North Central U.S. Climate and Drought Outlook

15 December 2022

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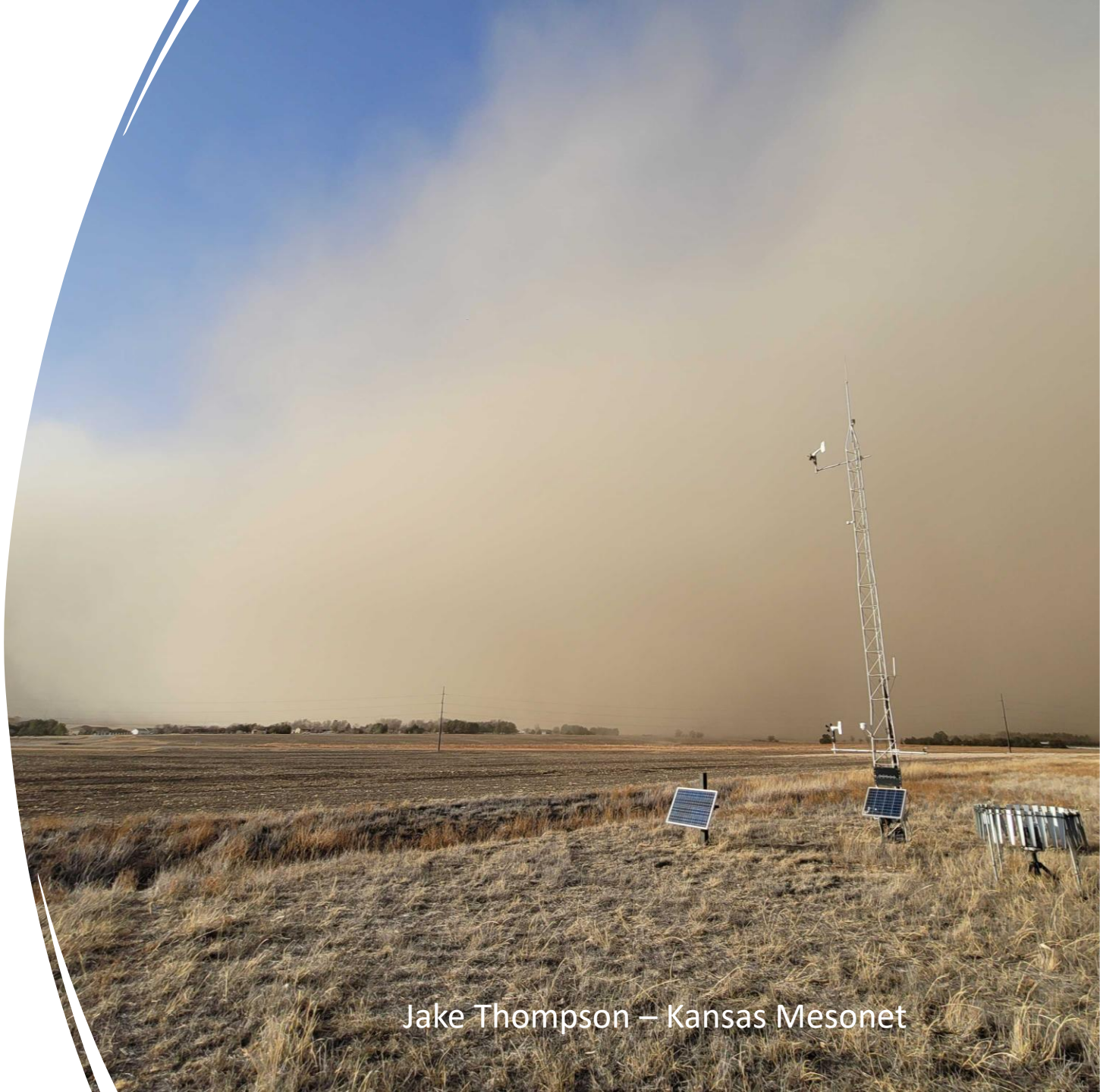
General Information

- **Providing climate services to the Central Region**
  - Collaboration Activity Between:
    - State Climatologists/American Association of State Climatologists
    - NOAA NCEI/NWS/OAR/NIDIS
    - USDA Climate Hubs
    - Midwest and High Plains Regional Climate Centers
    - National Drought Mitigation Center

- **Next Regular Climate/Drought Outlook Webinar**
  - January 2023 (1 PM CST): Presenter: Dr. Martha Durr, State Climatologist of Nebraska
- **Access to Future Climate Webinars and Information**
- http://www.drought.gov/drought/content/regional-programs/regional-drought-webinars
- **Recordings of Past Webinars**
- *https://mrcc.purdue.edu/multimedia/webinars.jsp*
- *http://www.hprcc.unl.edu/webinars.php*
- **Open for questions at the end**

Presentation Outline

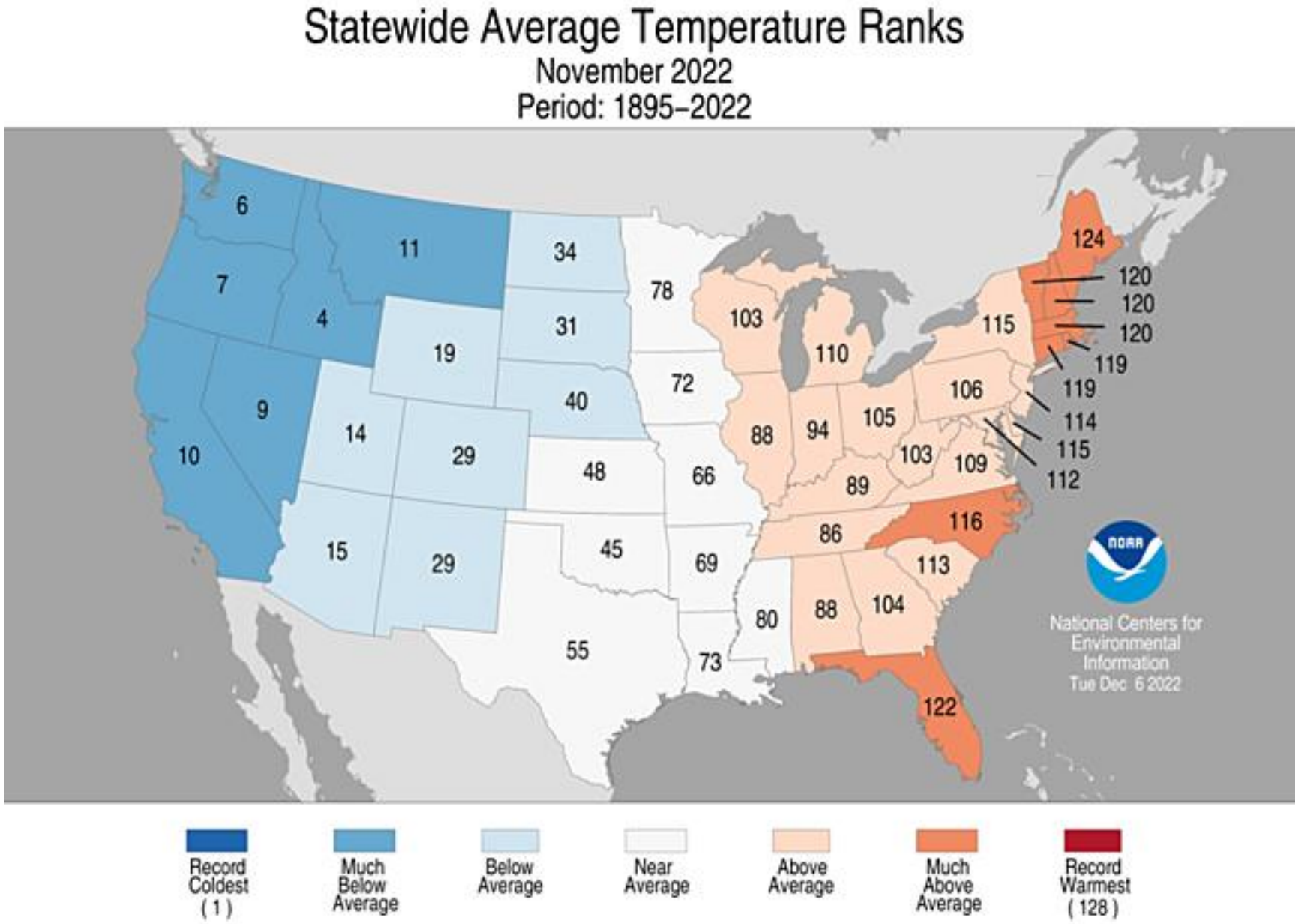
- Recent Conditions
  - Temperature and precipitation ranks
  - 30-day temperature and precipitation
  - Drought
- Growing Season Progress
- Snow, Fire, Rivers and Lakes
- Impacts and Notable Events
- Outlooks
  - La Niña
  - Short-term
  - Winter season



