Changing Freeze Dates in the Midwest

- **Dennis Todey, Director**
- **Freeze Tool Webinar**
- **21 September 2022**

USDA Midwest Climate Hub
U.S. DEPARTMENT OF AGRICULTURE

Intro to Climate Hub Work

Assessments and Syntheses
Delivering relevant information

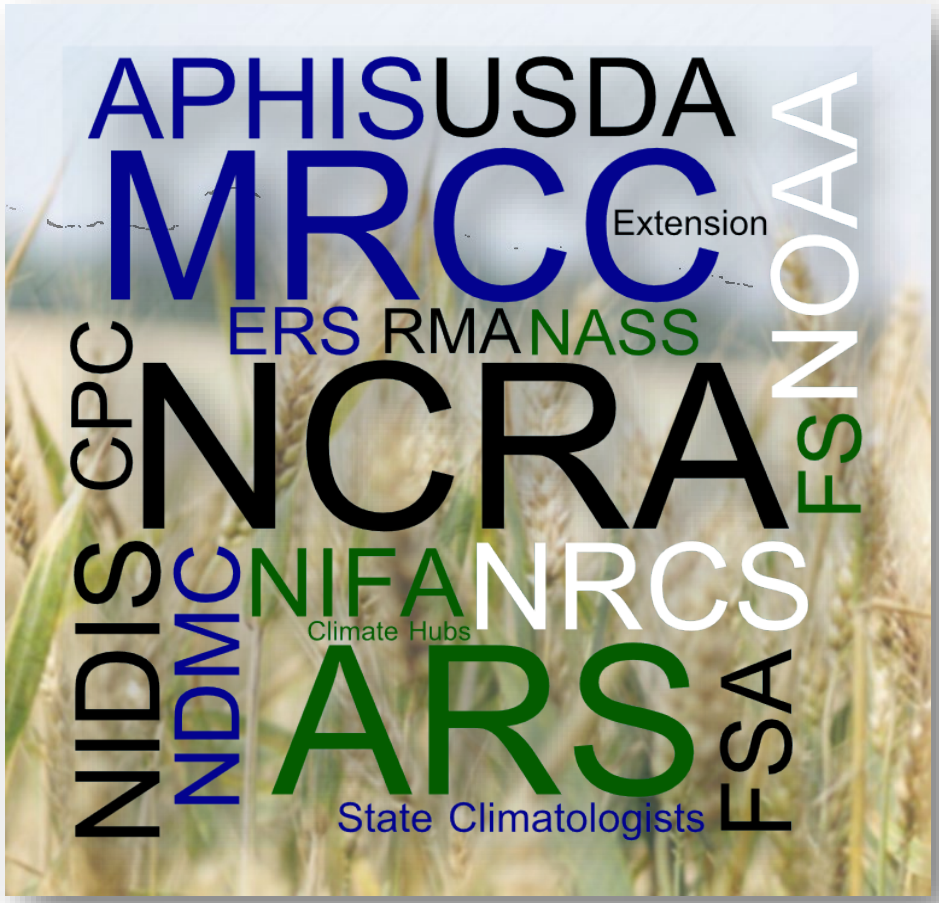
Outreach and Education
Enabling climate-informed decisions

