Regional Tools and Information for Agriculture

- **Dennis Todey, Director**
- **ICM**
- **30 November 2022**

USDA Midwest Climate Hub
U.S. DEPARTMENT OF AGRICULTURE

Intro to Climate Hub Work

Assessments and Syntheses
Delivering relevant information

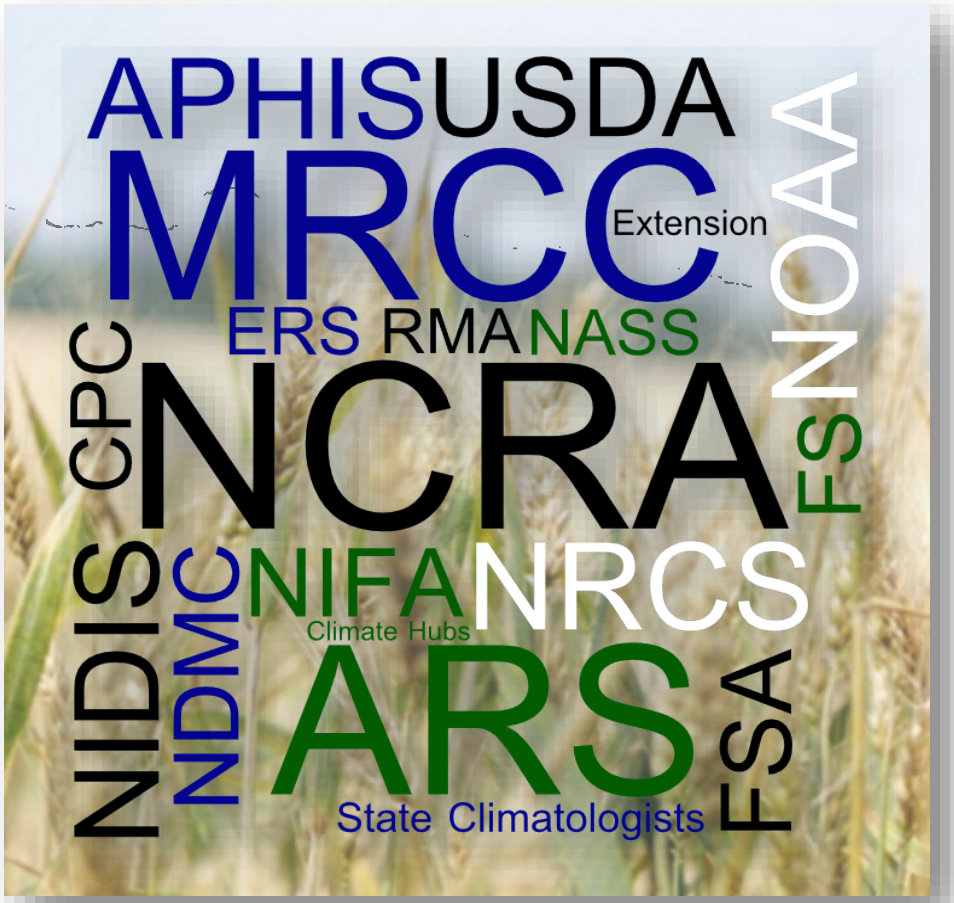
Outreach and Education
Enabling climate-informed decisions

Technical Support
Facilitating engagement, discovery and exchange

Agricultural Research Service

NRCS

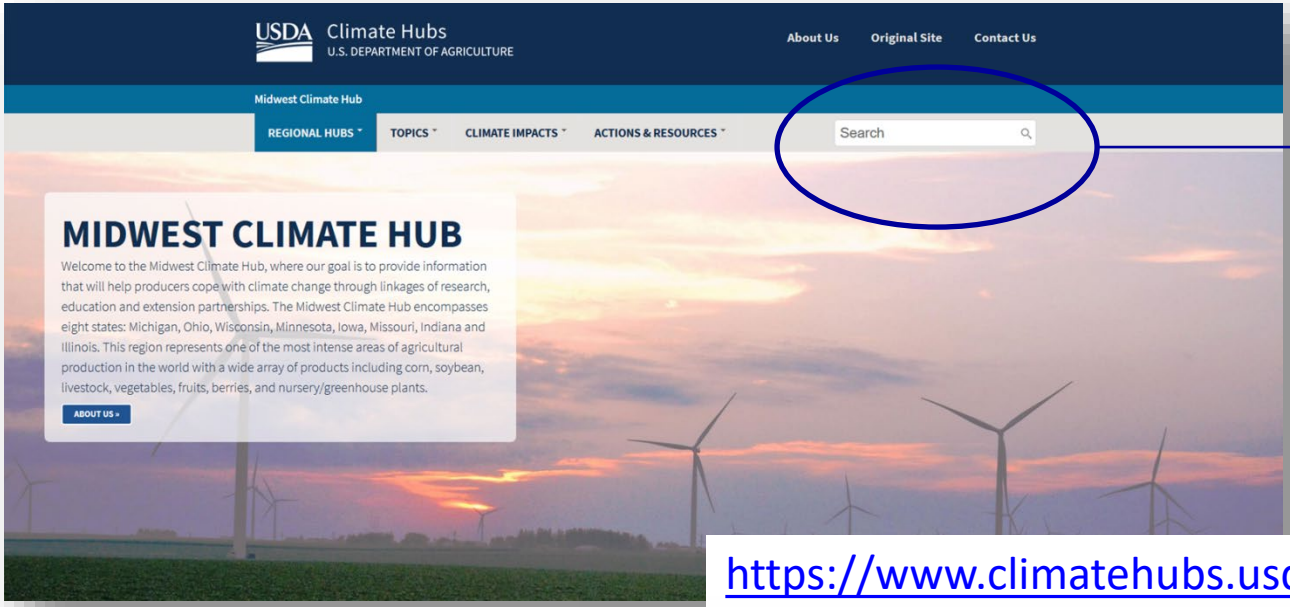
Partners



Stakeholders

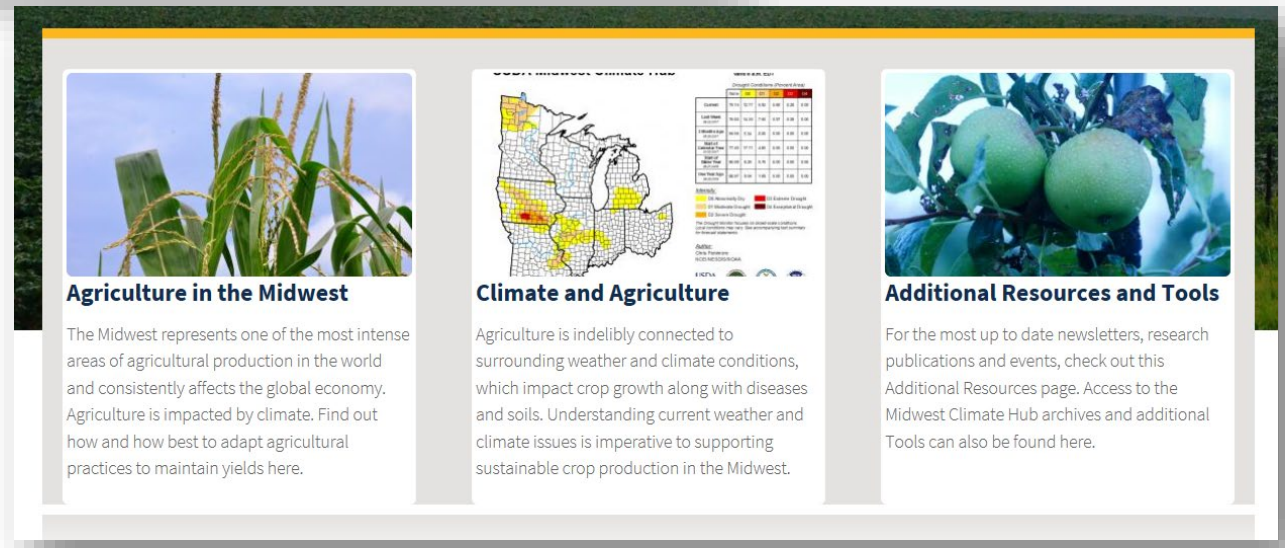
Crop Consultants
Commodity Organizations
Soil and Water
Conservation Districts
Other USDA Agencies
Cooperative Extension
Land Grant Universities
Farmers
Ranchers
Forest Land Owners
Specialty Crop Growers
…And Many Others

Resources: Website

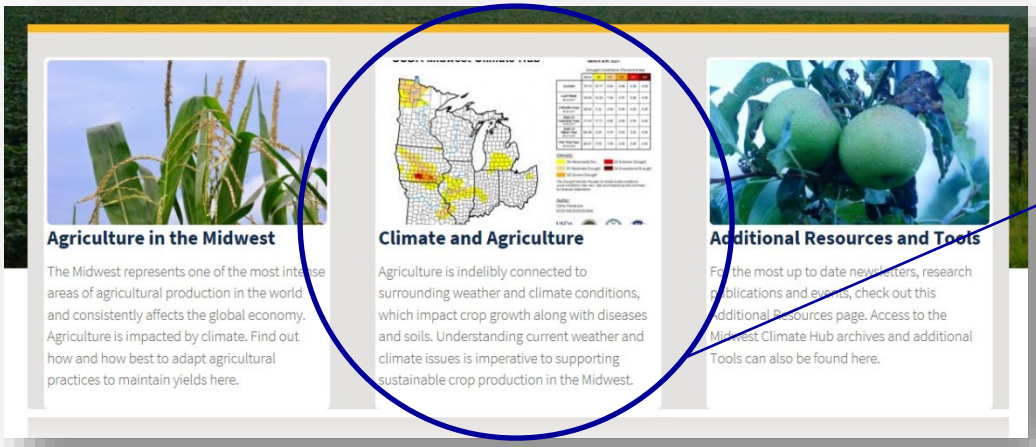


Search for tools, research and events by Region, Topic, type of crop, or climate Impact.

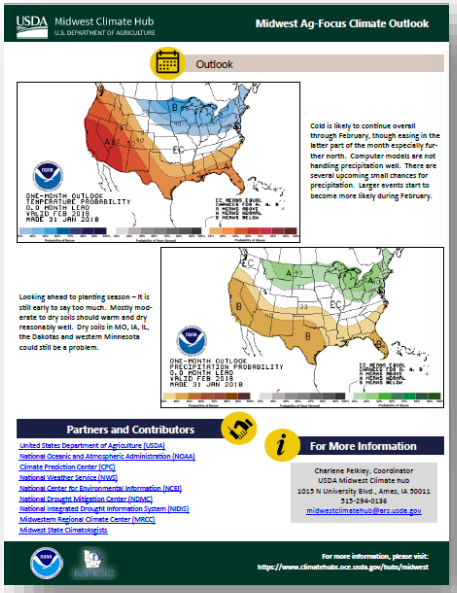
https://www.climatehubs.usda.gov/hubs/midwest

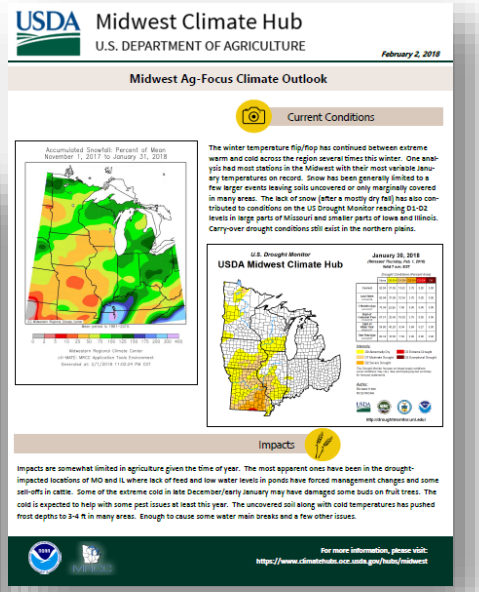


Resources: Operational Products



Midwest Ag-Focus Climate outlook

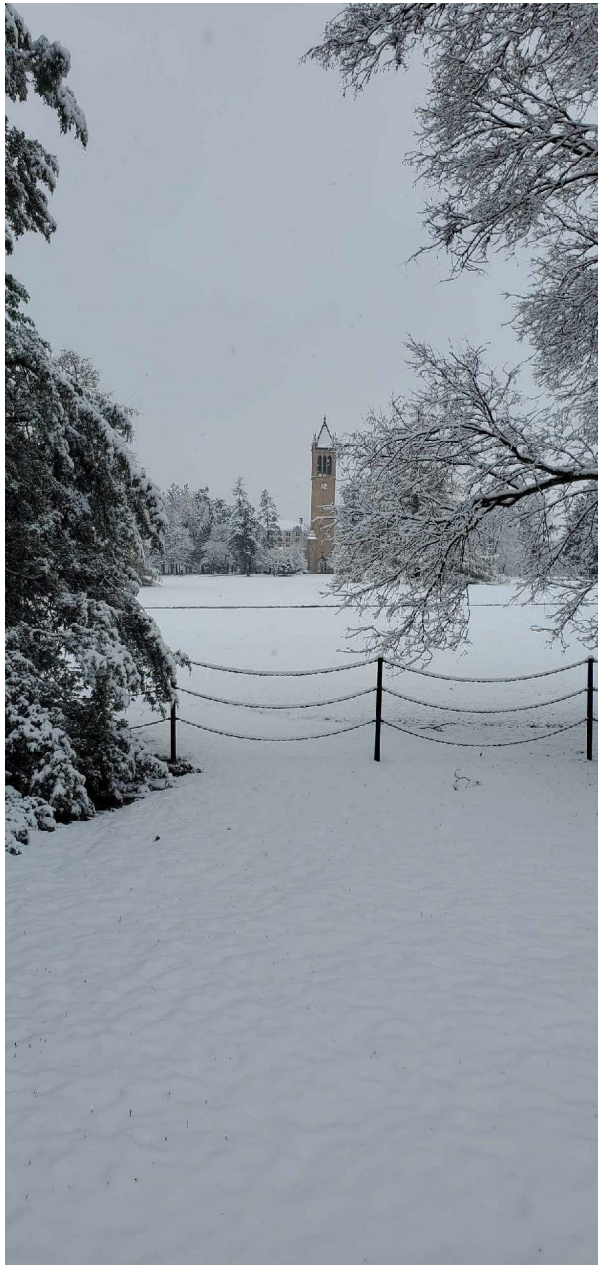




https://www.climatehubs.usda.gov/hubs/midwest/climate-outlooks

Specific agriculture information

AG-RELATED TOOLS



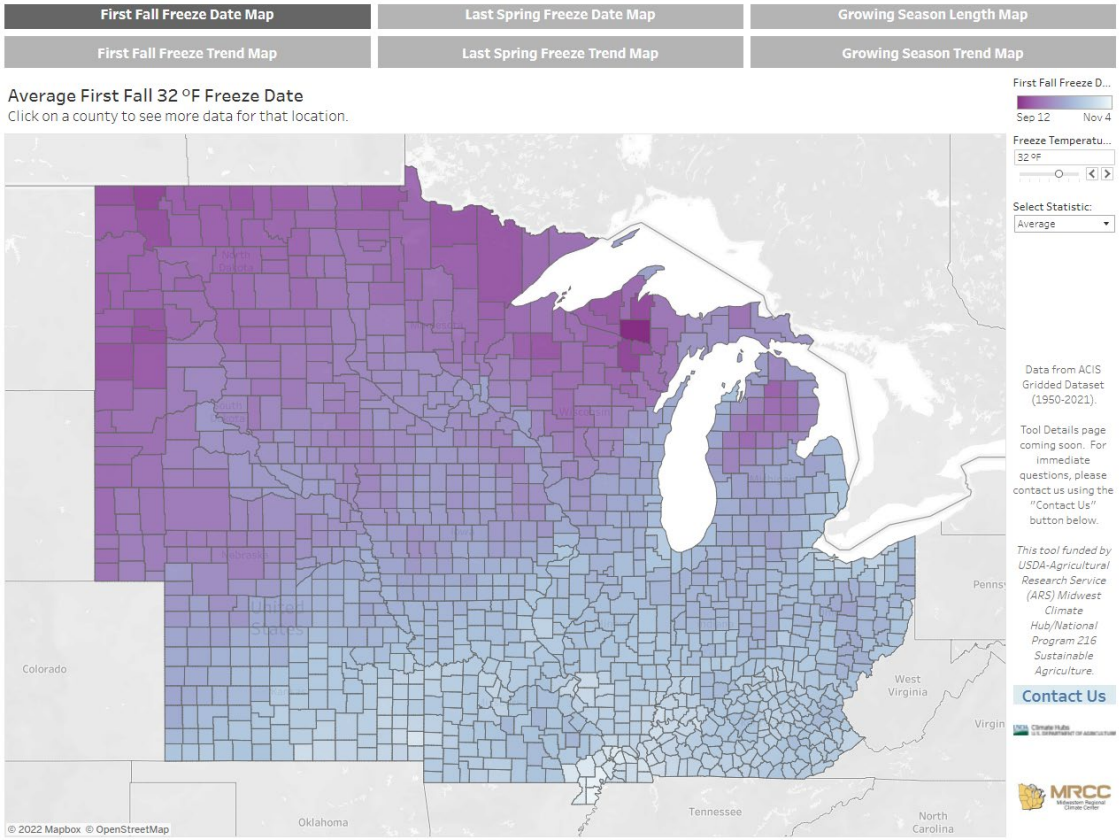
Common Web Sites

- Iowa – Iowa Environmental Mesonet
- https://mesonet.agron.iastate.edu/

- Regional – Midwestern Regional Climate Center/High Plains Regional Climate Center
- Frost-freeze https://mrcc.purdue.edu/freeze/freezedatetool.html
- GDD tracker https://mrcc.purdue.edu/U2U/