Recent Conditions

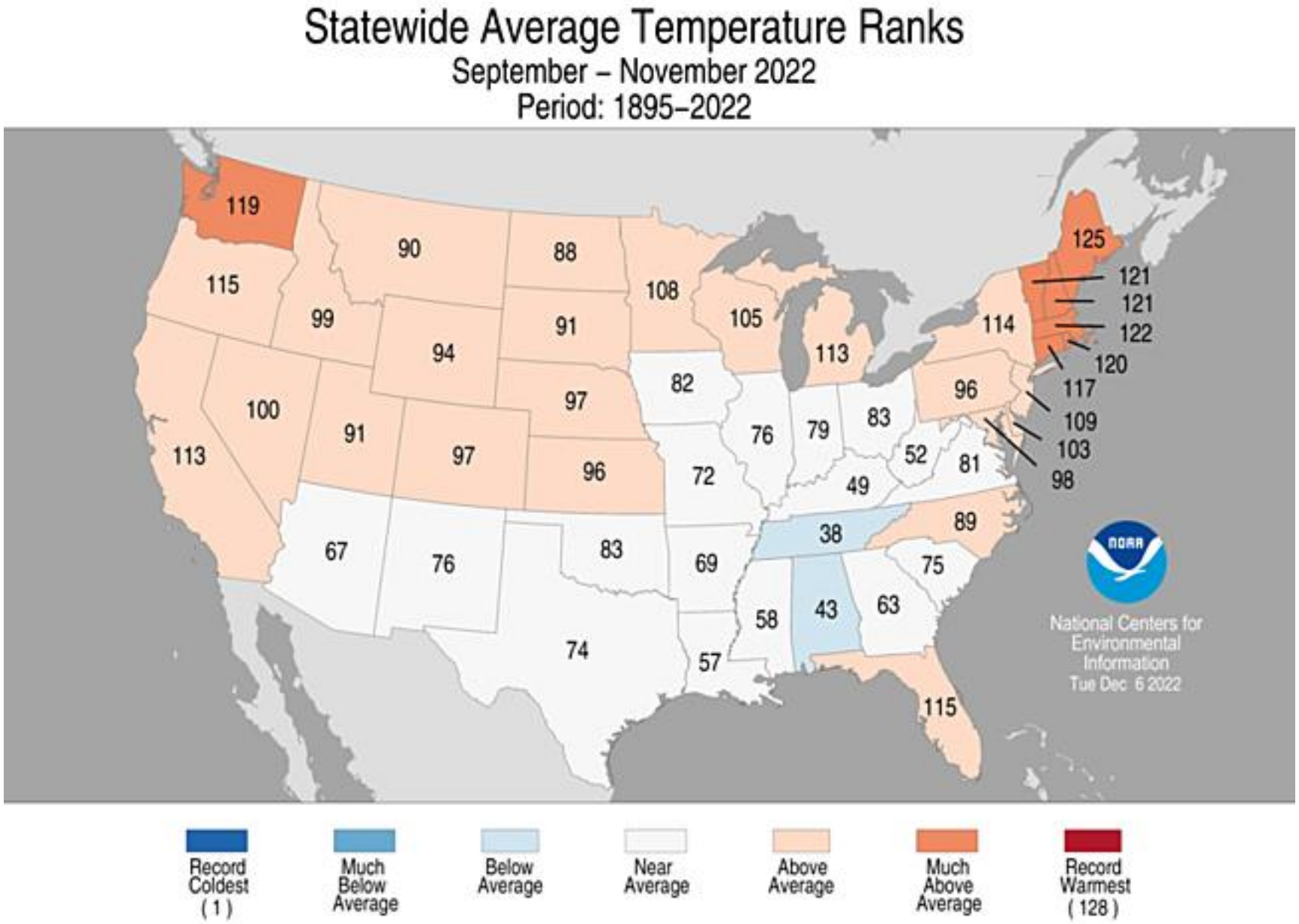
November Temperature and Precipitation Ranks
YTD Temperature and Precipitation Ranks
Departure from Normal Temperature and Precipitation
Long-term Precipitation Departures
Soil Moisture, Streamflow and Drought