Technical Support
Facilitating engagement, discovery and exchange

Agricultural Research Service

NRCS

Partners

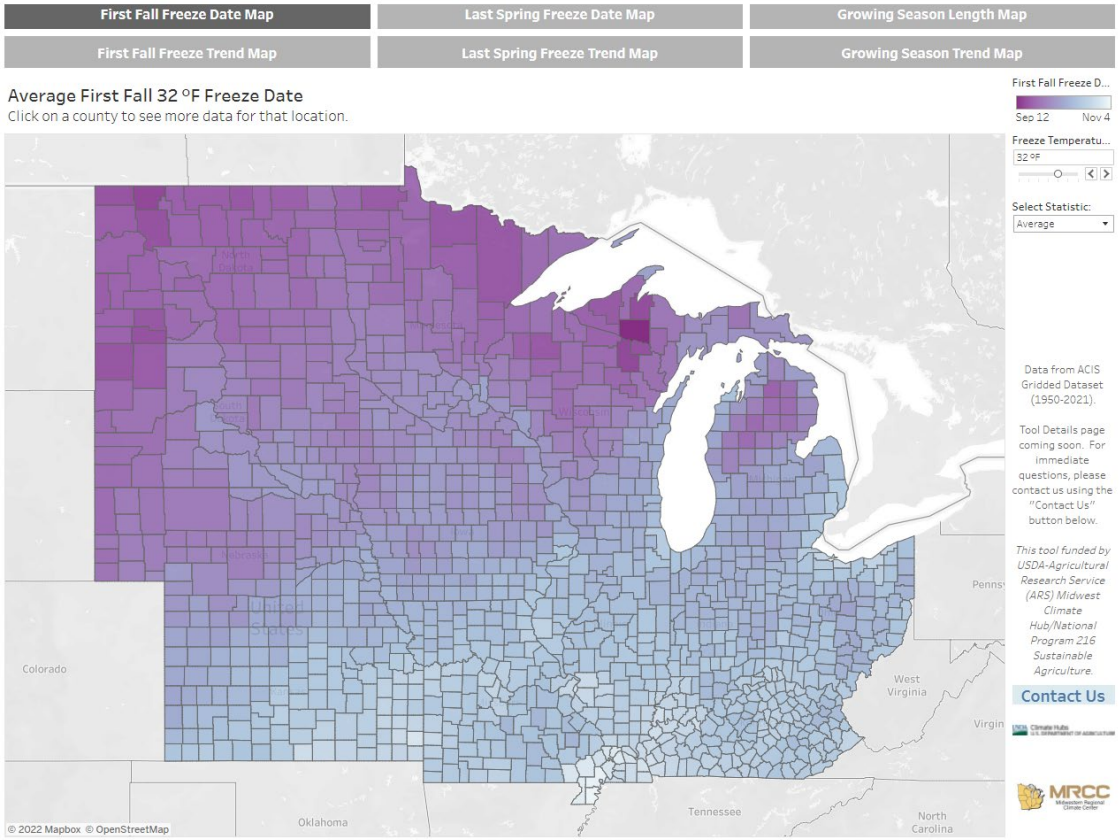


Stakeholders

Crop Consultants
Commodity Organizations
Soil and Water
Conservation Districts
Other USDA Agencies
Cooperative Extension
Land Grant Universities
Farmers
Ranchers
Forest Land Owners
Specialty Crop Growers
…And Many Others

Ongoing Projects

Assessments and Syntheses, ctd.
Delivering relevant information



Publicizing new visualization tool for county-level changes in frost-freeze dates

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Temperature Change

- Central/Northeast US Warming
  - Winter
  - Nights
- Push GDD accumulation/phenological state
- Increase insect issues
- Does help increase frost free season period

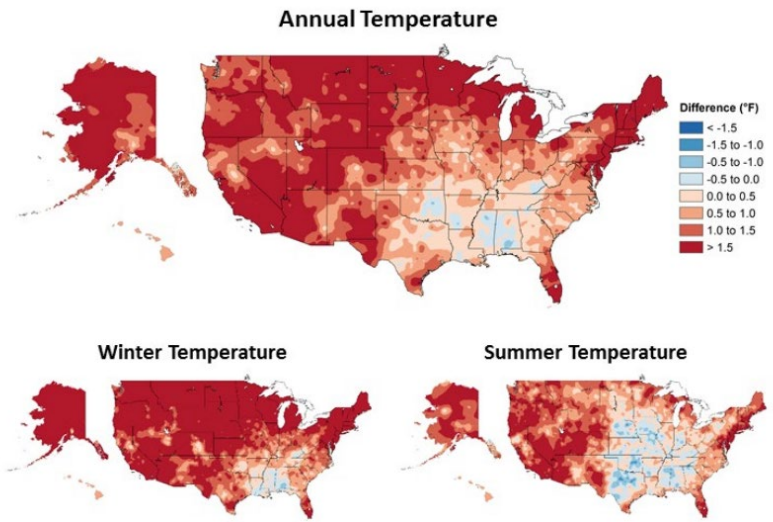
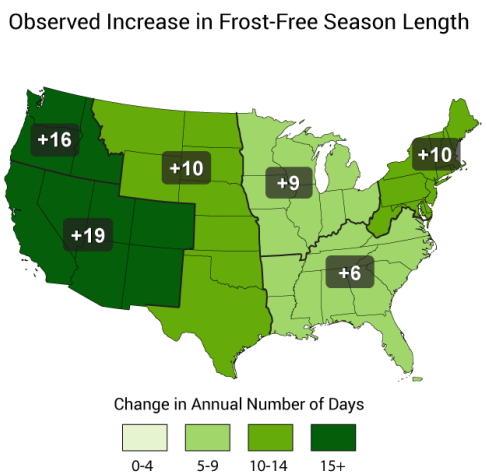
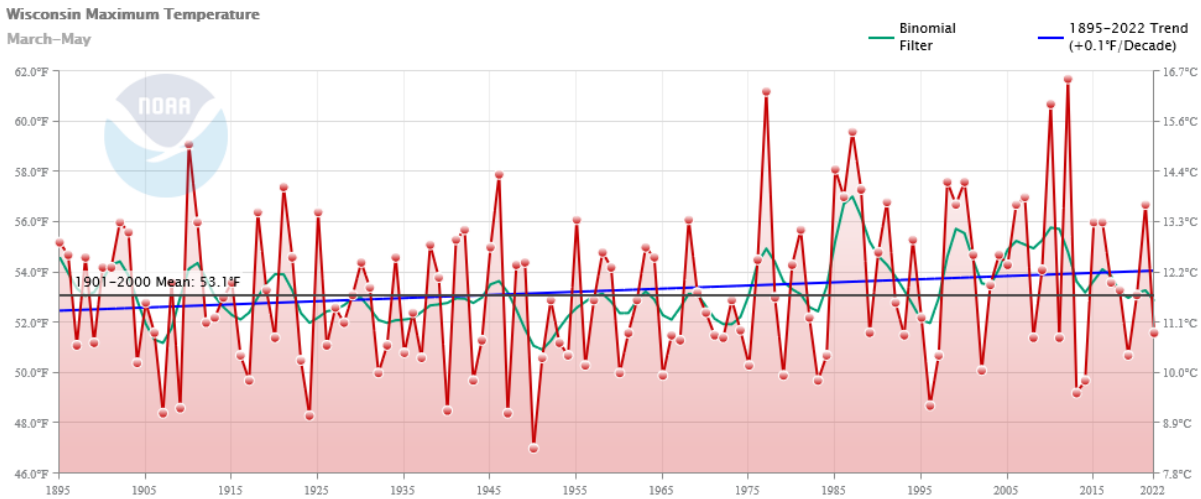