Ongoing Projects

Assessments and Syntheses, ctd.
Delivering relevant information



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

- Spring/fall freeze dates
- Growing season length change
- Uses different temperature cut-offs

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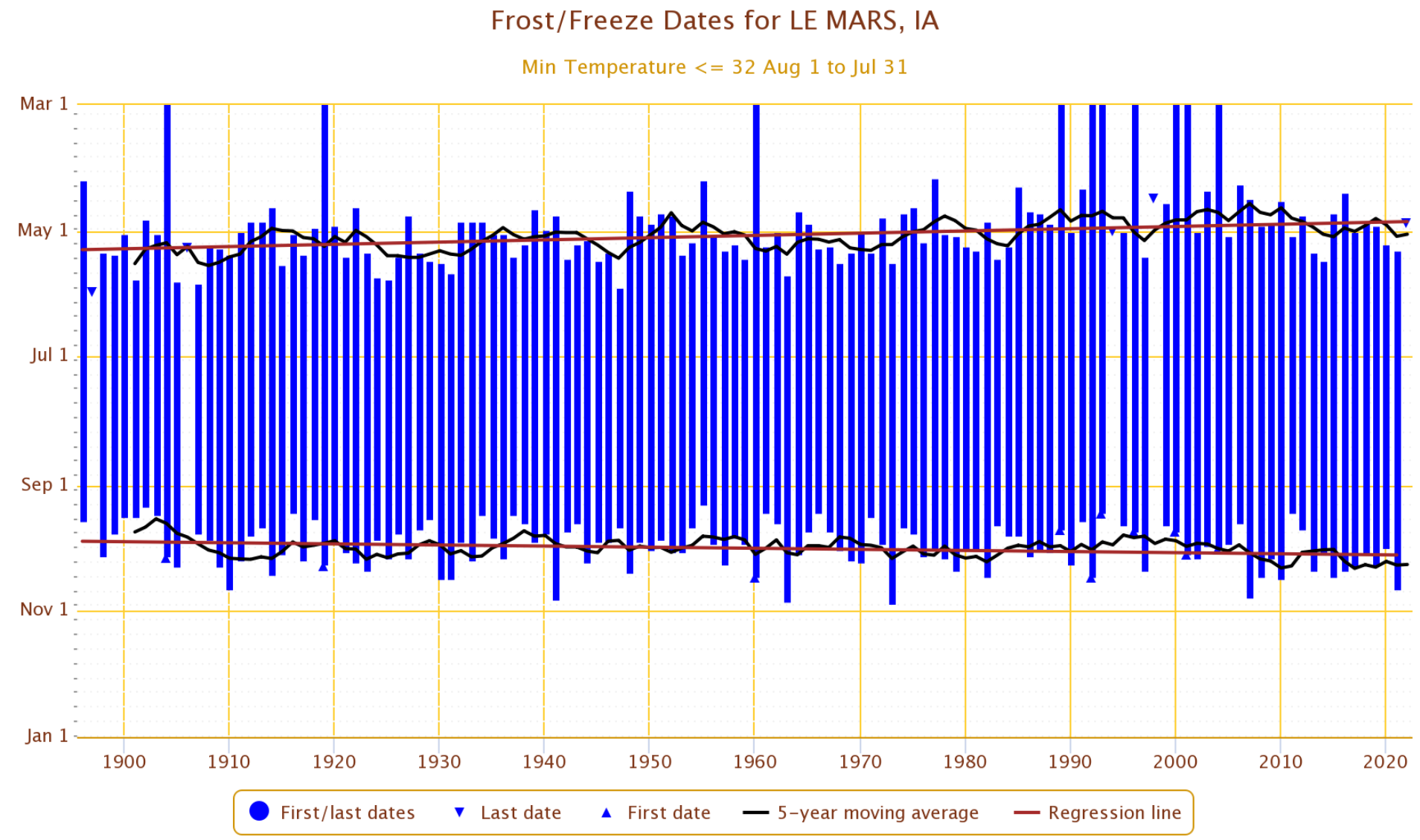
MRCC

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

Station Freeze Dates – Le Mars, IA



Powered by ACIS

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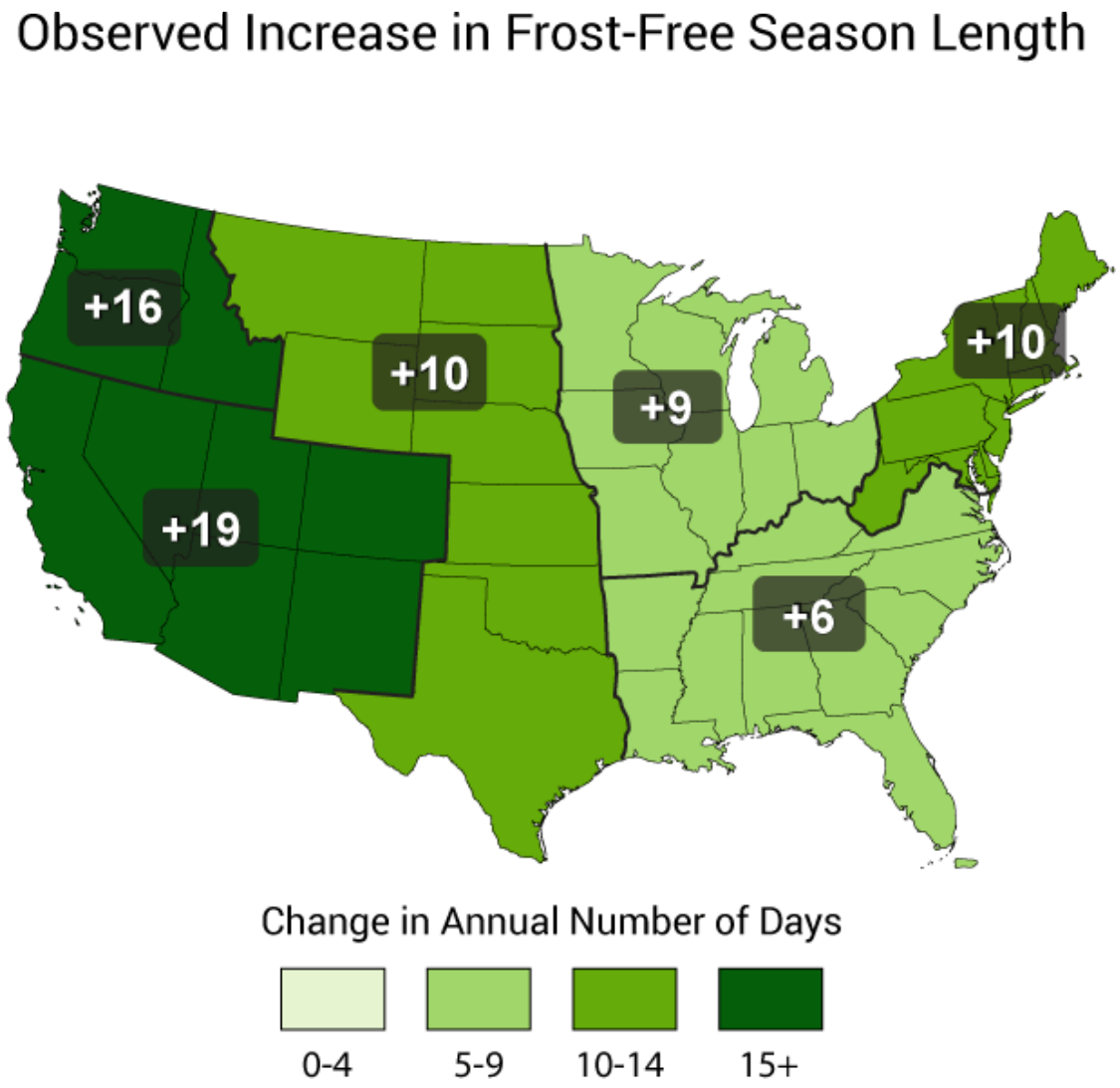
Regional Frost-Free Season Change



Interesting Freeze Date Features

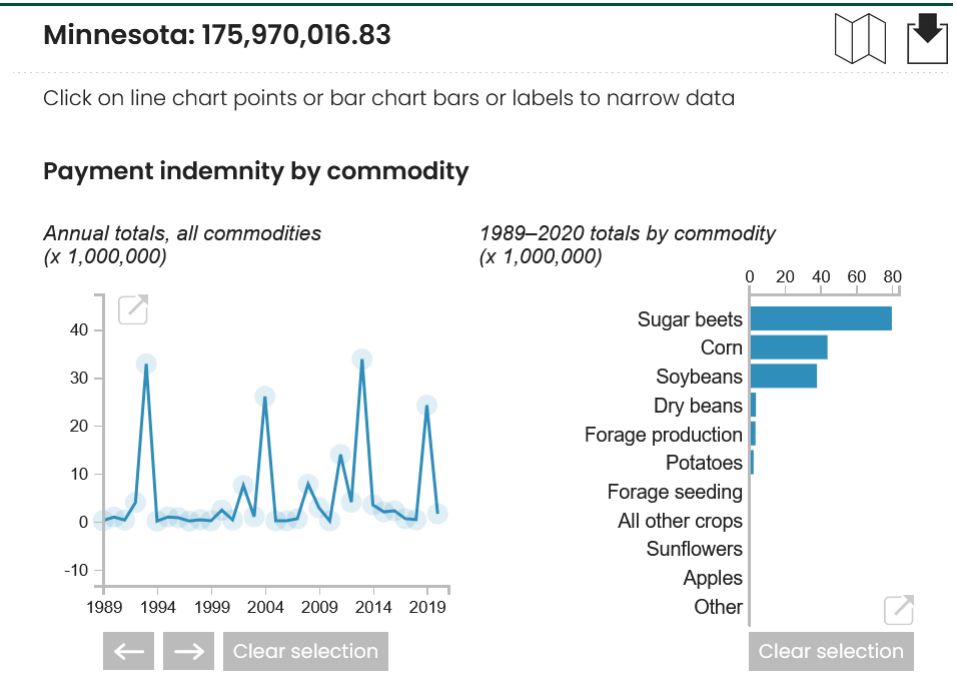
- Trend varies by location
- Trend varies by temperature cut-off

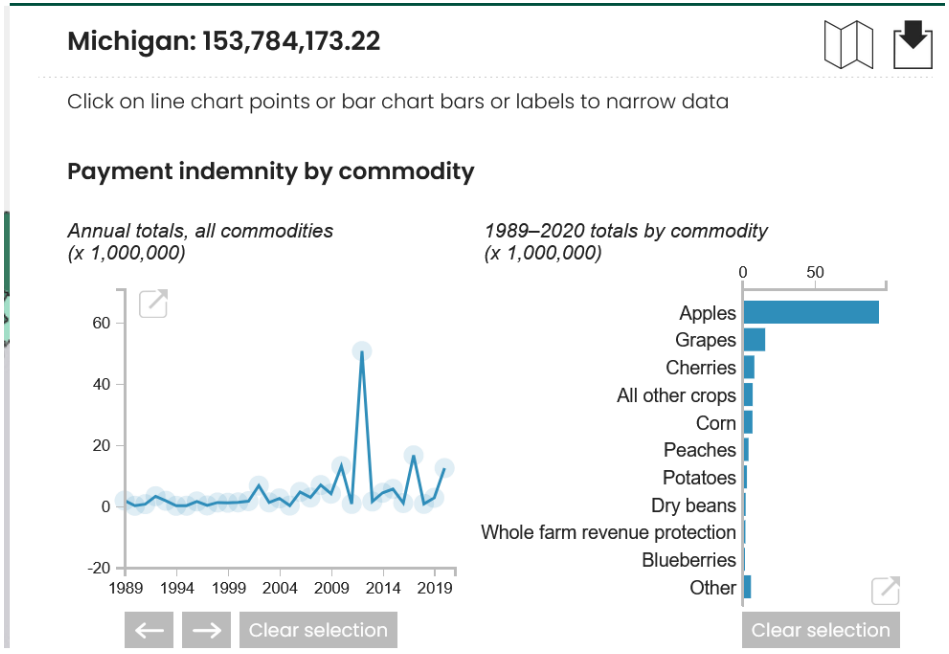
Climate-Impacted Issues for Agriculture

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

  - Minnesota
  - Row crop
  - Late season

  - Michigan
  - Specialty (food) Crops
  - Early season





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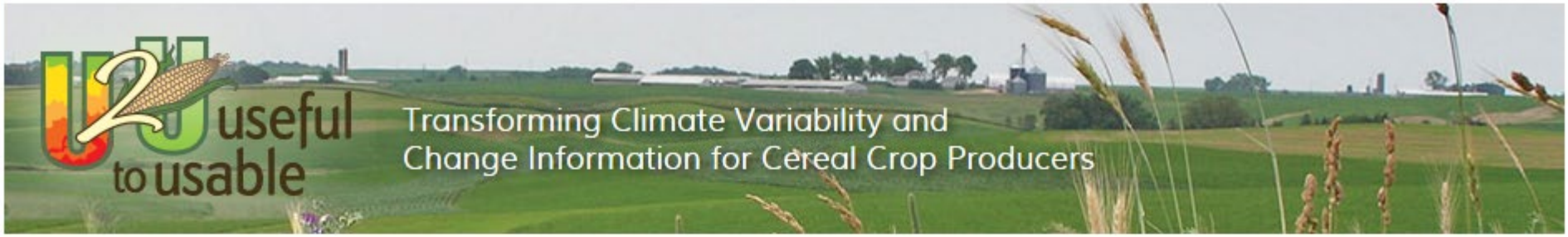
https://swclimatehub.info/rma/rma-data-viewer.html

Decision Dashboard



DECISION DASHBOARD | MEDIA CENTER | NEWSLETTER | ABOUT US

Decision Dashboard

U2U$_{DST}$ Suite | Other Decision Resources | Agro-Climate Reports | Weather/Climate Maps | Drought Info | Climate Outlooks | Helpful Links

U2U$_{DST}$ SUITE

AgClimate View$_{DST}$

A convenient way to access customized historical climate and crop yield data for the U.S. Corn Belt. View graphs of monthly temperature and precipitation,

Corn GDD$_{DST}$

Track real-time and historical GDD accumulations, assess spring and fall frost risk, and guide decisions related to planting, harvest, and seed selection.

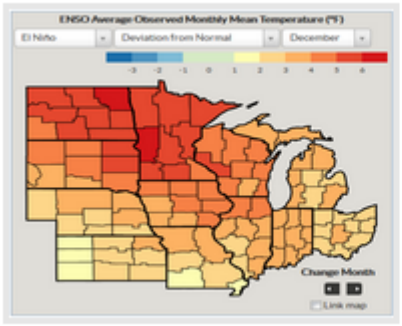
www.AgClimate4U.org

Decision Support Tools

U2U$_{DST}$ SUITE

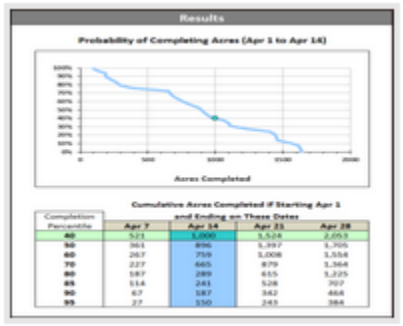
AgClimate View$_{DST}$

A convenient way to access customized historical climate and crop yield data for the U.S. Corn Belt. View graphs of monthly temperature and precipitation, plot corn and soybean yield trends, and compare climate and yields over the past 30 years.



Climate Patterns Viewer$_{DST}$

Discover how global climate patterns like the El Niño Southern Oscillation (ENSO) and Arctic Oscillation (AO) have historically affected local climate conditions and crop yields across the U.S. Corn Belt.