November Temperature Ranks



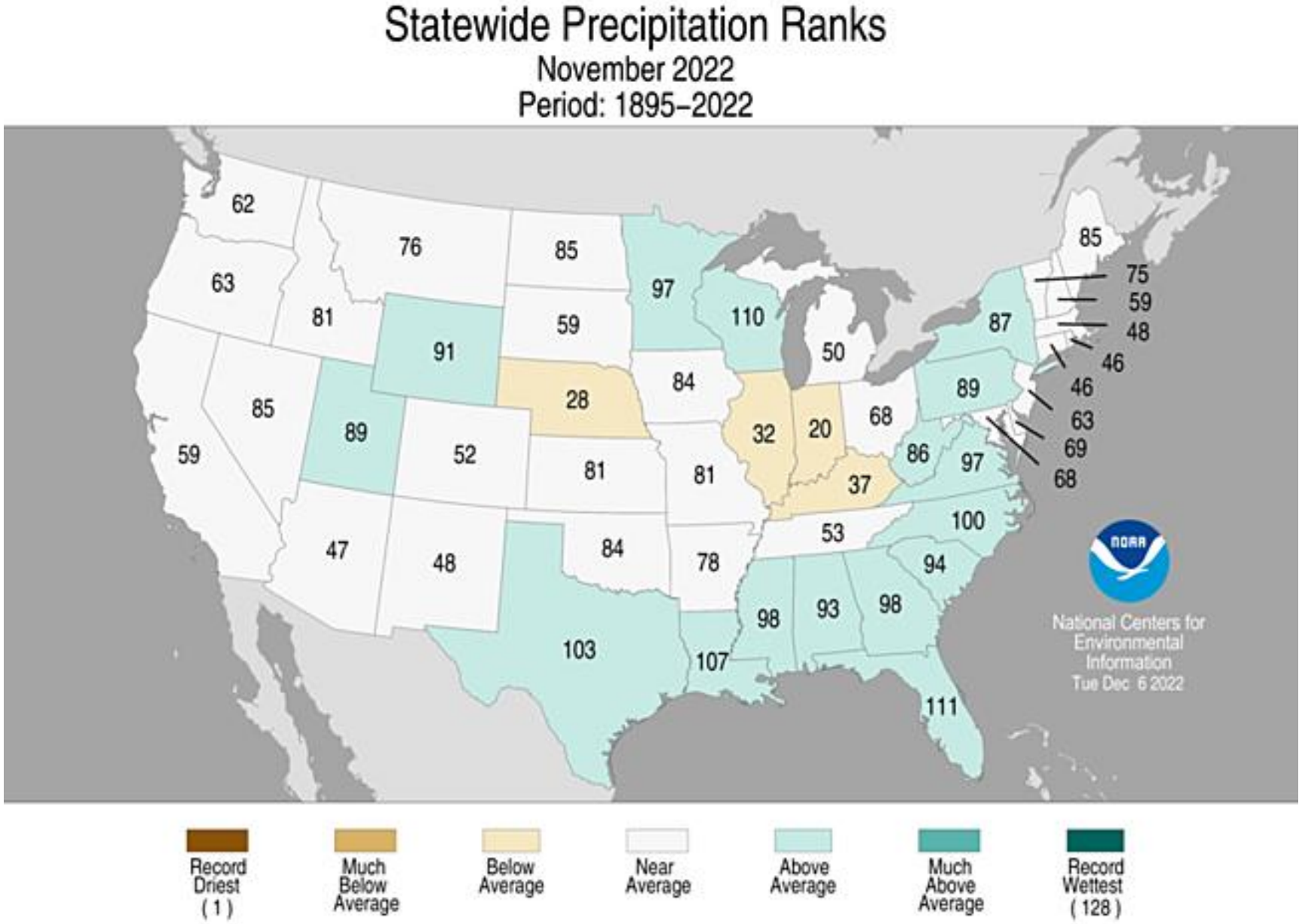
http://www.ncdc.noaa.gov/temp-and-precip/us-maps/

Fall Temperature Ranks



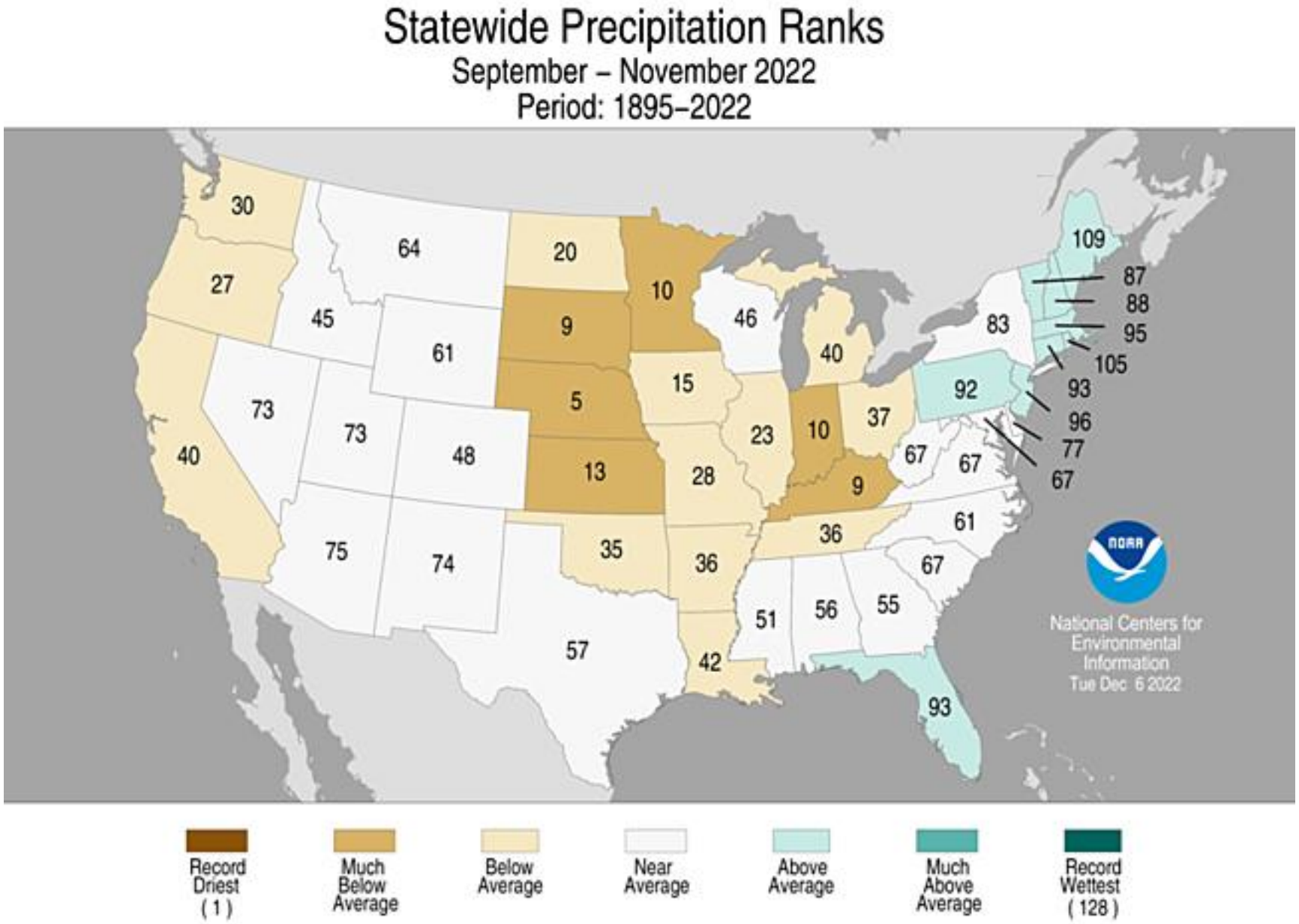
http://www.ncdc.noaa.gov/temp-and-precip/us-maps/