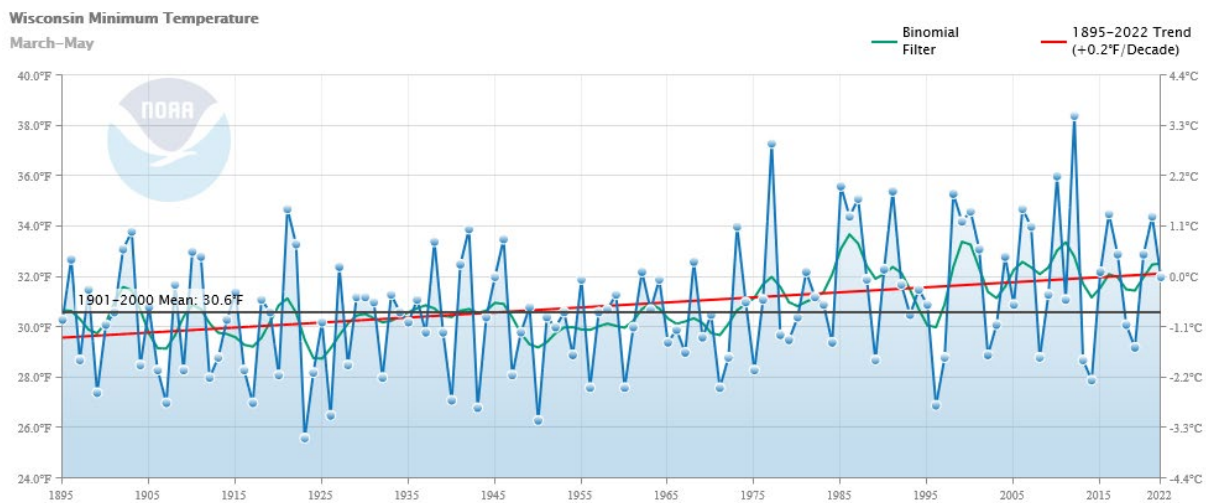
Figure 6.1. Observed changes in annual, winter, and summer temperature (°F). Changes are the difference between the average for present-day (1986–2016) and the average for the first half of the last century (1901–1960 for the contiguous United States, 1925–1960 for Alaska and Hawai'i). Estimates are derived from the nClimDiv dataset.[1,2] (Figure source: NOAA/NCEI).



