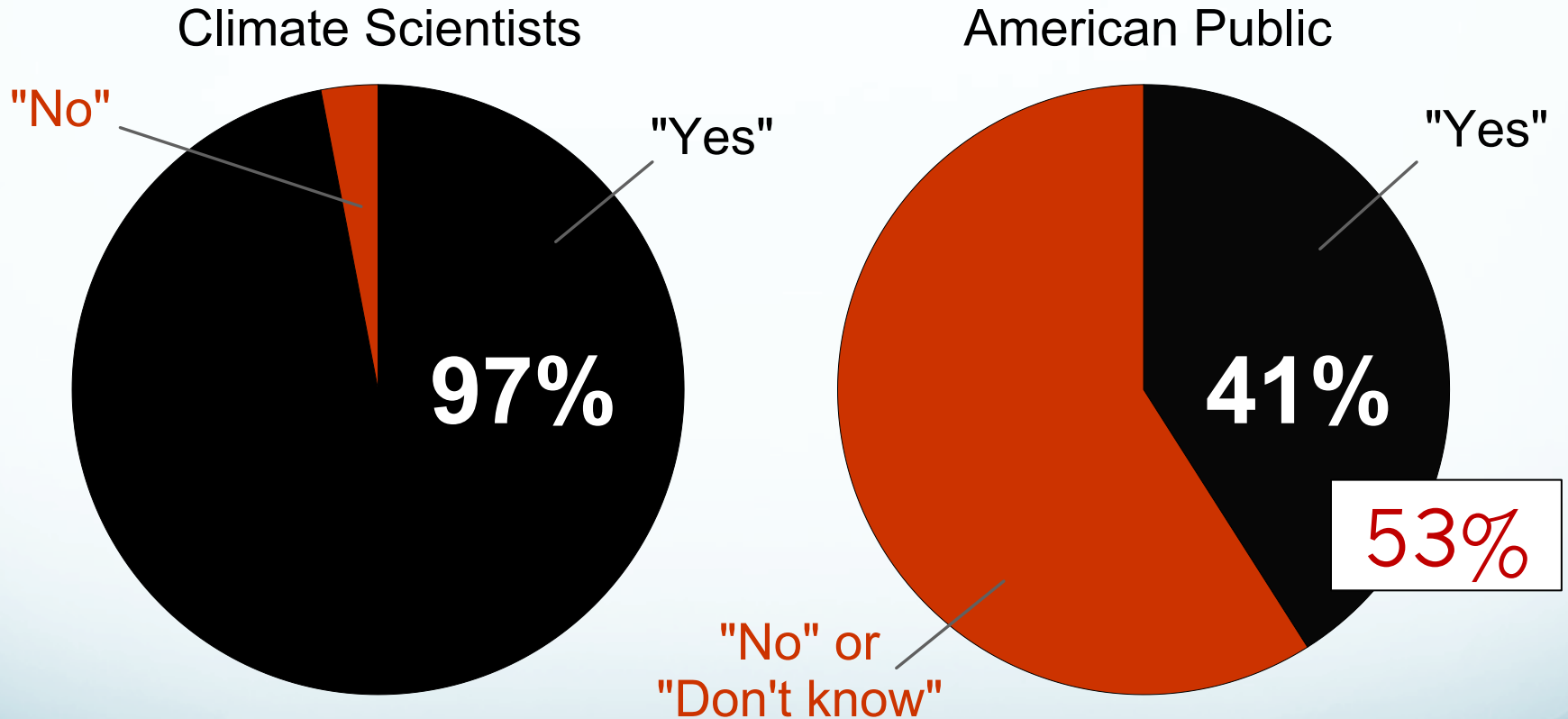
- Average temps continue to increase
 - By 2050 another 2-4 °F
 - By 2100 another 3-5 °F (low scenario) or 5-10 °F (high scenario)
- More precipitation in winter and spring
- Increased heat wave intensity and frequency; increased extreme rainfall events and flooding

Adaptation

- Agriculture has adapted to recent changes
- Existing techniques likely not sufficient for forthcoming changes in the climate – resilience is key
- Significant portion of world's food production already facing challenges and may not be able to invest in adaptation measures

Climate change & the American public

Say Climate Change is Happening and Human Caused



The “Six Americas”