November Precipitation Ranks



http://www.ncdc.noaa.gov/temp-and-precip/us-maps/

Fall Precipitation Ranks

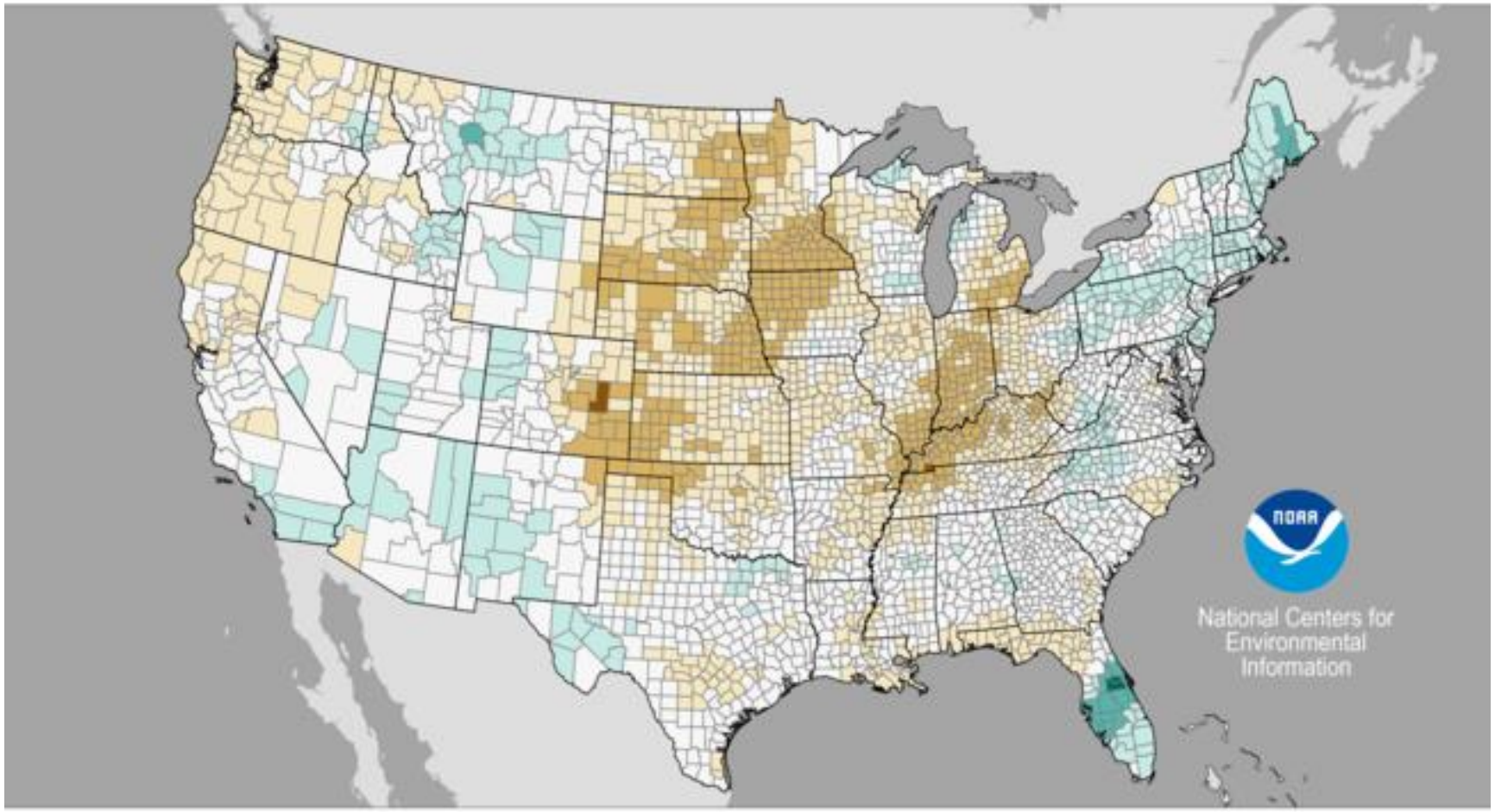


http://www.ncdc.noaa.gov/temp-and-precip/us-maps/

County Precipitation Ranks

September–November 2022

Period: 1895–2022

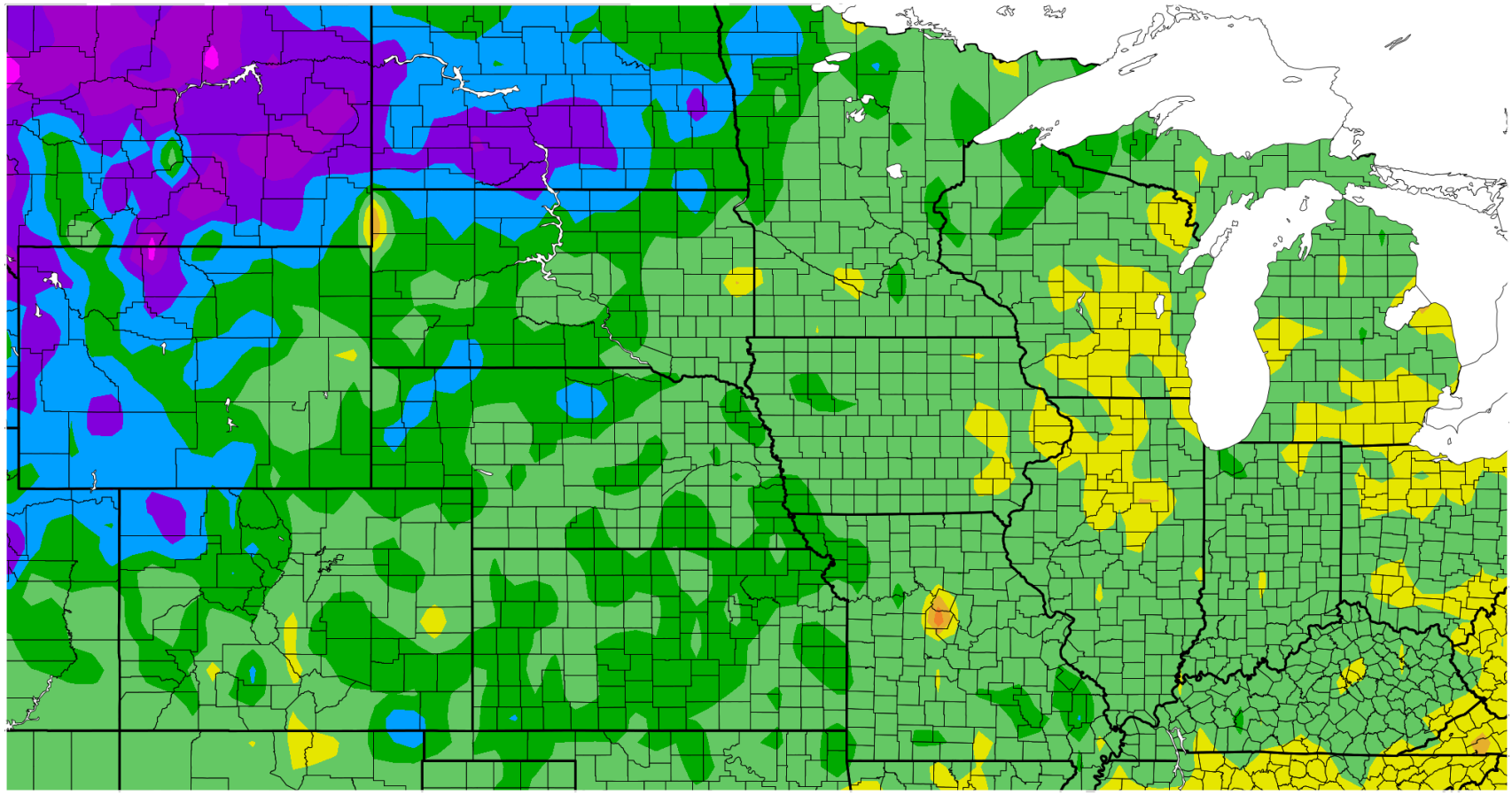


Record Driest | Much Below Average | Below Average | Near Average | Above Average | Much Above Average | Record Wettest