Wisconsin Spring Temperatures Max/Min

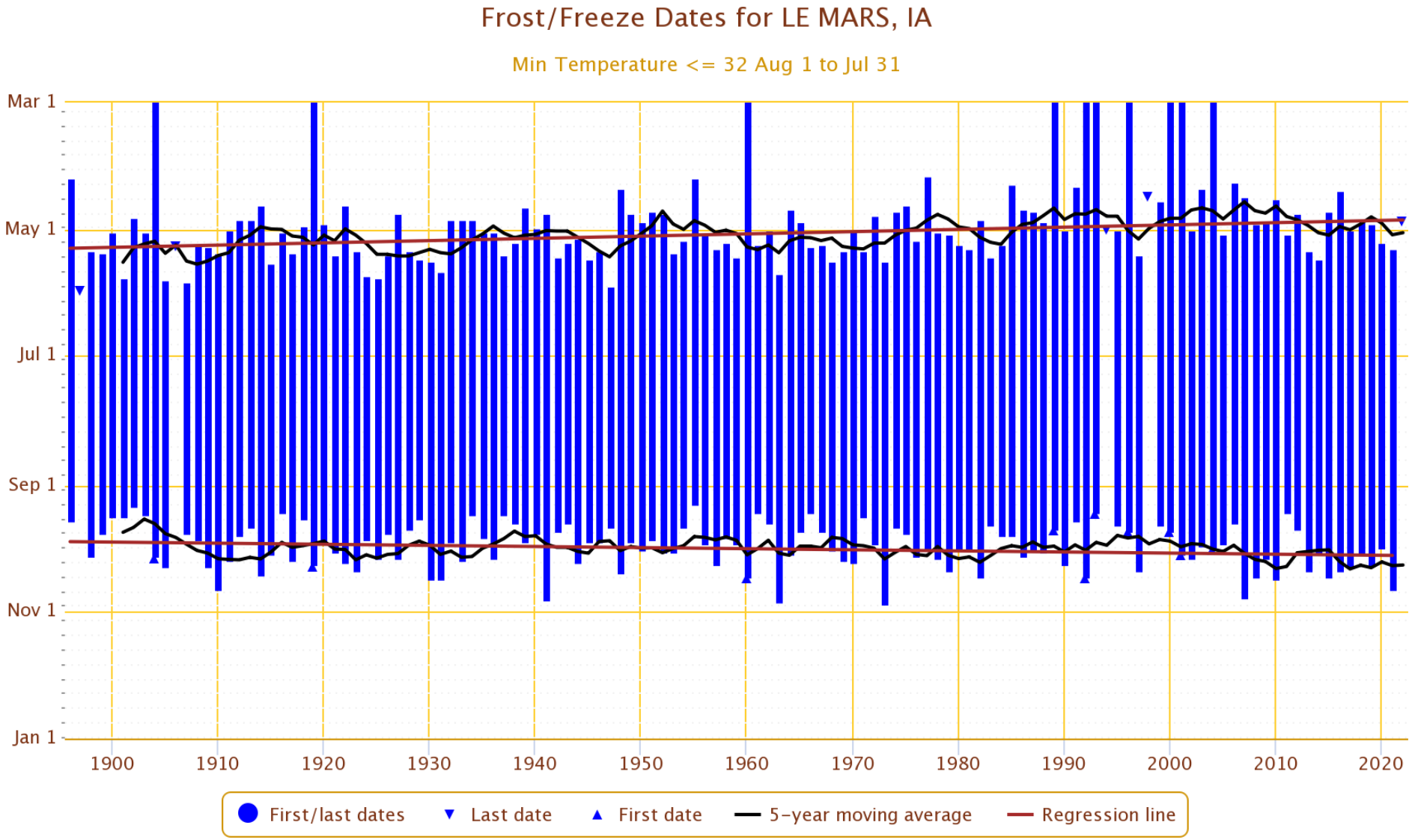


- Both Maximums and Minimums warming in spring
- Variable



https://www.ncdc.noaa.gov/cag