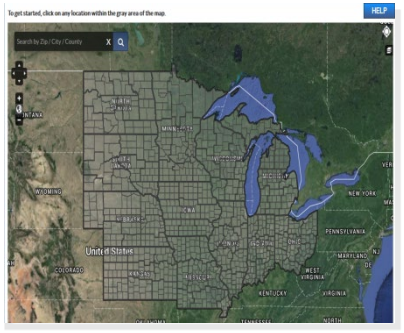


Probable Fieldwork Days$_{DST}$

This spreadsheet-based tool uses USDA data on Days Suitable for Fieldwork to determine the probability of completing in-field activities during a user-specified time period. This product is currently available for Illinois, Iowa, Kansas, and Missouri. (Hosted by the University of Missouri)

Corn GDD$_{DST}$

Track real-time and historical GDD accumulations, assess spring and fall frost risk, and guide decisions related to planting, harvest, and seed selection. This innovative tool integrates corn development stages with weather and climate data for location-specific decision support tailored specifically to agricultural production.



Corn Split N$_{DST}$ (NEW!)

Determine the feasibility and profitability of using post-planting nitrogen application for corn production. This product combines historical data on crop growth and fieldwork conditions with economic considerations to determine best/worst /average scenarios of successfully completing nitrogen applications within a user-specified time period.

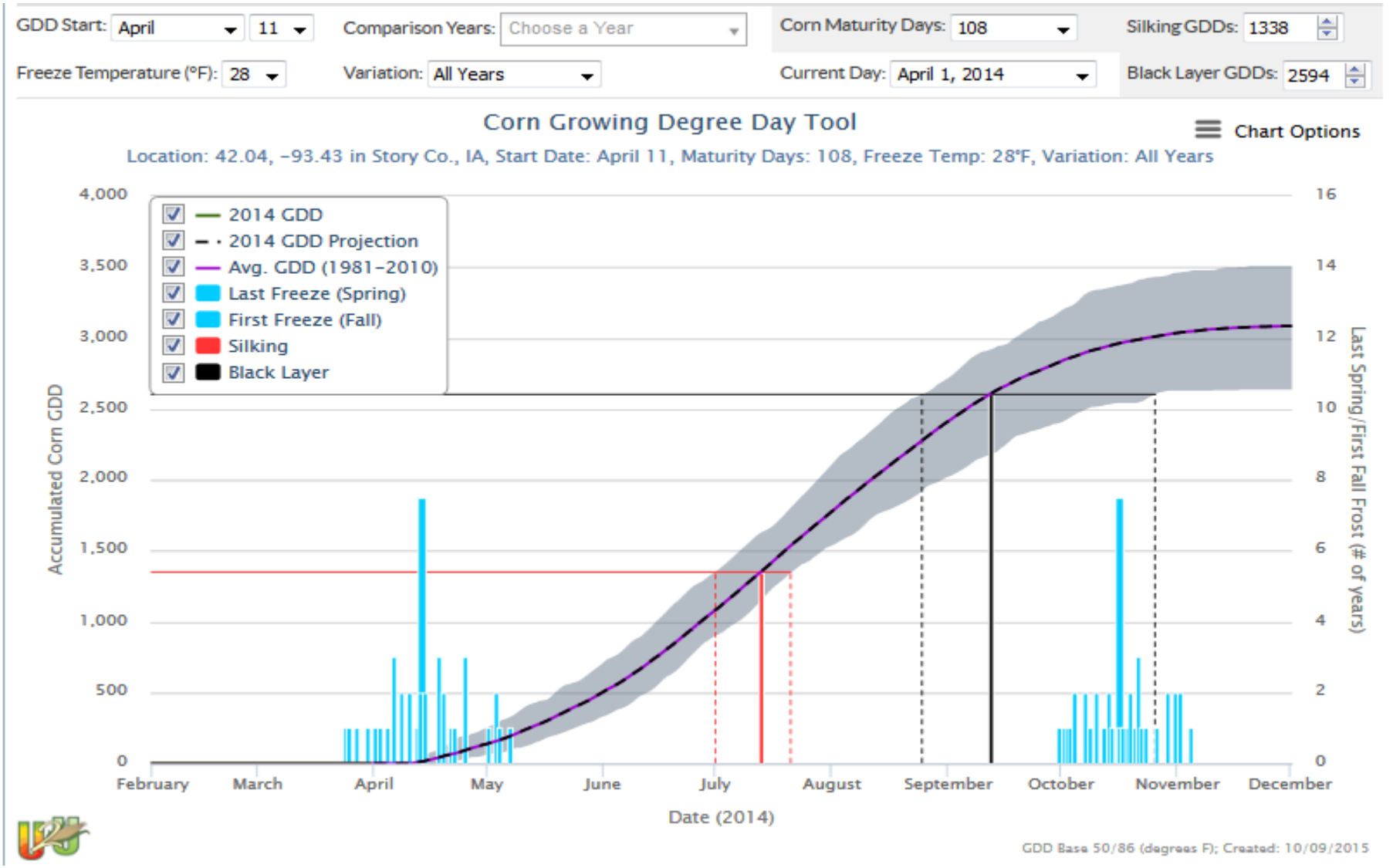
www.AgClimate4U.org

Corn Growing Degree Days

This tool puts current conditions into a 30-year historical perspective and offers trend projections through the end of the calendar year. Growing Degree Day (GDD) projections, combined with analysis of historical analog data, can help you make decisions about:

- Climate Risks – Identify the likelihood of reaching maturity before frosts/freezes.
- Activity Planning – Consider corn hybrid estimated physiological maturity requirements, along with GDD projections when making seed purchasing and other growing season decisions.
- Marketing – Look at historical and projected GDD when considering forward pricing and crop insurance purchases.

GDD Graph



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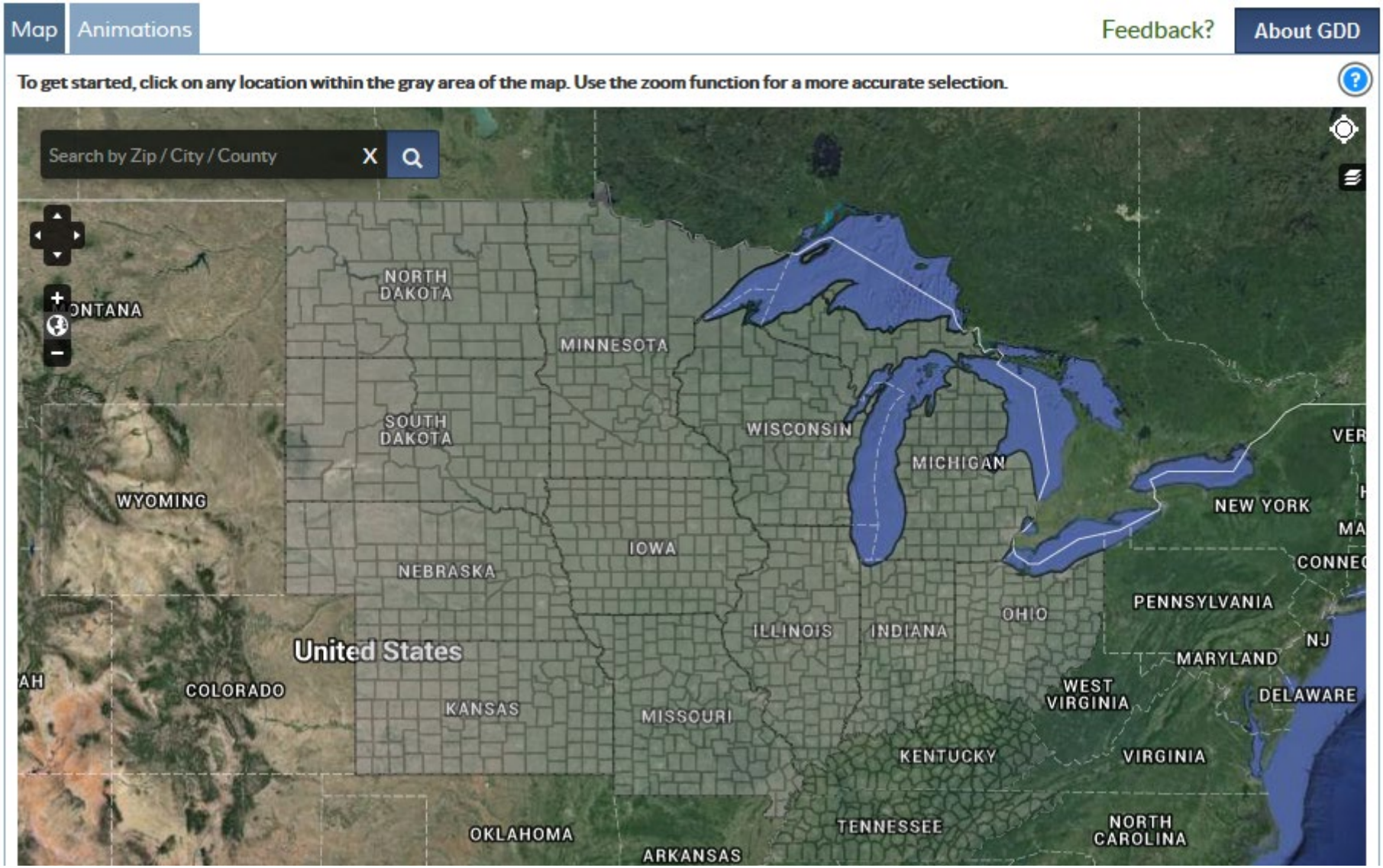
Pick Your Location



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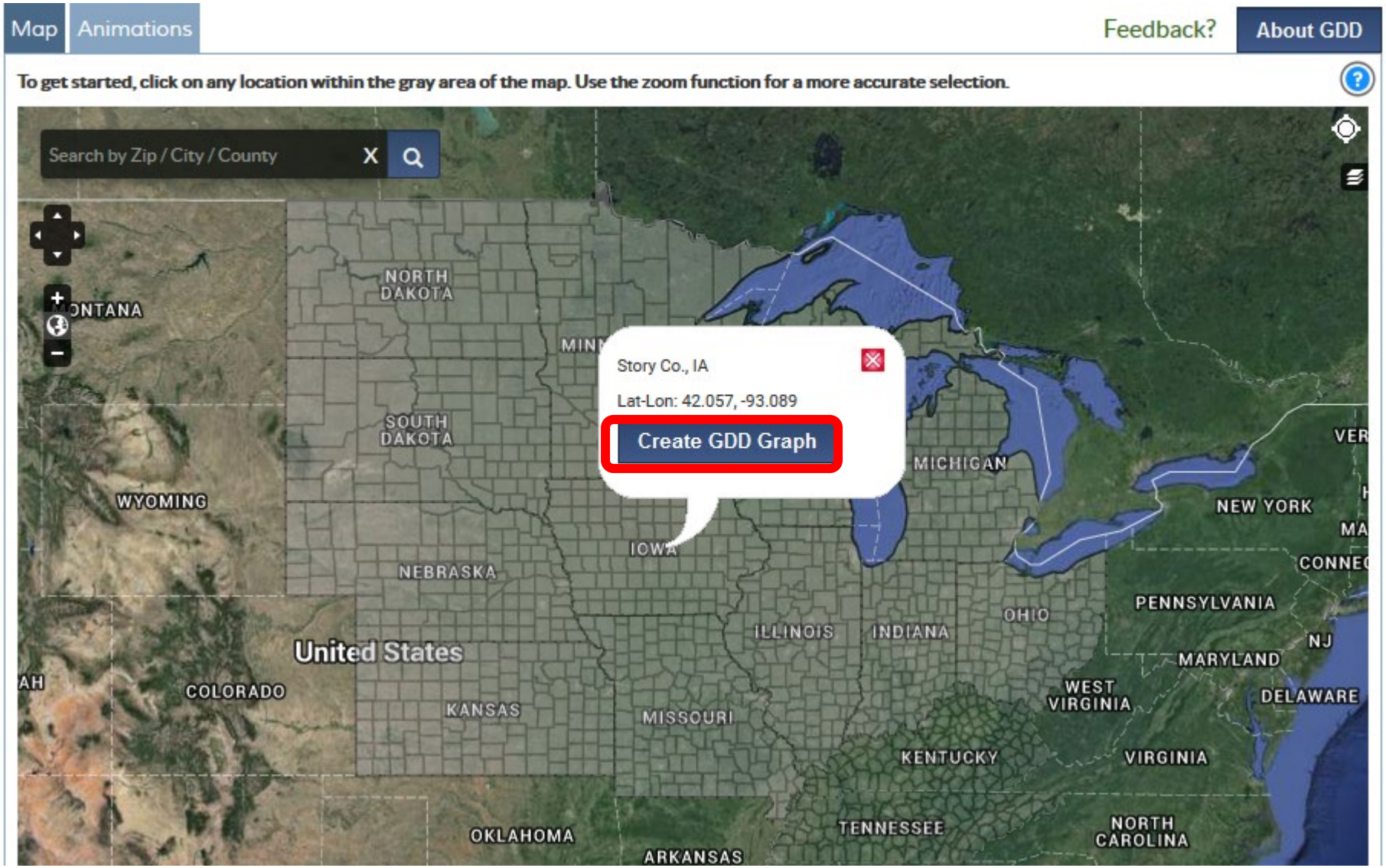
For Example:



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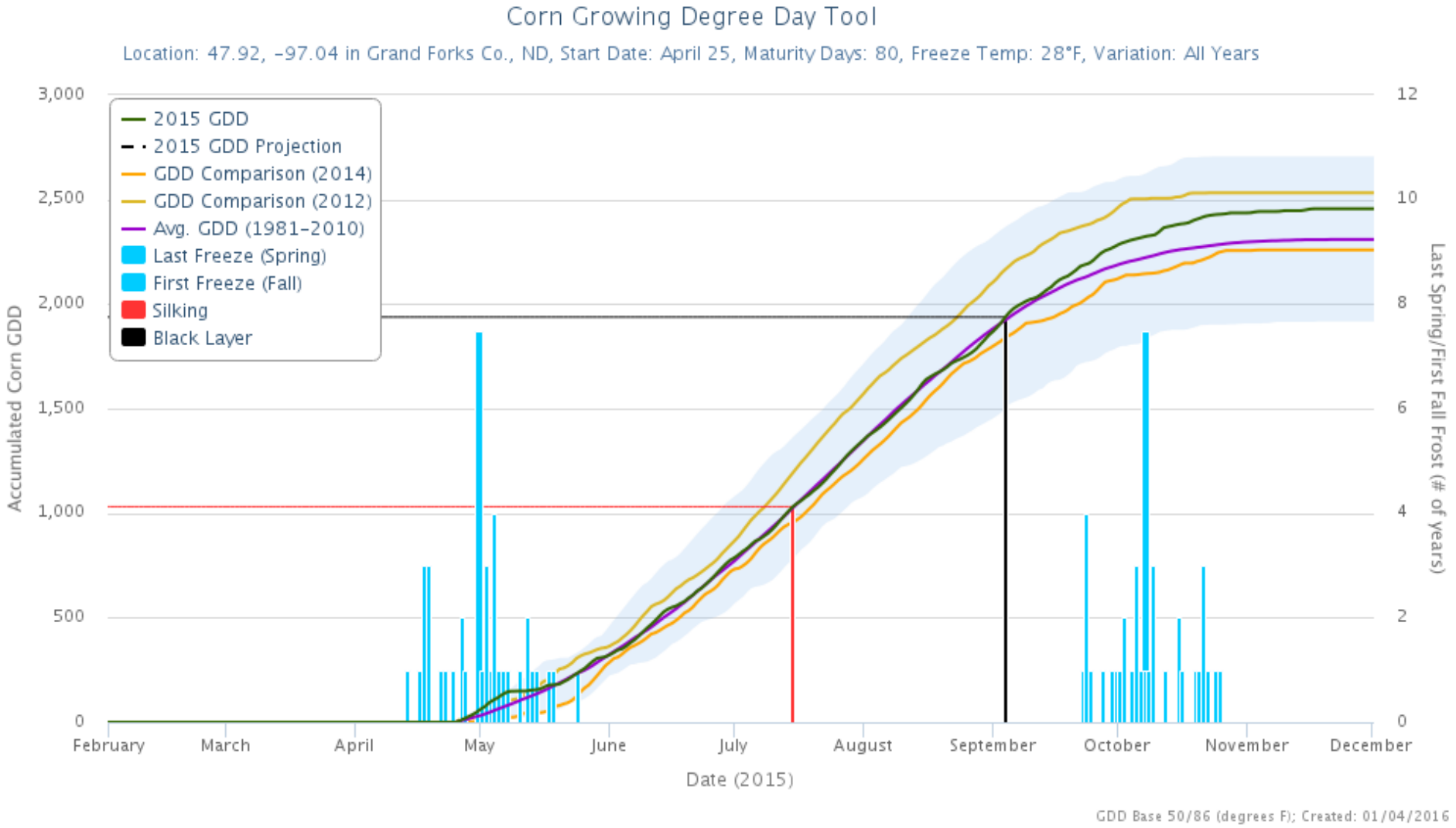
GDD Graph



