~~El Niño~~, La Niña, Drought and a Whole Lot More!

IFB Spring Webinar

Dennis Todey, Director

USDA Midwest Climate Hub

4 April 2024

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Topics/Agenda

- A brief Background of USDA Climate Hubs
  - Partners, Executive Committee and Steering Committee
  - More on the Midwest Climate Hub
- Tools
- Climate Issues
- Current Conditions
- Drought/El Niño
- Outlook and more
- For More Information
  - Resources
  - Website
  - Contact Info

Intro to Climate Hubs

Assessments and Syntheses
Delivering relevant information

Outreach and Education
Enabling climate-informed decisions

Technical Support
Facilitating engagement, discovery and exchange

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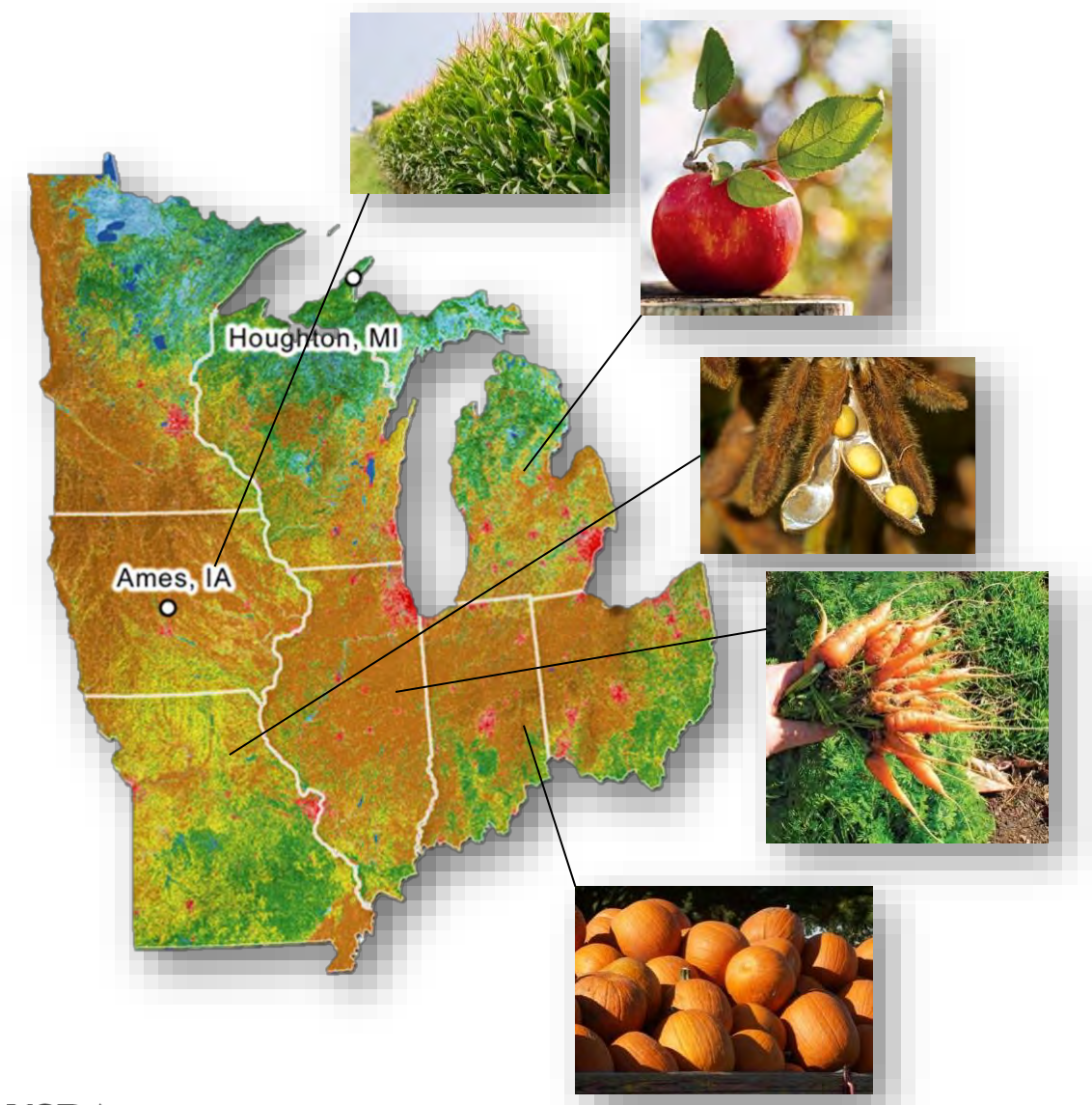
Agricultural Research Service

NRCS

Here in the Midwest…



Our Goal

To provide information to help producers cope with climate change through **linkages of research, education and partnerships** in a region that represents one of the **most intense areas of agricultural production** in the world.

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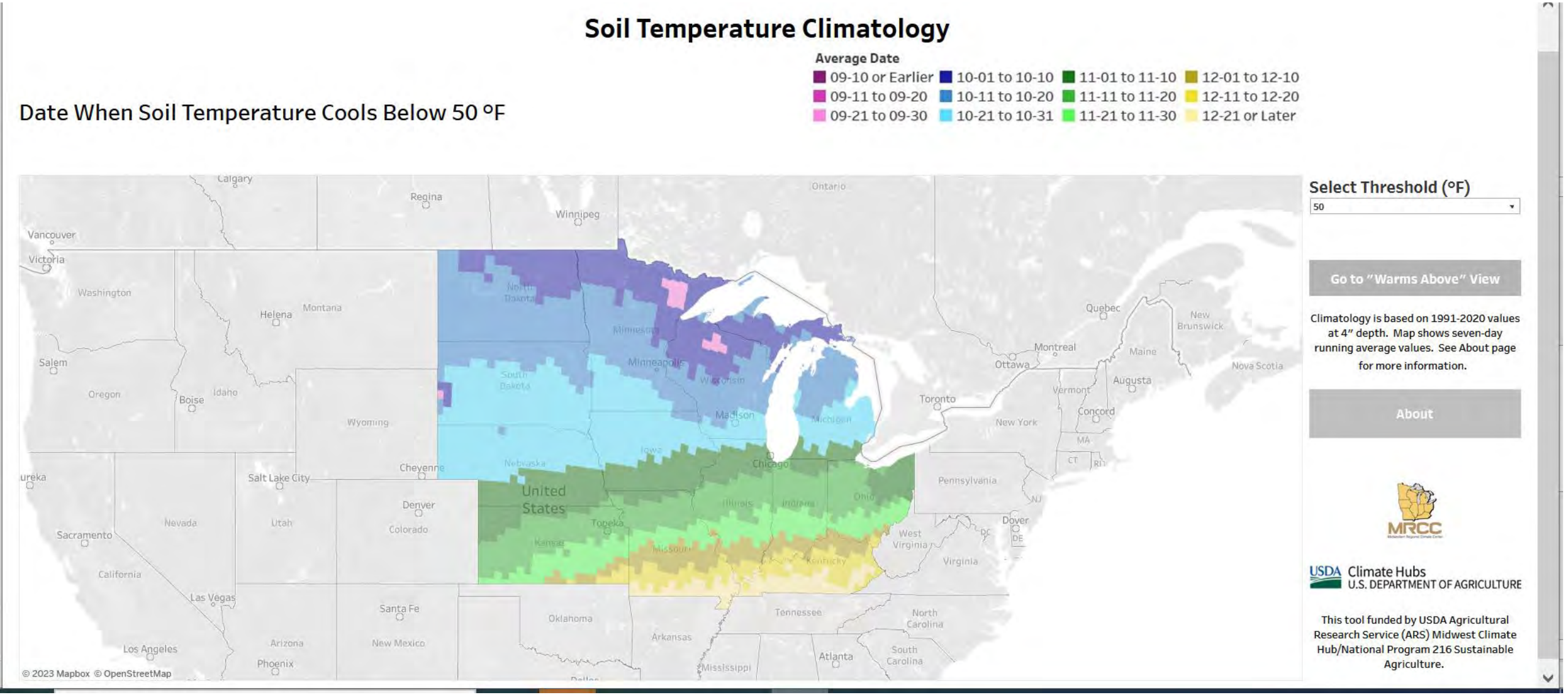
Let us know if you have other needs….

TOOLS

Soil Temperature Climatology (ver. 1)

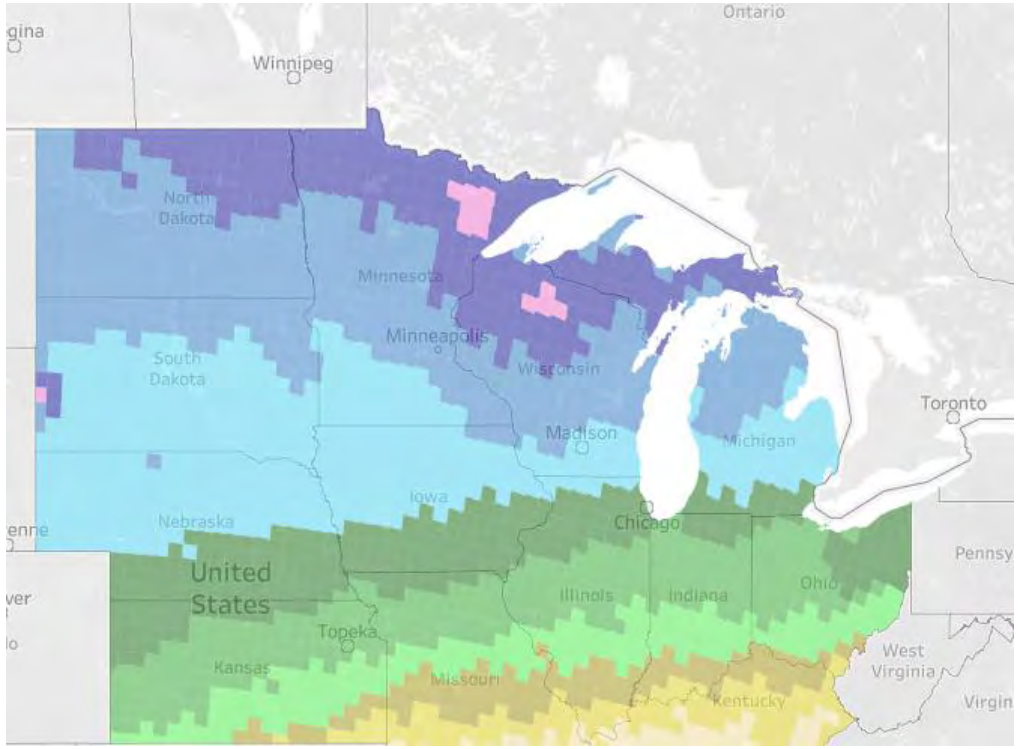


Soil Temperature Climatology (ver. 1)

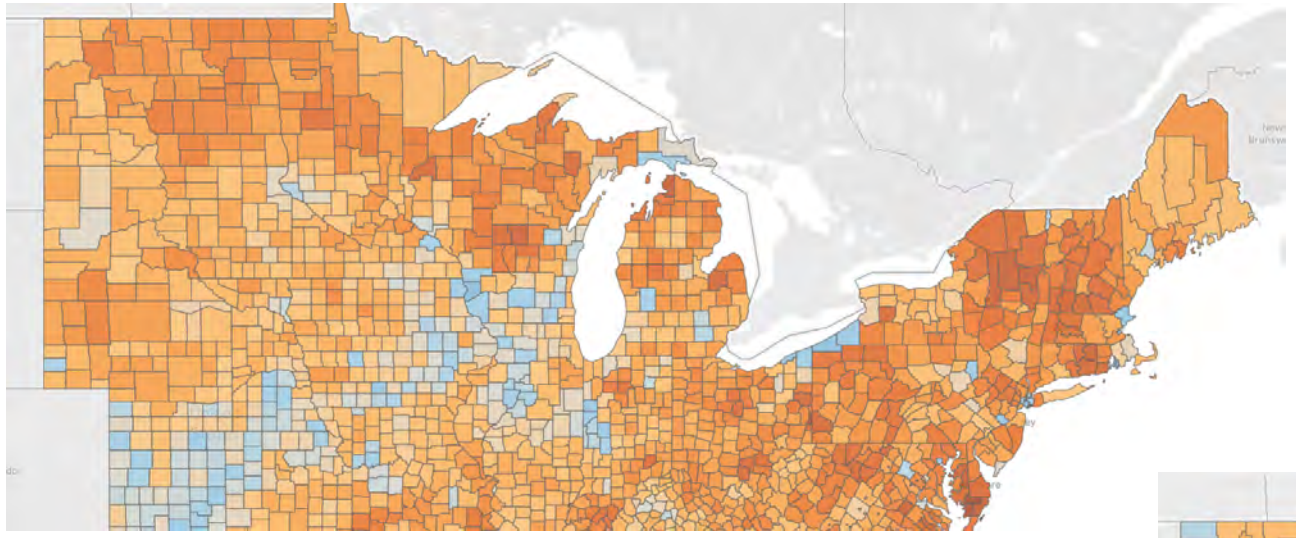
- Focus on average dates (50 F – spring and fall)
- Soil freeze dates – much more variable

- Watch for spring webinar
- https://www.climatehubs.usda.gov/hubs/midwest/tools/tracking-soil-temperatures-north-central-united-states
-

- Additional updates to the product
  - Changes over time
  - Data availability



Regional Frost-Free Season Change

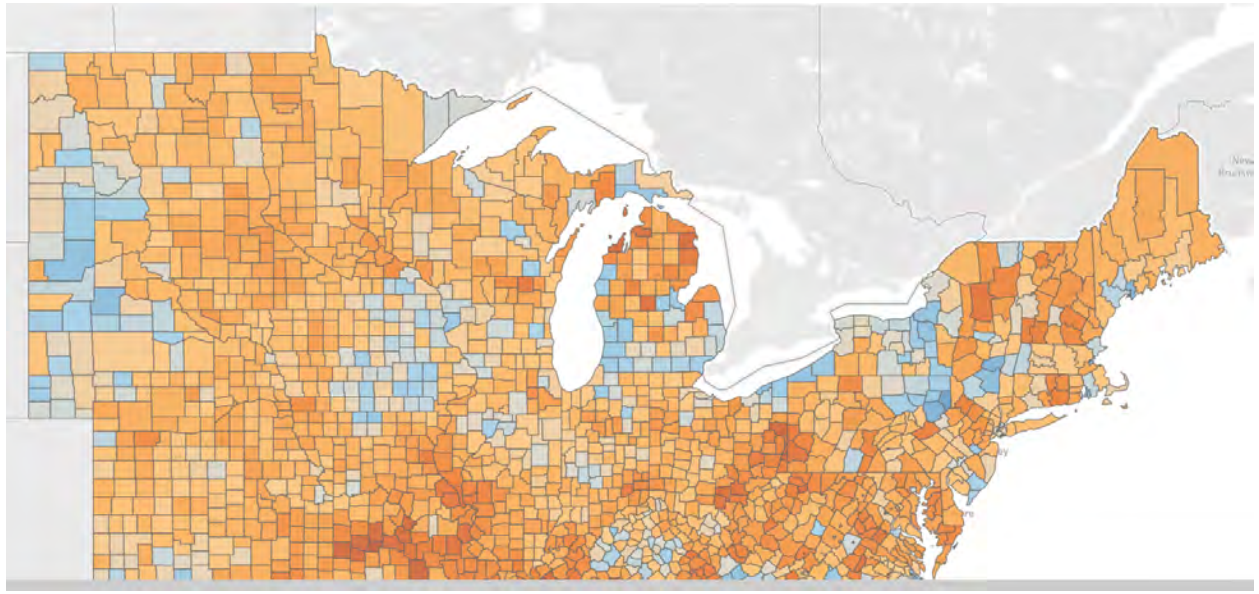


Fall – First 28 F Day Trend

Decadal Change (Days)

-5.0 5.0

Spring – Last 28 F Day Trend



Decadal Change (Days)

-5.0 5.

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

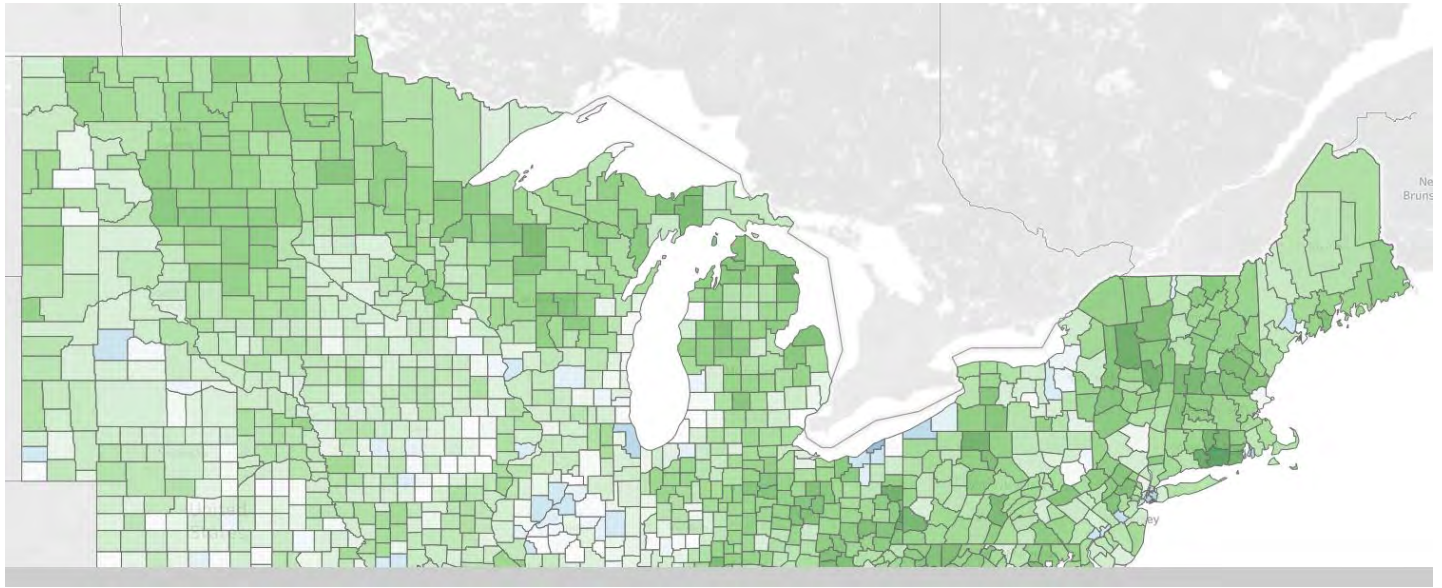
Regional Frost-Free Season Change

- Growing season length
- Statistical significance

- Various temperature cut-offs.

- Understand season lengths
- Regional variations

Growing Season Length Trend



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

What is happening?

CLIMATE ISSUES AND AGRICULTURE

Climate Change Indicators for Agriculture

ISU Extension Agronomy Fall Meeting

22 September 2020

Dennis Todey

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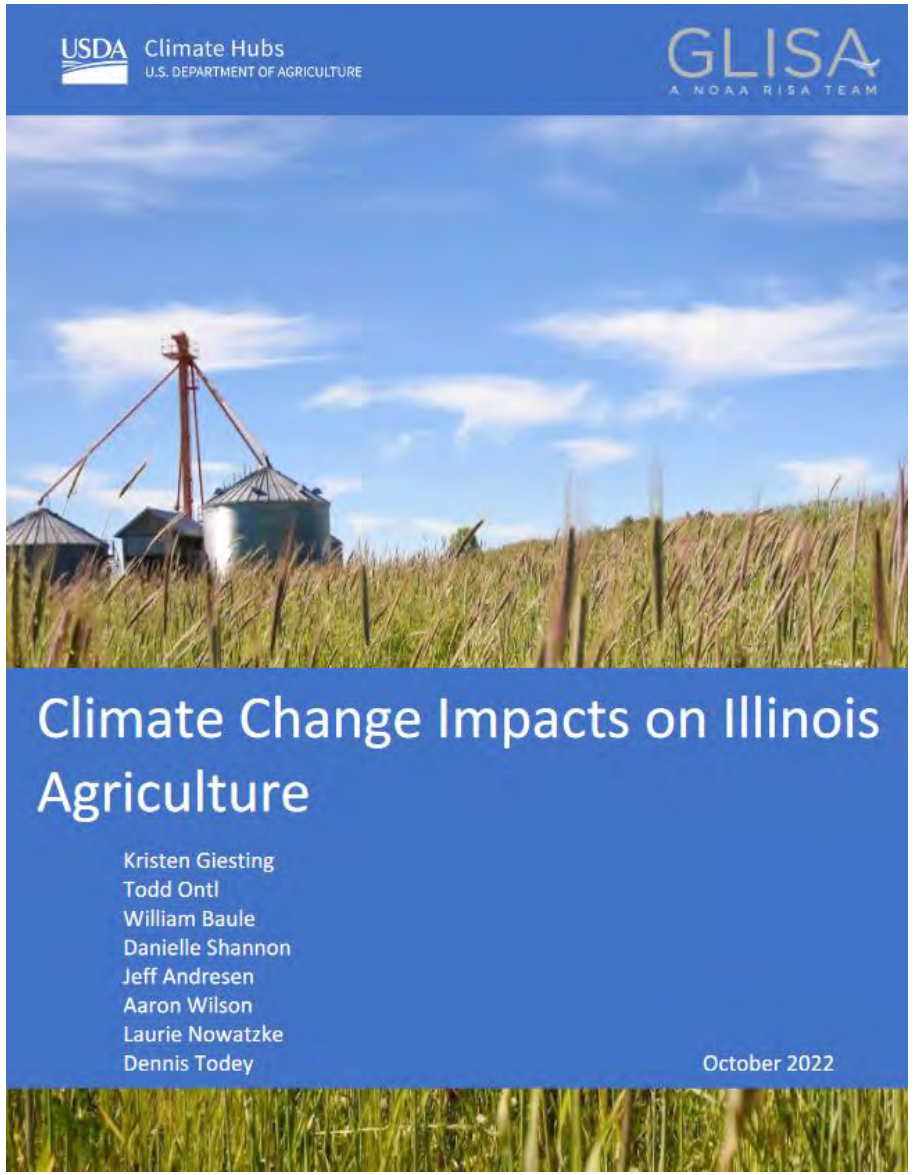
https://www.usda.gov/sites/default/files/documents/climate_indicators_for_agriculture.pdf

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

Climate Hub – Ongoing Projects



Minnesota released last week

https://www.climatehubs.usda.gov/hubs/midwest/topic/assessing-impacts-climate-change-midwest-agriculture