Alarmed Concerned **Cautious** Disengaged **Doubtful** Dismissive

Sept.
2012
n=1,058



Highest Belief in Global Warming
Most Concerned
Most Motivated

Lowest Belief in Global Warming
Least Concerned
Least Motivated

Proportion represented by area

Source: Yale / George Mason University

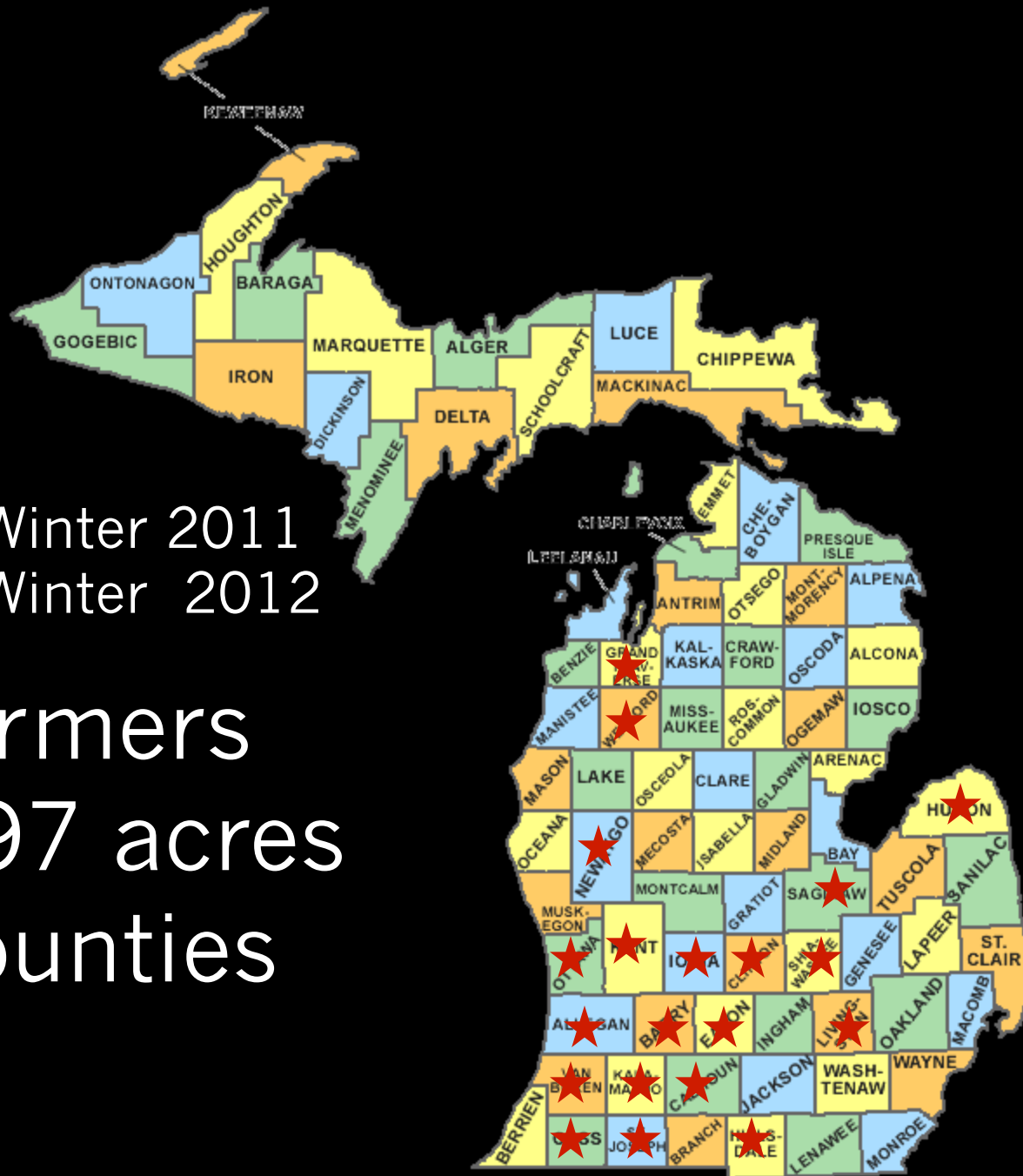
Research question

What do Michigan grain crop farmers think about climate change and its relationship to agriculture?

How should MSU Extension help farmers adapt to and mitigate a changing climate?

Two rounds of focus groups with Michigan grain crop farmers





- Round 1: Winter 2011
- Round 2: Winter 2012

- 54 farmers
- 59,697 acres
- 20 counties

“I’ve seen it get hot and get cold, get hot and get cold, you know, at different periods in my life. So I think it’s more of a cycle than it is a total climate change.”

“We really don’t hear some of the positive [effects] that agriculture has on the climate.”

“We used to see more intermediate rain showers, you know, a 1/2 inch to 1 inch, but now we just get gully-washers.”

“We talked about variations in the weather and precipitation, well in the time that I’ve been farming, this past growing season and the 2009 growing season, were as opposite as I have ever seen in my whole career.”

“For one reason or another you’ll see the most amazing differences in rainfall within a fifteen mile stretch.”