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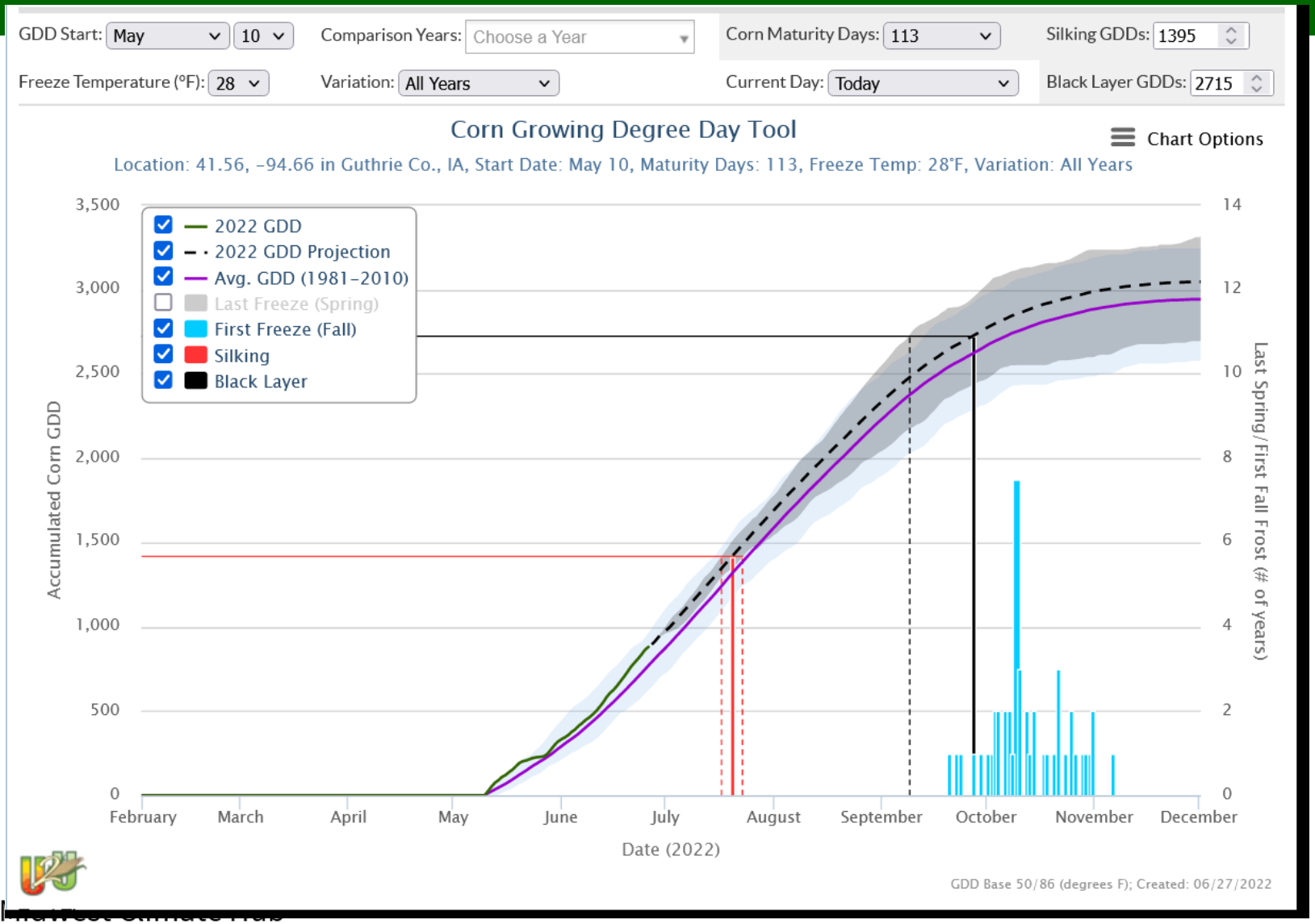
GDD Accumulations (Guthrie Co.)



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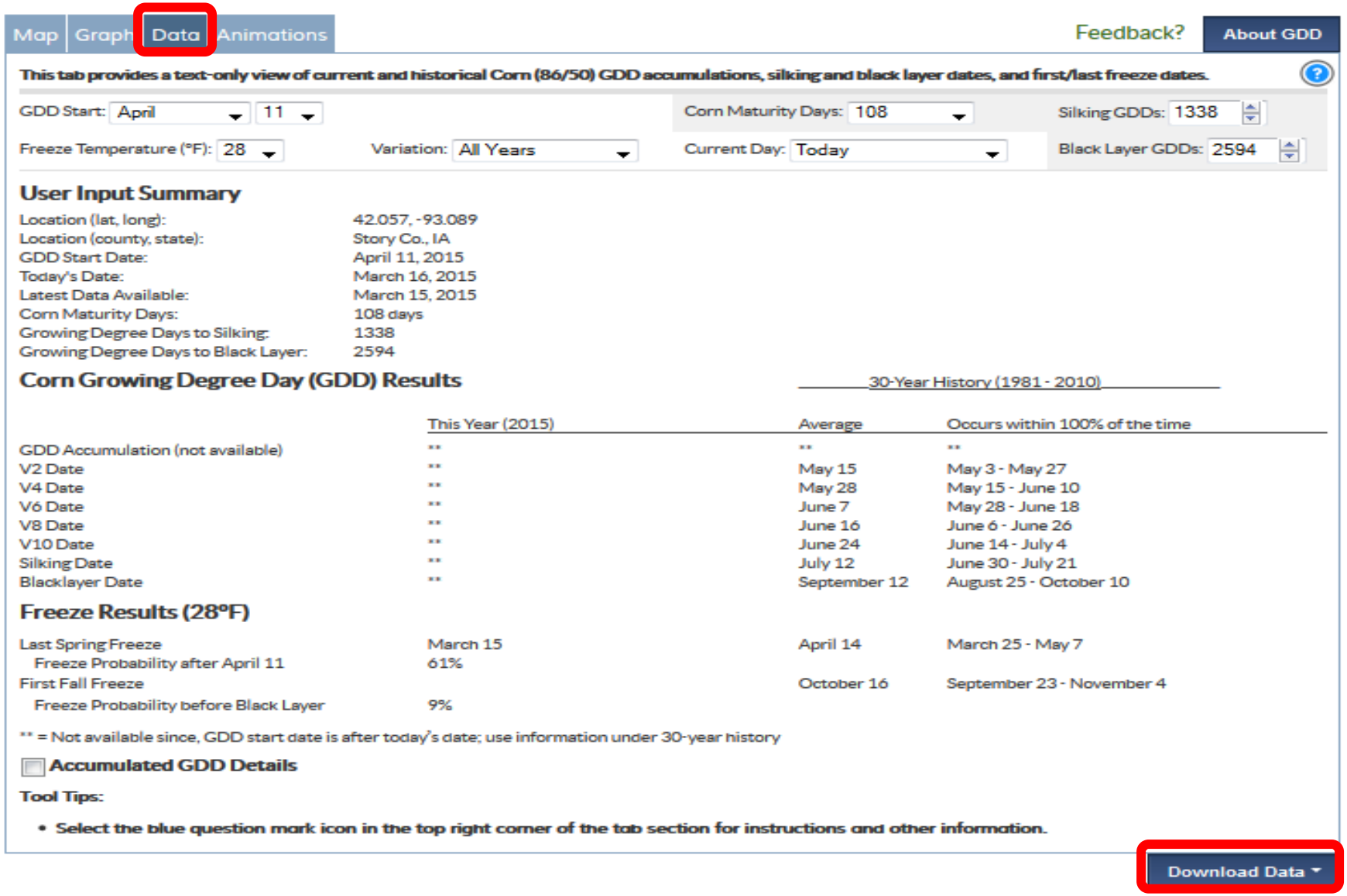
https://mygeohub.org/groups/u2u/purdue_gdd

Data Details and Download

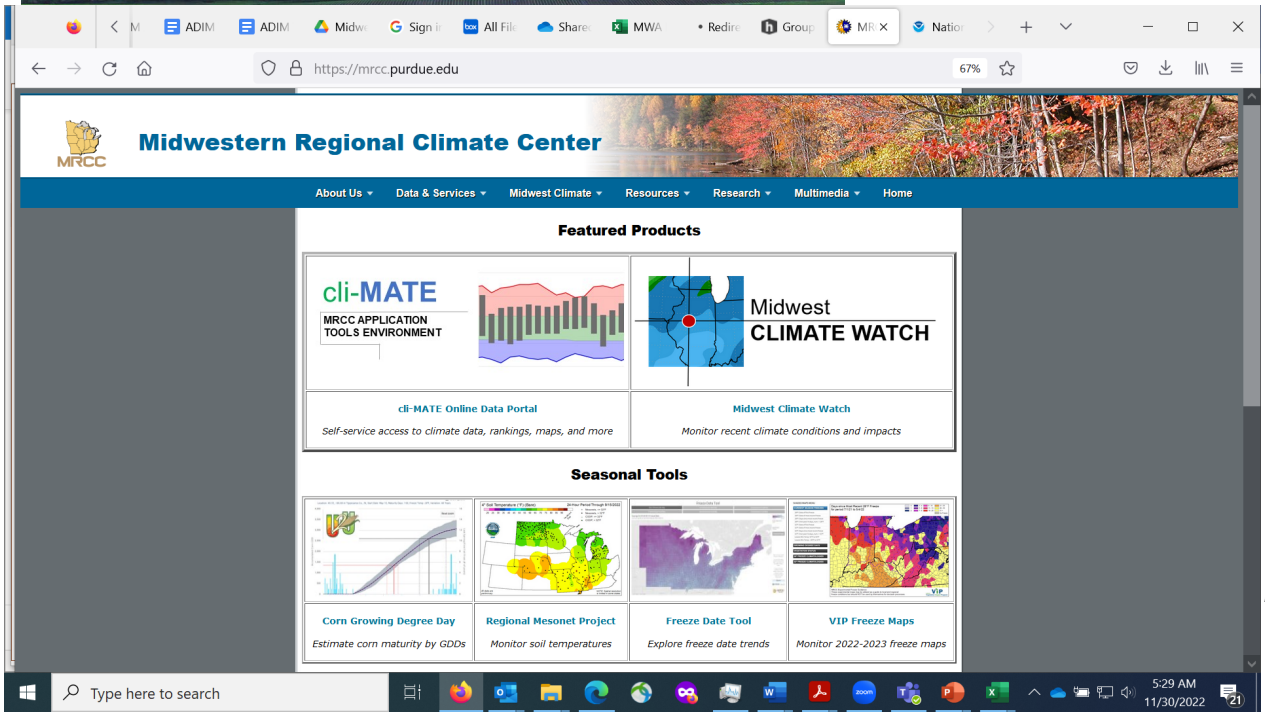


www.AgClimate4U.org

DATA MATTERS

We have the tools to help you make decisions.

- Climate Tools
- Interactive Maps
- Customized Services



MRCC
Midwestern Regional Climate Center

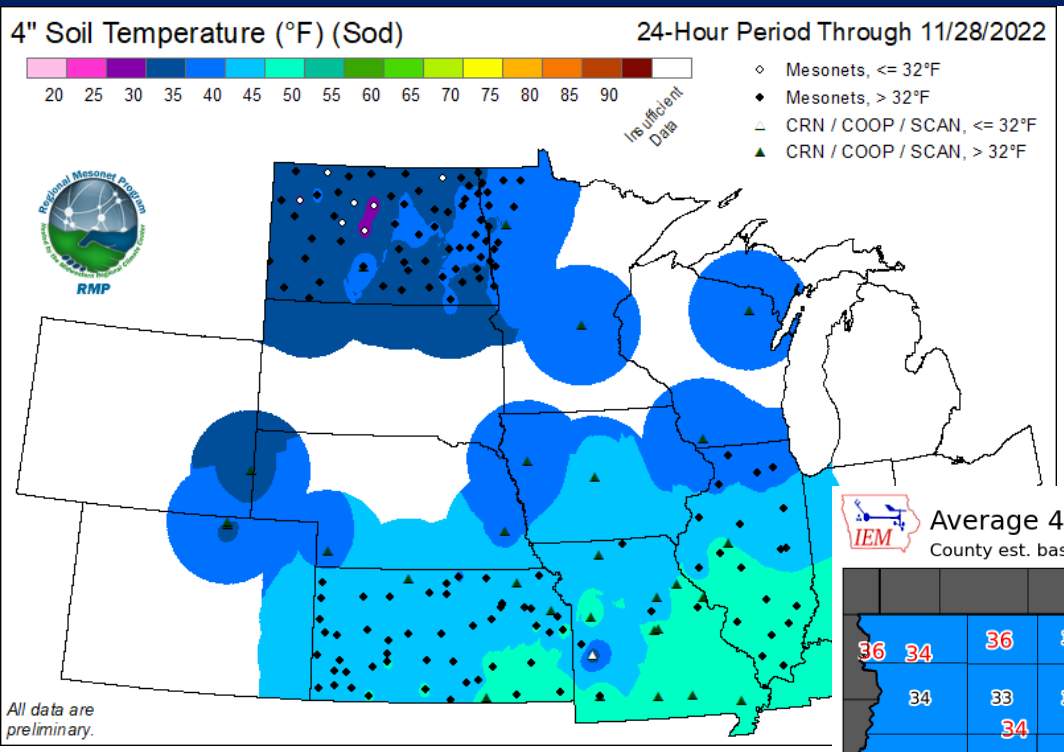
mrcc.purdue.edu

NOAA

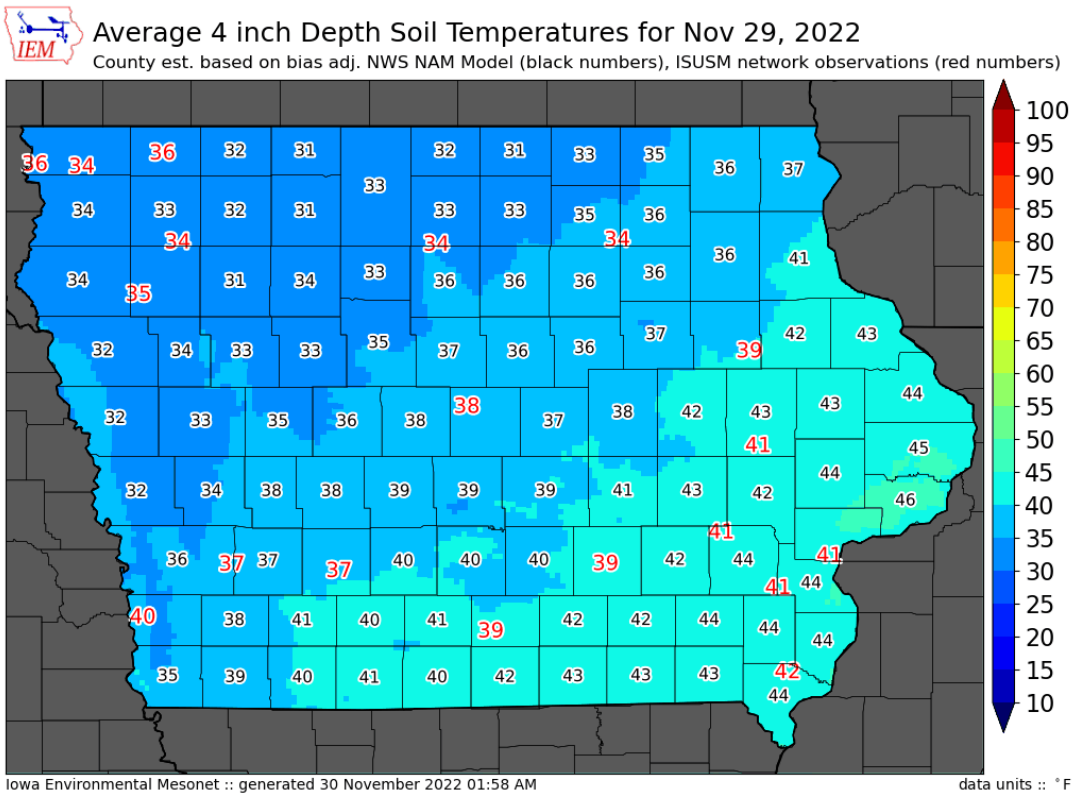
PURDUE UNIVERSITY

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

Soil Temperatures



https://mrcc.purdue.edu/RMP/currentMaps.html#banner



https://mesonet.agron.iastate.edu/agclimate/soilt.php

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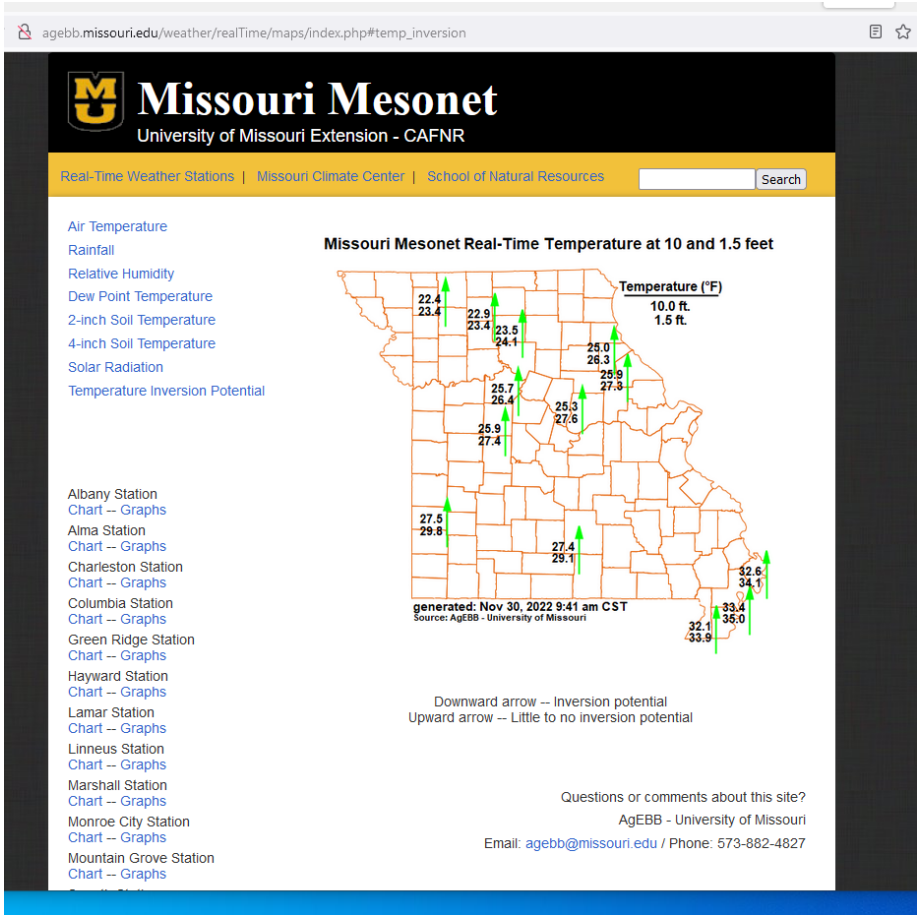
Coming Attractions-MRCC