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Precipitation Change

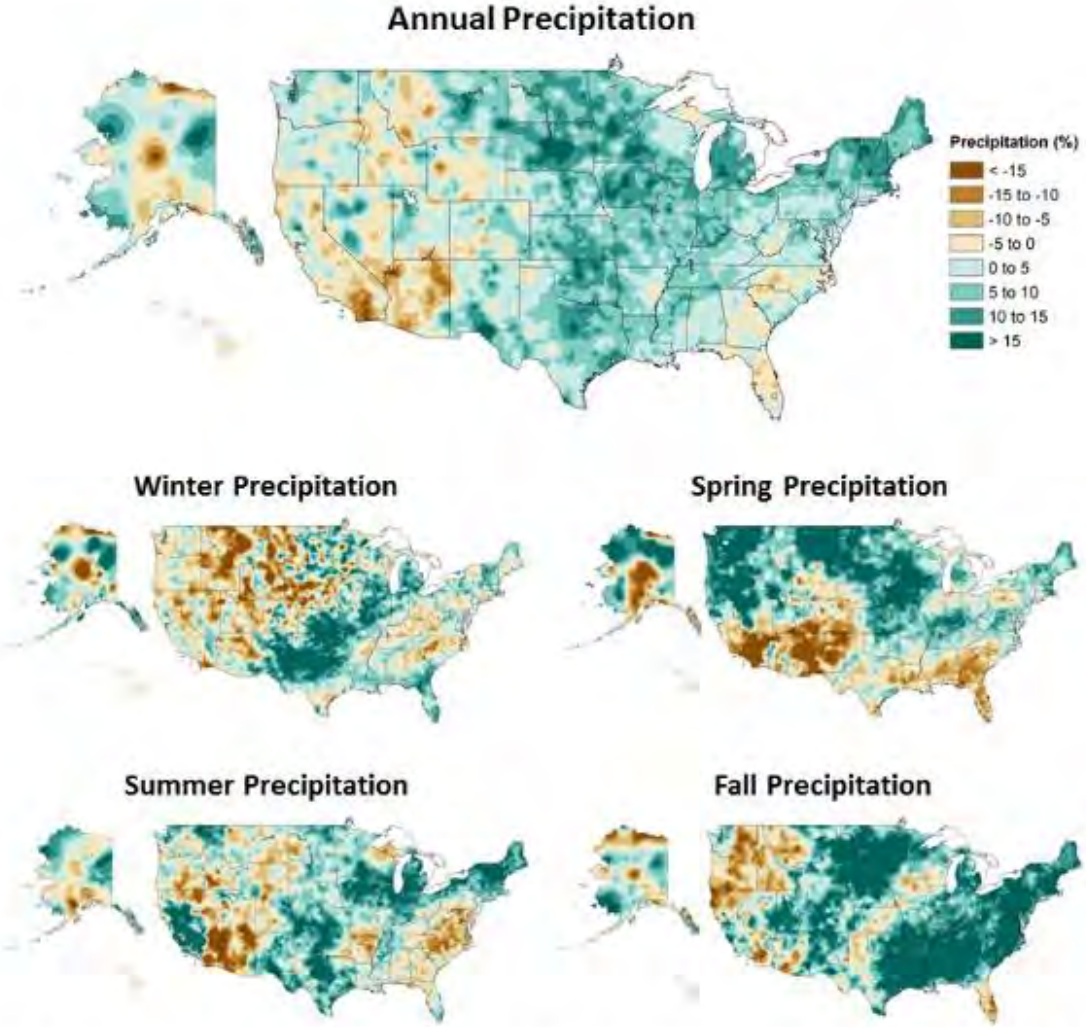
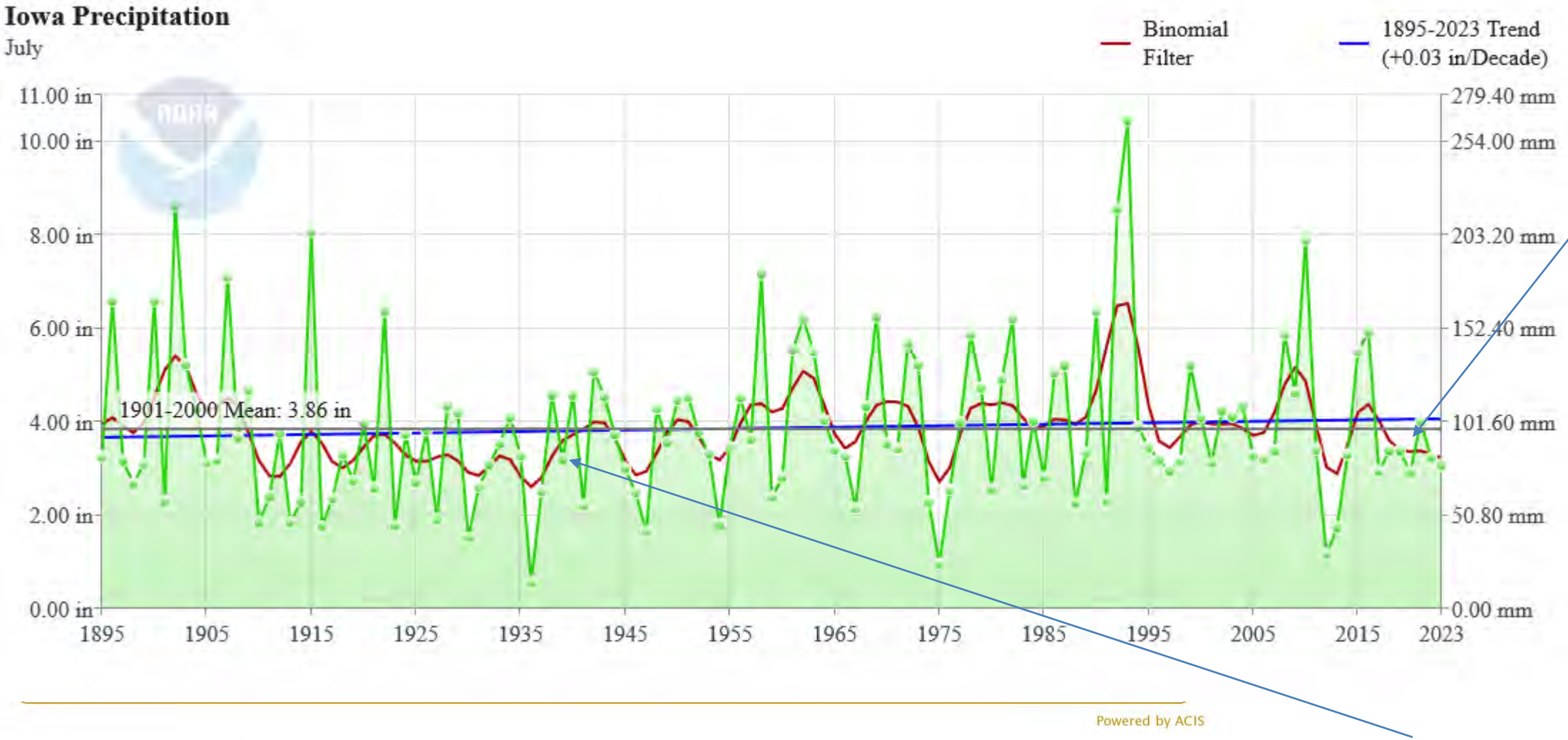


Figure 7.1: Annual and seasonal changes in precipitation over the United States. Changes are the average for present-day (1986–2015) minus the average for the first half of the last century (1901–1960 for the contiguous United States, 1925–1960 for Alaska and Hawai'i) divided by the average for the first half of the century. (Figure source: [top panel] adapted from Peterson et al. 2013,[78] © American Meteorological Society. Used with permission; [bottom four panels] NOAA NCEI, data source: nCLIMDiv].

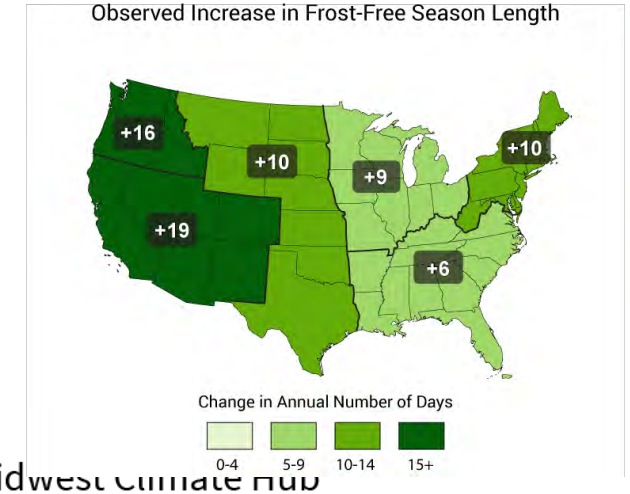
Iowa July Precipitation

Monthly Climate Normals (1991–2020) – REDWOOD FALLS MUNICIPAL AIRPORT, MN



Temperature Change

- Warming
  - Winter
  - Nights
- Adds livestock/human stress
- Push GDD accumulation/ phenological state
- Does help increase frost free season period



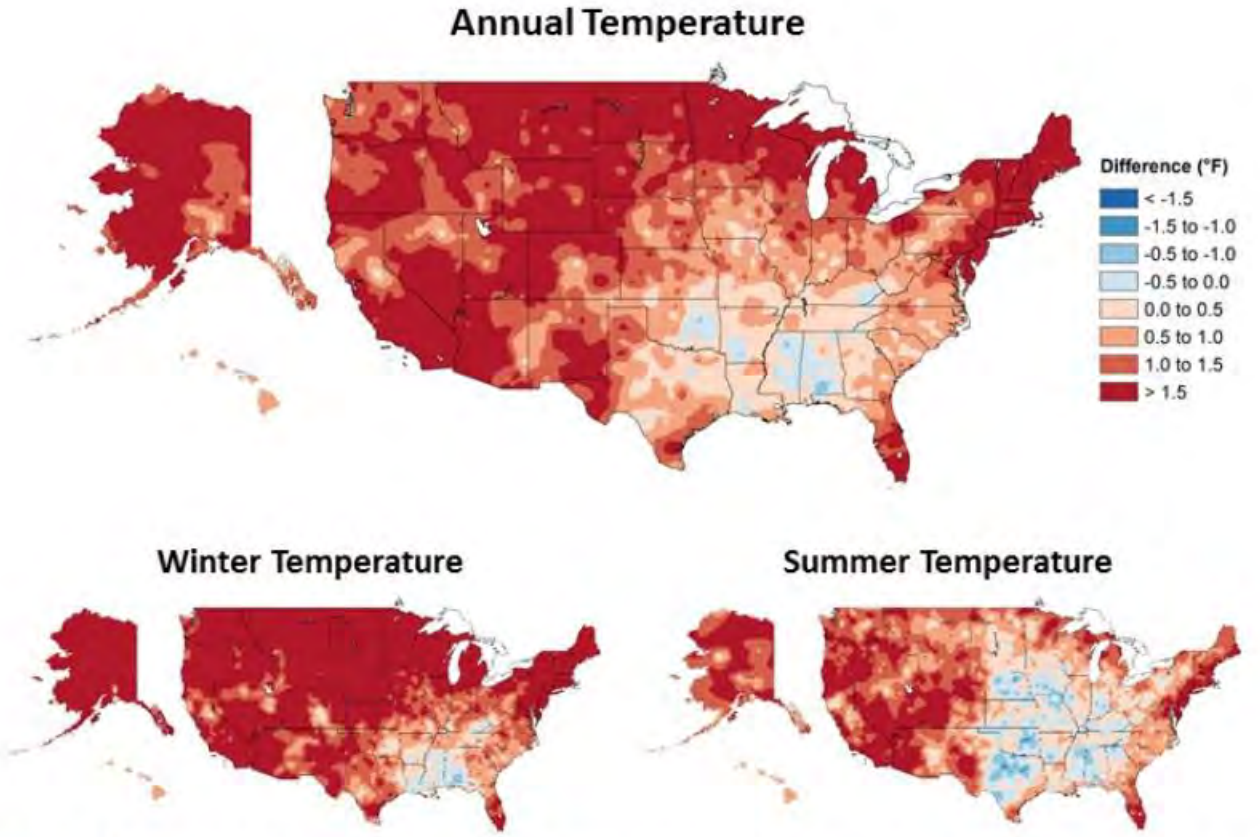
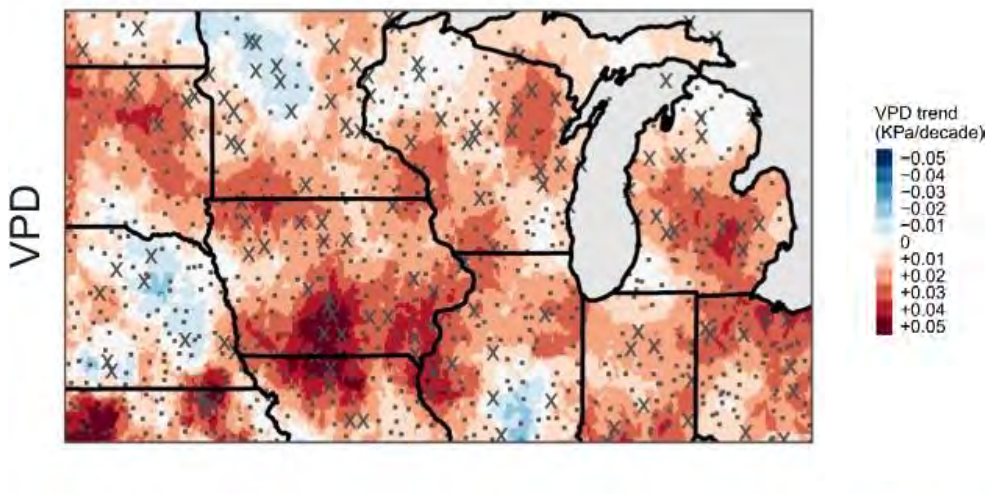
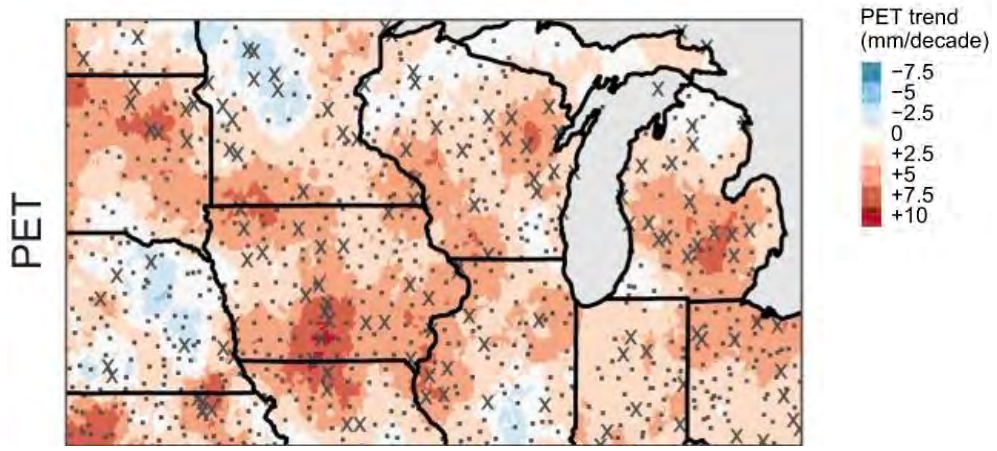


Figure 6.1. Observed changes in annual, winter, and summer temperature (°F). Changes are the difference between the average for present-day (1986–2016) and the average for the first half of the last century (1901–1960 for the contiguous United States, 1925–1960 for Alaska and Hawai'i). Estimates are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

30 Year Trend (Summer VPD and PET)



Trend to drier air – higher PET.



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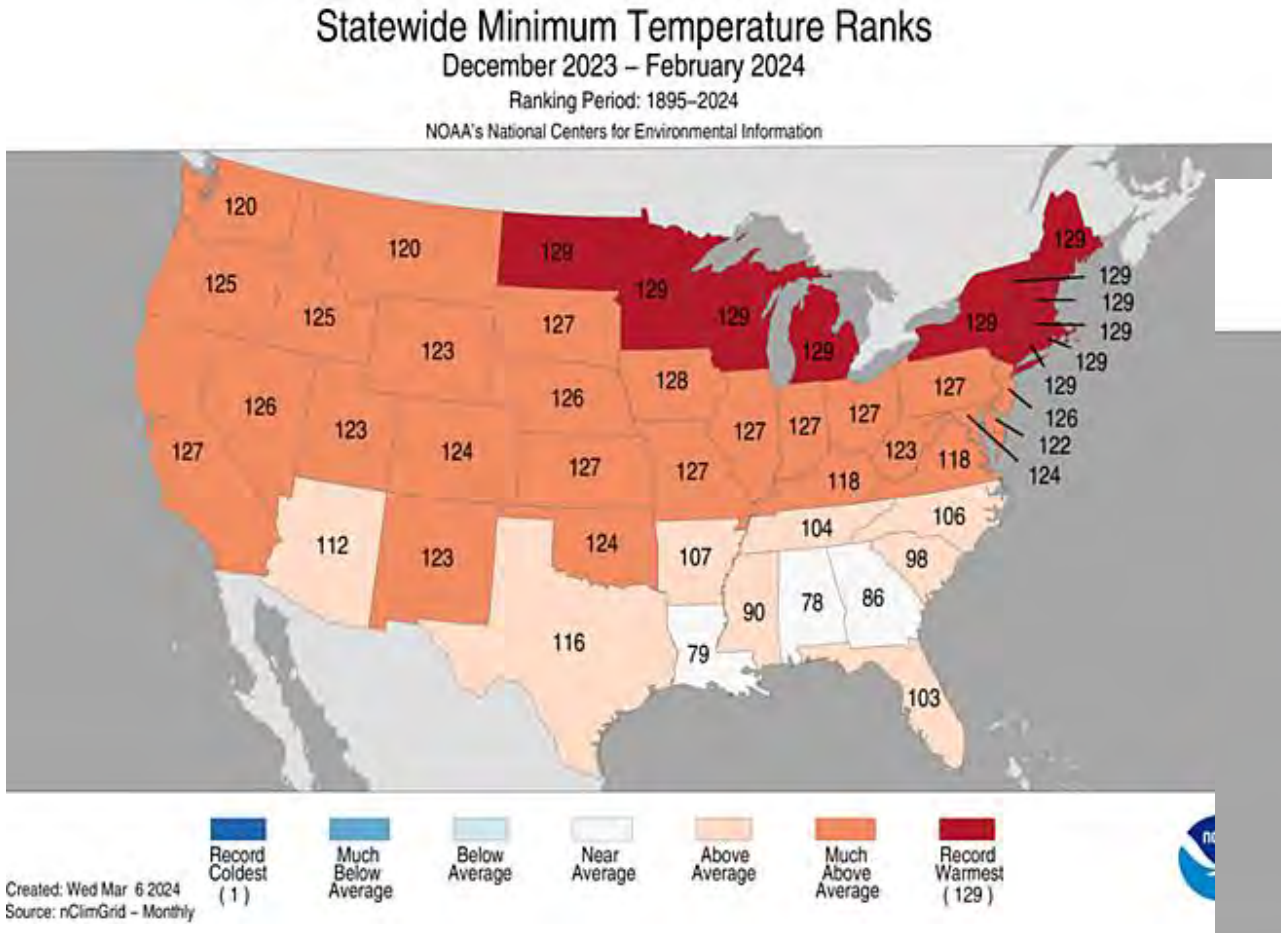
Basso et al. 2021
https://www.nature.com/articles/s41467-021-21763-7

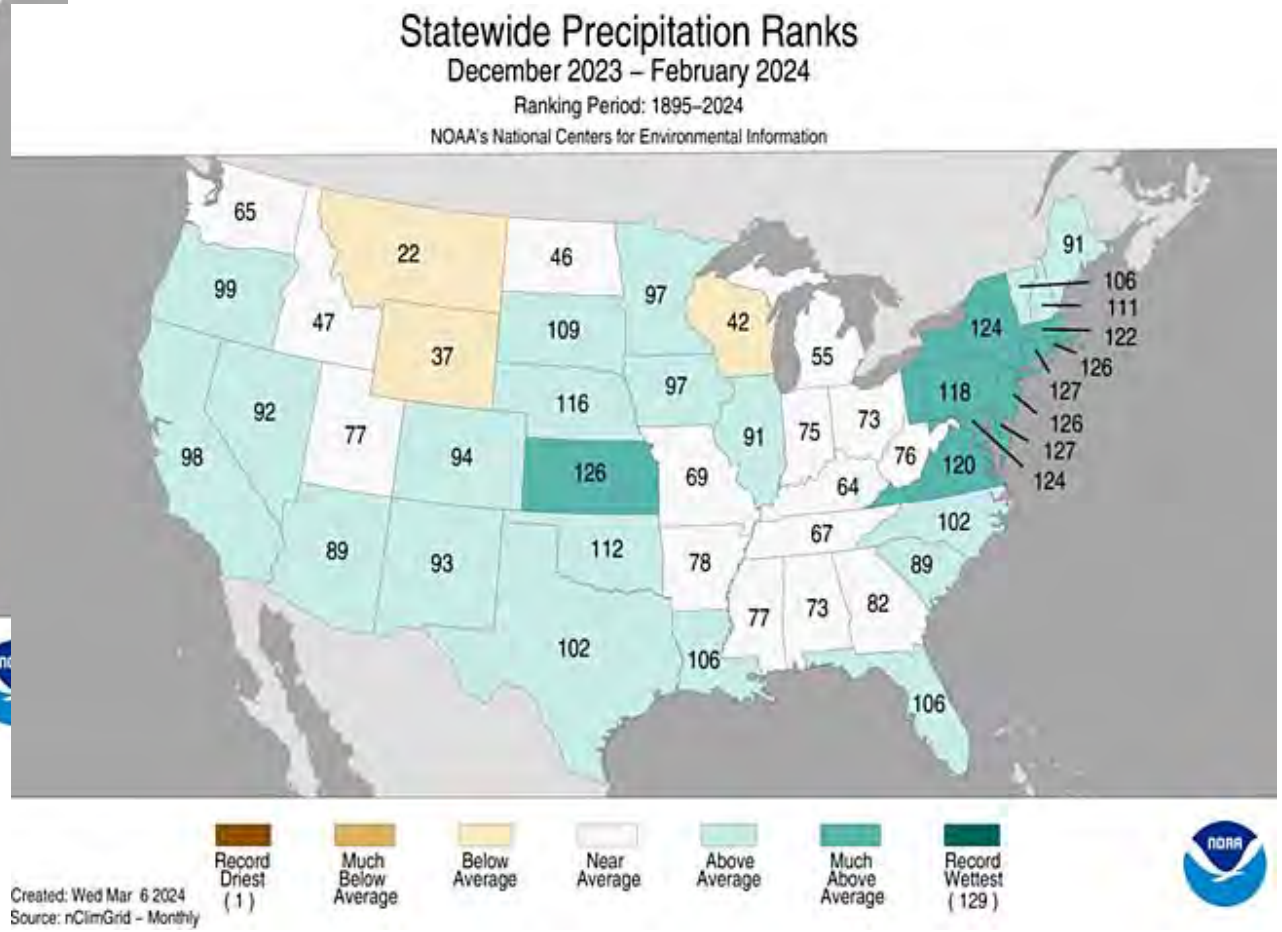
Where do we stand right now?