Created: Tue Dec 06 2022

Data Source: nClimGrid

Departure from Normal Temperature (F)
11/15/2022 - 12/14/2022

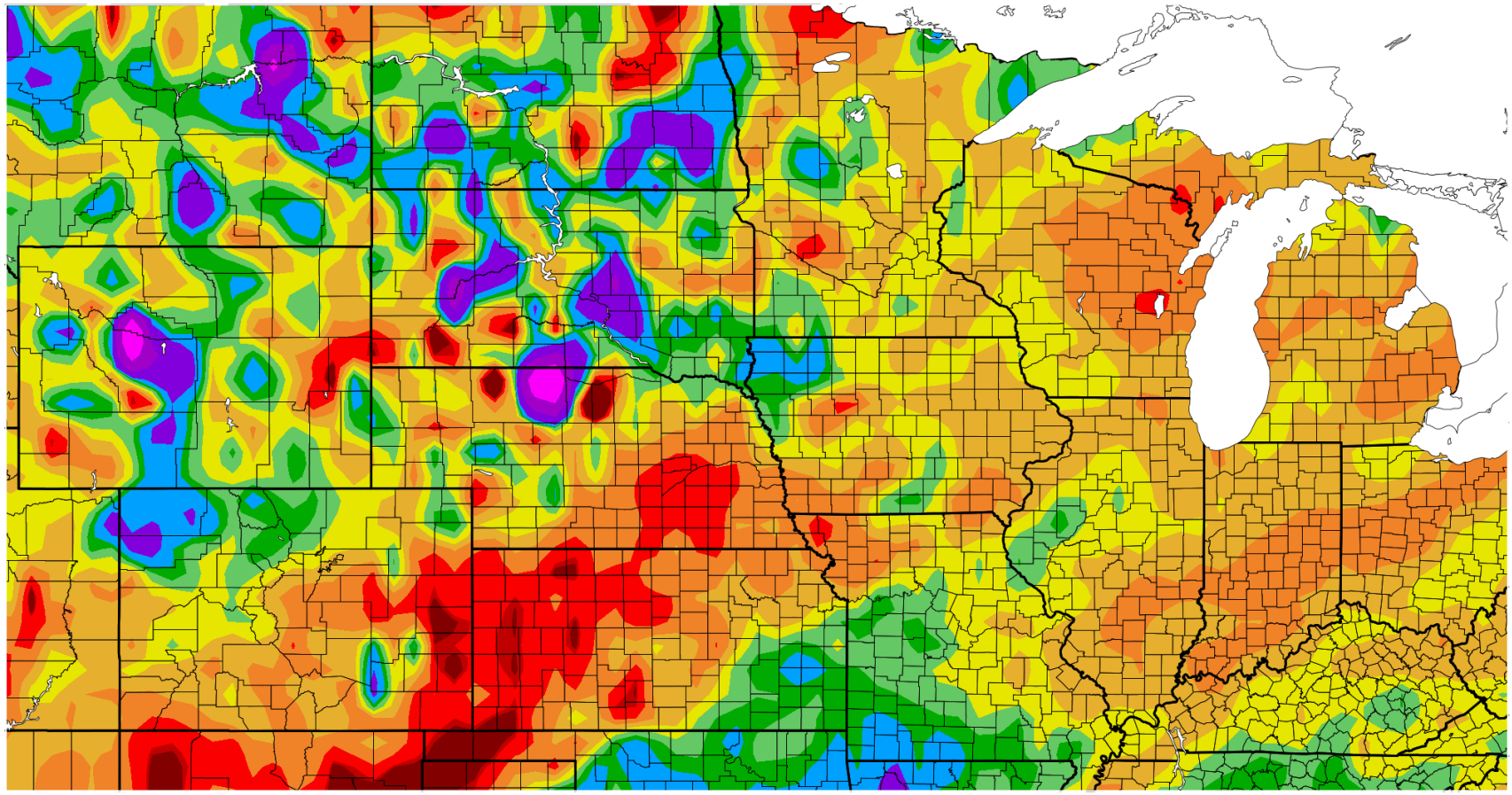


−10 −8 −6 −4 −2 0 2 4 6 8 10

Generated 12/15/2022 at HPRCC using provisional data.