- Soil temperature climatology
- Temperature Inversion web site



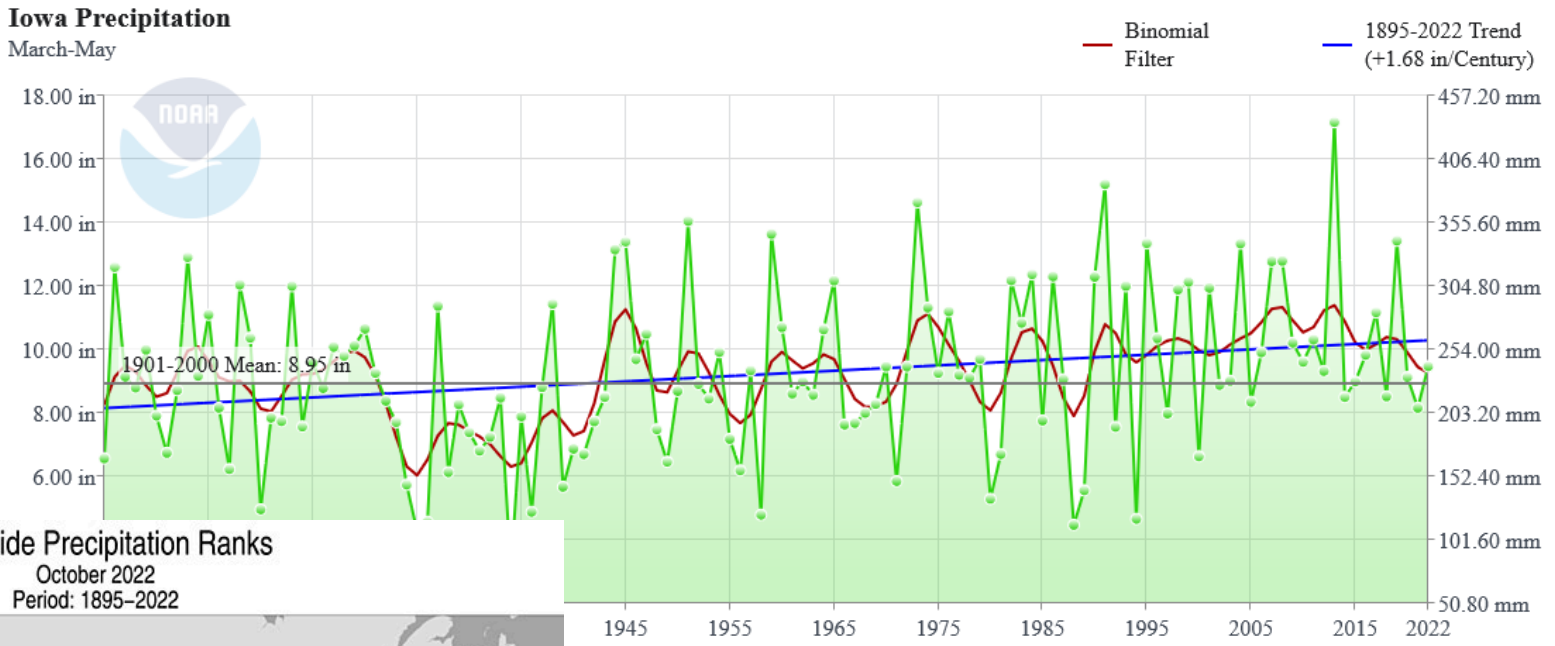
National to County level data for over 125 years

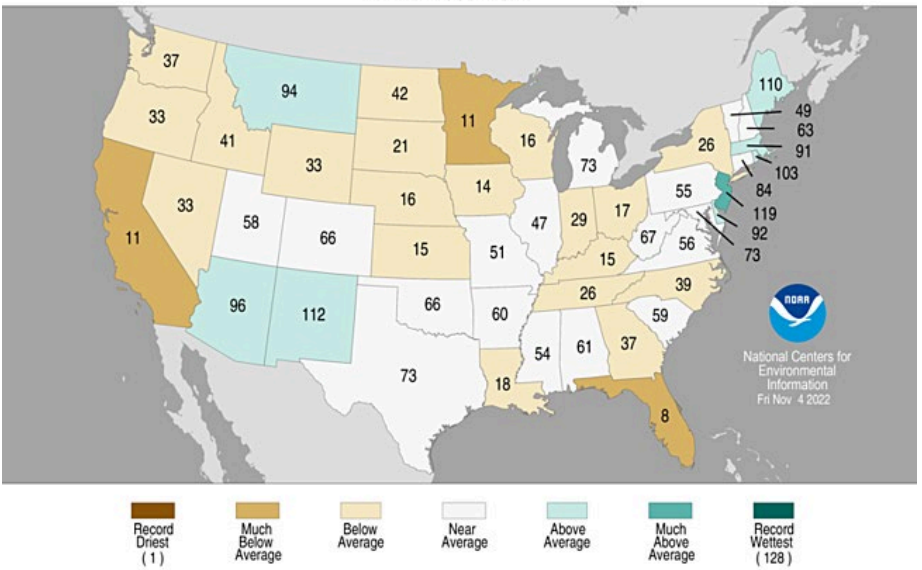
LONG-TERM DATA

Long Term Data/Trends

- National Drought Mitigation Center
  - https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/
  - https://www.ncei.noaa.gov/access/monitoring/us-maps/

NOAA Climate Trends





- https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/
  https://www.ncei.noaa.gov/access/monitoring/us-maps/

Information about and assessing drought

DROUGHT

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Assessing Drought - Ag

- National Drought Mitigation Center
  - https://droughtmonitor.unl.edu/
  - https://drought.unl.edu/Monitoring/DroughtMonitoringTools.aspx
  - https://agindrought.unl.edu/

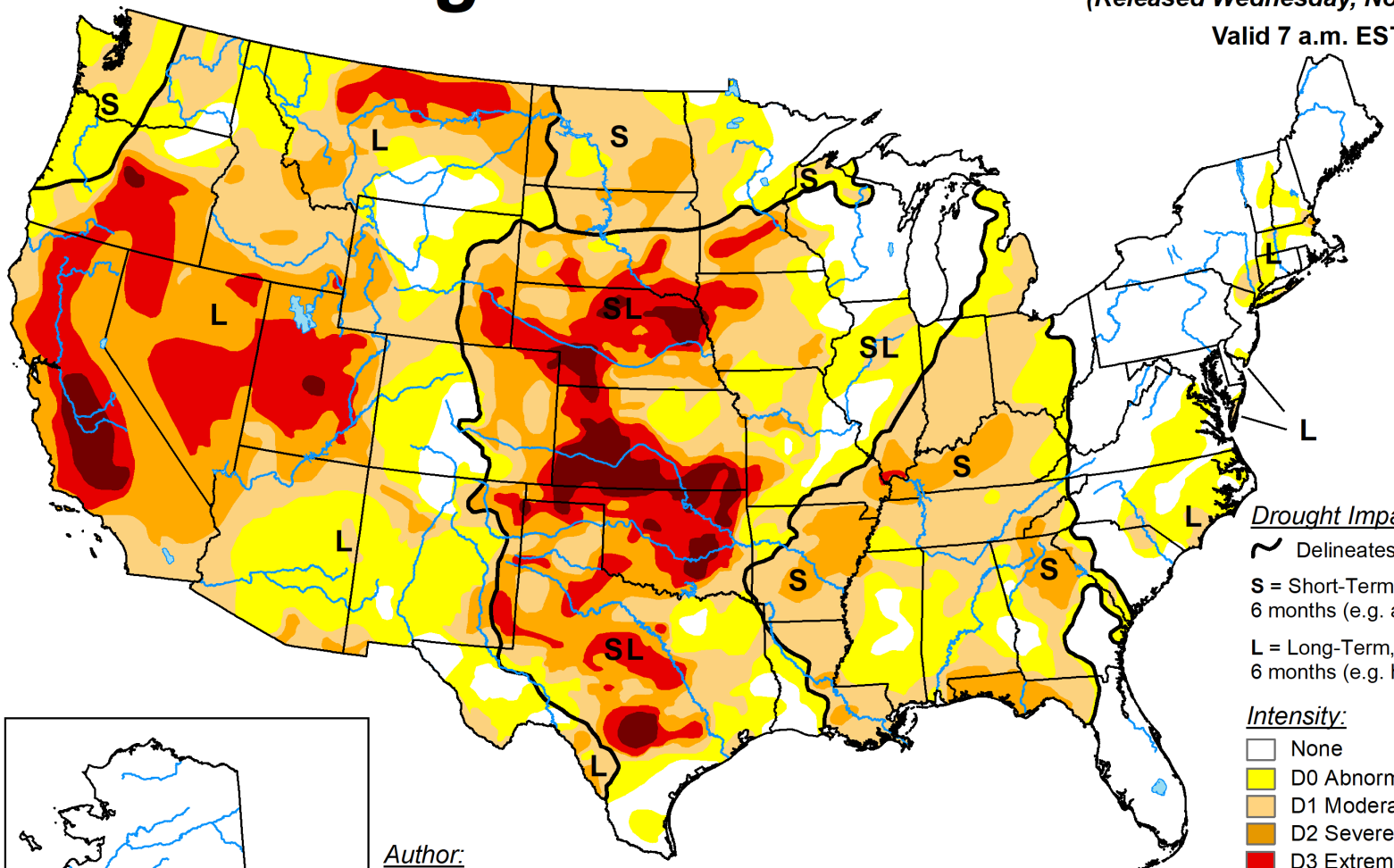
- National Integrated Drought Information System (NIDIS)
  - https://www.drought.gov/
  - https://www.drought.gov/topics/agriculture

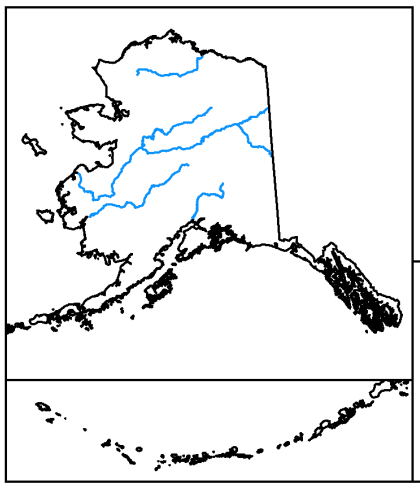
U.S. Drought Monitor

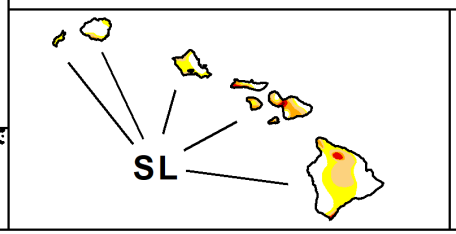
November 22, 2022

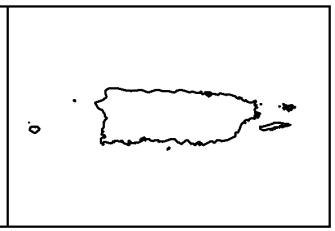
(Released Wednesday, Nov. 23, 2022)

Valid 7 a.m. EST









Author:
Brad Rippey
U.S. Department of Agriculture

Drought Impact Types:

~ Delineates dominant impacts

S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

USDA NDMC NOAA

droughtmonitor.unl.edu

U.S. Drought Monitor

Iowa

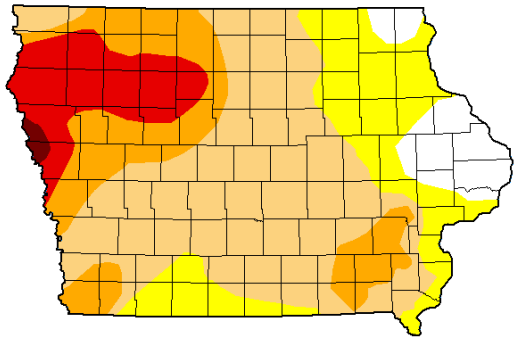
November 22, 2022

(Released Wednesday, Nov. 23, 2022)

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	7.36	92.64	73.30	29.84	12.01	0.57
Last Week 11-15-2022	7.36	92.64	73.30	29.84	12.01	0.57
3 Months Ago 08-23-2022	34.28	65.72	38.87	15.92	2.08	0.00
Start of Calendar Year 01-04-2022	50.98	49.02	11.87	0.00	0.00	0.00
Start of Water Year 09-27-2022	20.90	79.10	45.05	22.25	5.07	0.02
One Year Ago 11-23-2021	57.58	42.42	13.17	0.00	0.00	0.00



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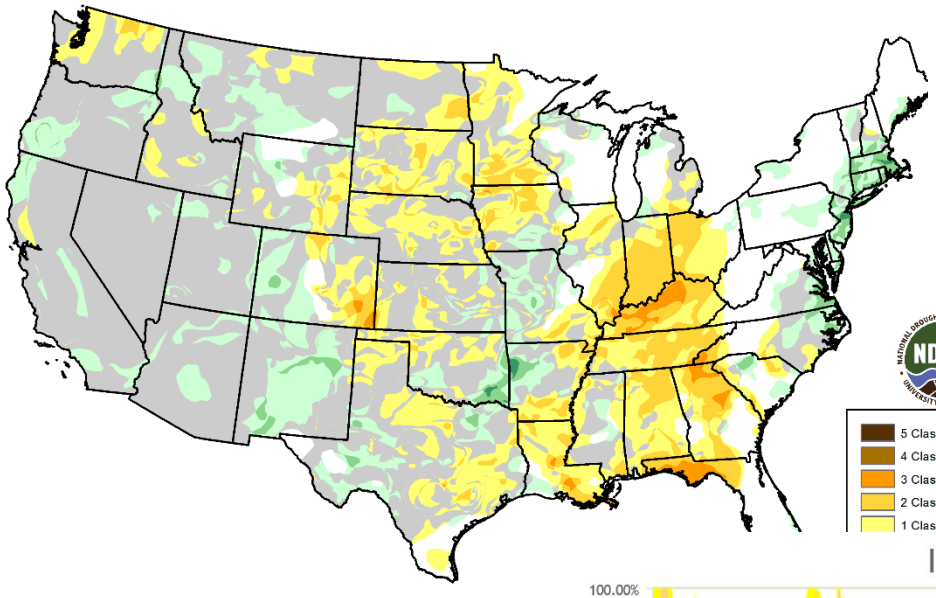
U.S. Department of Agriculture

droughtmonitor.unl.edu

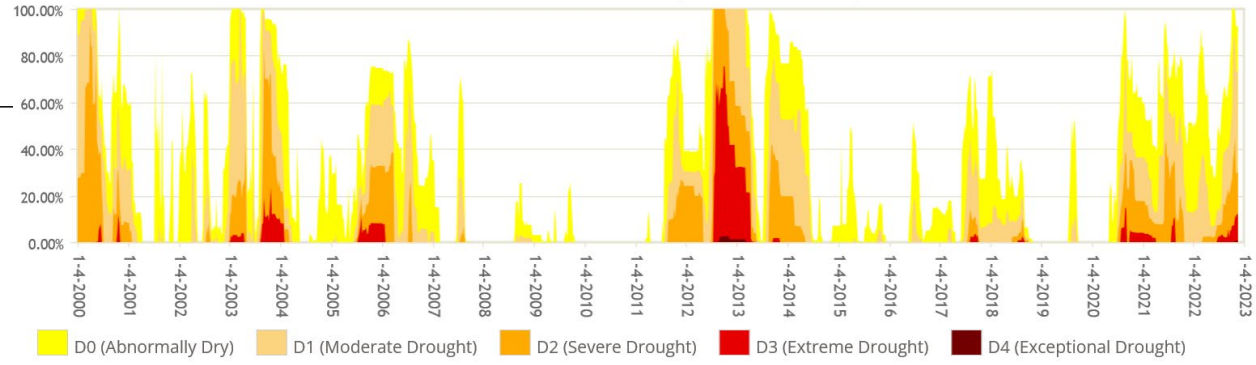
U.S. Drought Monitor Class Change - CONUS