CURRENT CONDITIONS

Winter Recap



Winter near warmest/warmest on record Variable precipitation.



https://www.ncei.noaa.gov/access/monitoring/us-maps/

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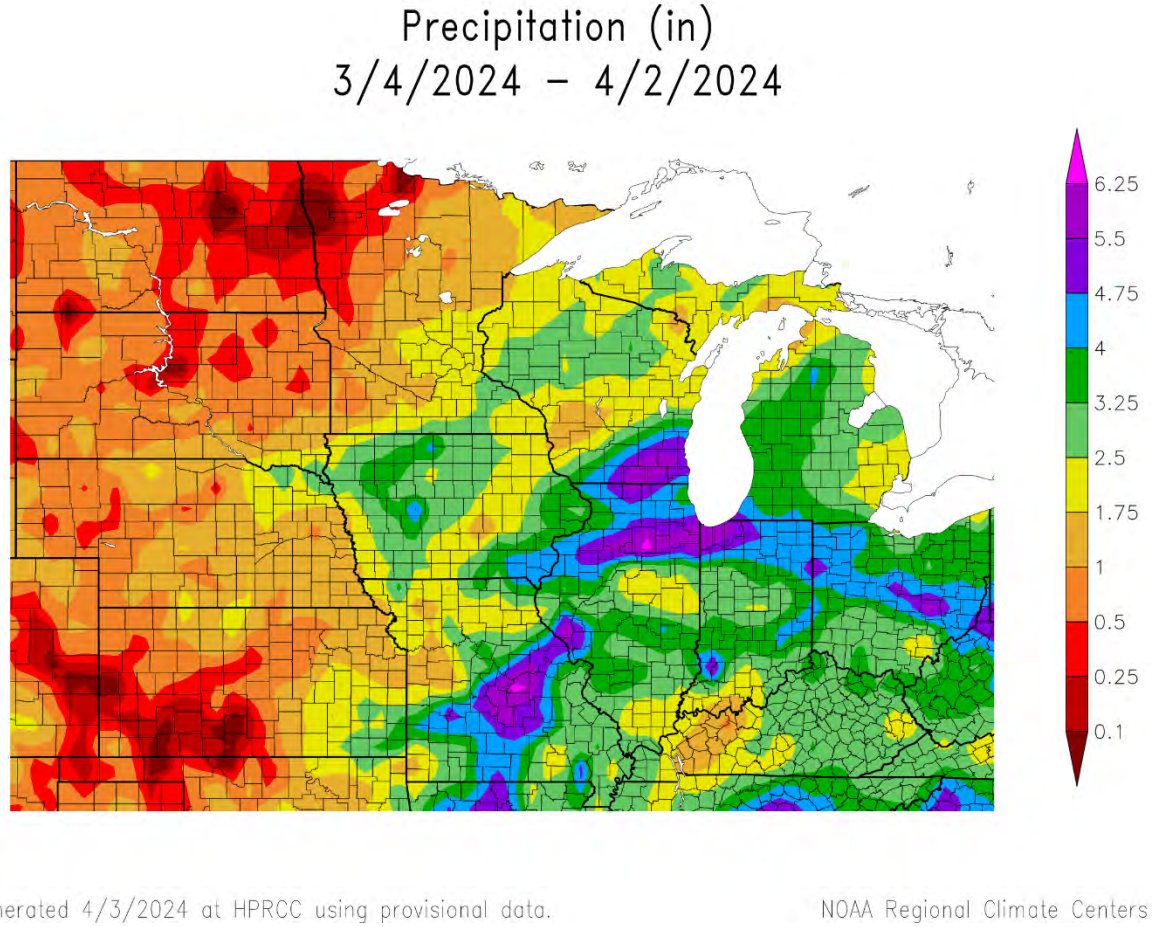
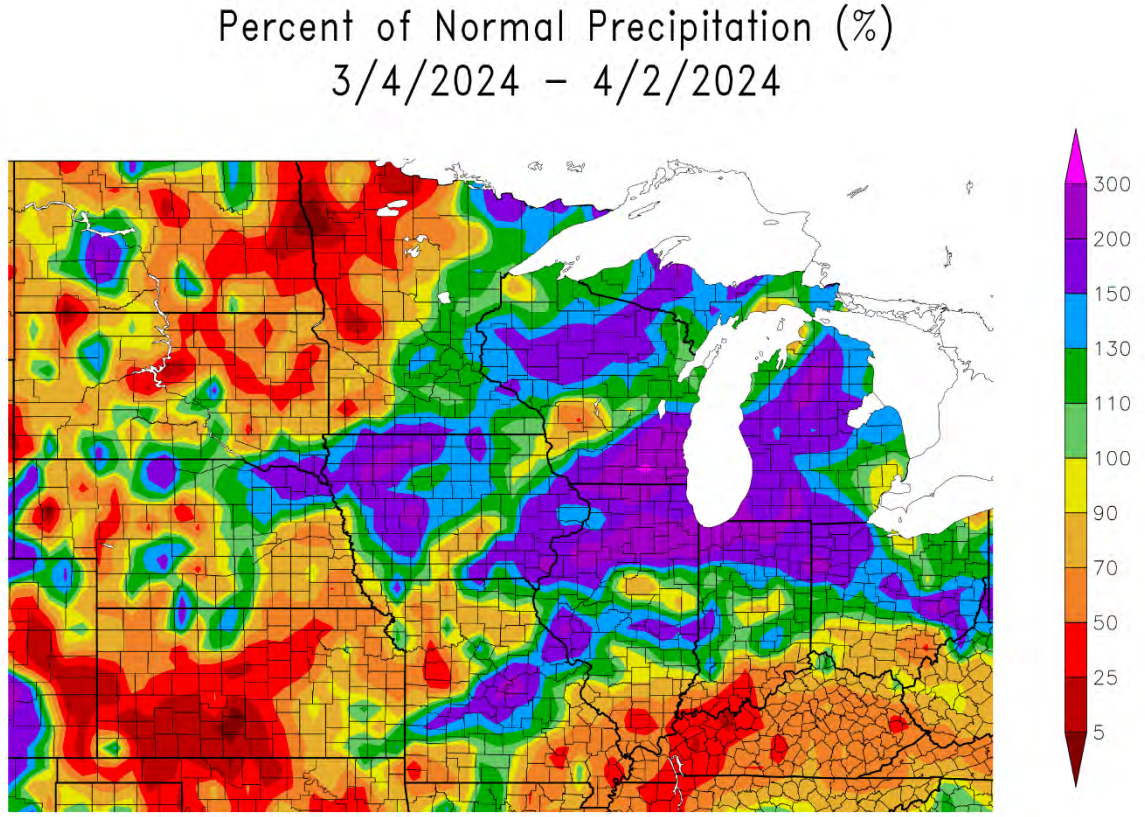
Precipitation (30 days)



Dry conditions continue (north) – some improvement (south).



https://hprcc.unl.edu/maps.php?maps=ACISClimateMaps

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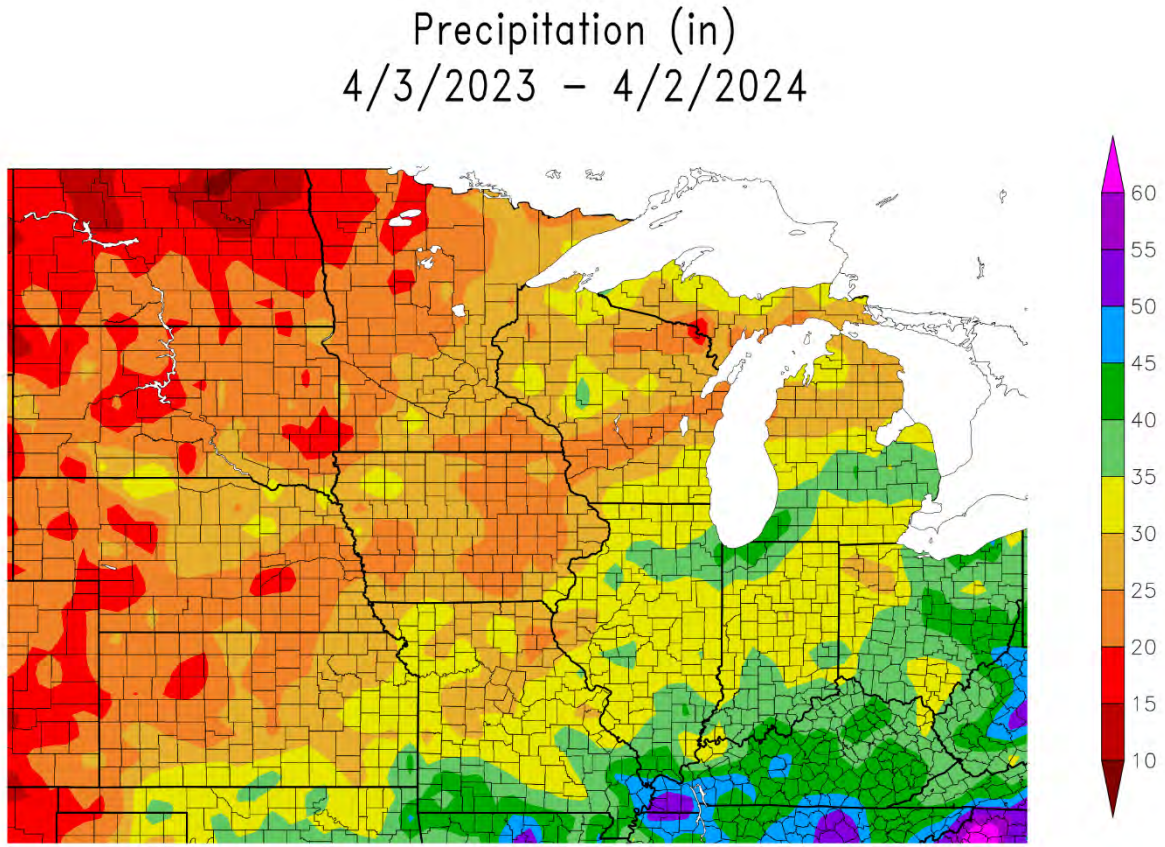
Precipitation (12 months)



https://hprcc.unl.edu/maps.php?maps=ACISClimateMaps

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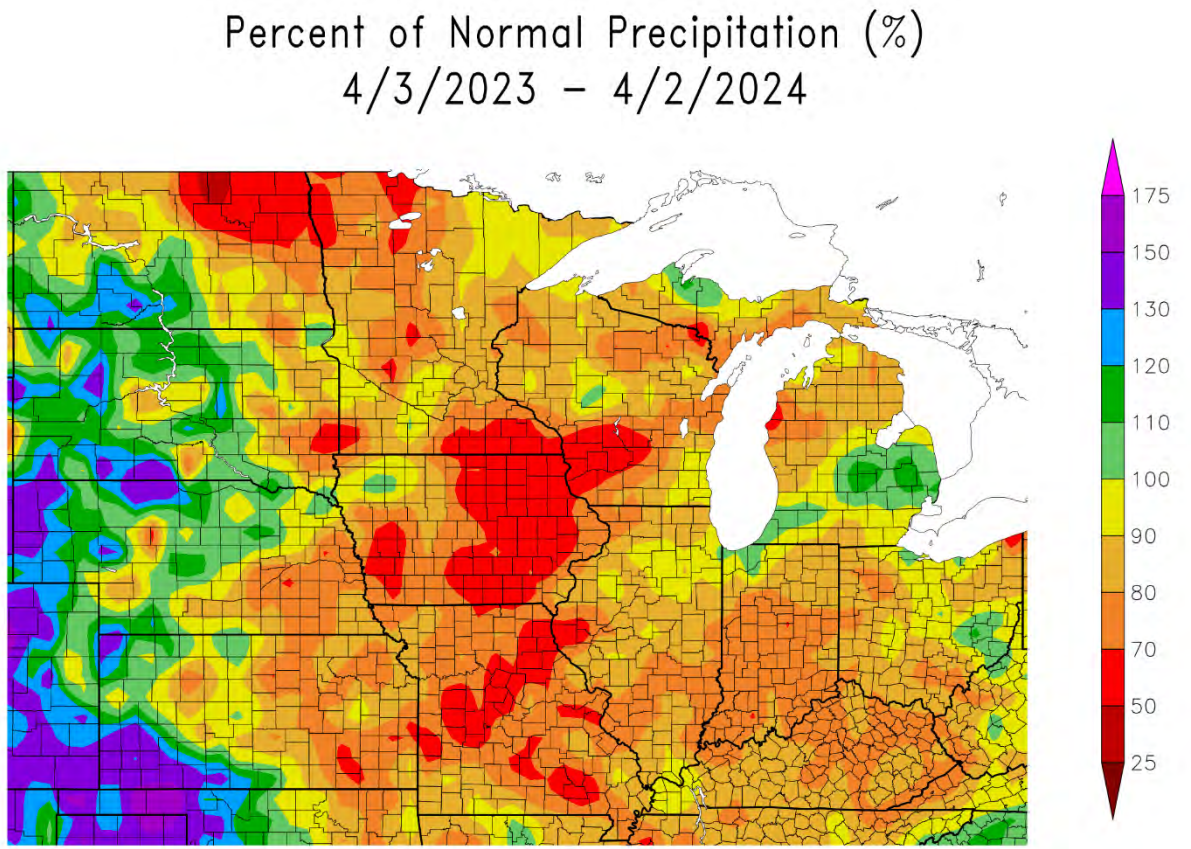
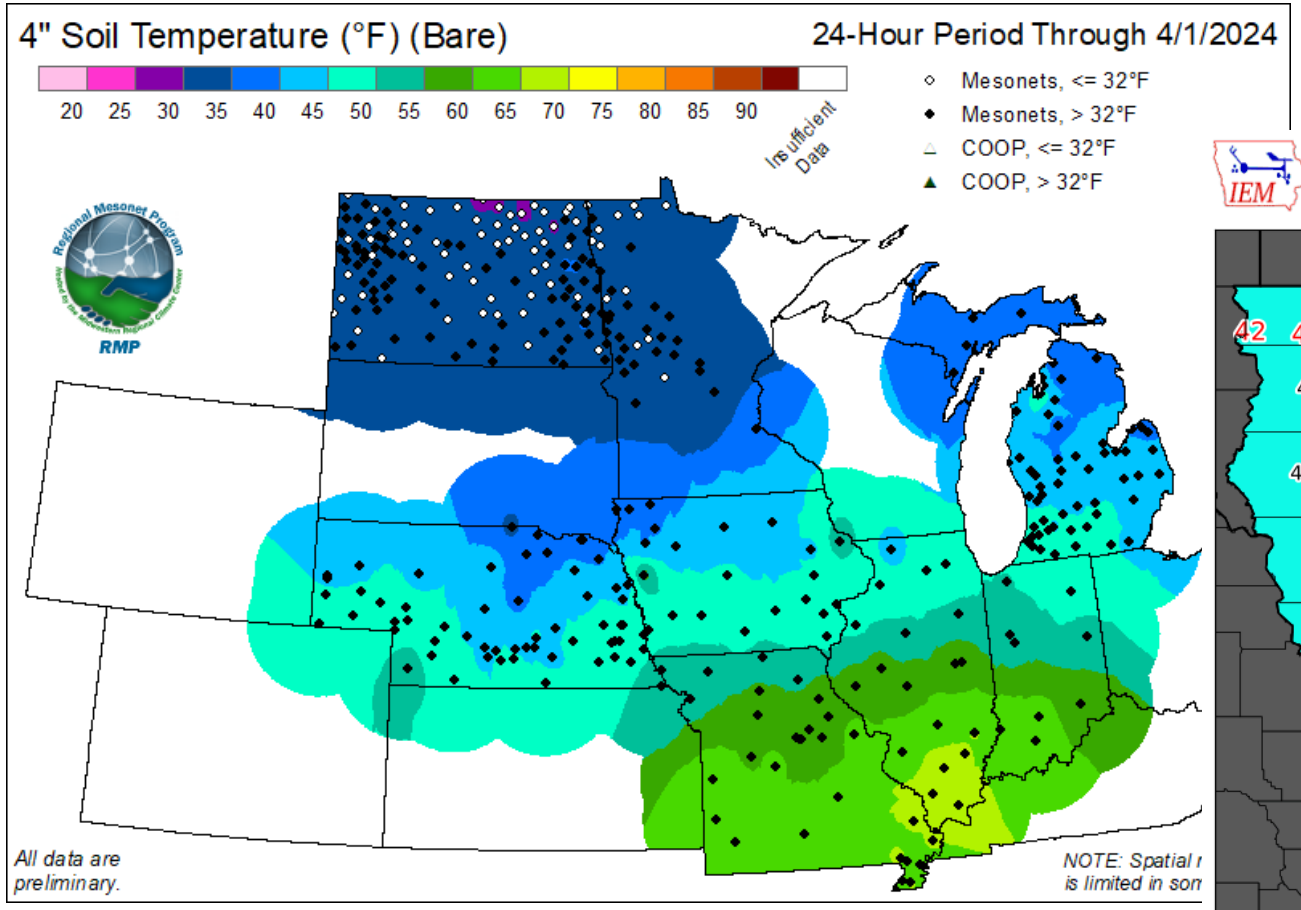
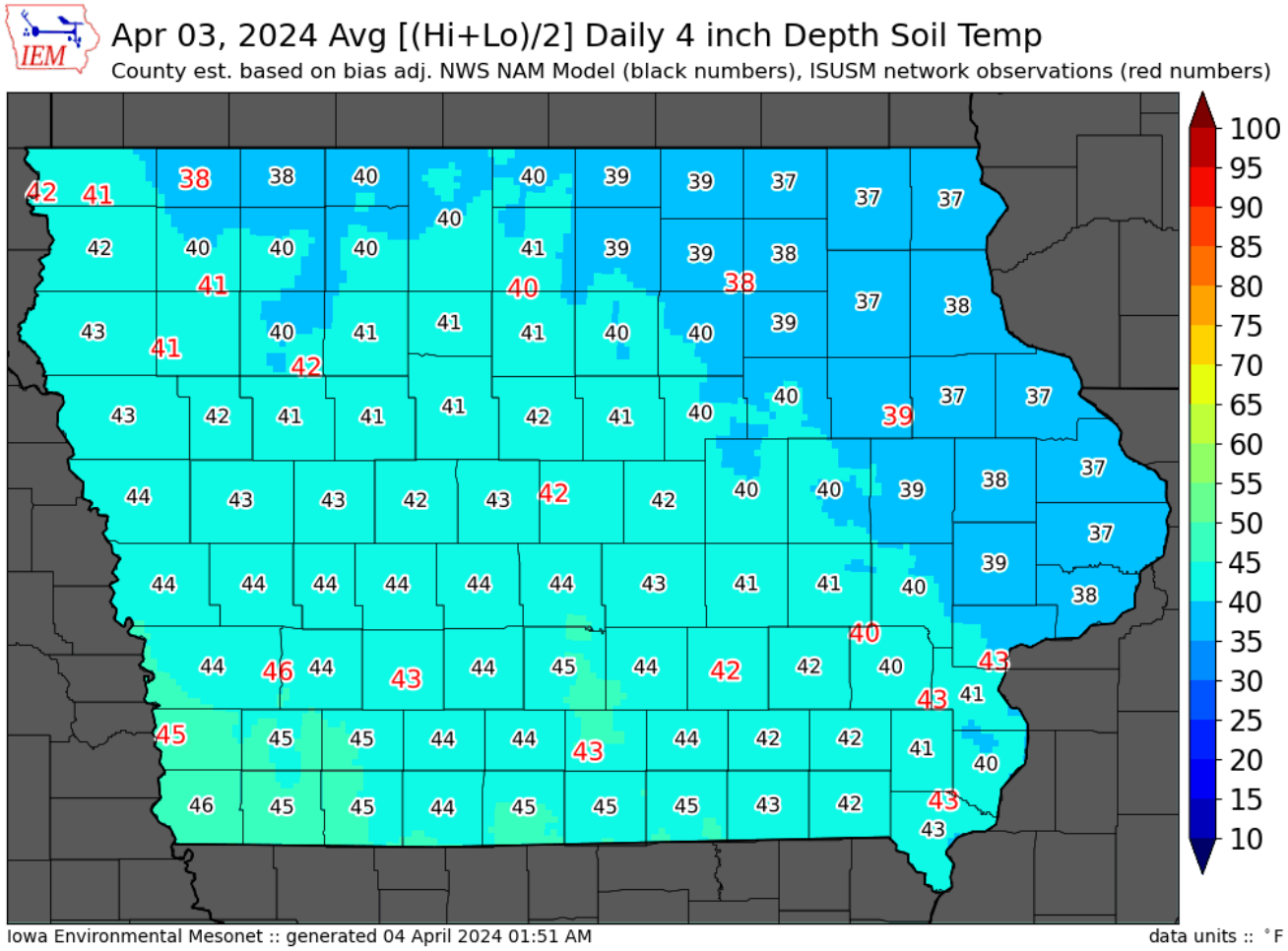
Longer term dry issues.