NOAA Regional Climate Centers

Percent of Normal Precipitation (%)
11/15/2022 - 12/14/2022

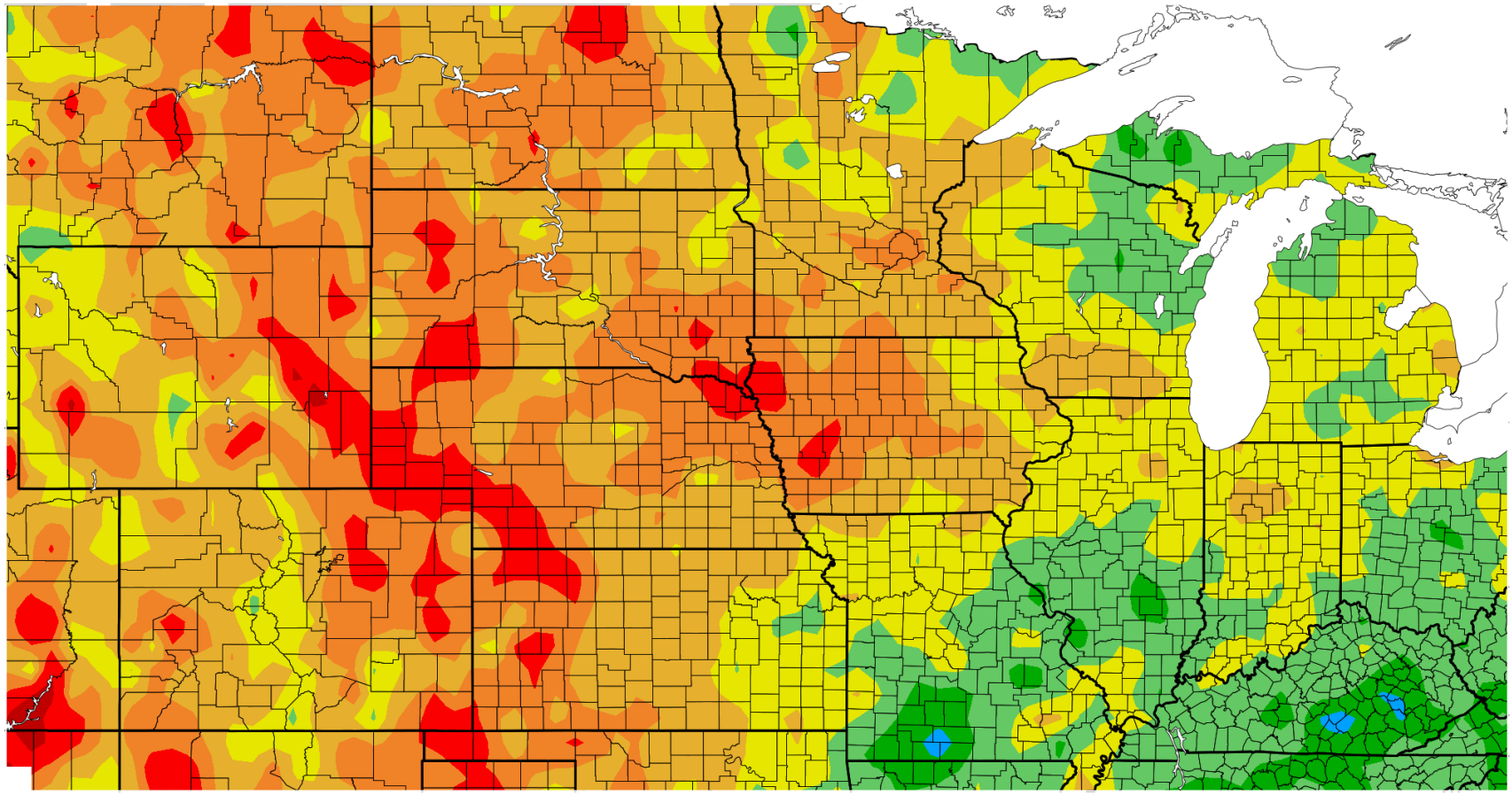


2 5 25 50 75 100 125 150 200 400 800

Generated 12/15/2022 at HPRCC using provisional data.

NOAA Regional Climate Centers

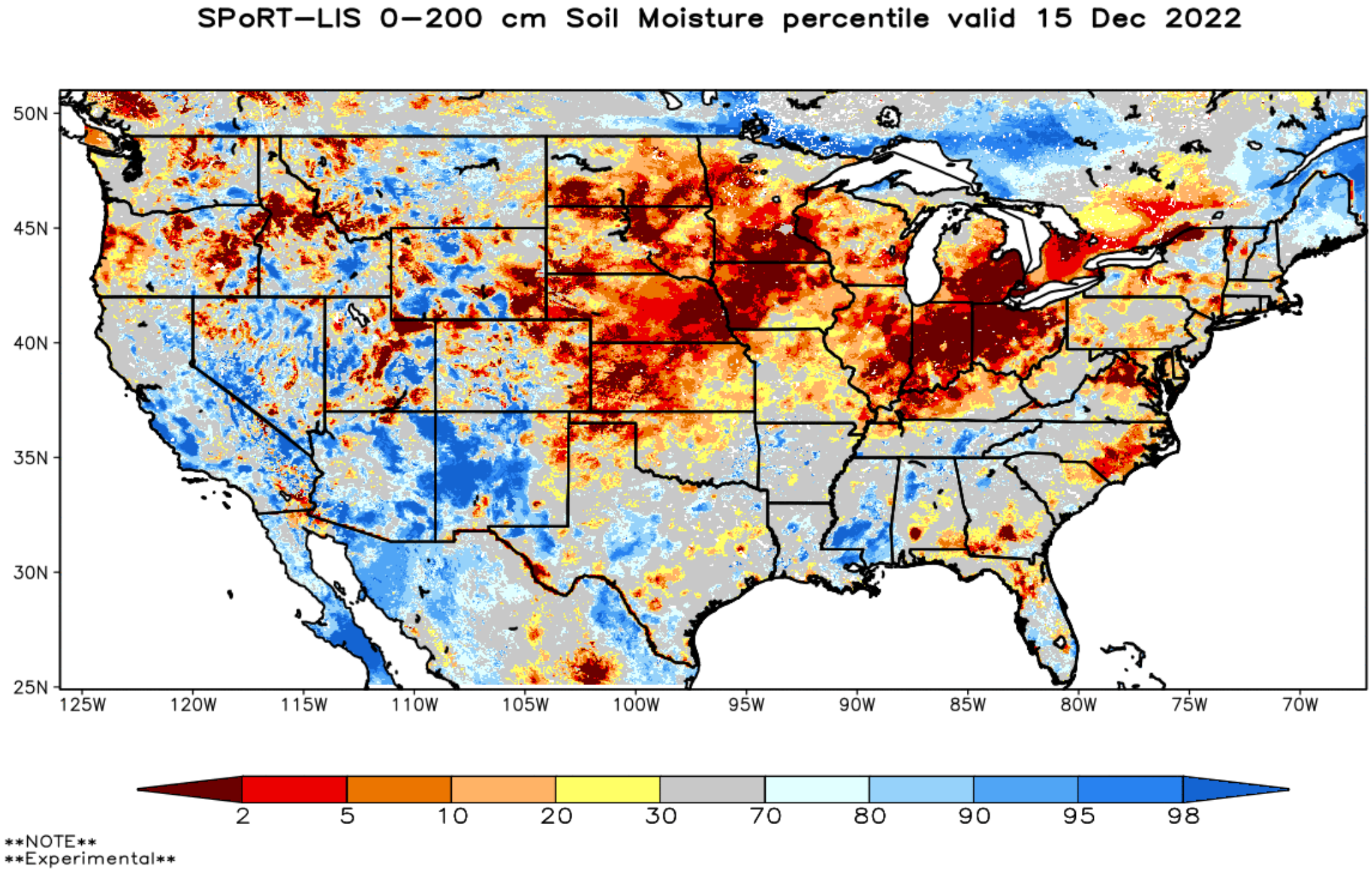
Percent of Normal Precipitation (%)
12/15/2019 – 12/14/2022



25 50 70 80 90 100 110 120 130 150 175

Generated 12/15/2022 at HPRCC using provisional data.