Station Freeze Dates – Le Mars, IA



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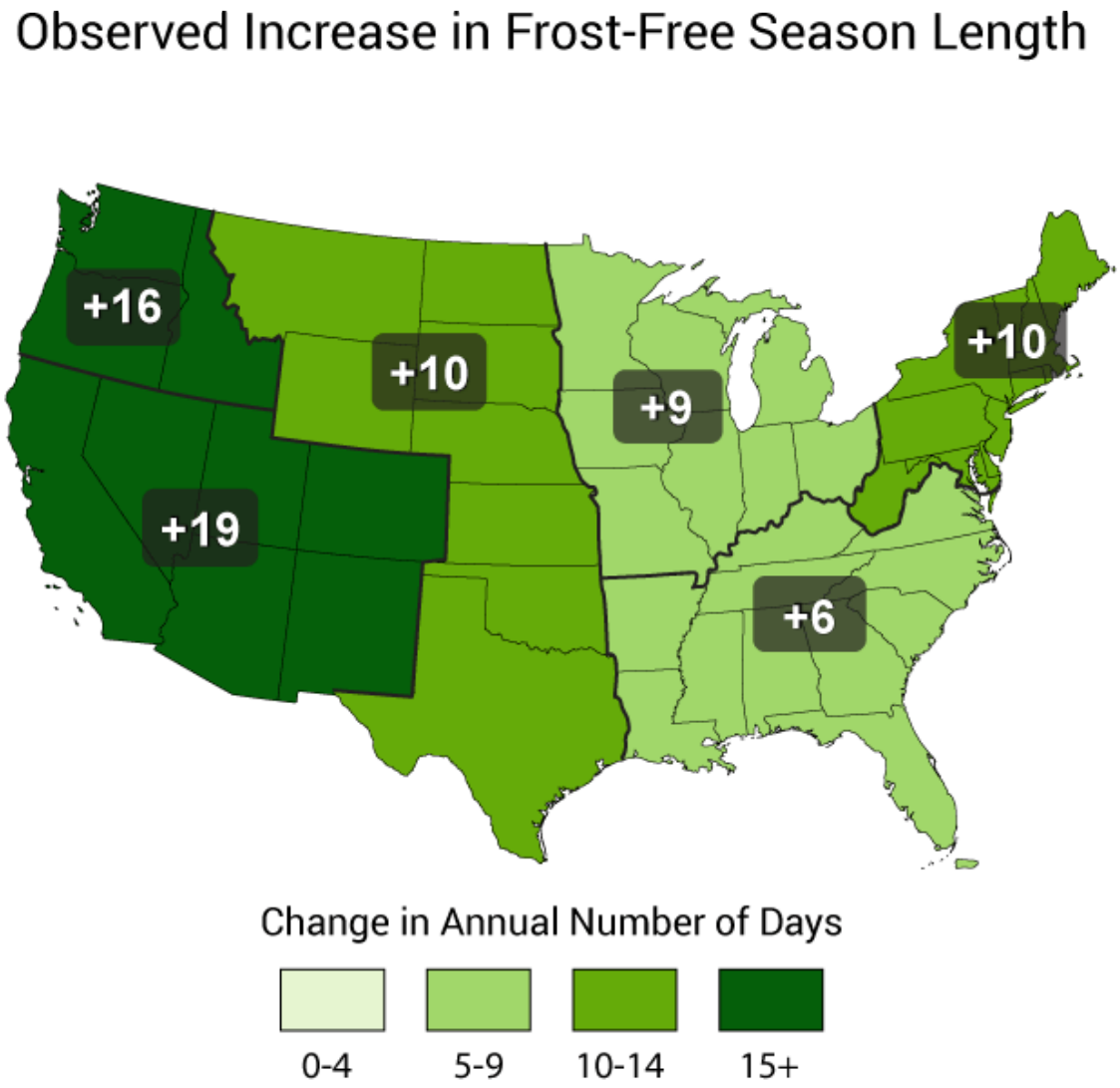
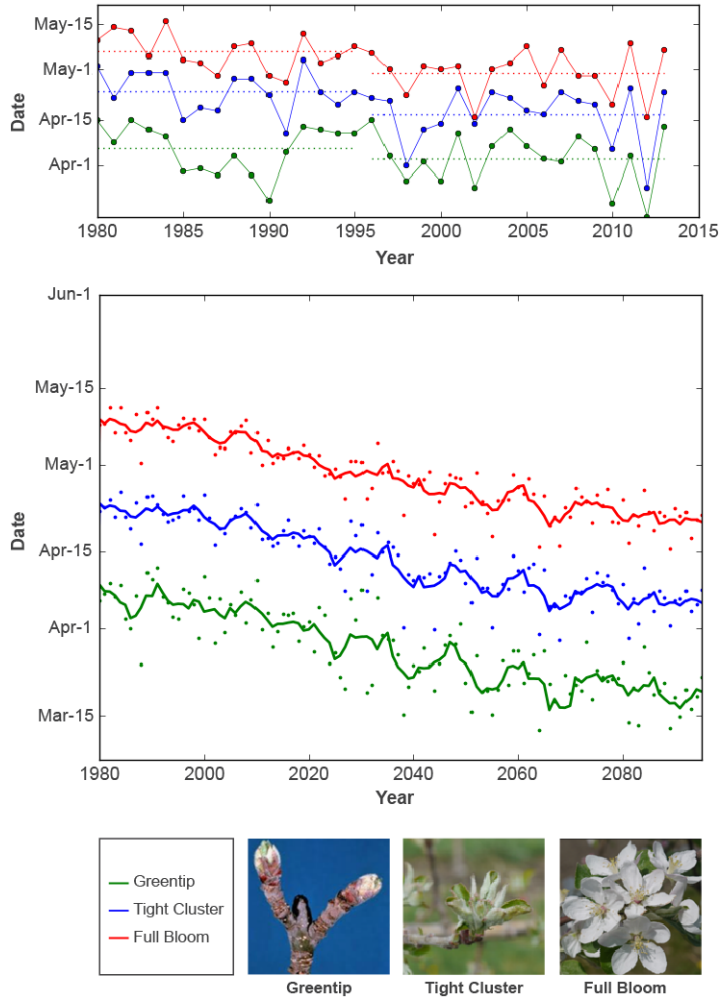
Regional Frost-Free Season Change