Soil Temperature





https://mrcc.purdue.edu/RMP/currentMaps
https://mesonet.agron.iastate.edu/agclimate/soilt.php

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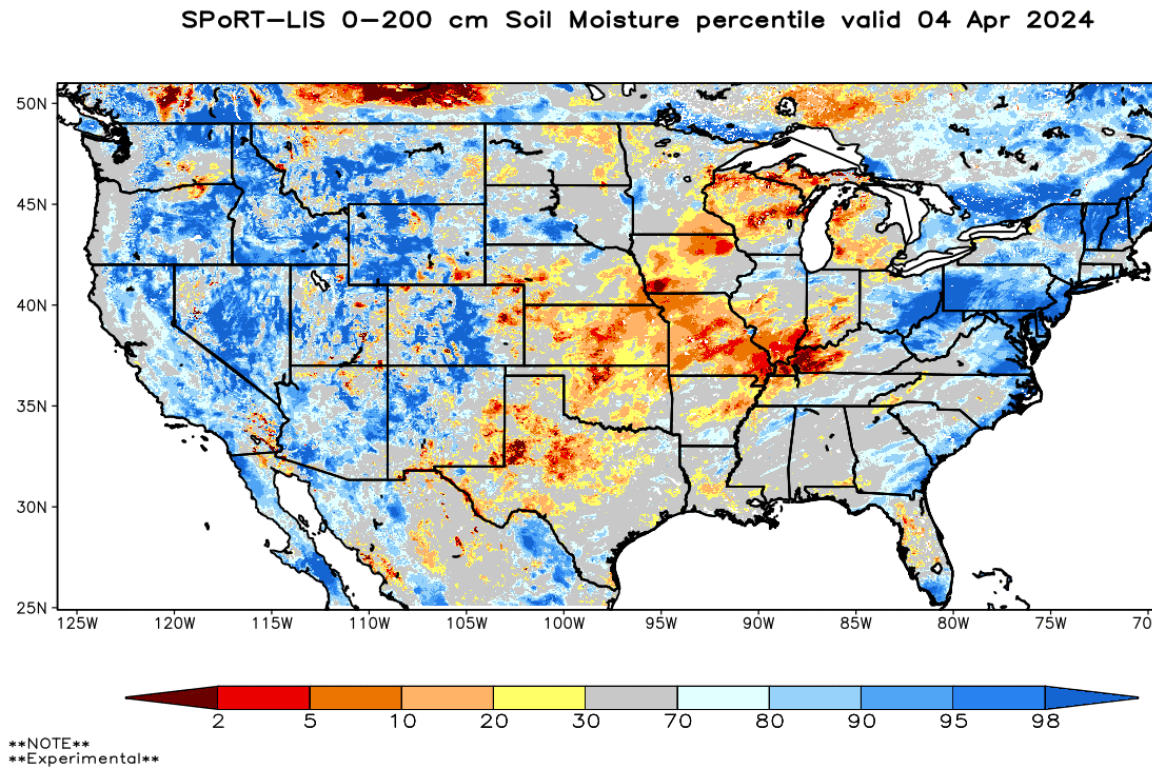
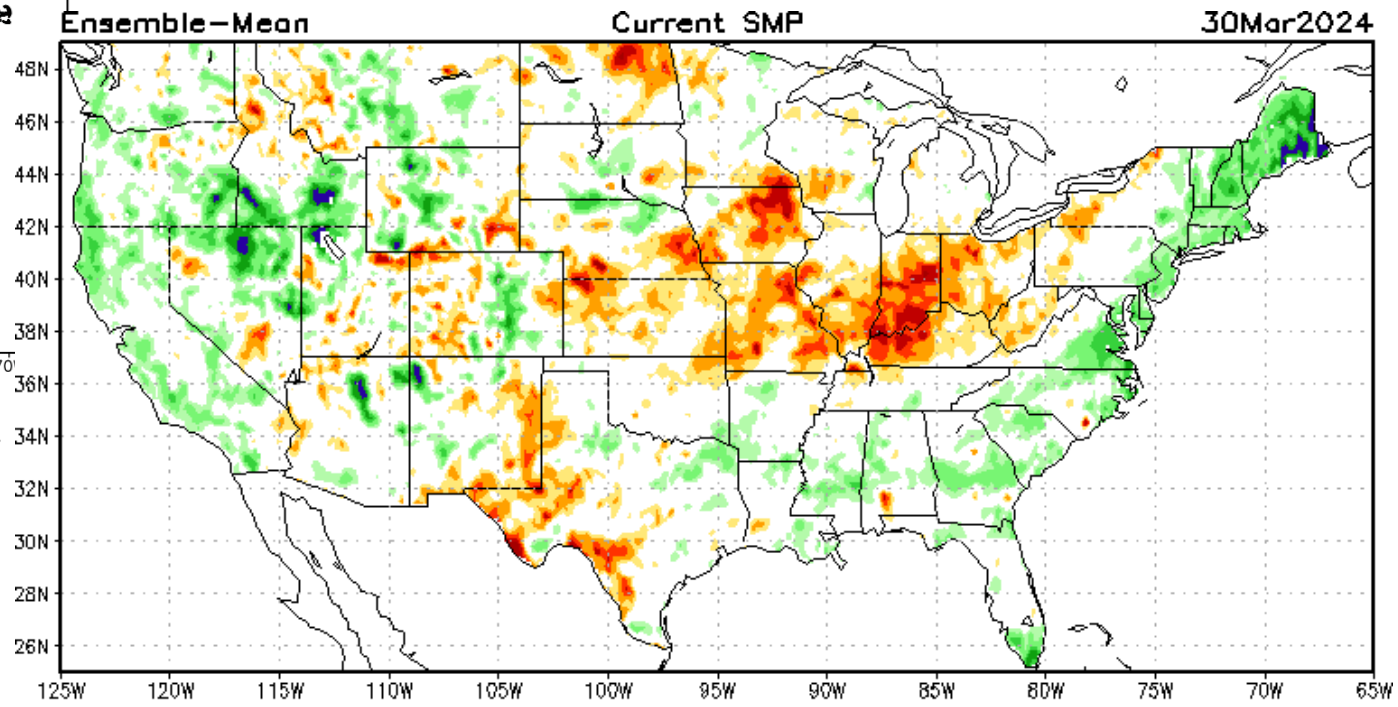
Modeled Soil Moisture





https://weather.msfc.nasa.gov/sport/case_studies/lis_CONUS.html
https://www.cpc.ncep.noaa.gov/products/Drought/Monitoring/smp_new.shtml#

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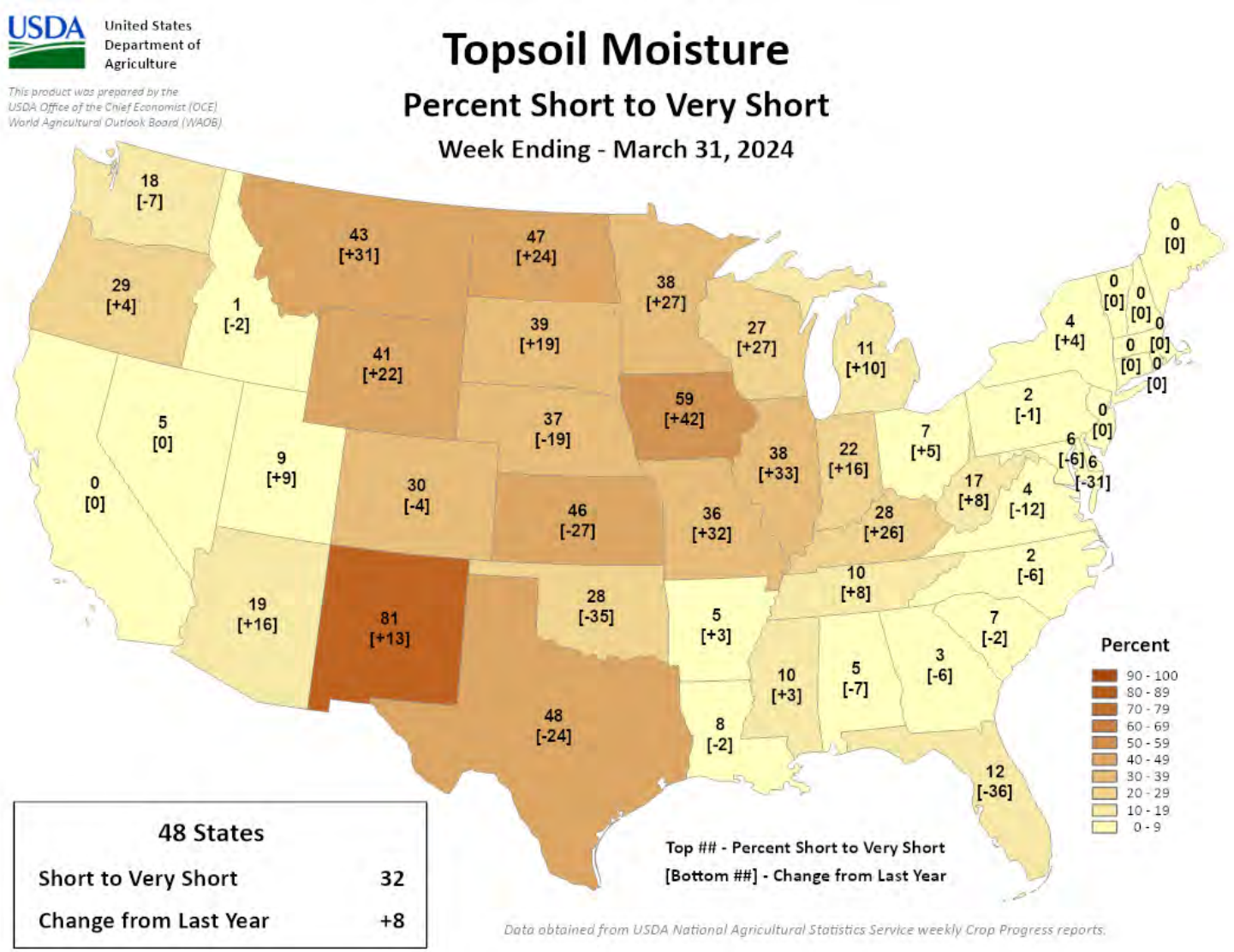
Soil Moisture (NASS)



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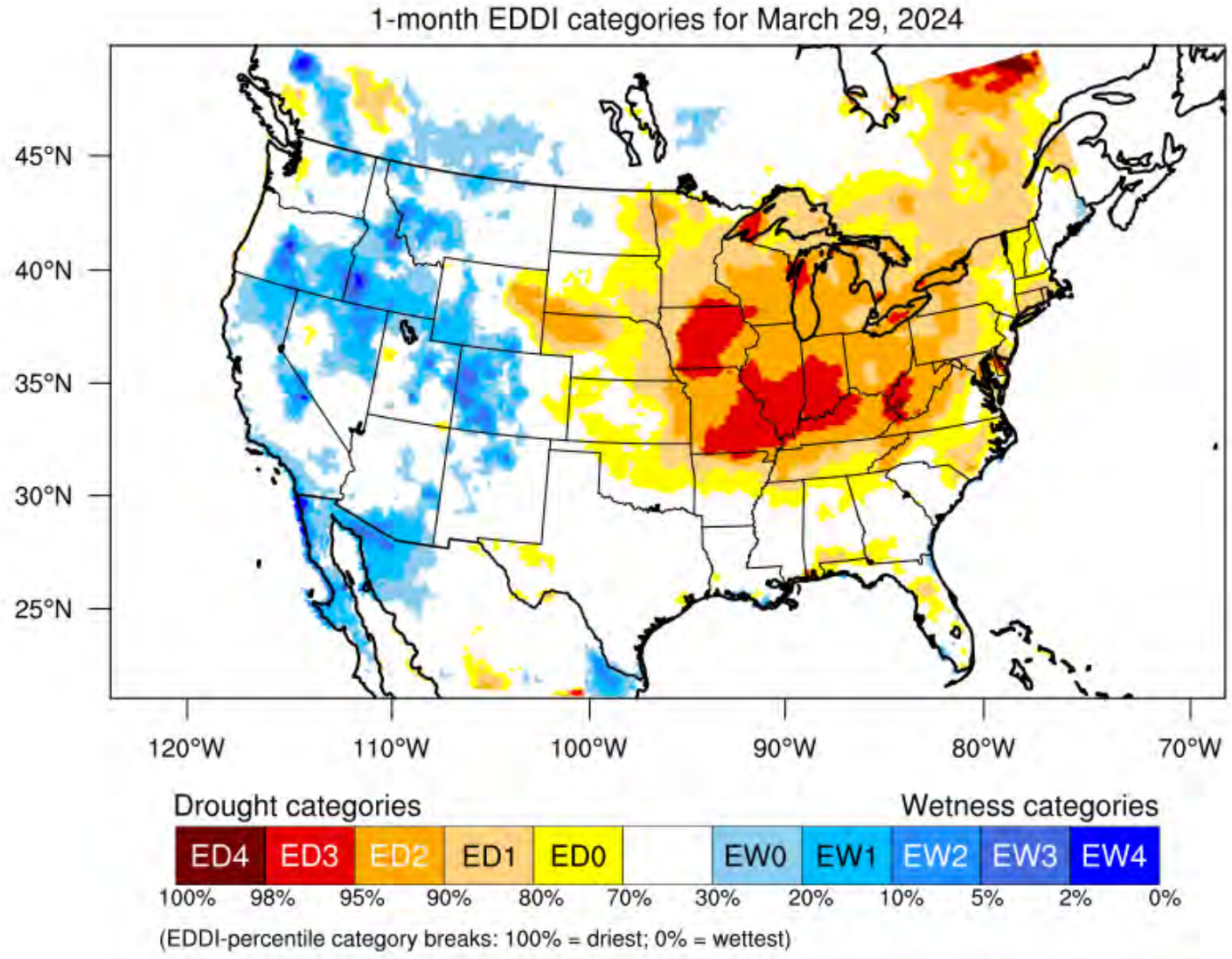
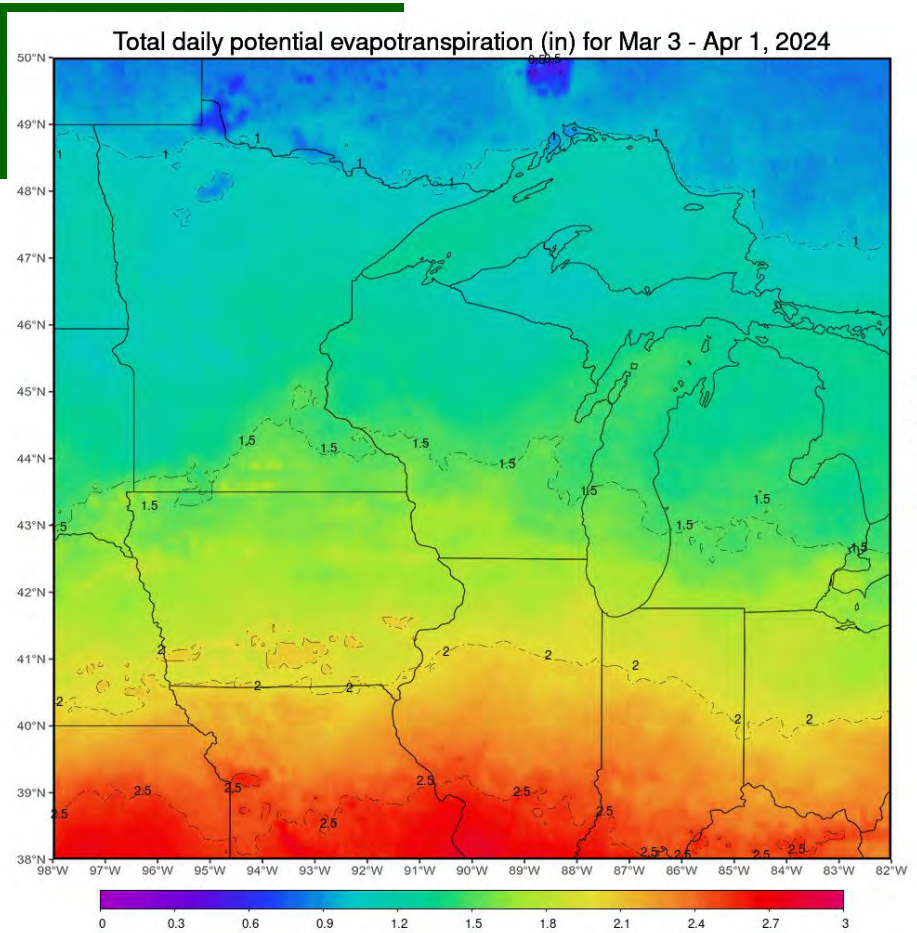
https://agindrought.unl.edu/Other.aspx

Evapo-transpiration





- ET – EDDI product eased since last month but still D2-D3 category common
- Plains not quite as significant.
- Amounts pushing 2” possible

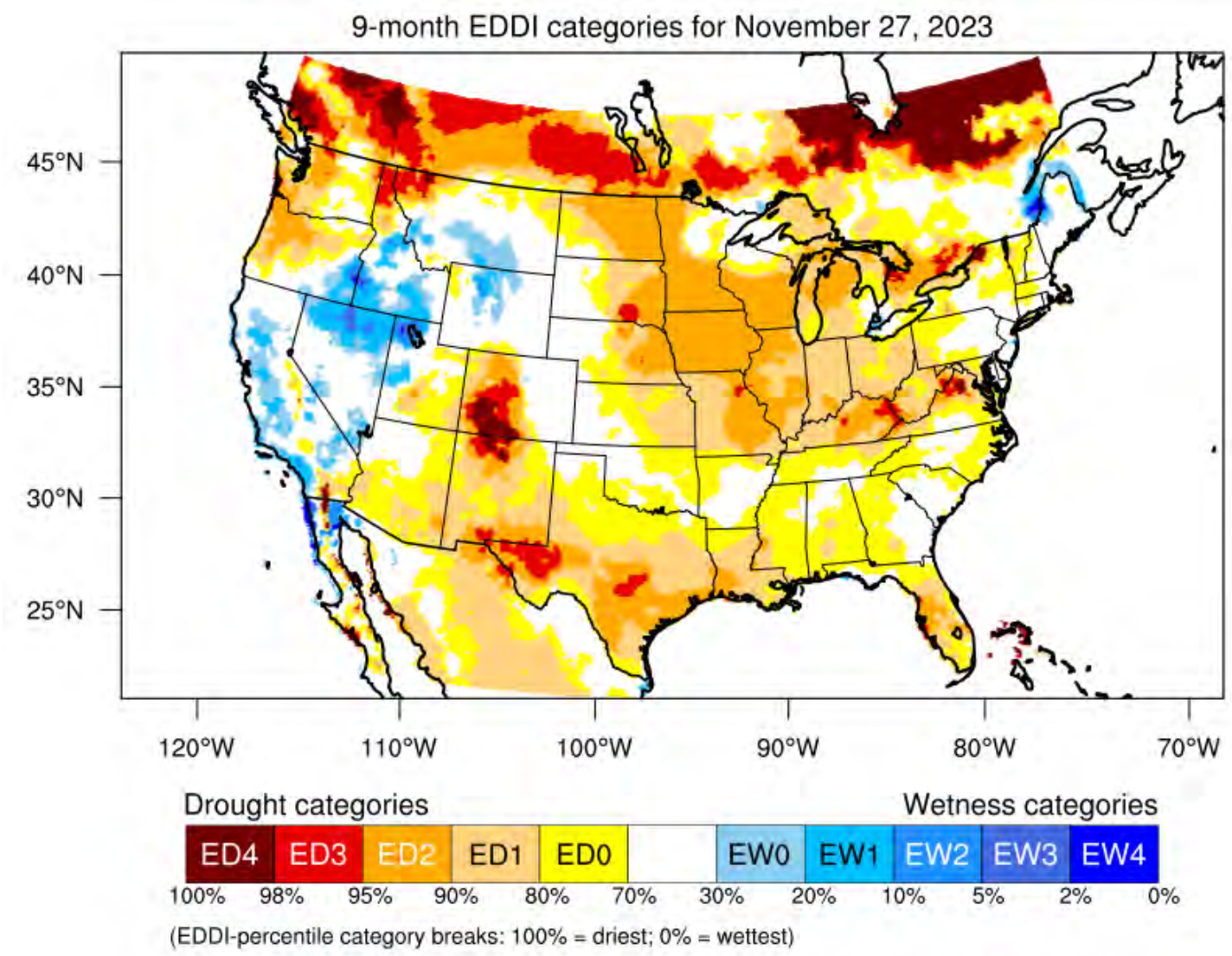
https://psl.noaa.gov/eddi/#current_conditions

Evaporation Growing Season 2023

Very dry conditions continue.

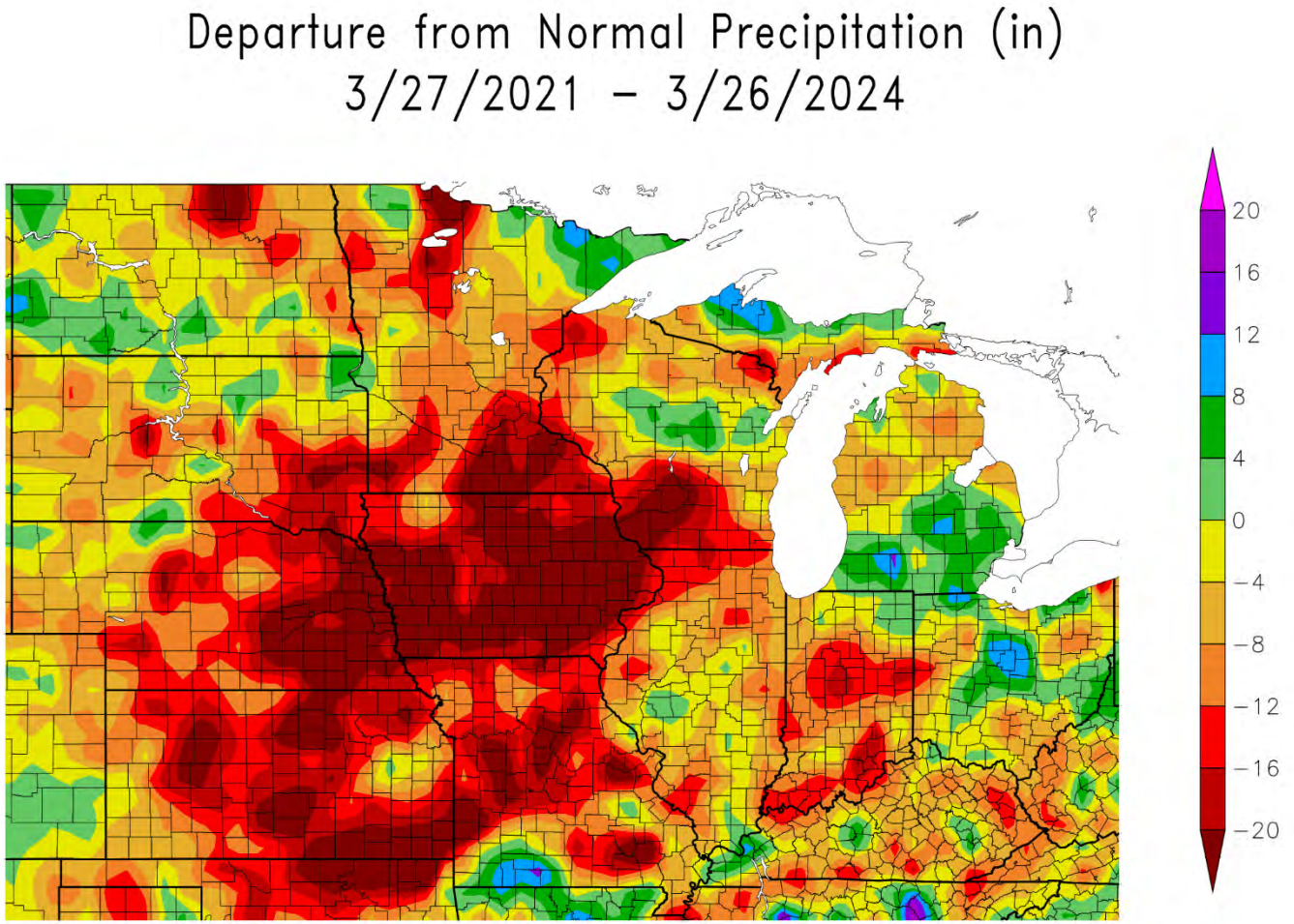
Evaporative demand adding to the issue

Winter warmth also helps dry soils some.