8 Week



November 22, 2022 compared to September 27, 2022

Iowa Percent Area in U.S. Drought Monitor Categories



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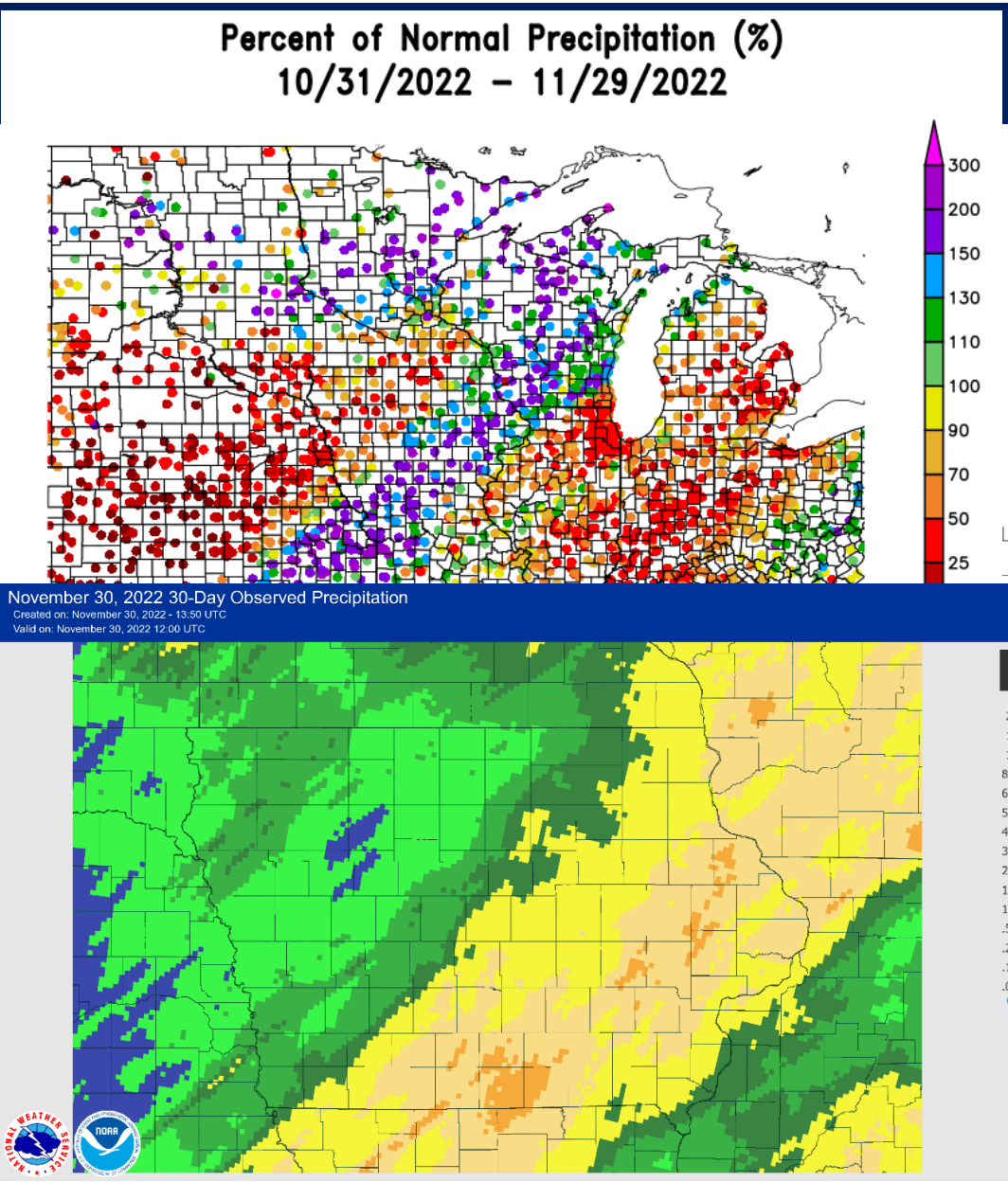
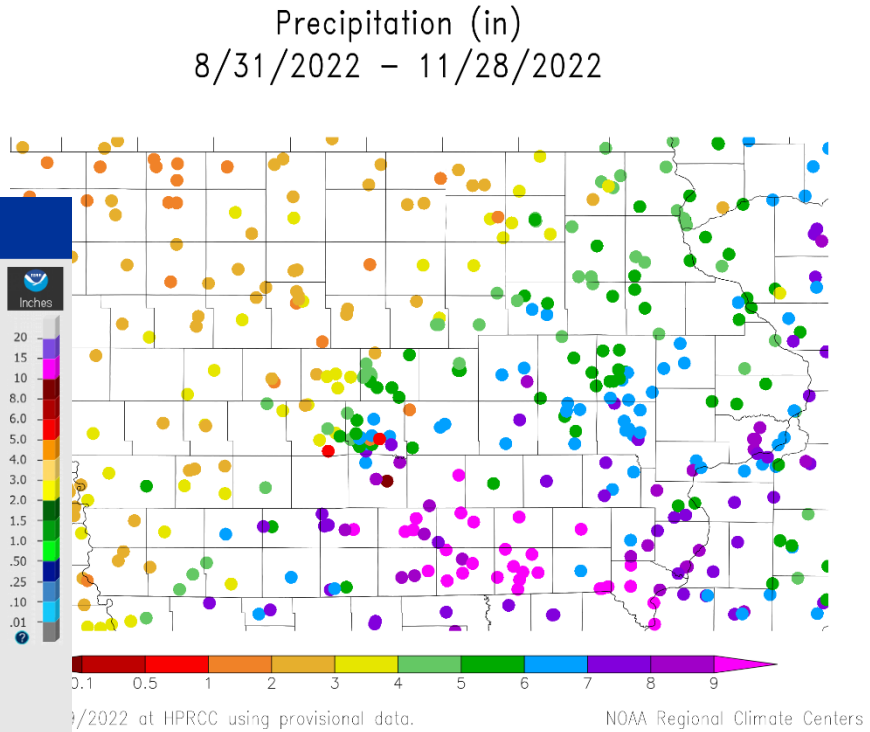
Assessing Drought





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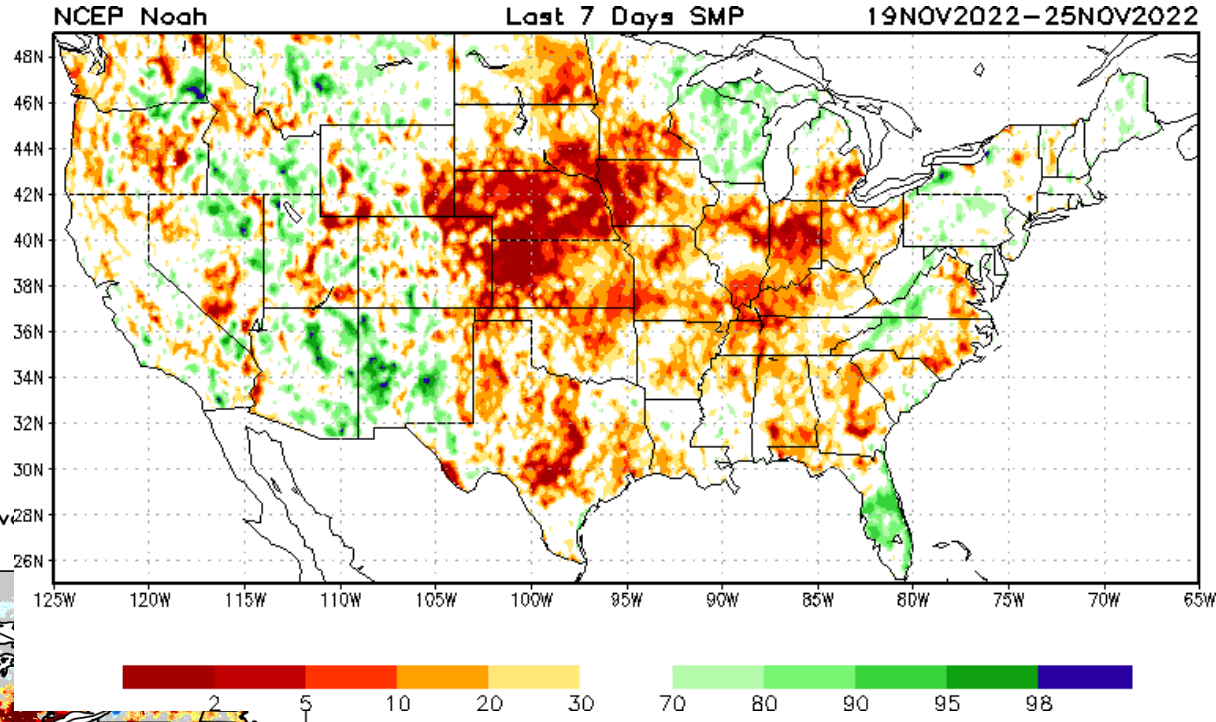
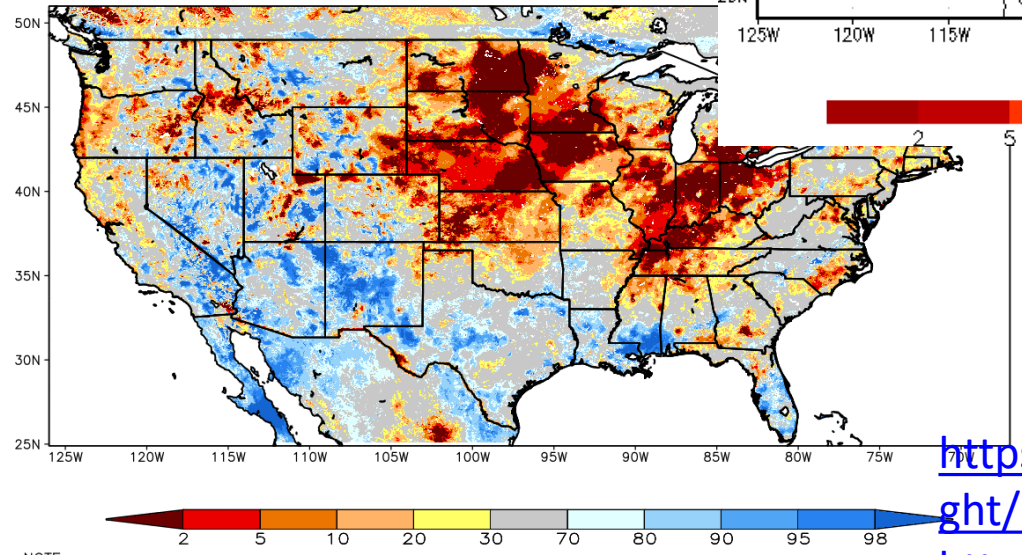
https://hprcc.unl.edu/maps.php?maps=ACISClimateMaps
https://water.weather.gov/precip/

Soil Moisture





NOTE
Experimental

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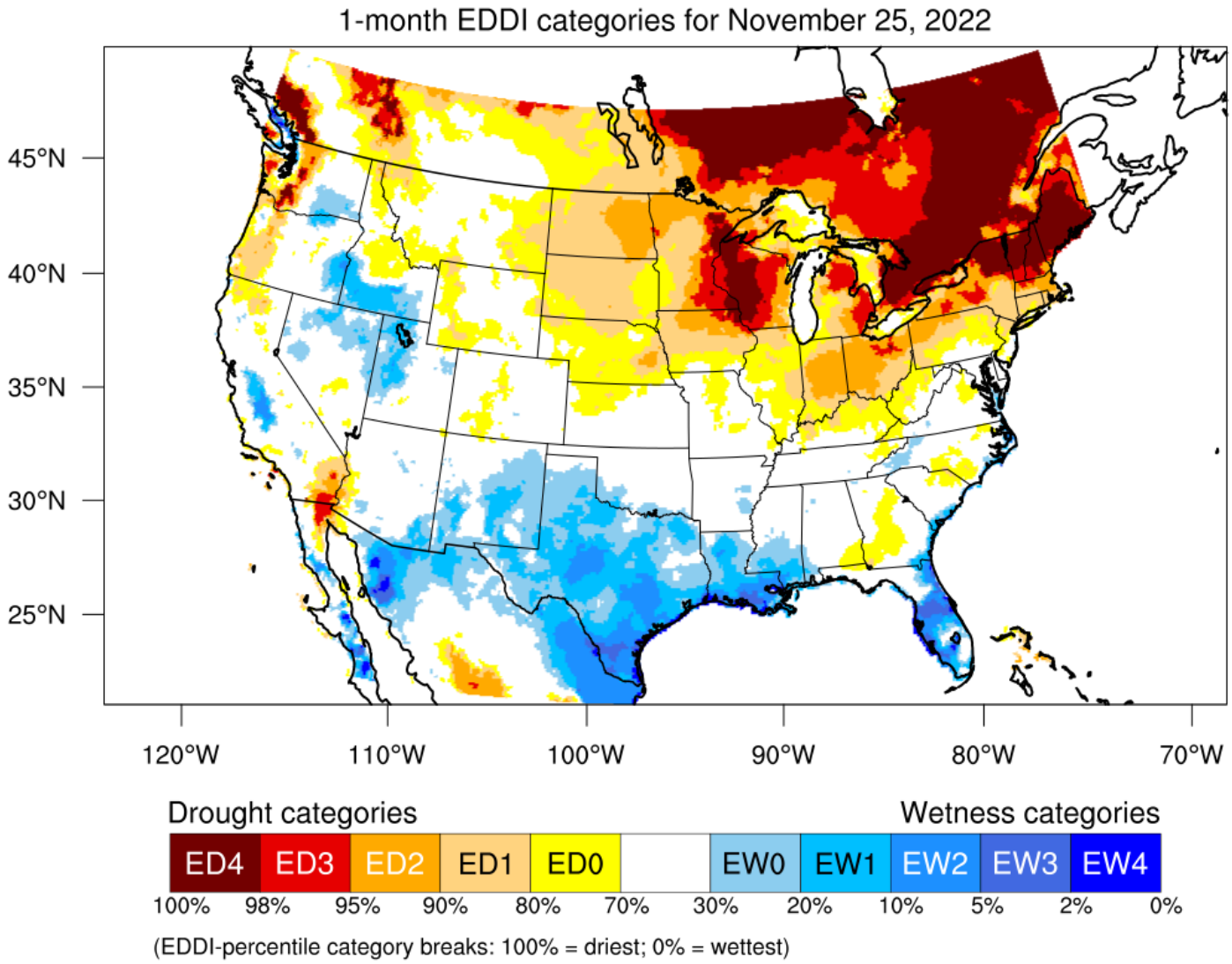
https://www.cpc.ncep.noaa.gov/products/Drought/Monitoring/smp_new.shtml#

https://weather.msfc.nasa.gov/sport/case_studies/lis_CONUS.html

Assessing Drought Evapo-Transpiration

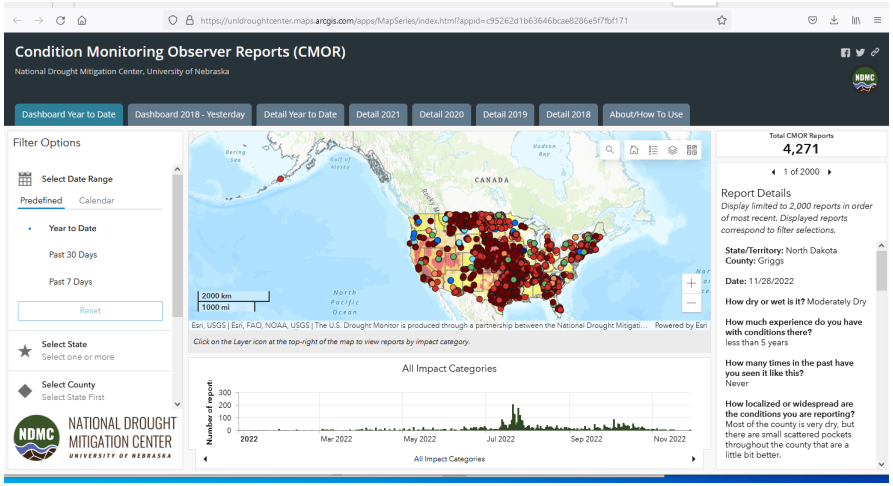
- Evapo-transpiration based on drought scale
- Not by actual amounts