Timing of Budbreak in Fruit Trees

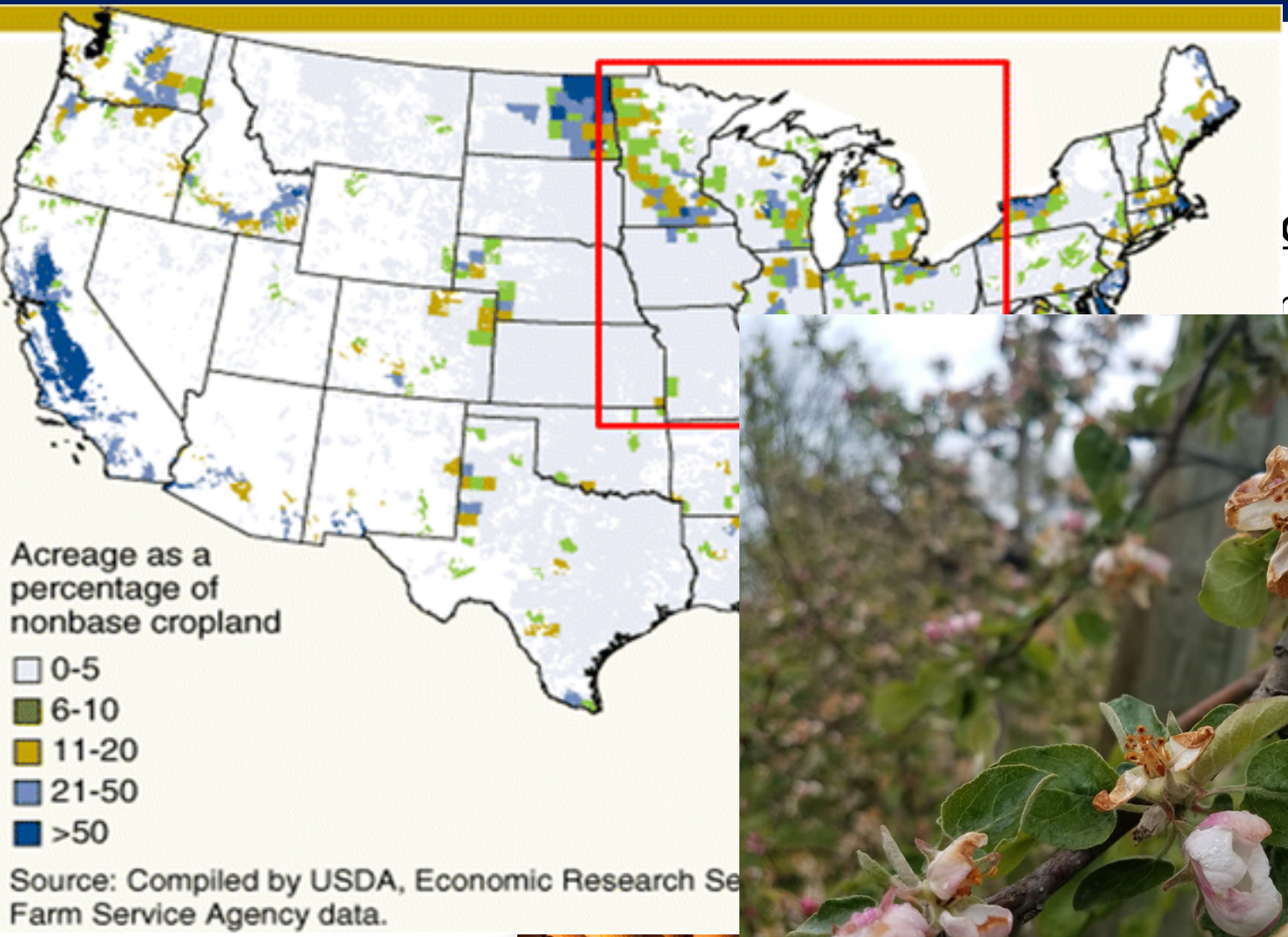
- Primarily influenced by temperature; also affected by soil moisture, solar radiation, and humidity
- Earlier bloom dates have been widely reported for domestic fruit crops since the 1970s
- Warm winter temperatures paradoxically increase the risk of freeze damage due to early emergence



Historical and projected changes in apple bud development.