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

Precipitation (departure last 3 years)

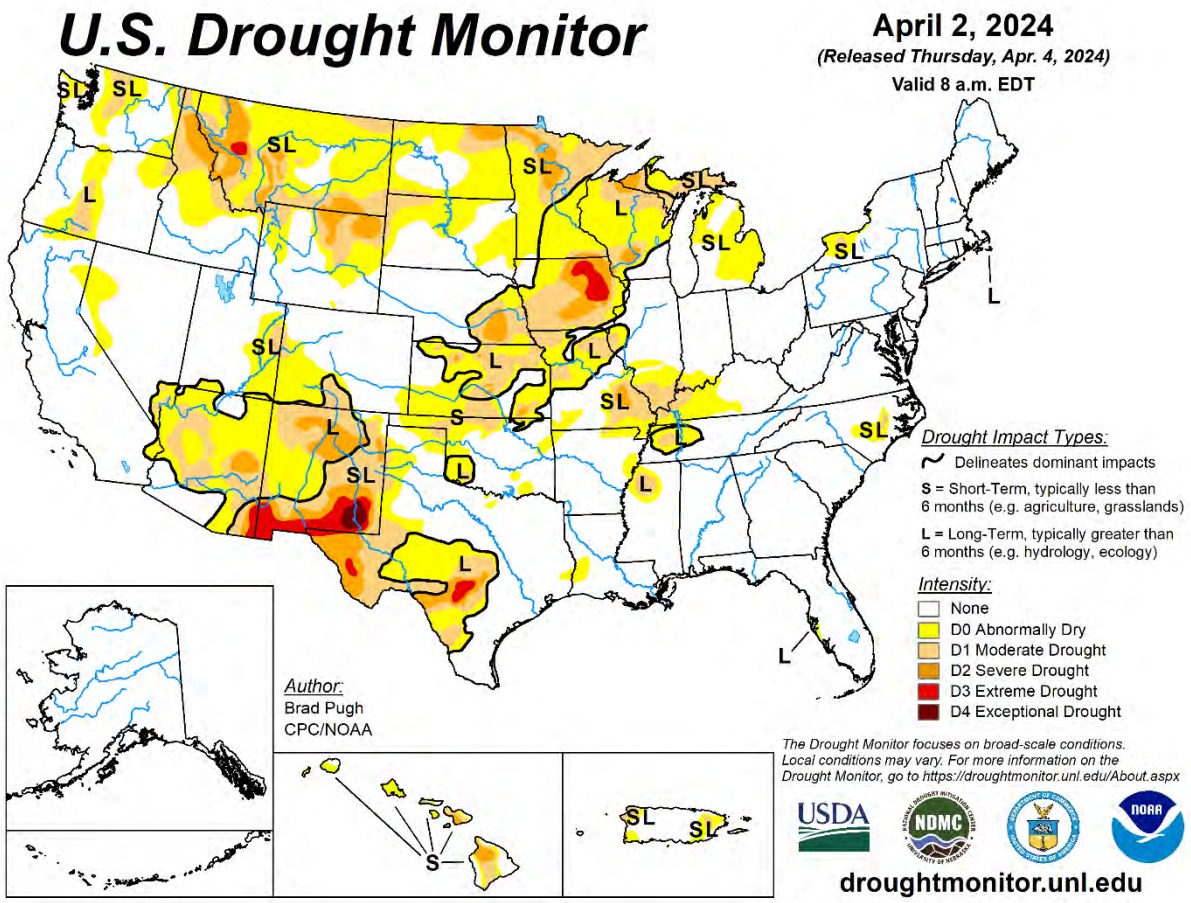


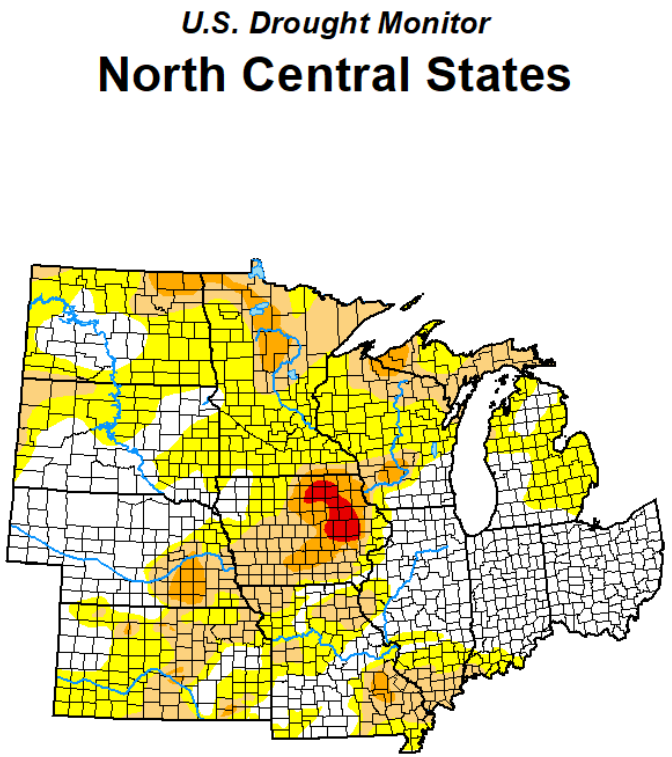
https://hprcc.unl.edu/maps.php?maps=ACISClimateMaps

Climate context

DROUGHT

Drought Monitor





April 2, 2024
(Released Thursday, Apr. 4, 2024)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	38.82	61.18	25.26	5.92	0.85	0.00
Last Week 03-26-2024	36.99	63.01	24.79	6.05	0.89	0.00
3 Months Ago 01-02-2024	37.52	62.48	38.54	16.91	3.77	0.02
Start of Calendar Year 01-02-2024	37.52	62.48	38.54	16.91	3.77	0.02
Start of Water Year 09-26-2023	25.87	74.13	49.98	25.16	7.67	0.73
One Year Ago 04-04-2023	50.91	49.09	27.71	16.49	9.03	4.59

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

Author:
Brad Pugh
CPC/NOAA

droughtmonitor.unl.edu

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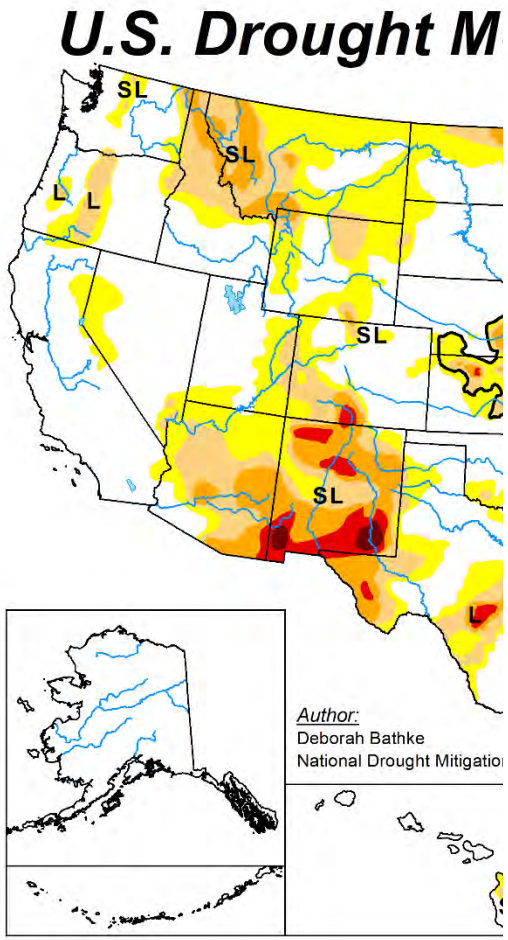
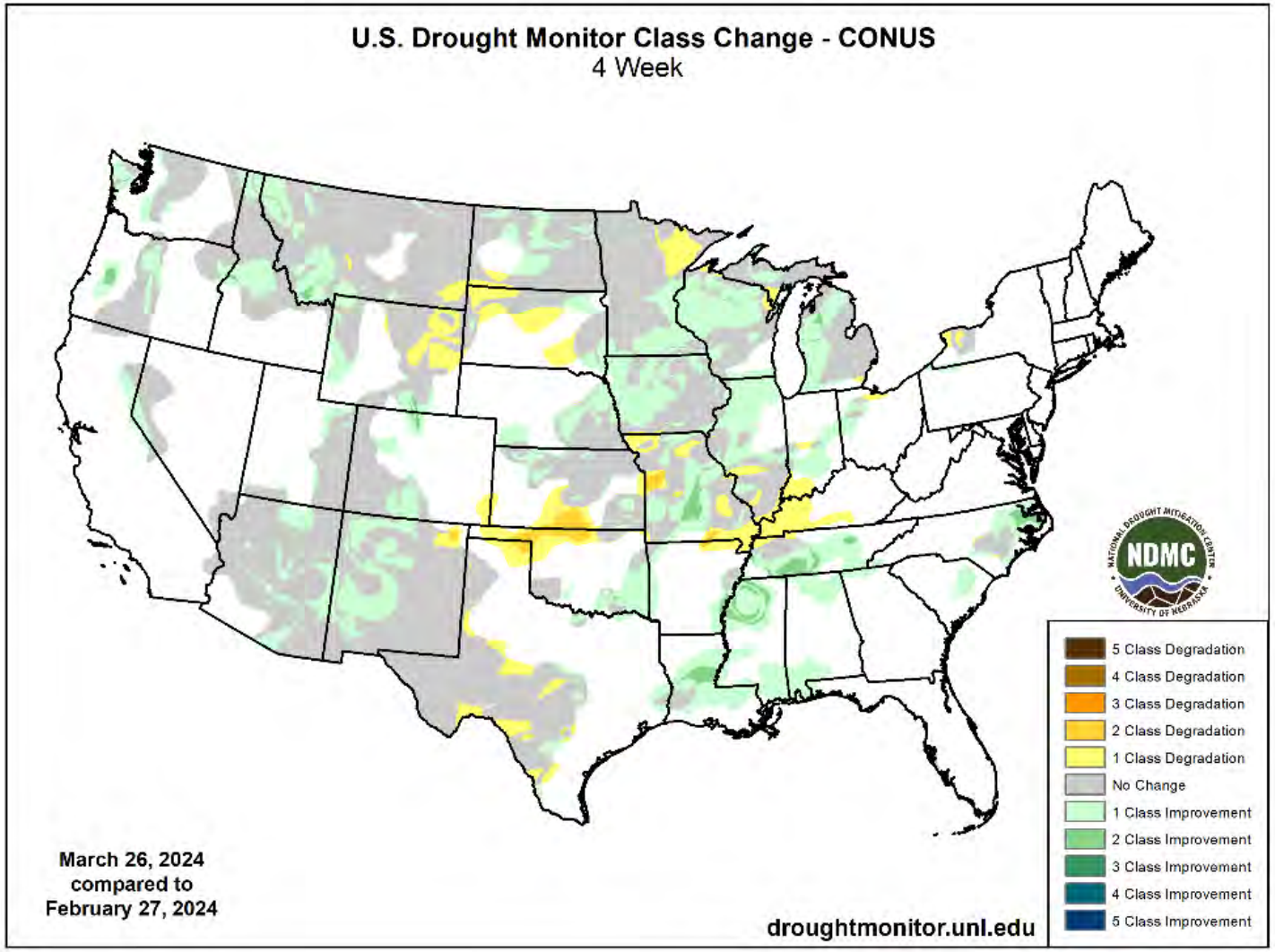
https://droughtmonitor.unl.edu

Drought Monitor





February 6, 2024

(Released Thursday, Feb. 8, 2024)

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	48.13	51.87	22.79	8.95	1.43	0.00
Last Week 01-30-2024	47.81	52.19	23.62	9.25	1.45	0.00
3 Months Ago 11-07-2023	43.93	56.07	31.77	15.76	3.79	0.47
Start of Calendar Year 01-02-2024	37.52	62.48	38.54	16.91	3.77	0.02
Start of Water Year 09-26-2023	25.87	74.13	49.98	25.16	7.67	0.73
One Year Ago 02-07-2023	36.16	63.84	44.00	21.55	11.45	5.07

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

Author:
Deborah Bathke
National Drought Mitigation Center

droughtmonitor.unl.edu

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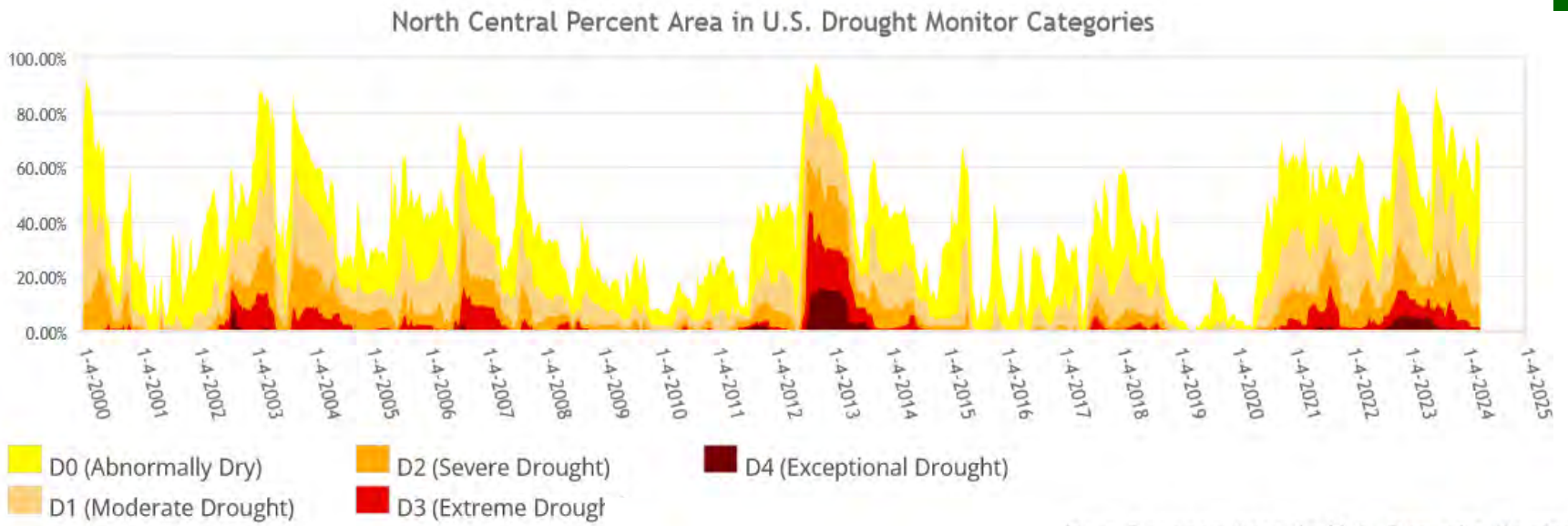
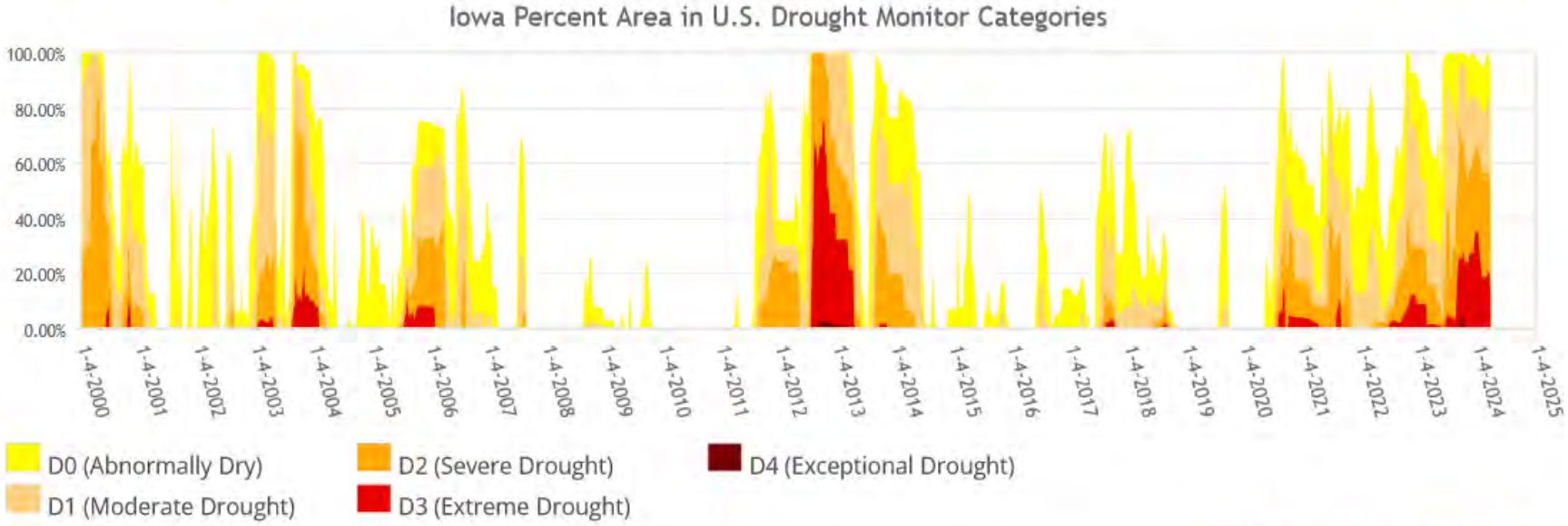
https://droughtmonitor.unl.edu

Drought-context



From the U.S. Drought Monitor website, https://droughtmonitor.unl.edu/DmData/TimeSeri



From the U.S. Drought Monitor website, https://droughtmonitor.unl.edu/DmData/TimeSeries.aspx, 4-4-2024

- Corn Belt persisting drought conditions
- Iowa in drought since July 2020. 196(?) weeks

https://droughtmonitor.unl.edu

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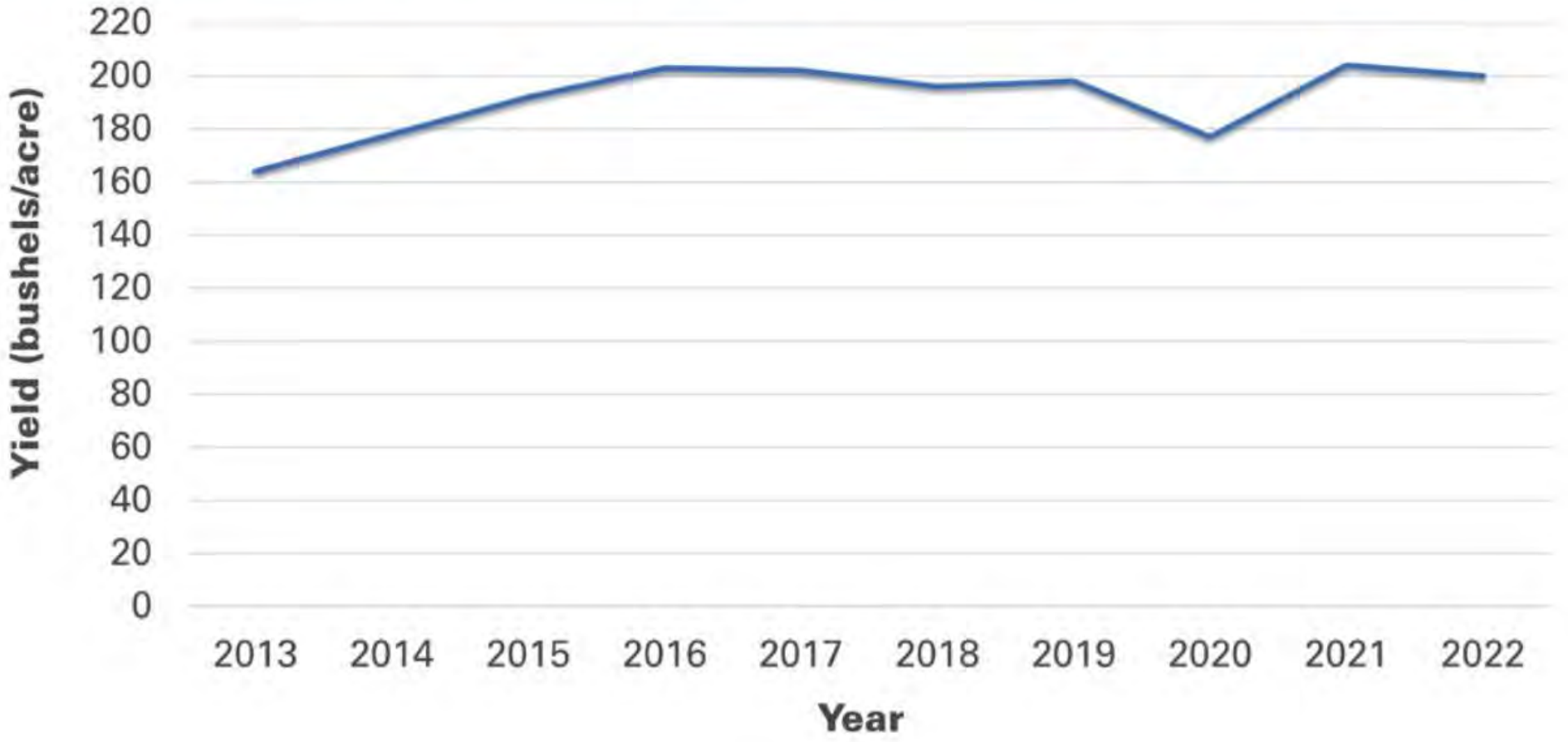
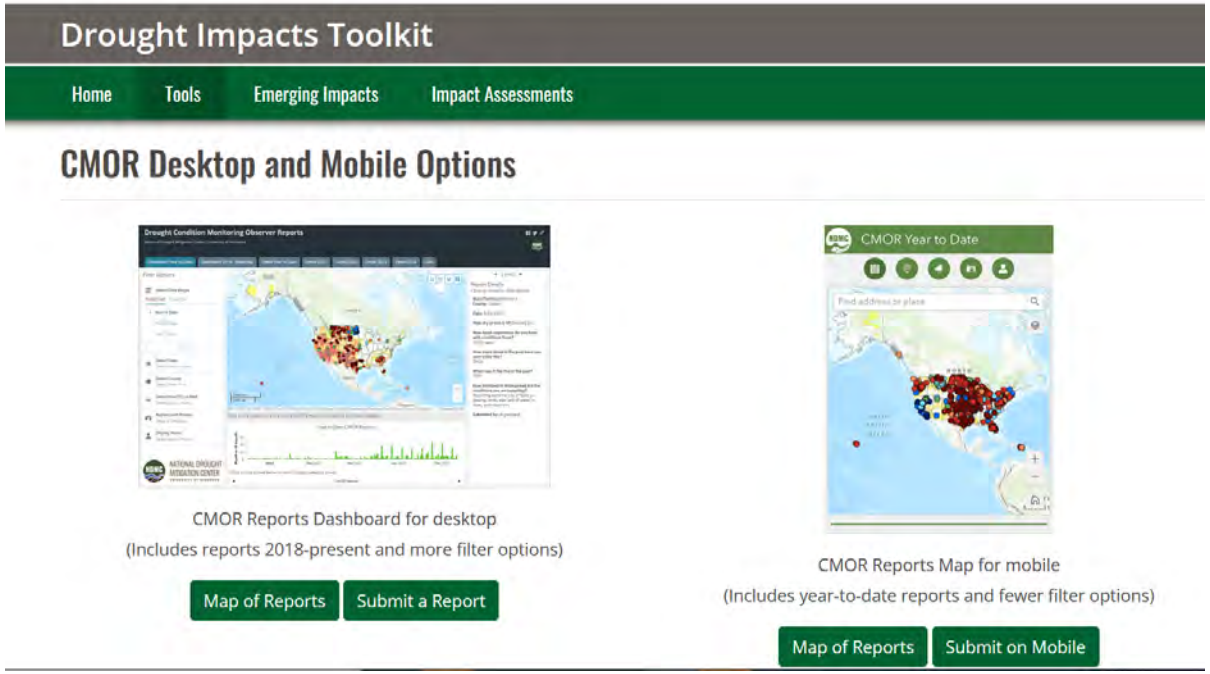
Climate/Drought – Yield Impacts?