NOAA Regional Climate Centers



https://weather.msfc.nasa.gov/cgi-bin/basicLooper.pl?category=lis_CONUS&initialize=first&regex=vsm0-200percent_20201118

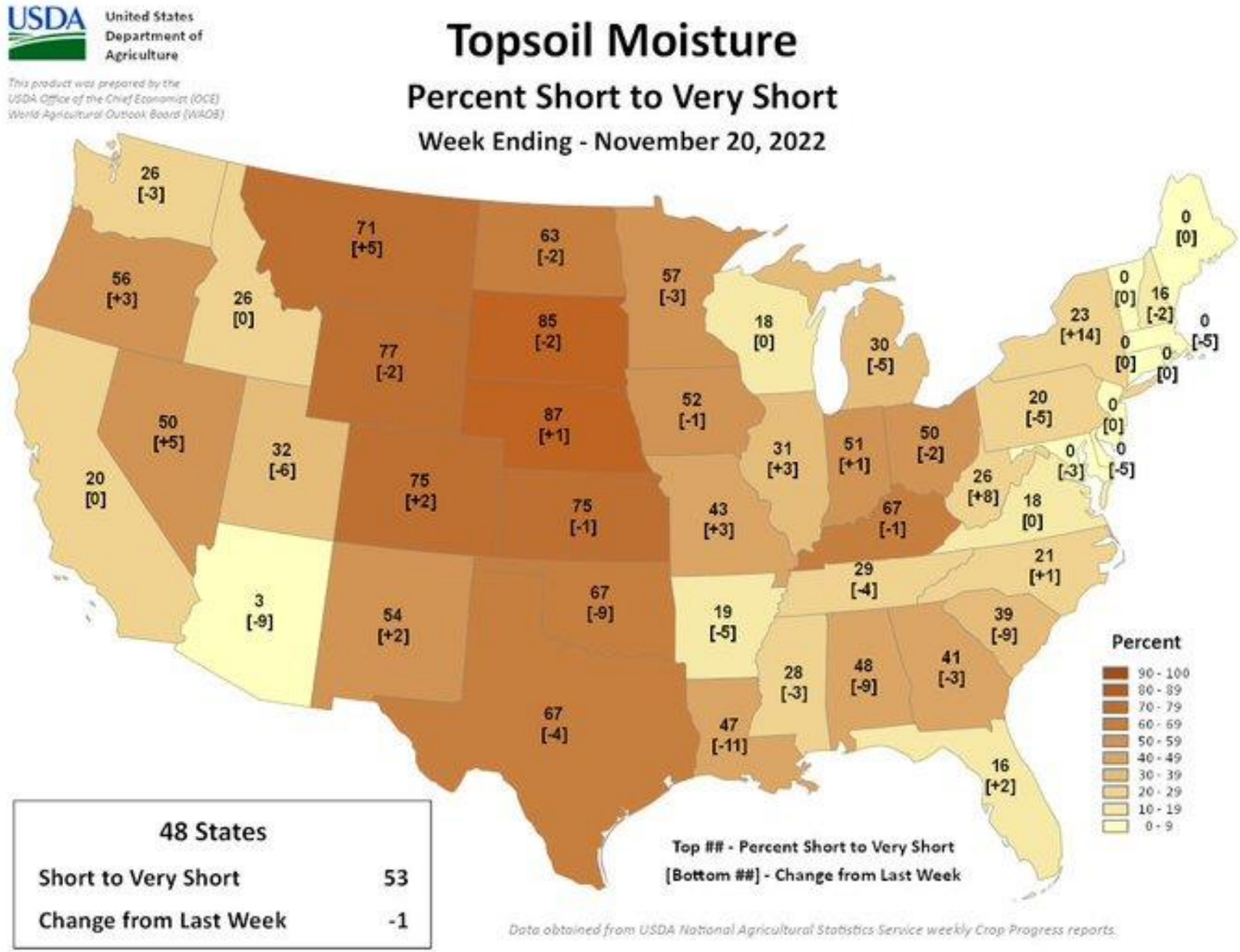
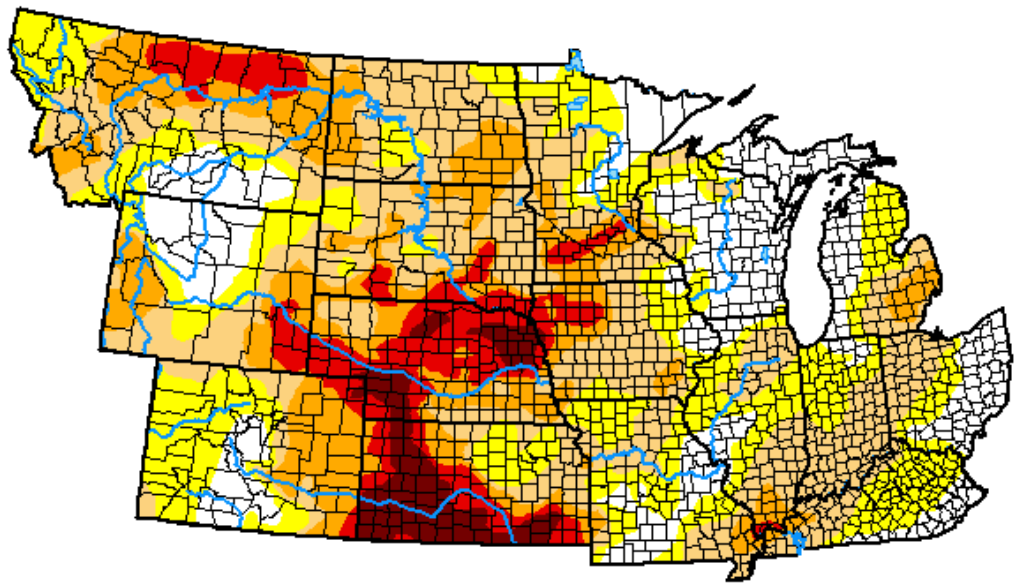


Figure Credit: Brad Rippey – USDA OCE/USDA NASS Data

U.S. Drought Monitor

NWS Central



December 13, 2022

(Released Thursday, Dec. 15, 2022)

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	17.91	82.09	57.82	29.23	12.22	3.87
Last Week *12-06-2022*	17.10	82.90	60.12	29.70	12.37	3.80
3 Months Ago *09-13-2022*	36.06	63.94	34.67	19.67	6.47	1.62
Start of Calendar Year *01-04-2022*	33.94	66.06	46.53	27.27	10.67	1.77
Start of Water Year *09-27-2022*	27.00	73.00	47.70	23.08	8.80	2.73
One Year Ago *12-14-2021*	32.68	67.32	47.64	29.04	12.47	3.89