“Because of climate change you are buying bigger machinery. You are doing stuff in a hurry.”

“Over the years, irrigation has become so much more popular, with less water and more heat. I put out seven pivots in the last four years; I never had irrigation before.”

“When it comes to making decisions, we don’t think about climate by itself. We just, we learn from where we’ve been, and we change and modify to take some of those risks away.”

“I guess, if I could summarize, it doesn't matter what the weather is going to be in twenty-thirty years from now. It only matters what it's going to be next year, and nobody can predict that.”

“It was nice to be asked about an important subject rather than being told what someone else thinks.”

“If MSUE is sponsoring the endeavor, there is got to be some basis behind it, and if [my Extension Educator] thinks it is important, so do I!!!”

Focus group summary

- Resisted the term “climate change”
- Articulated changing conditions and specific actions they are taking in response
- No silver bullet for adaptation – variability within & between farms and years
- Farmers appreciated being listened to
- Trust MSU Extension & research for climate info

MSU Extension Climate Outreach Team

SKIP TO
CONTENT



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Climate Outreach Team

The Climate Variability and Change Action Team (CV-CAT) was formed in April 2011 when a group of Michigan State University Extension educators gathered together to review input and observations on the impacts of weather and climate conditions from various stakeholders in field crop agriculture. Their goal was to discuss MSU Extension's role in climate change outreach and education, and in response, the CV-CAT was born. The CV-CAT has grown to include representatives from each institute within MSU Extension — Agriculture and Agribusiness, Greening Michigan, Children and Youth, and Health and Nutrition — Extension affiliates and other departments on campus.

The CV-CAT fosters dialogue with rural and urban communities, as well as stakeholders involved in economic development, natural resources and our youth. This multi-disciplinary approach fosters a greater understanding of each group's needs and contributions to create and improve social capital in communities. The CV-CAT is also well positioned to identify and assemble resources, as well as to develop training materials and webinars on risk management strategies.

Our Goals

- Help MSU Extension personnel and clientele understand inter-relationships between climate, agriculture, natural resources and society.
- Introduce MSU Extension personnel and clientele to scenarios for climate change and potential implications for Michigan's agricultural and natural ecosystems.
- Disseminate science-based information to a broader public audience on regional climate change and associated societal response options.
- Design extension programming to work with clientele on building adaptive capacity and resilience to seasonal climate variability and long-term changes in climate.
- Promote and facilitate linkages between MSUE personnel and stakeholders who need scientific information on climate risks and who would benefit from development of new technologies and decision support systems.

Team Members

The Climate Variability and Change Action Team is made up of dedicated individuals — campus and field-based — who bring a broad understanding of agricultural management practices, policy, science communication and climate to the effort. This group includes researchers, policy specialists and educators. Many team members are involved in multi-state projects and programs

New ways to dialogue about climate: “fish bowls”



... is warming
the atmosphere than carbon dioxide (CO₂)
Even small reductions in emissions matter to our environment

- It is the major GHG emitted by agriculture
Soil management activities such as fertilizer application account for ~70% of human-induced emissions in the US

New ways to dialogue about climate: “fish bowls”



New ways to dialogue about climate: “fish bowls”



Farmer reactions to this approach:

- 100% said that the discussion format was a comfortable setting.
- 98% felt completely listened to at the event and agreed they gained something from the discussion.
- 100% agreed the discussion was an effective way to gather information.