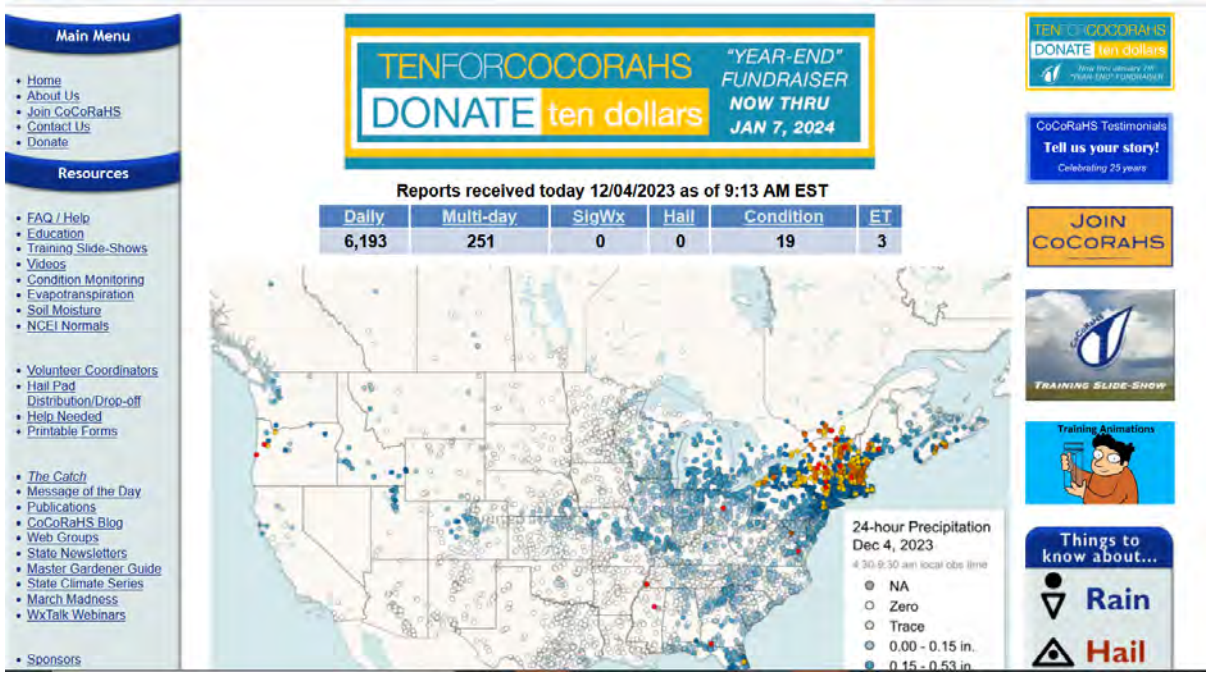
Figure 2. Iowa average corn yields, 2013-2022



https://www.extension.iastate.edu/agdm/crops/pdf/a1-12.pdf

Things you can do - reporting





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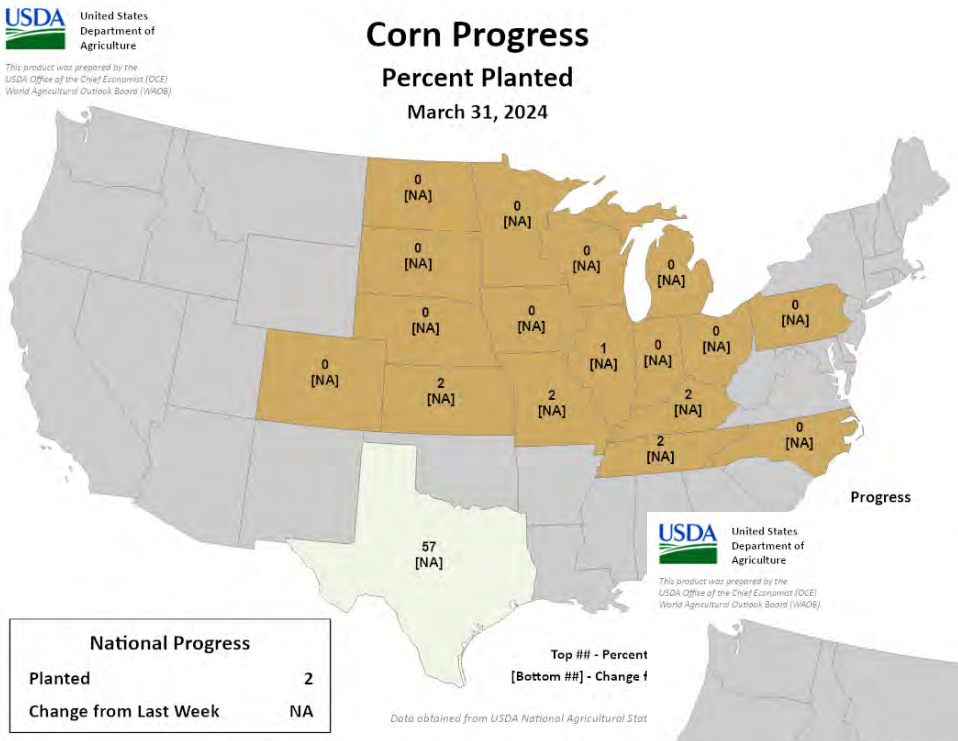
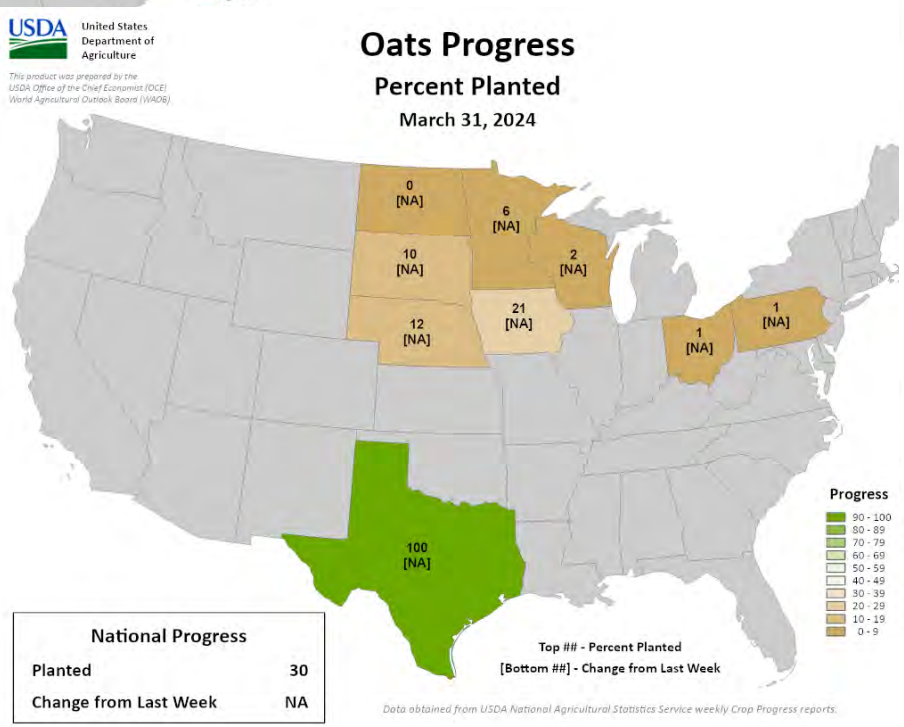
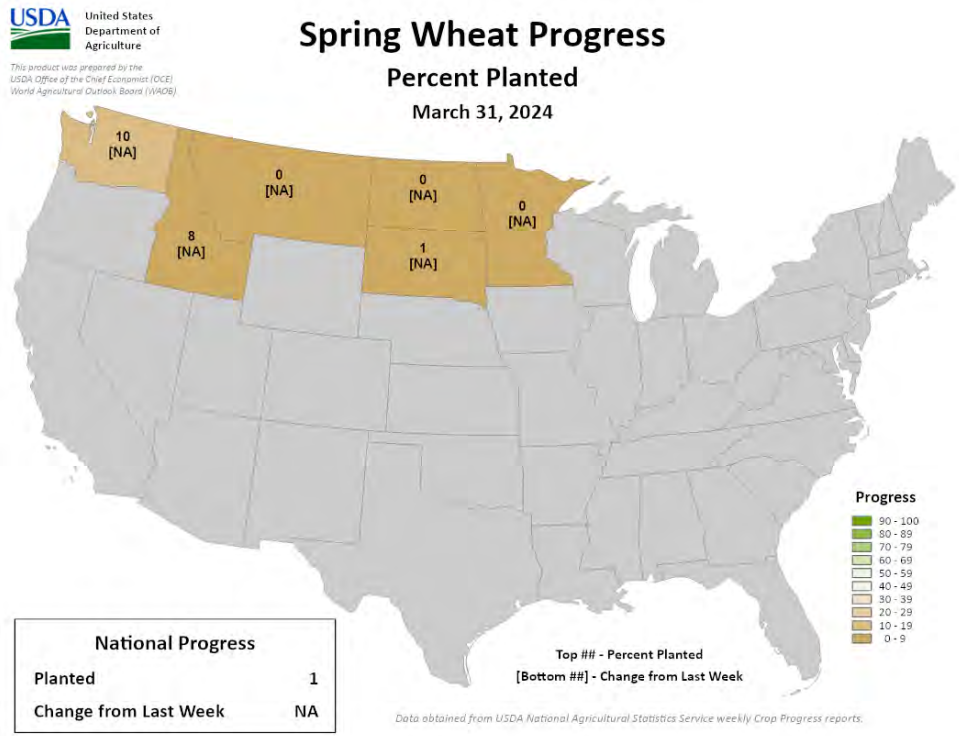
https://droughtimpacts.unl.edu/Tools/ConditionMonitoringObservations.aspx
https://www.cocorahs.org/

Crop Planted (NASS)







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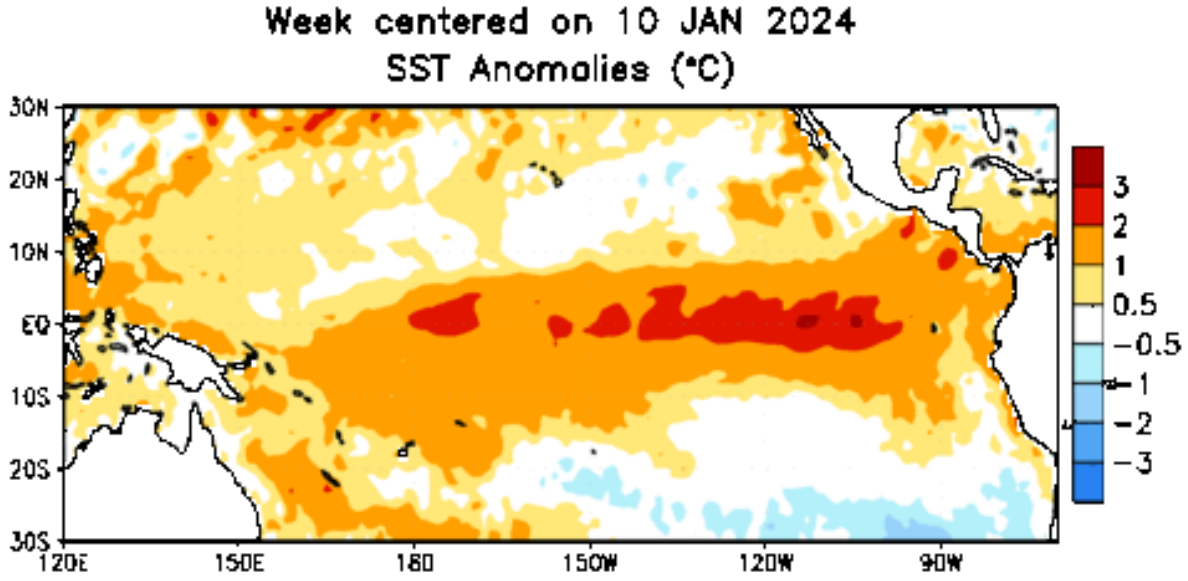
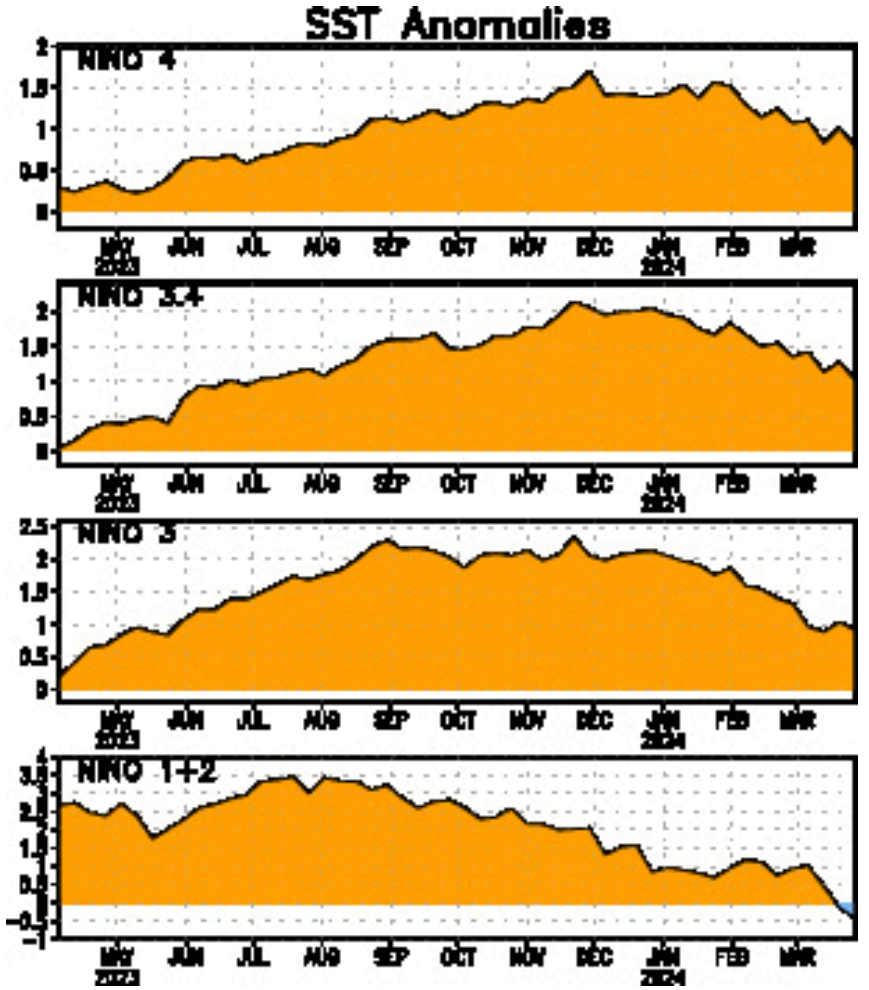
https://agindrought.unl.edu/Other.aspx

Climate context

EL NIÑO – SO LONG….

Strong El Niño





- Current status – El Niño
- Weakening in the spring
- Unlikely to affect summer

.

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https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/

ENSO Probabilistic Forecast

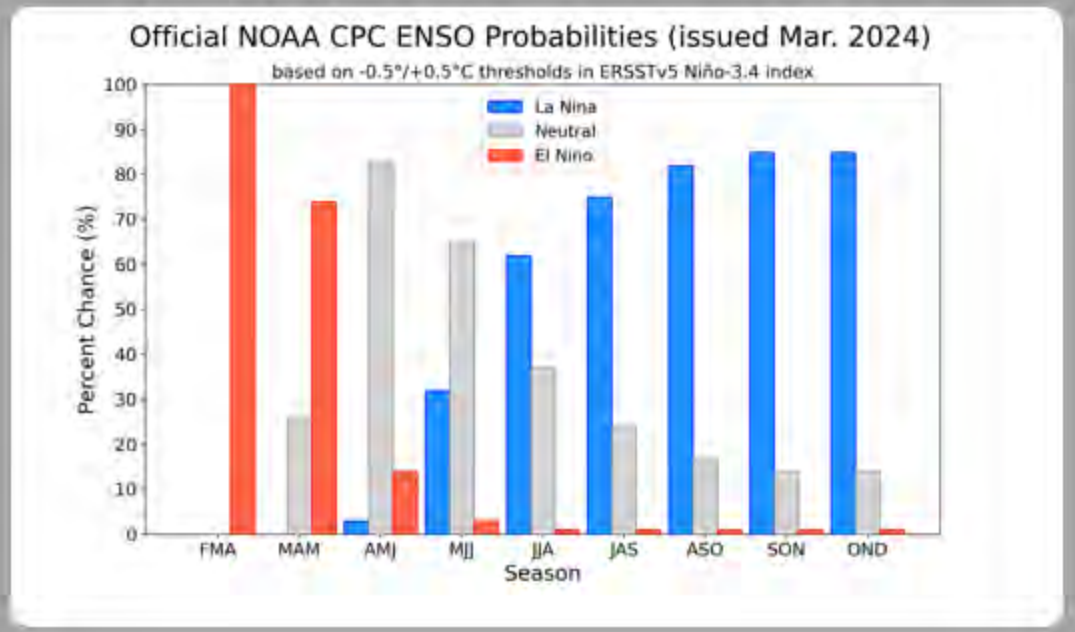
- Current status – El Niño
- Weakening through spring
- Neutral into early summer
- La Niña likely by end of summer.

- Recent research hints at these rapid transition summers more likely being warmer than average.

CPC Probabilistic ENSO Outlook

Updated: 14 March 2024

A transition from El Niño to ENSO-neutral is expected by April-June season 2024, with ENSO-neutral persisting through May-July 2024. Thereafter, La Niña is favored in June-August, and chances increase through the October-December season.



https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.shtml

A look ahead

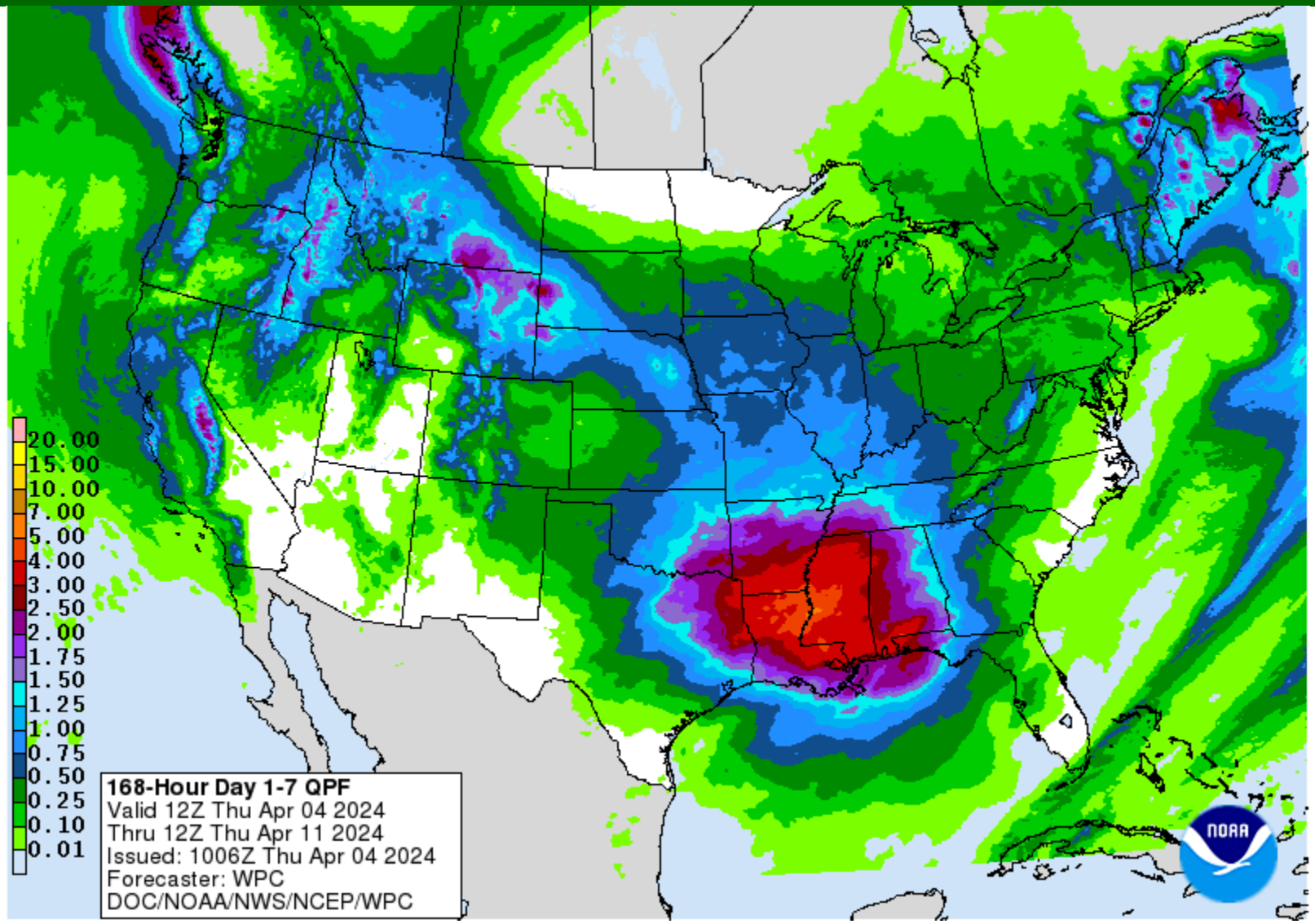
OUTLOOKS

Climate Outlooks

- 6-10 and 8-14 day updated daily
- Monthly updated 2x/month
- Longer range updated monthly