https://naldc.nal.usda.gov/catalog/7201760

Here in the Midwest…



Goal

rmation to help

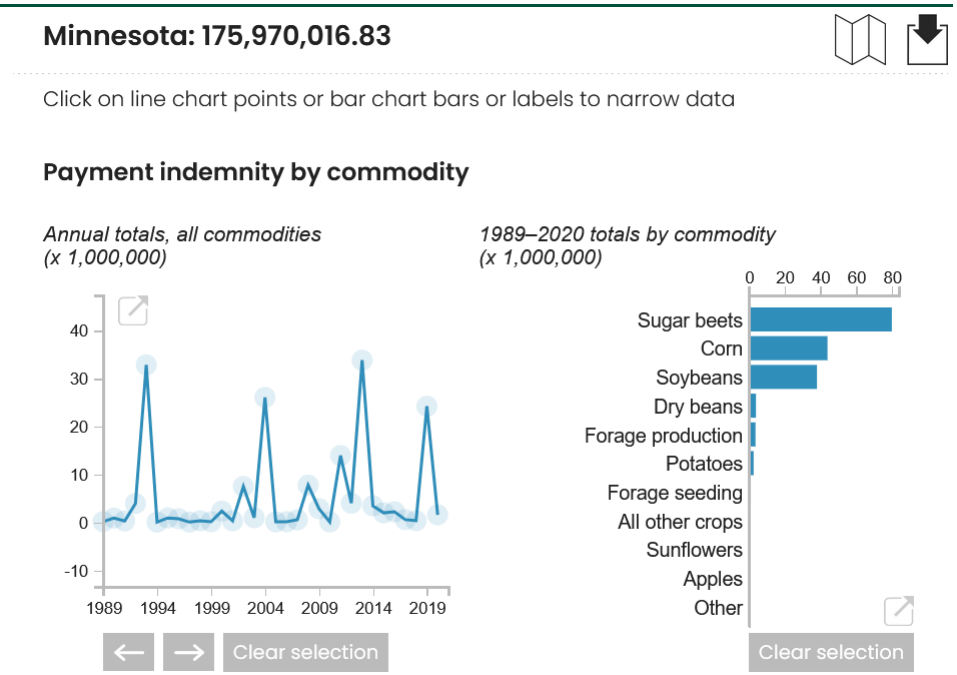
Apple blossoms are damaged by a freeze event on May 9, 2020, in Berrien County, Michigan. Photo credit: by Mike Reinke, Michigan State University Extension.

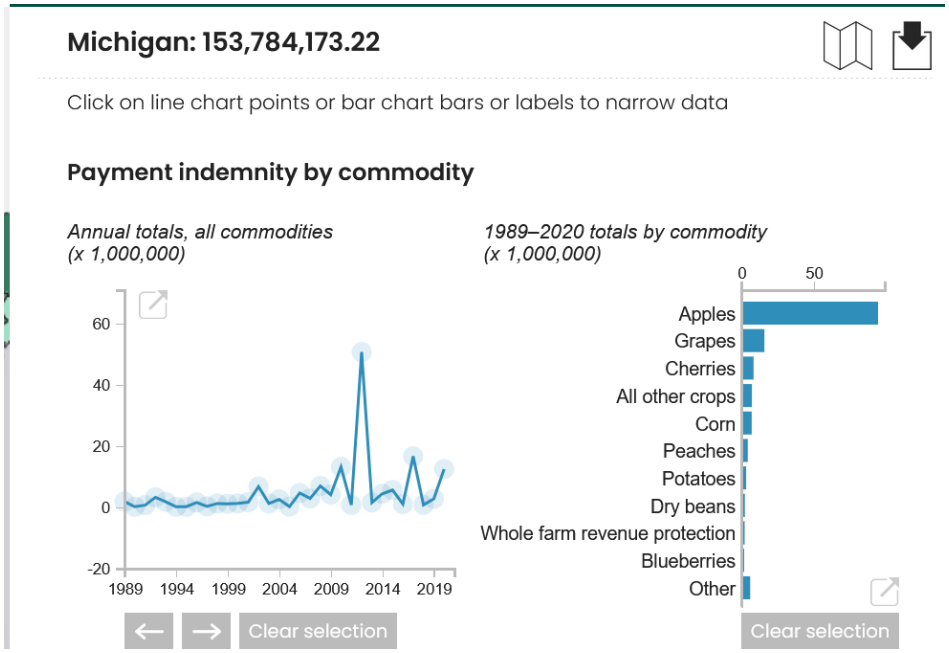
Climate-Impacted Issues for Agriculture

- Freeze cause of loss – RMA indemnity payments 1989-2020

  - Minnesota
  - Row crop
  - Late season

  - Michigan
  - Specialty (food) Crops
  - Early season





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https://swclimatehub.info/rma/rma-data-viewer.html

Interesting Freeze Date Features

- Trend varies by location
- Trend varies by temperature cut-off

For More Information

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@dennistodey

https://www.climatehubs.usda.gov/hubs/midwest

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MRCC
Midwestern Regional Climate Center

mrcc.purdue.edu

NOAA

PURDUE UNIVERSITY

Partnering with the National Centers for Environmental Information and Purdue University.