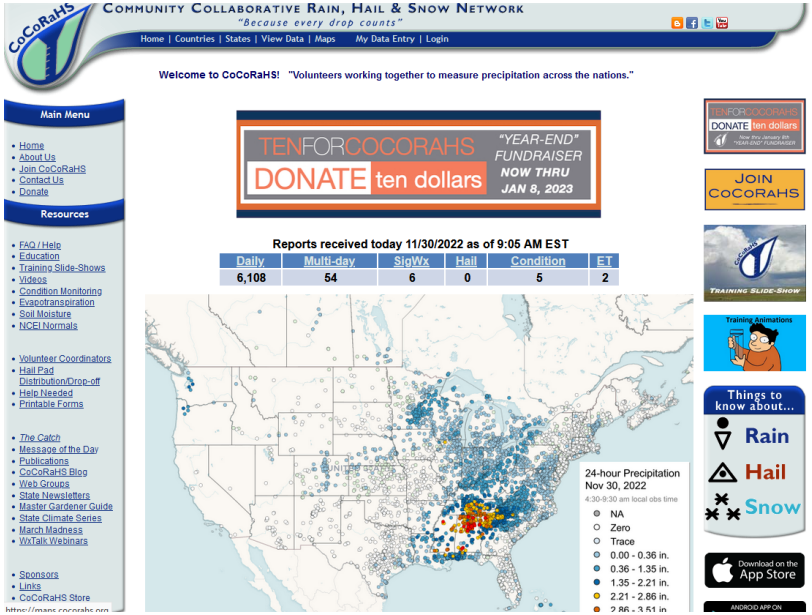
https://psl.noaa.gov/eddi/#current_conditions

Drought (and other) Share Information

- Condition Monitoring Reports (CMOR)
  - https://droughtimpacts.unl.edu/Tools/ConditionMonitoringObservations.aspx
  - Submit condition reports/pictures



- CoCoRaHS
  - https://cocorahs.org/
  - Record rainfall (daily) – can also do condition reporting



Looking ahead from tomorrow to a year from now

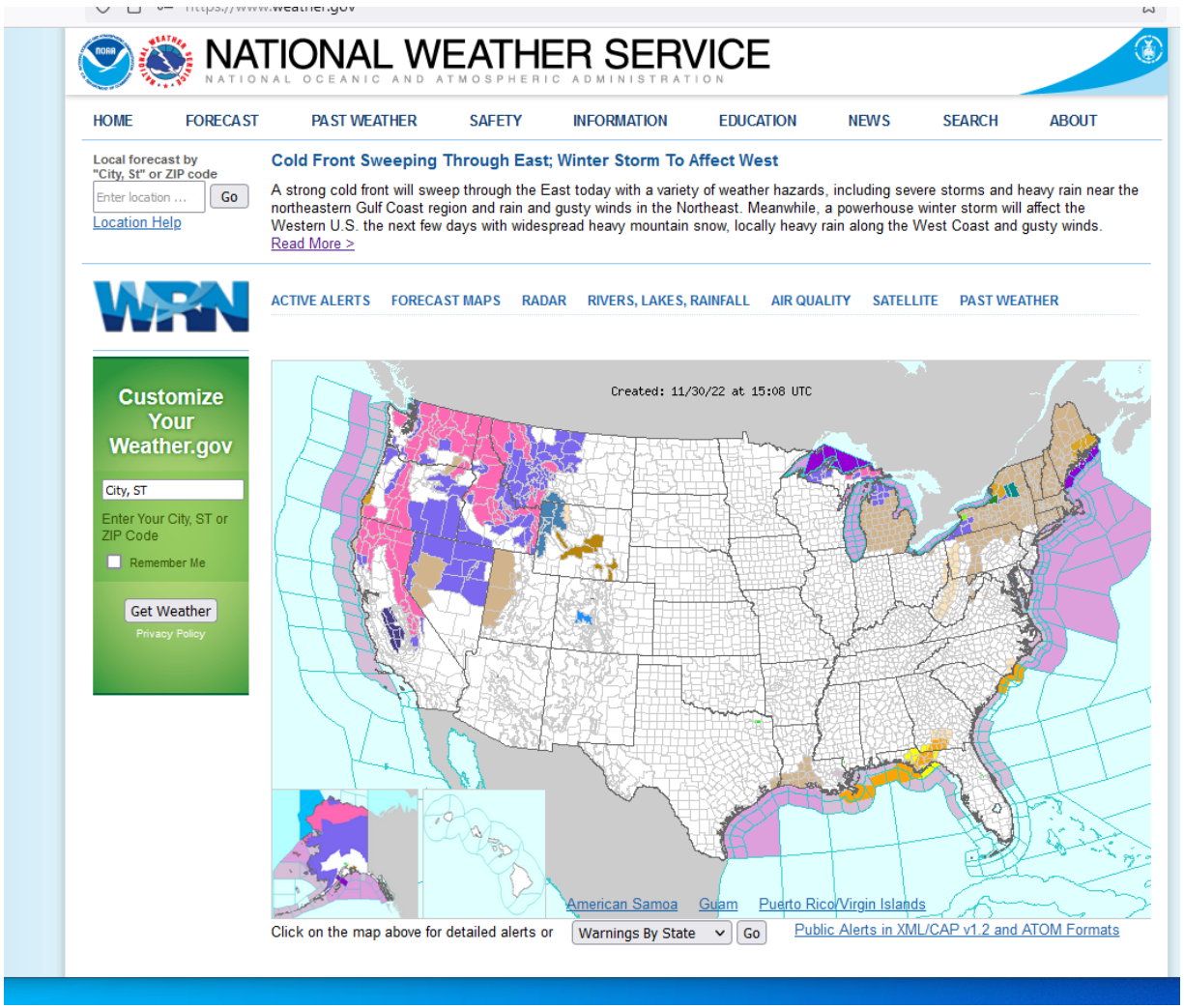
FORECASTS/OUTLOOKS

Forecasts/Outlooks

- Forecasts (1-7 Day)
  - https://www.weather.gov/

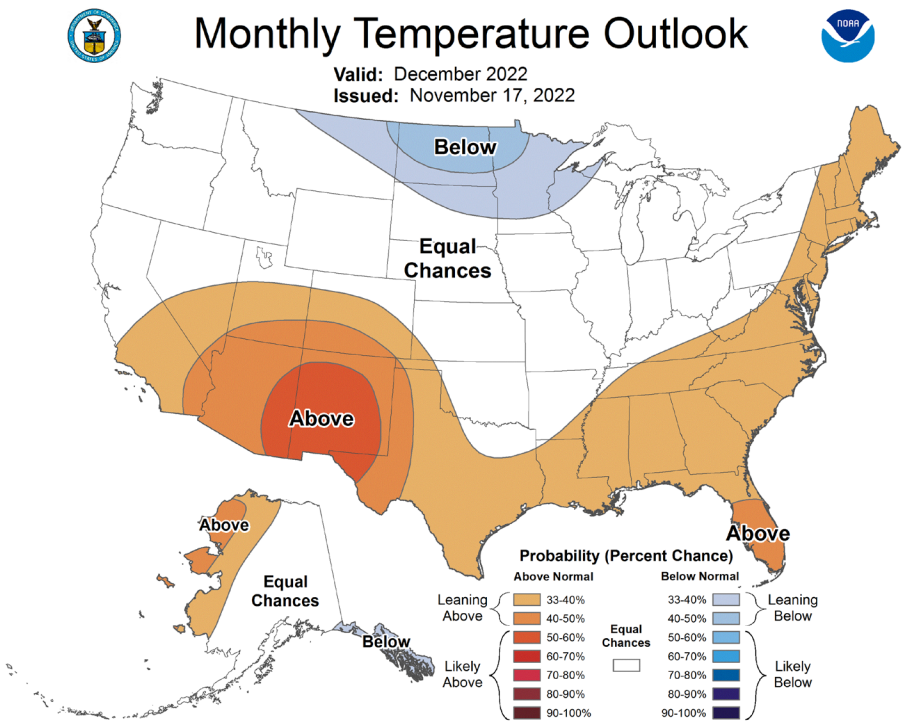
- Outlooks (Week 2 – 1 Year)
  - https://www.cpc.ncep.noaa.gov/

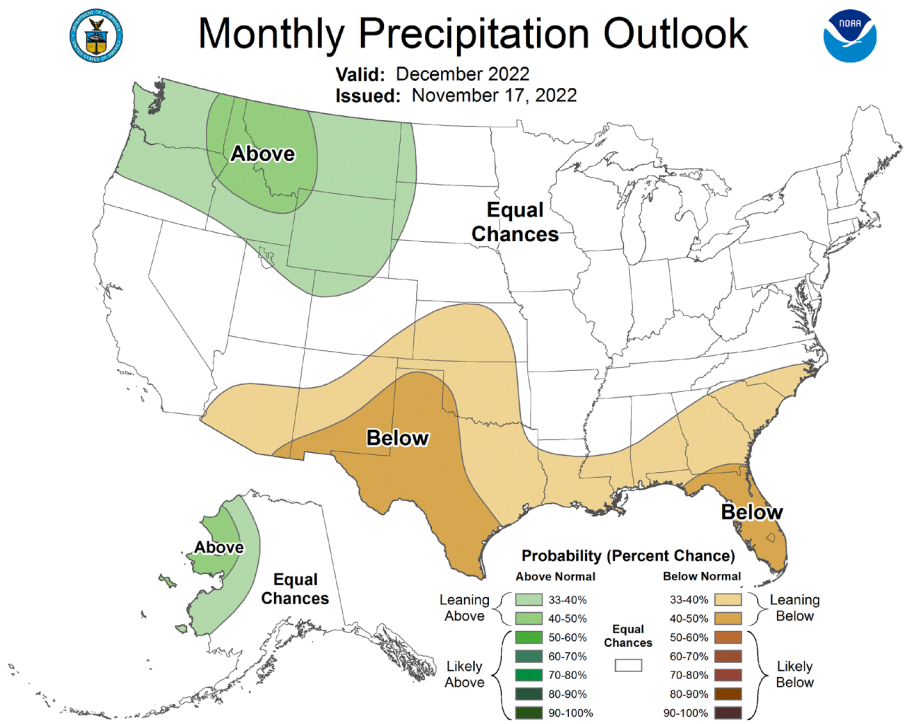
Forecasts 1-7 Days



https://www.weather.gov/

December Temperature and Precipitation Probabilities

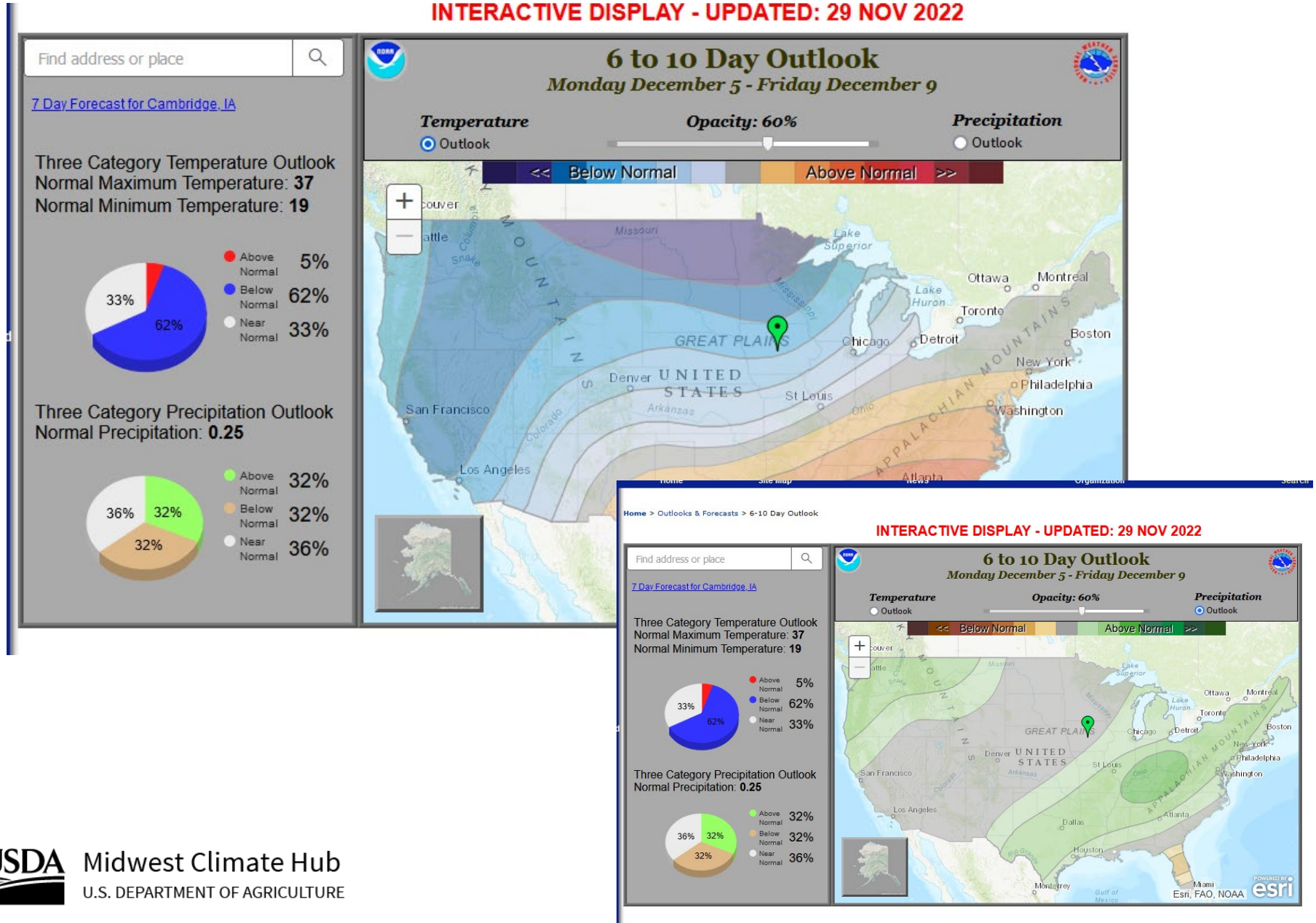




Temperature **Precipitation**

http://www.cpc.ncep.noaa.gov/products/predictions/30day/

Understanding CPC Outlooks



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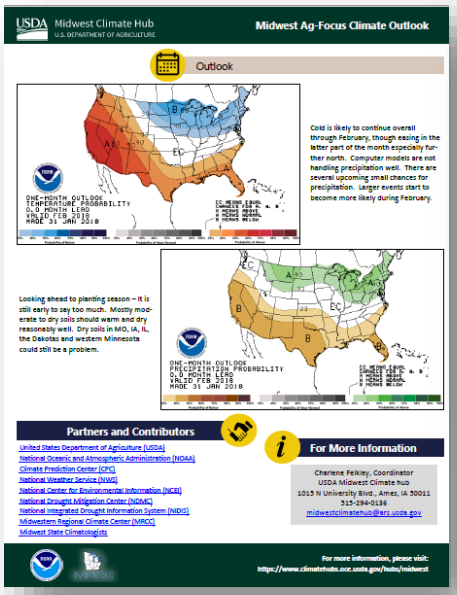
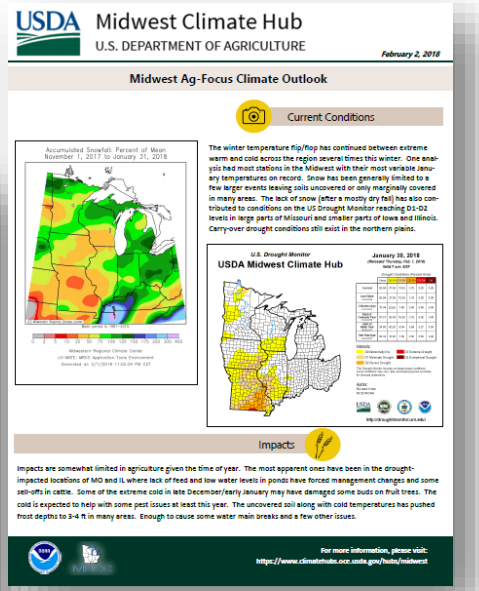
Resources: Operational Products

Midwest Ag-Focus Climate outlook





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https://www.climatehubs.usda.gov/hubs/midwest/climate-outlooks

What else do you need?