- Based on probabilities
- Good to have ag interpretation
- Check Midwest Climate Hub website for ag interpretation

7-day Quantitative Precipitation Forecast



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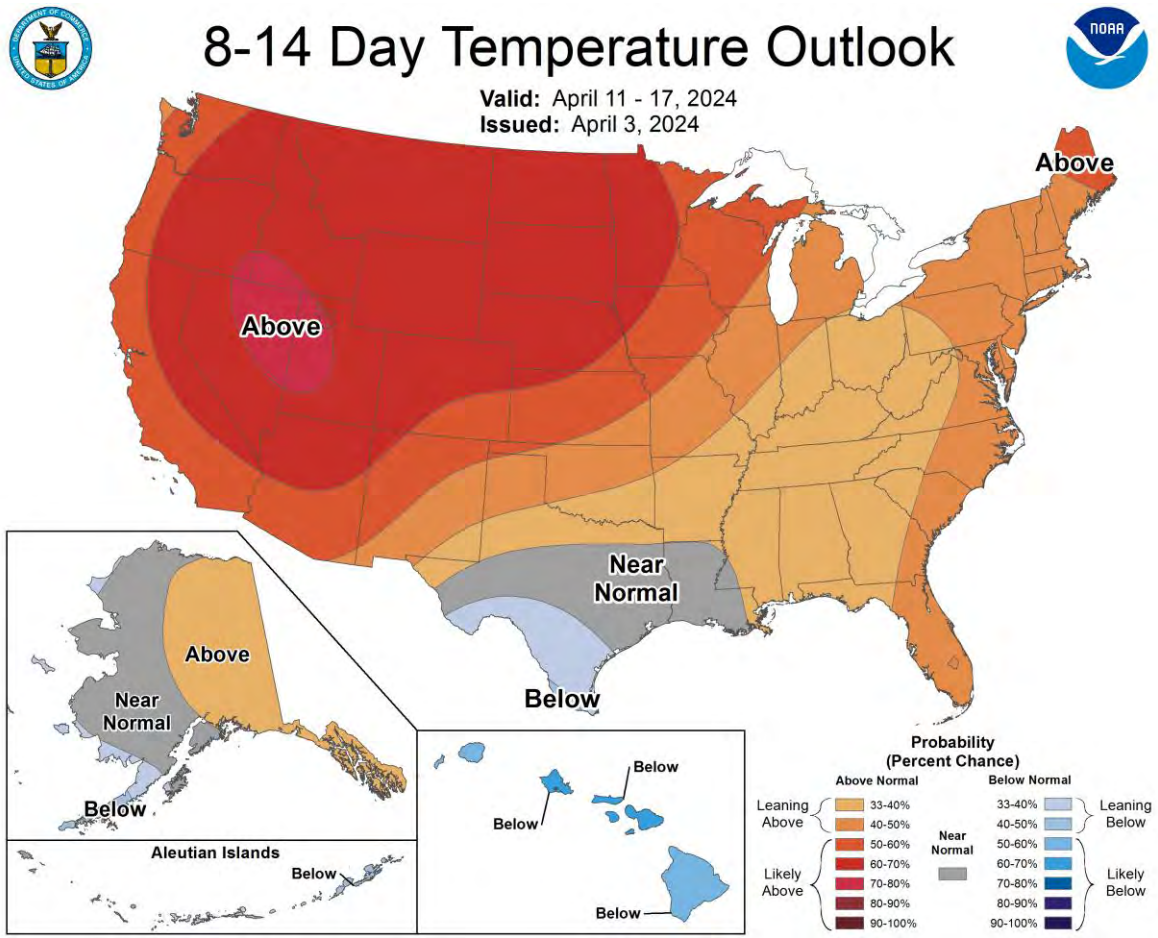
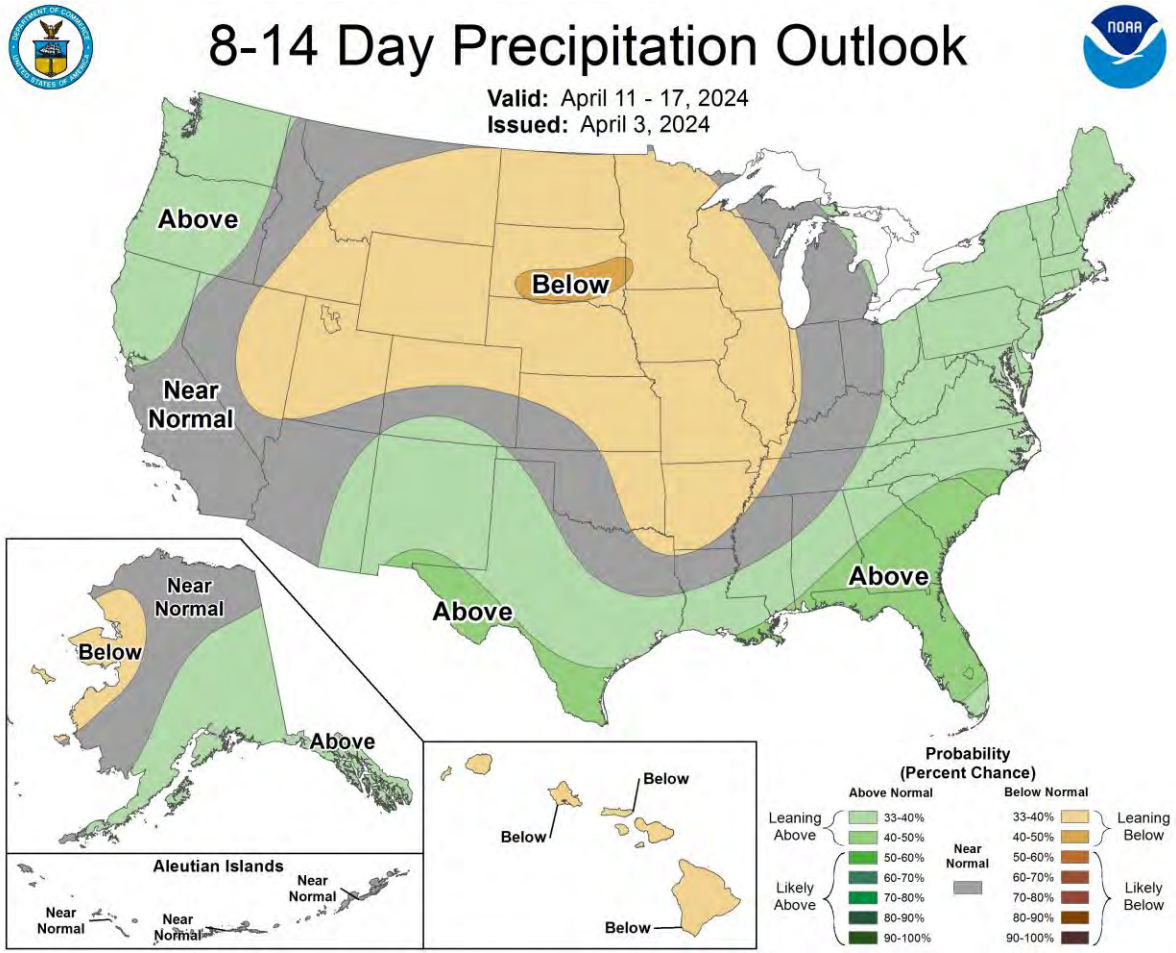
http://www.wpc.ncep.noaa.gov/qpf/day1-7.shtml

8-14 Day Temp. and Precip. Outlook





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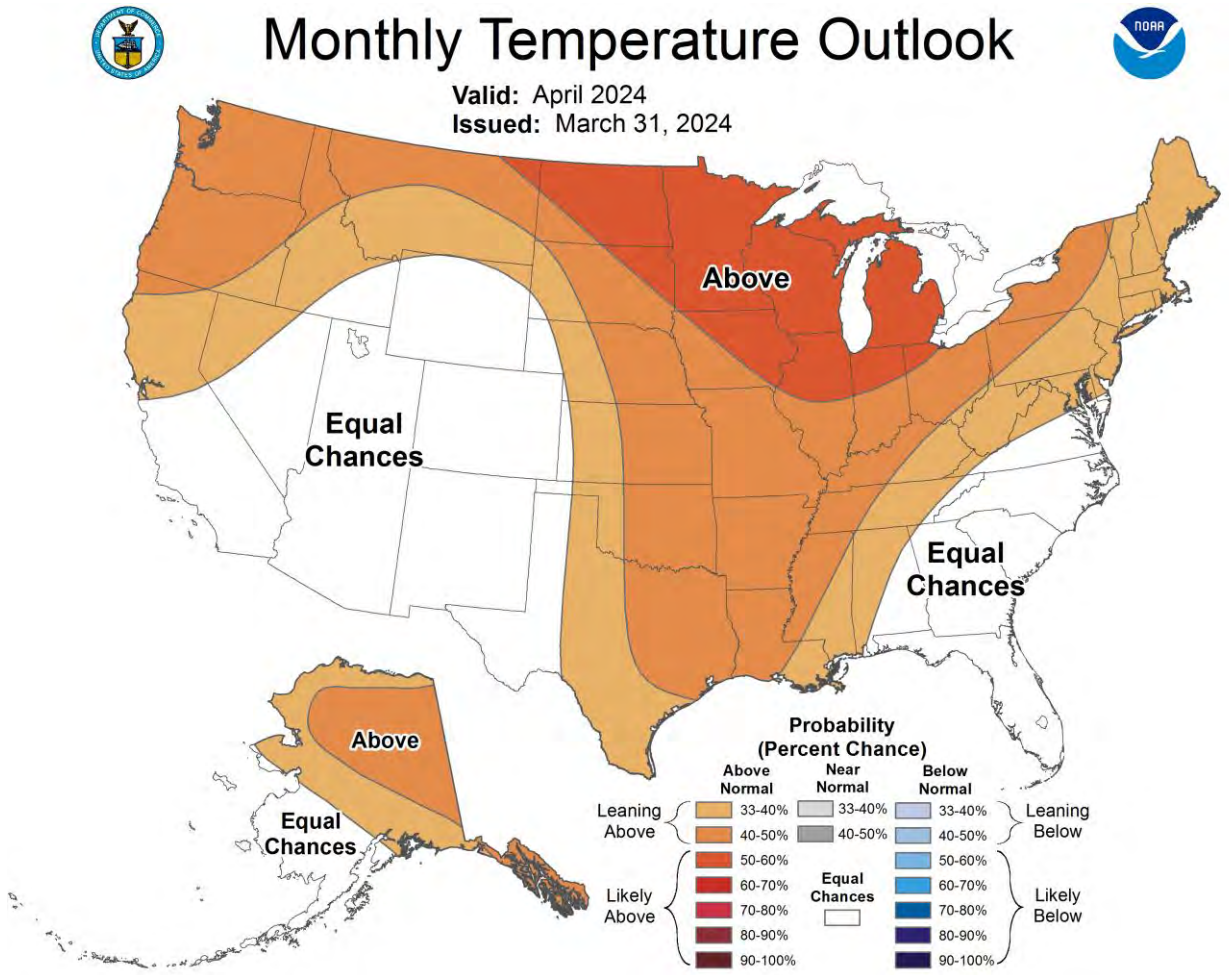
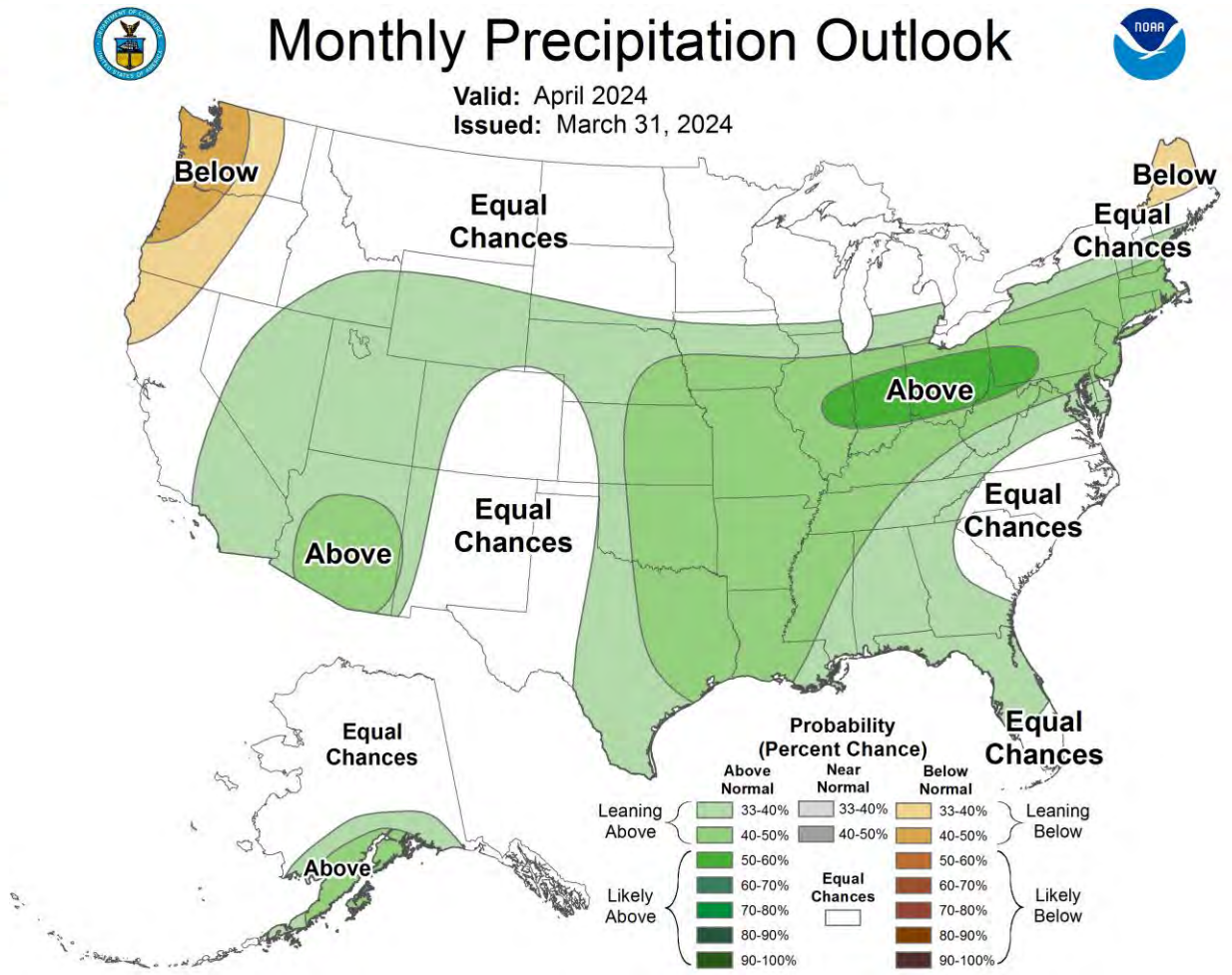
http://www.cpc.ncep.noaa.gov/

30 Day Temp and Precip. Outlook





http://www.cpc.ncep.noaa.gov/

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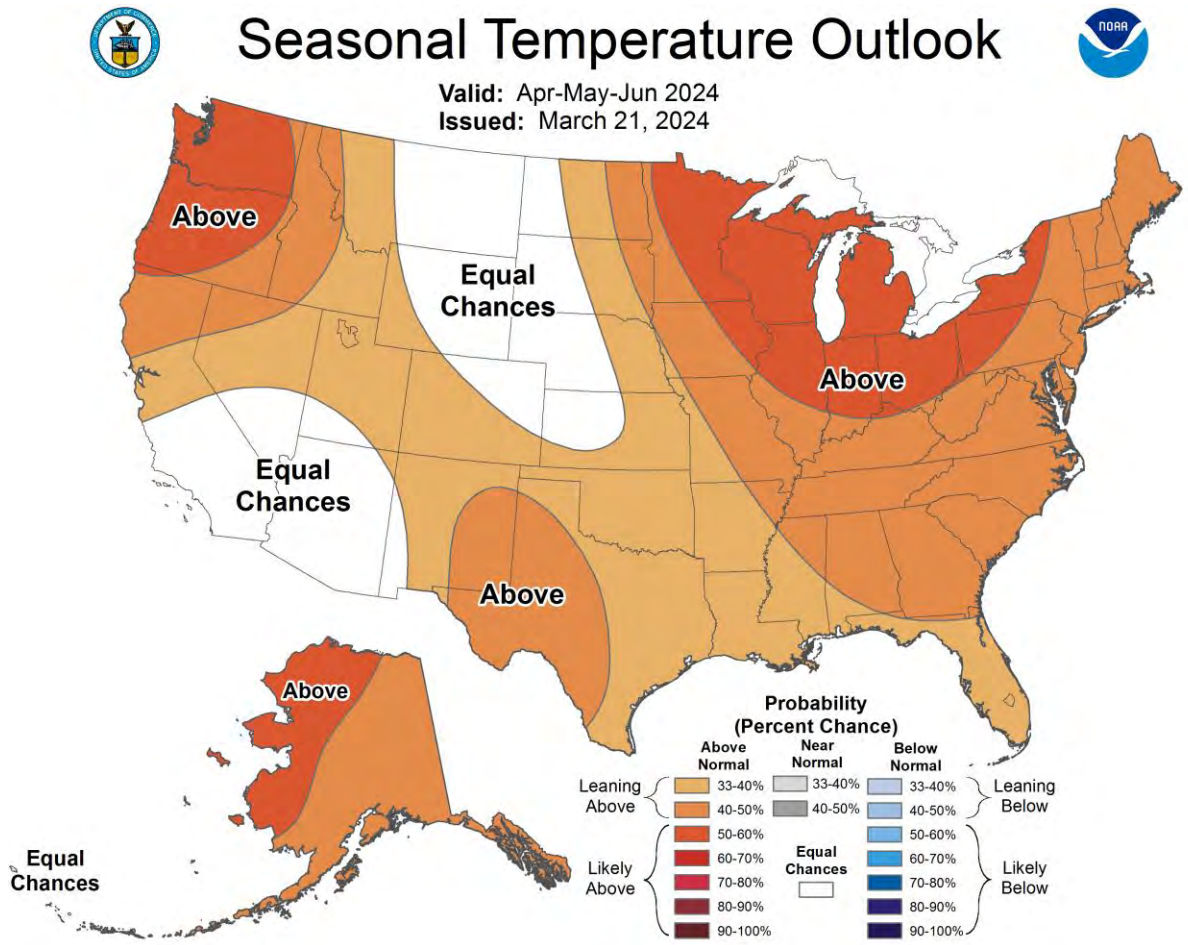
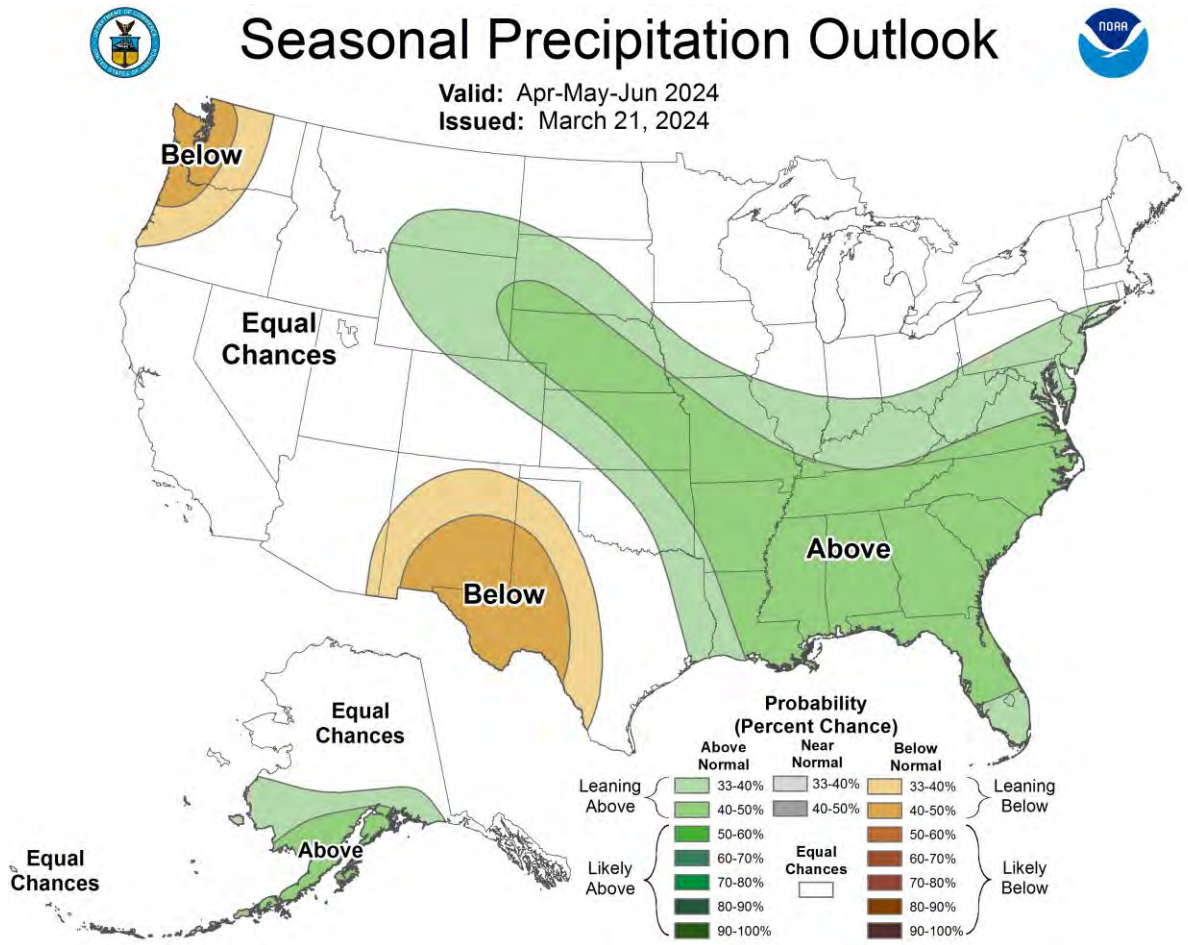
30 day outlook for April – likely warmer again.
Hints toward above average precip.

90 Day Temp and Precip. Outlook





http://www.cpc.ncep.noaa.gov/

El Niño-weakening –. Slightly more likely warm. No indications on precipitation.