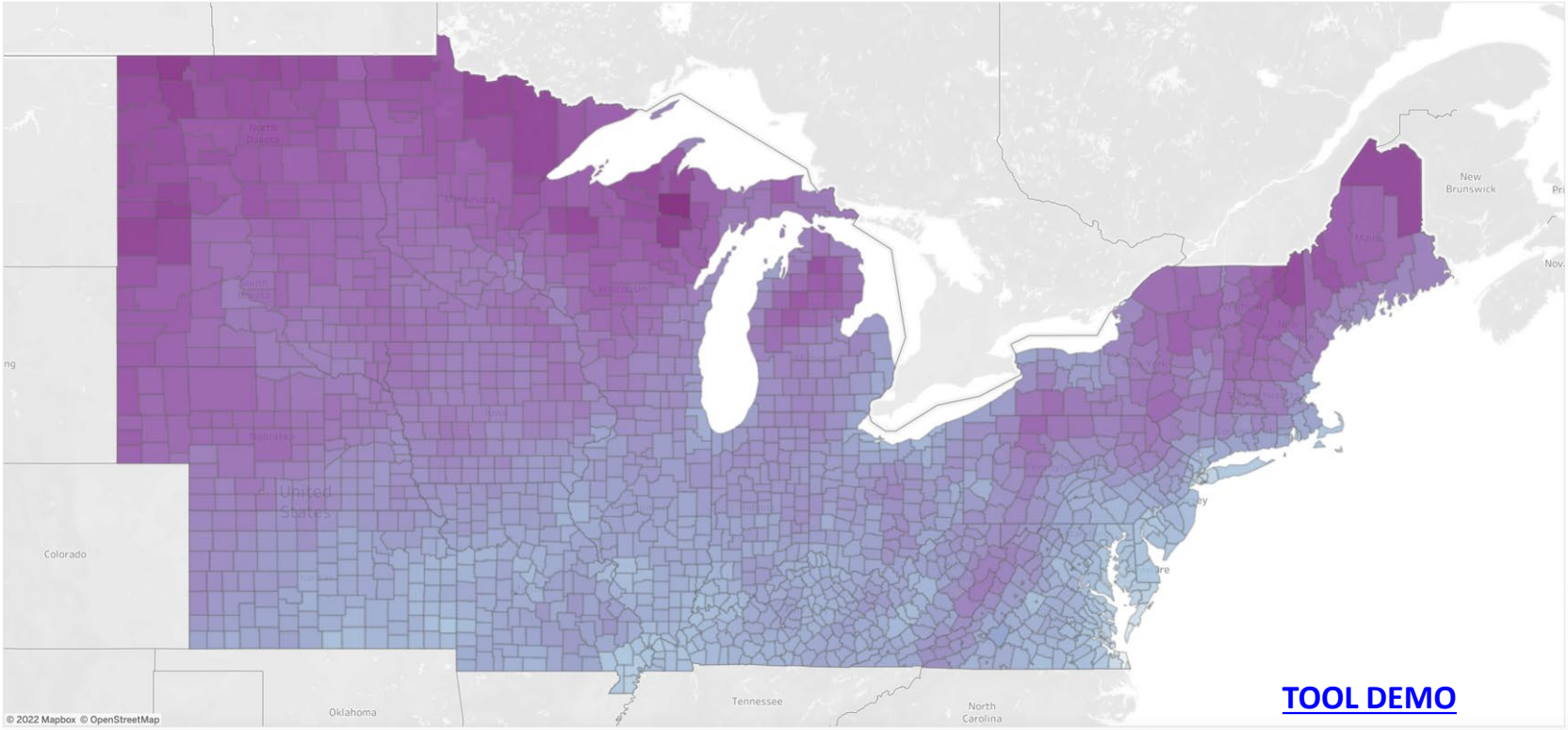
Freeze Date Tool

First Fall Freeze Date Map | Last Spring Freeze Date Map | Growing Season Length Map

First Fall Freeze Trend Map | Last Spring Freeze Trend Map | Growing Season Trend Map

Average First Fall 32 °F Freeze Date

Click on a county to see more data for that location.



First Fall Freeze Date

Sep 13 — Nov 23

Freeze Temperature: 32 °F

Select Statistic: Average

Download Image

Data from ACIS Gridded Dataset (1950-2021).

For more information about this tool and the data it uses, please click the "About" button below.

This tool funded by USDA-Agricultural Research Service (ARS) Midwest Climate Hub/National Program 216 Sustainable Agriculture.

About

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MRCC Midwestern Regional Climate Center

TOOL DEMO

Thank you!

Freeze Date Tool

https://mrcc.purdue.edu/freeze/freezedatetool.html

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OPTIONAL SLIDES