Climate change and soil health



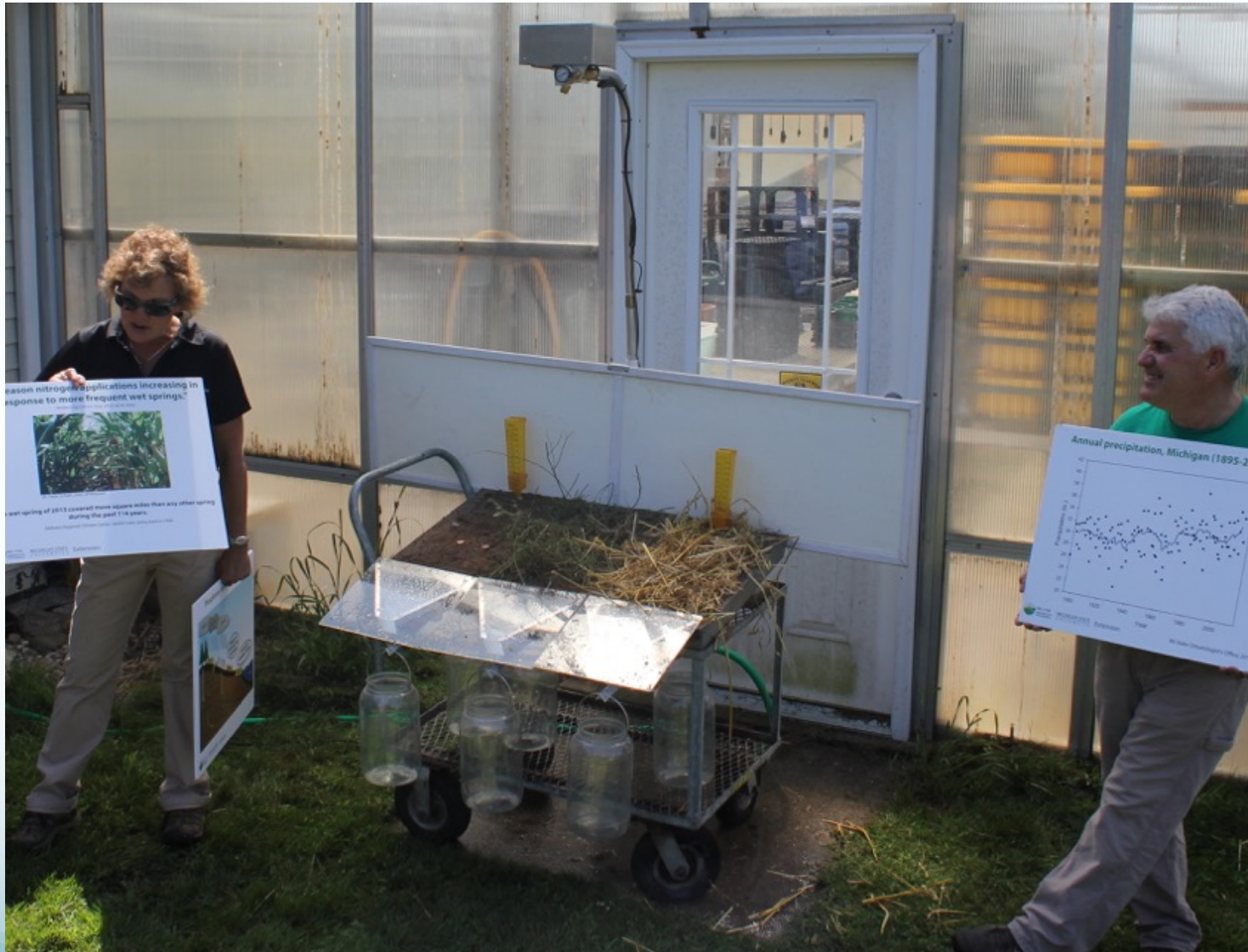
Shower head

Soil bins w/
different
management

Infiltration
collectors

Runoff
collectors

Climate change and soil health



Summary and next steps

- Climate change is affecting and will affect agriculture, farmers need tools
- MI farmers appreciated the opportunity to dialogue about changes in climate and effects on agriculture
- Dialogue-based approaches (e.g., "Fish bowls") to address climate change and other critical agricultural issues
- Rainfall simulator: climate change and soil health demonstrations

Thank you

- Focus group and interview participants
- Claire Layman Bode and Jeff Andresen
- MSUE Climate Outreach Team
- Marilyn Thelen, Paul Gross, and Christina Currell, MSUE
- Student assistants, Marci Baranski, Samantha Shaughnessy
- Funders: Environmental Protection Agency, Project GREEN, MSUE AABI, NCR-SARE and NSF (KBS LTER program)

For more information on climate change and agriculture

- **MSU Extension Climate Change & Agriculture Bulletin Series:** <http://lter.kbs.msu.edu/get-involved/educational-resources/>
 - Greenhouse gas basics
 - Climate change basics
 - Frequently asked questions about climate change
 - Field crop agriculture and climate change
 - Management of nitrogen fertilizer to reduce nitrous oxide emissions from field crops
 - Animal agriculture & climate change in Michigan
- **Climate Change & Sustainable Ag Resource Handbook:** <http://lter.kbs.msu.edu/get-involved/educational-resources/>
- **National Climate Assessment:** <http://nca2014.globalchange.gov>
- **MSU Extension Climate Outreach Team:** http://msue.anr.msu.edu/program/climate_change_and_variability/climate_outreach_team

For more information on climate change and agriculture

- **MSU Enviro-weather** - Weather-based pest, natural resources, and production management tools:
<http://www.enviro-weather.msu.edu/homeMap.php>
- **NOAA's GLISA program** – Preparing the Great Lakes region for climate risks: <http://glisa.umich.edu>
- **U2U- Useful to Usable** – Transforming climate variability and change information for cereal crop producers:
<https://mygeohub.org/groups/u2u>
- **USDA Midwest Climate Hub:**
<http://climatehubs.oce.usda.gov/midwest>