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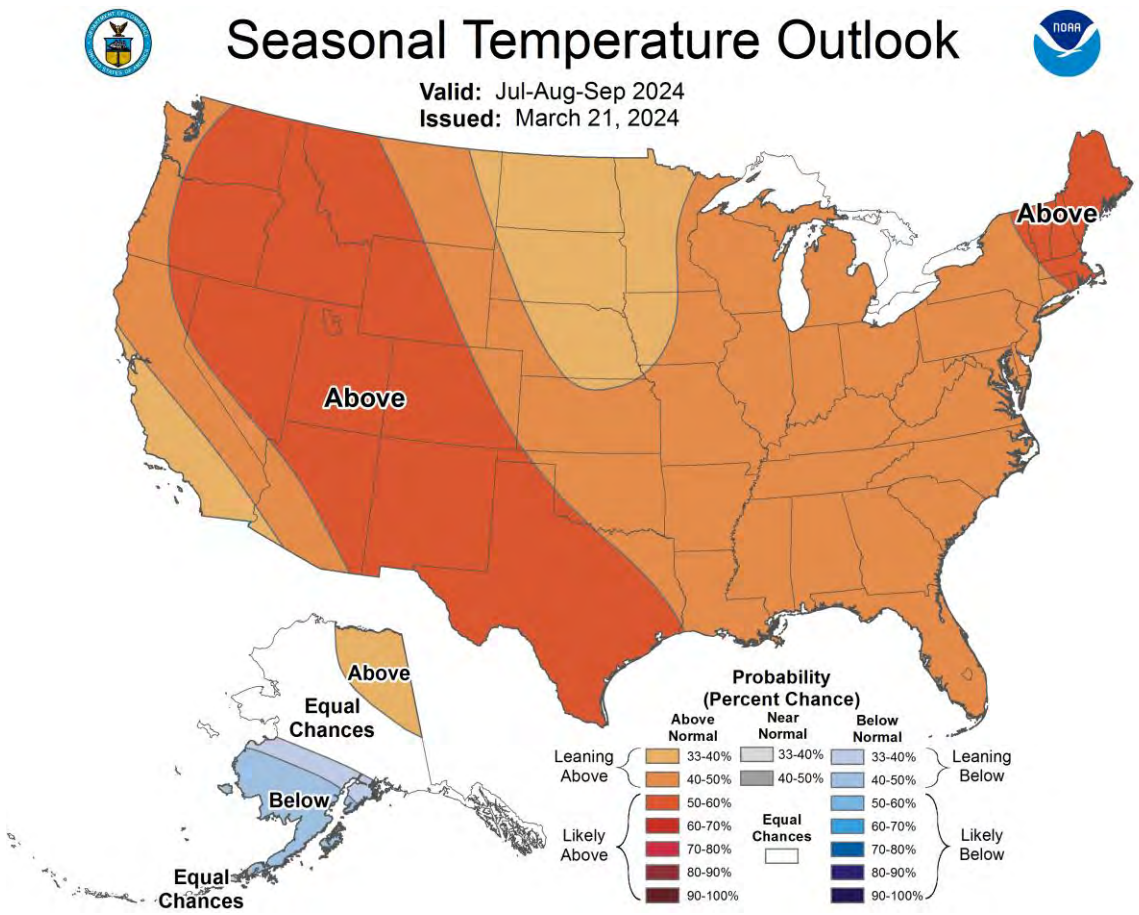
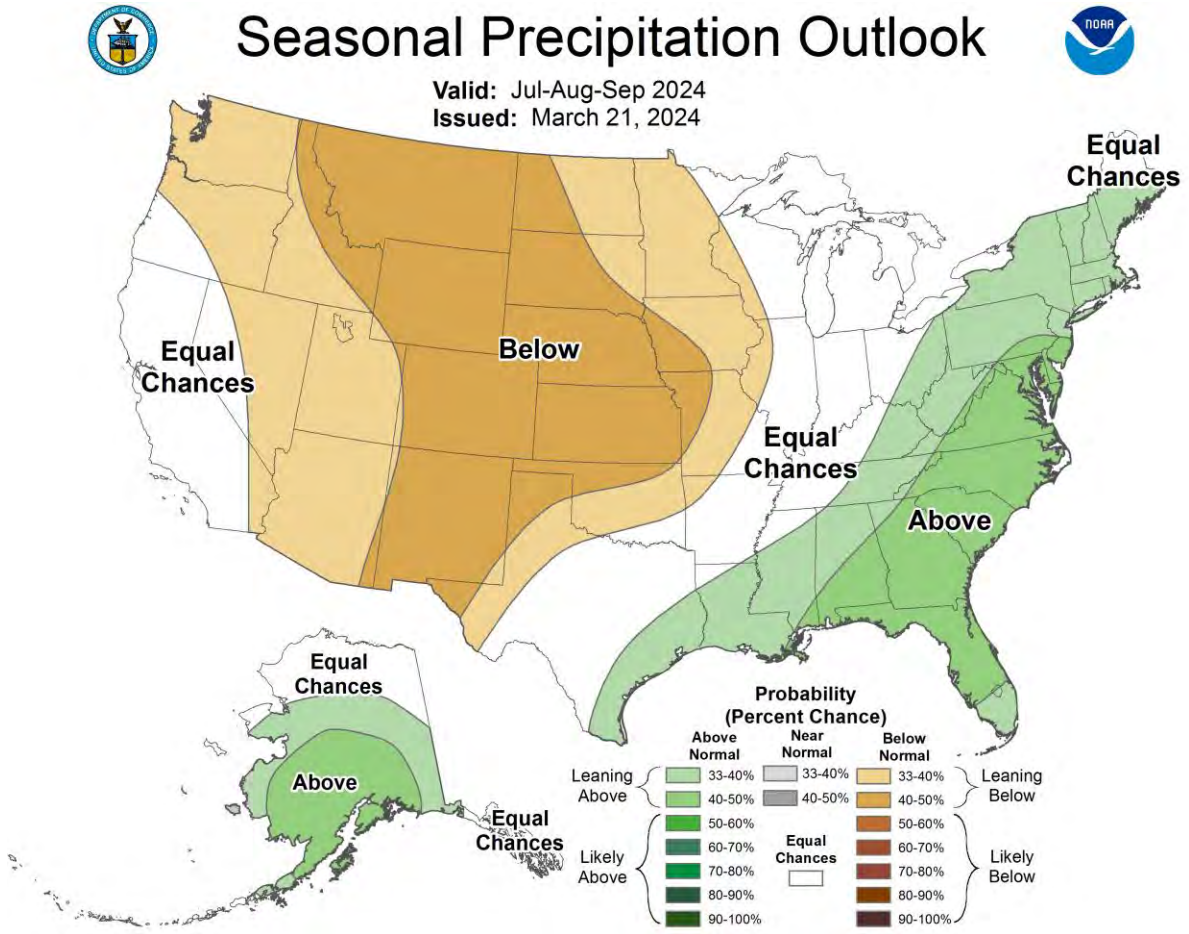
Seasonal Outlook for July-September





- Summer - *more likely La Niña*.
- How much drought continues? What other develops?

https://www.cpc.ncep.noaa.gov/products/predictions/multi_season/13_seasonal_outlooks/color/churchill.php

Summary

- *Conditions*
- Drought continues into year 4
- Some recent recovery in places
- Deeper soil profile likely still dry
- El Niño weakening

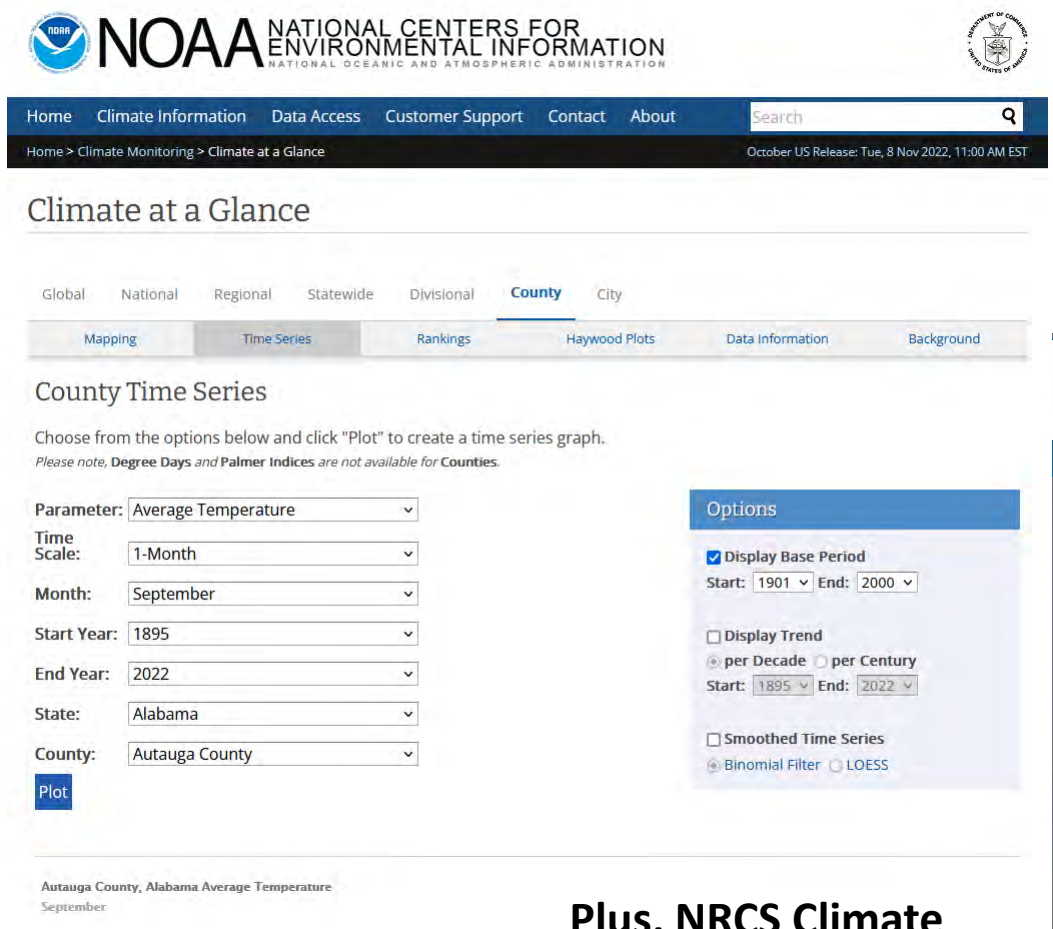
- *Outlooks*
- El Niño will weaken though spring – likely La Niña by late summer
- Drought recovery (some but marginal)
- Spring planting less likely major wetness slowdowns.
- Increased chance of warmer summer
- Summer precip still in question

Recommendations

- Strongly consider yield goals – fertilizer recommendations (soil moisture recovery could limit)
- Increased chance of heat – increases water use. Increasing risk of crop stress in dry areas.
- Mixed message by location.
- Soil management – tillage loses soil moisture.
- If depending on a water source (irrigation/livestock etc.) – check its level and develop alternate plans

https://www.cpc.ncep.noaa.gov/products/predictions/multi_season/13_seasonal_outlooks/color/churchill.php

Useful Resources Historical Climate Data



Find all links at tiny.cc/acj1vz

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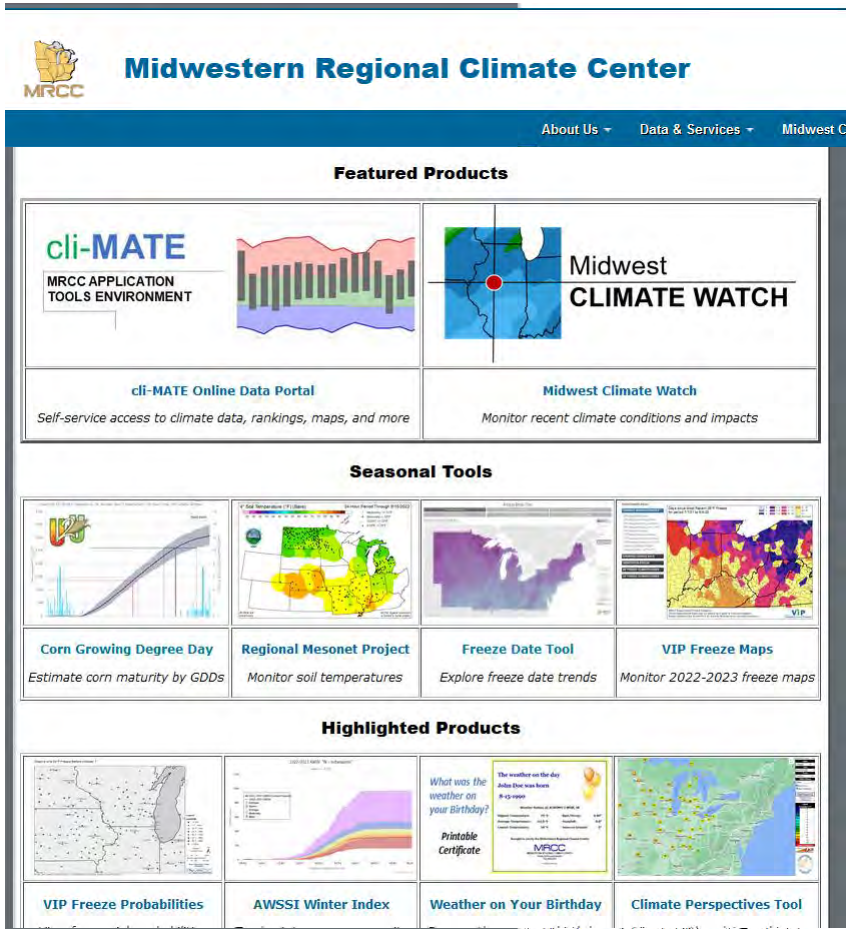
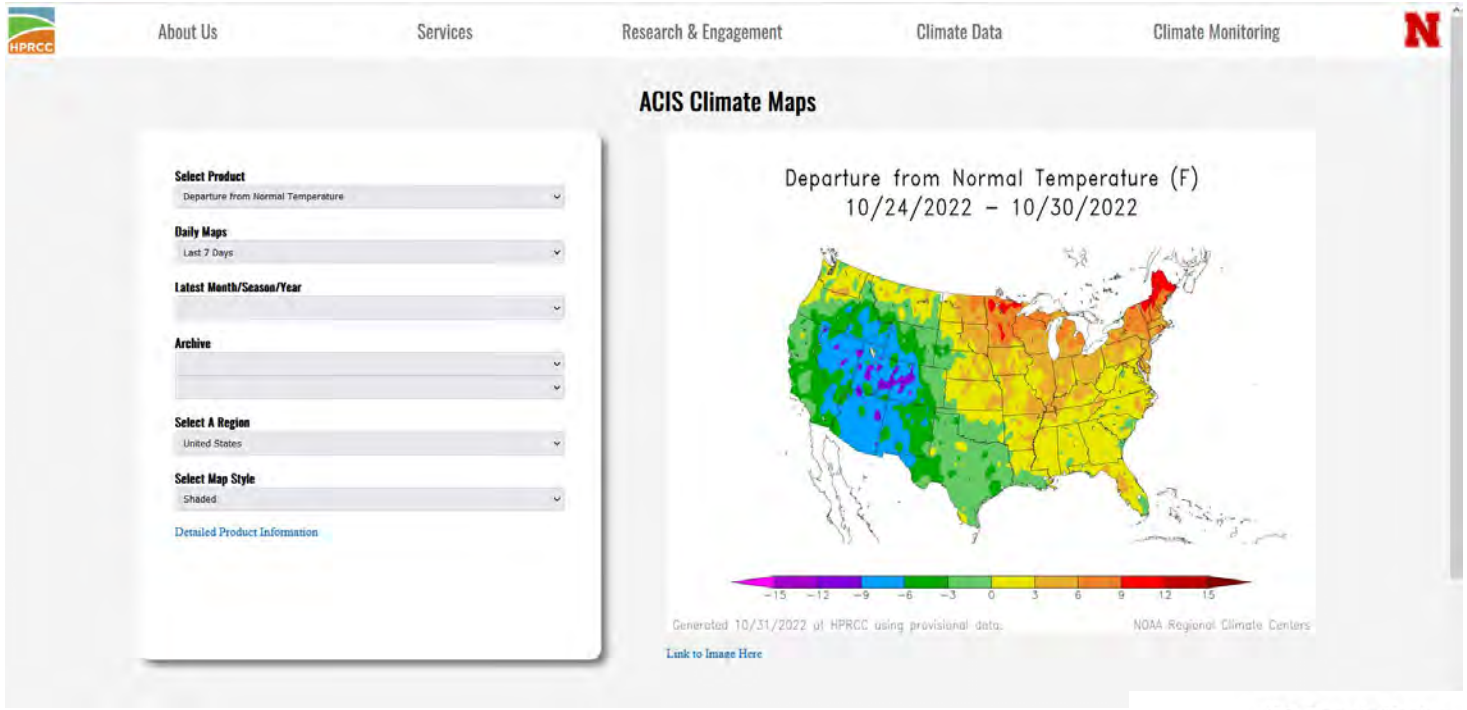
Plus, NRCS Climate Quick Reference Guides (Counties)
https://webapps.jornada.nmsu.edu/climate-quick-guides/

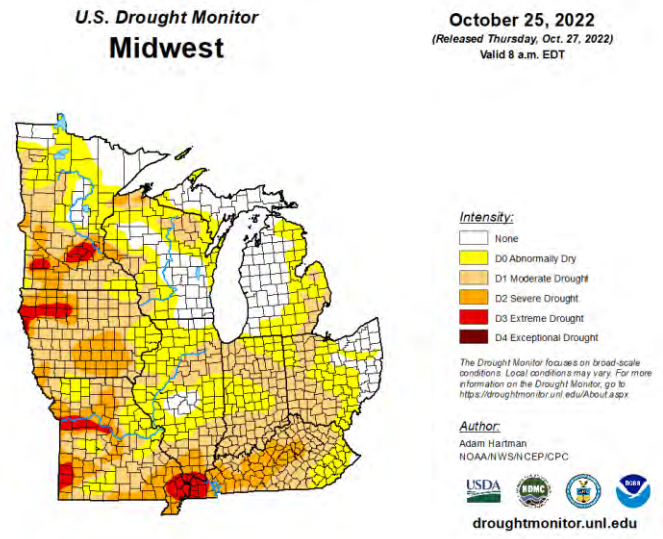
NCEI Climate at a Glance

Midwestern Regional Climate Center



Useful Resources Recent/Current Conditions





Find all links at tiny.cc/acj1vz

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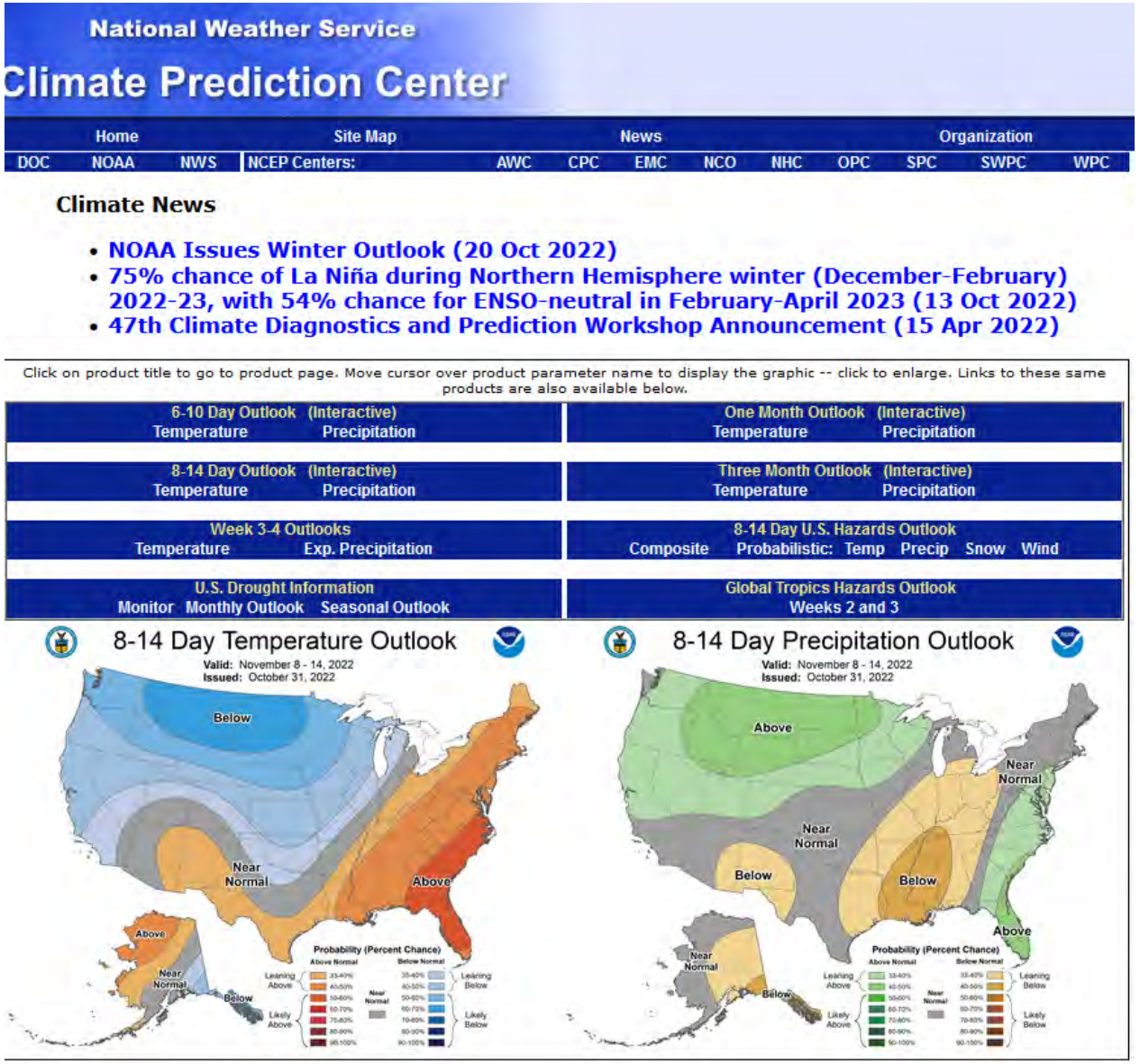
Useful Resources Forecasts and Outlooks



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https://www.drought.gov/drought/dews/midwest/reports-assessments-and-outlooks

Midwest and Great Plains Climate-Drought Outlook 15 September 2016

National Drought Mitigation Center

NOAA

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

U.S. DEPARTMENT OF COMMERCE

REGIONAL CLIMATE CENTERS

AASC

AMERICAN ASSOCIATION OF STATE CLIMATOLOGISTS

USDA

United States Department of Agriculture

Midwest Climate Hub

For More Information

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

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

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Contact Laurie to sign up for newsletter and monthly ag outlooks!