For More Information

@USDAClimateHubs
@dennistodey

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

https://www.climatehubs.usda.gov/newsletter-signup

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National Laboratory for Agriculture and the Environment
Attn: Midwest Climate Hub
1015 N University Blvd
Ames, Iowa 50011-3611

OPTIONAL SLIDES

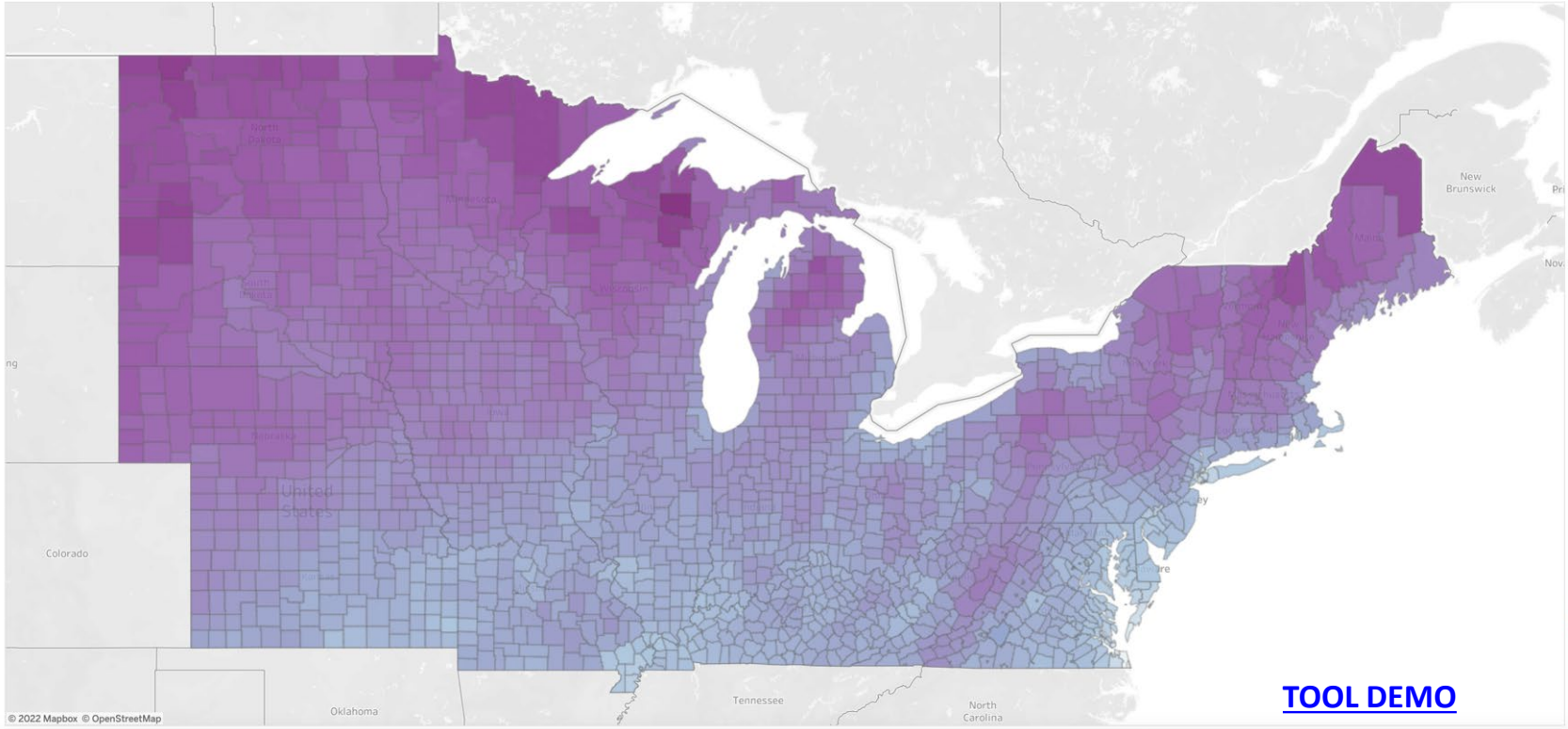
Freeze Date Tool

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.



[TOOL DEMO]

Temperature Change

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

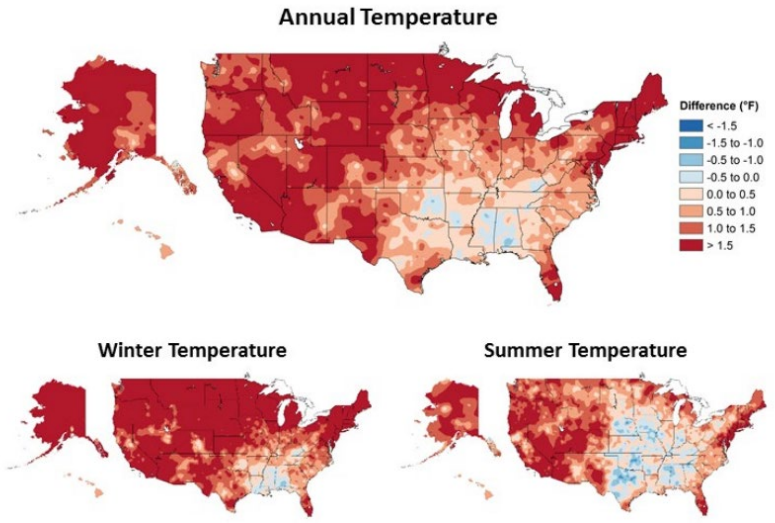
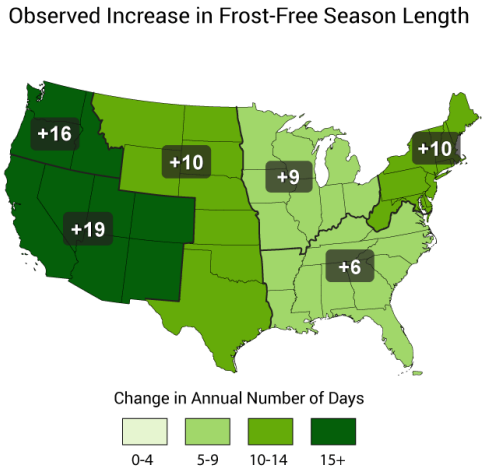
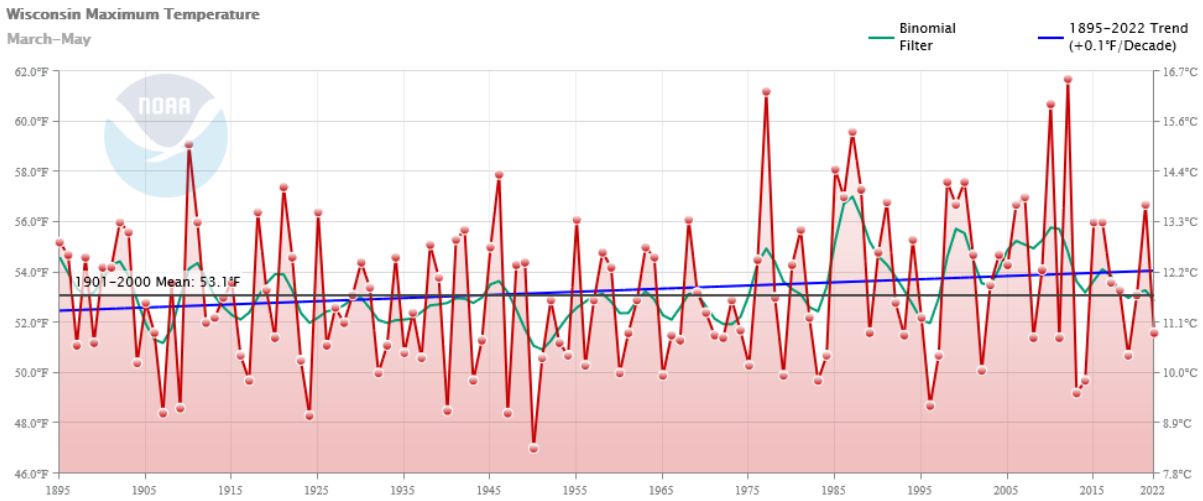


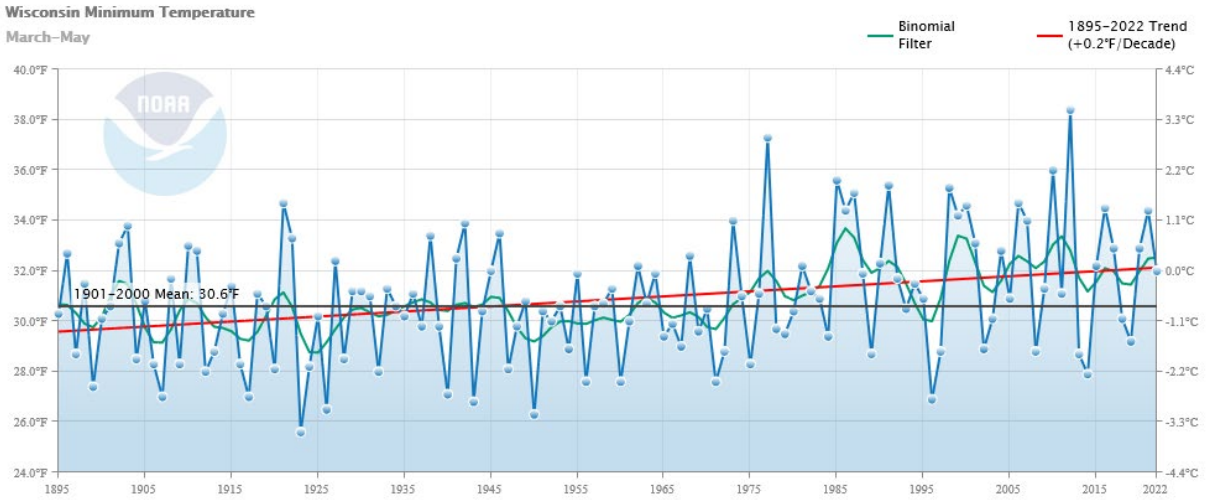
Figure 6.1. Observed changes in annual, winter, and summer temperature (°F). Changes are the difference between the average for present-day (1986–2016) and the average for the first half of the last century (1901–1960 for the contiguous United States, 1925–1960 for Alaska and Hawai'i). Estimates are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



Wisconsin Spring Temperatures Max/Min



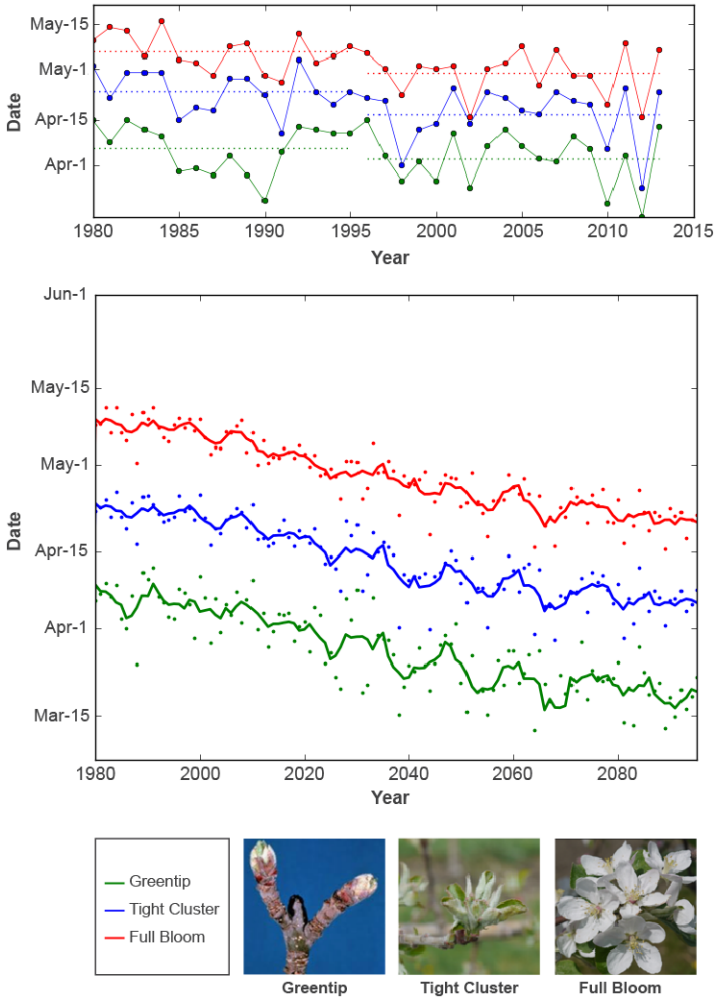
- Both Maximums and Minimums warming in spring
- Variable



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

Timing of Budbreak in Fruit Trees

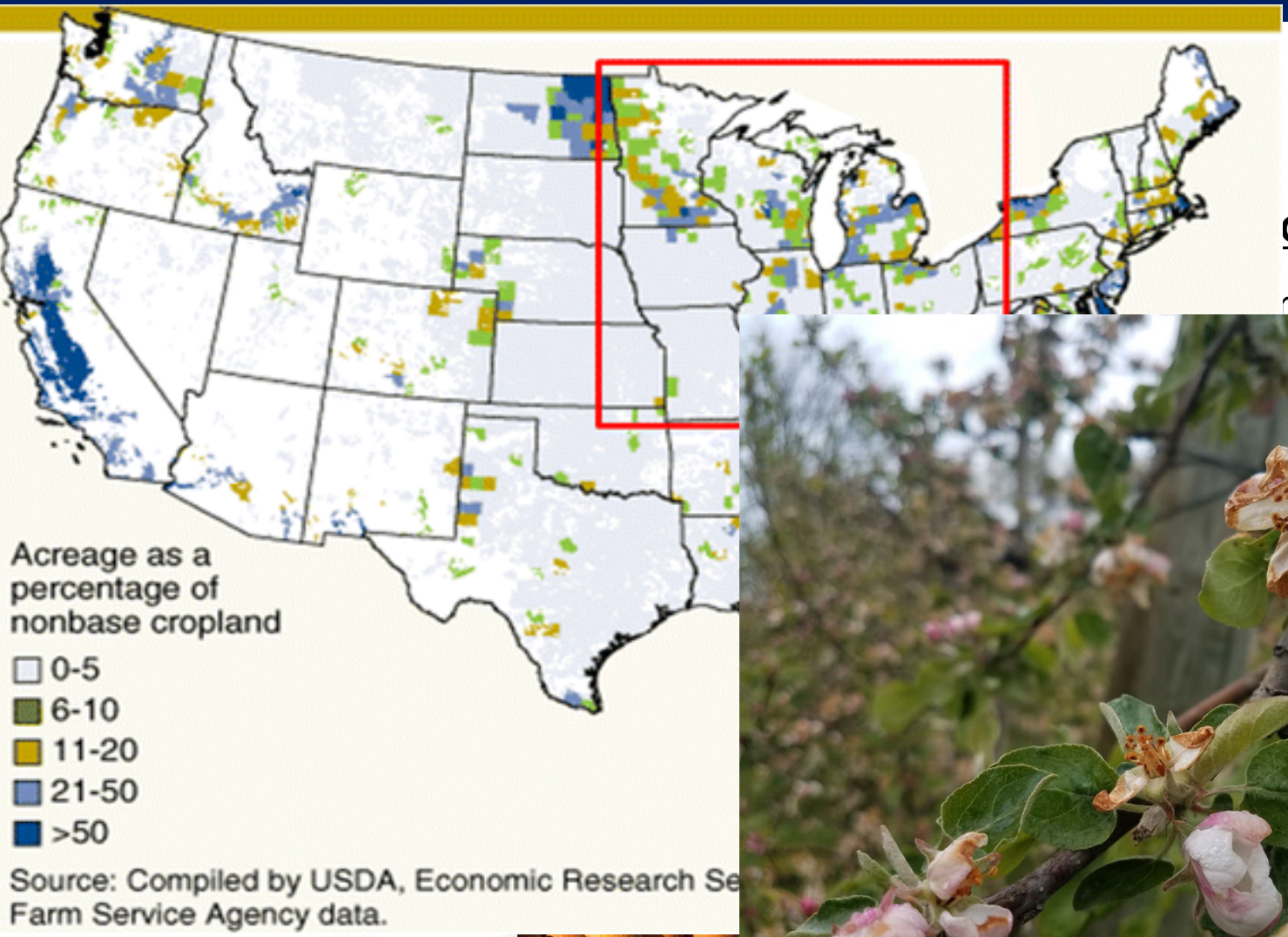
- Primarily influenced by temperature; also affected by soil moisture, solar radiation, and humidity
- Earlier bloom dates have been widely reported for domestic fruit crops since the 1970s
- Warm winter temperatures paradoxically increase the risk of freeze damage due to early emergence



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.