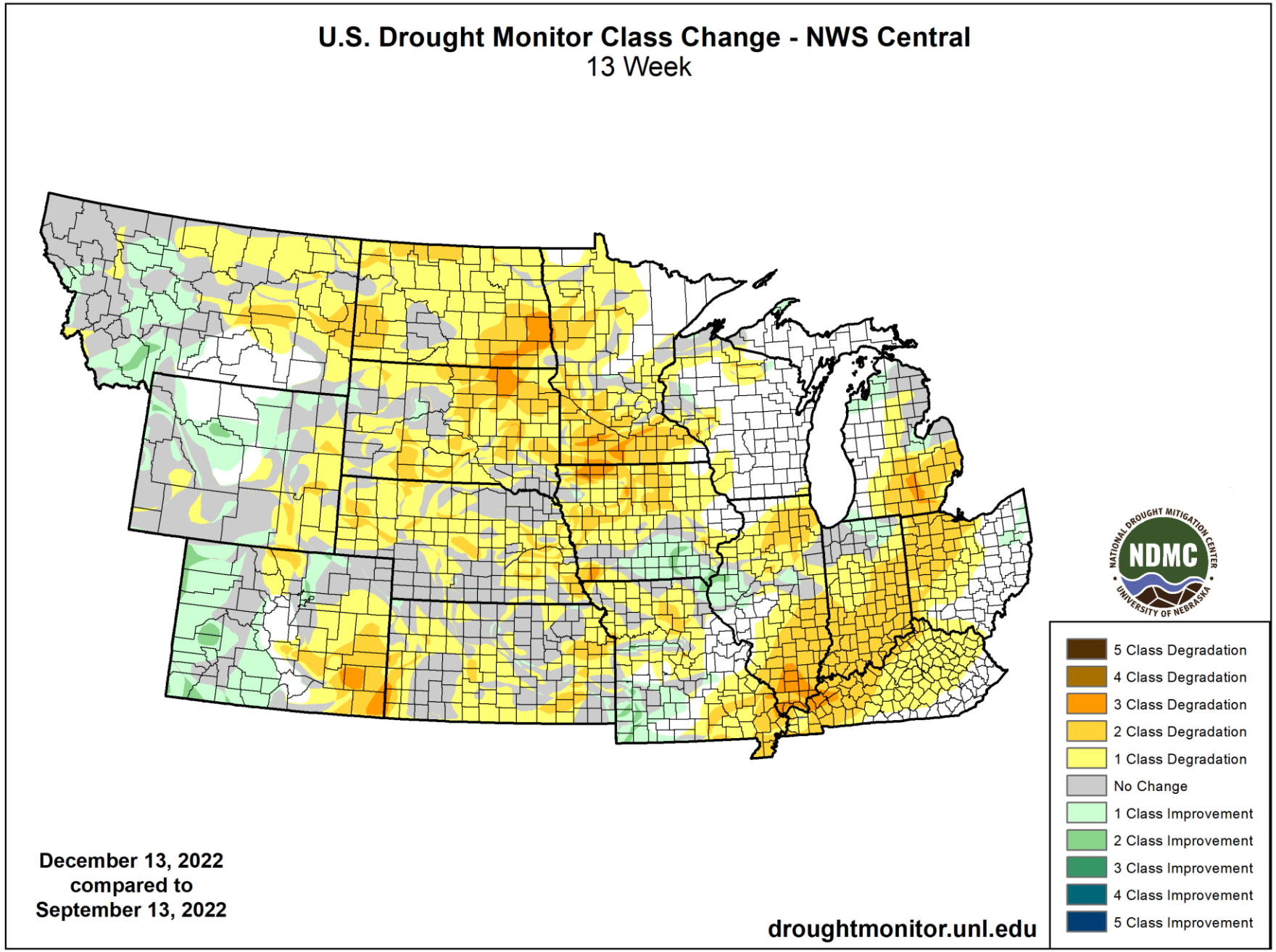
Intensity:

- 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

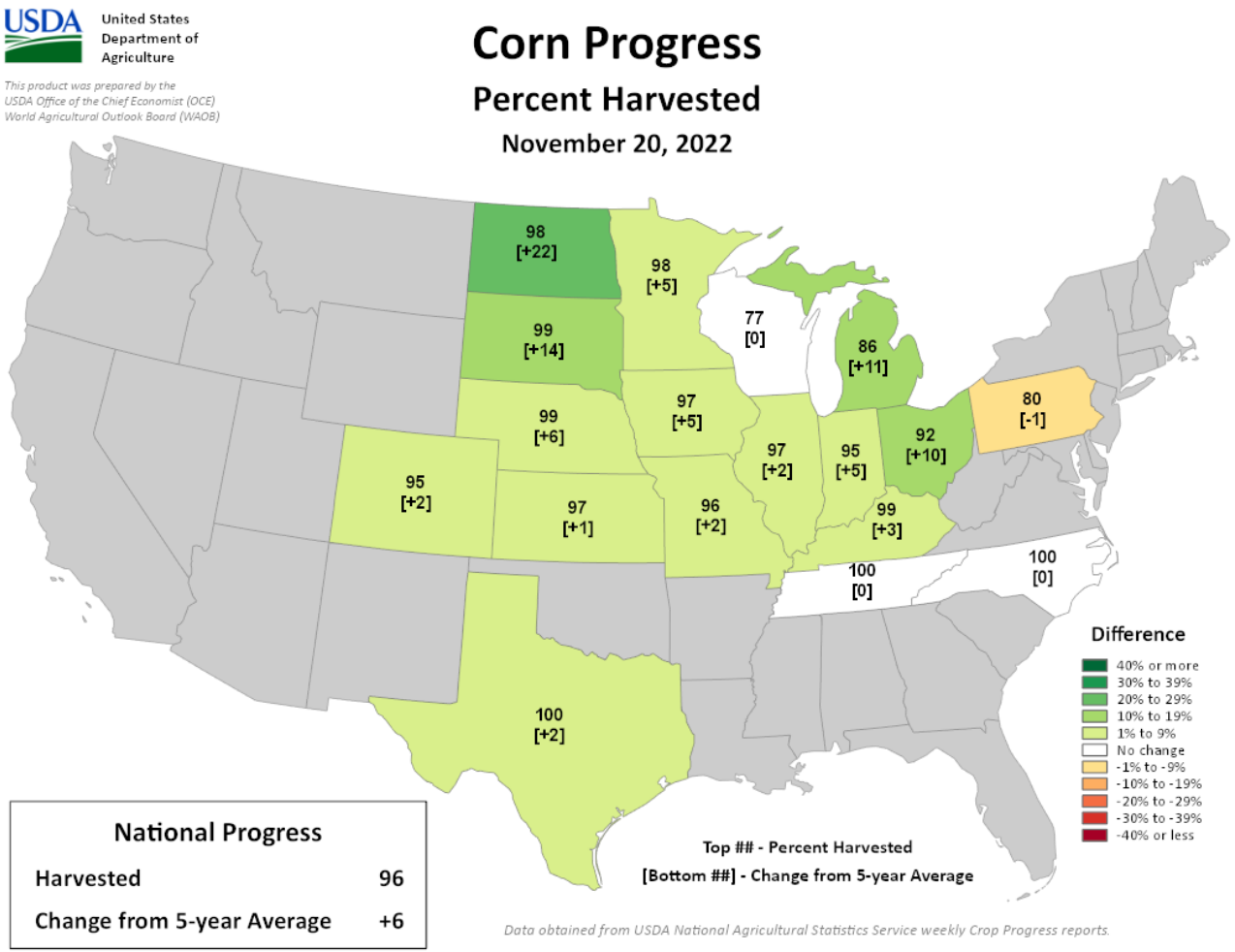
Author:
Curtis Riganti
National Drought Mitigation Center

droughtmonitor.unl.edu



https://droughtmonitor.unl.edu/Maps/ChangeMaps.aspx

Growing Season Progress



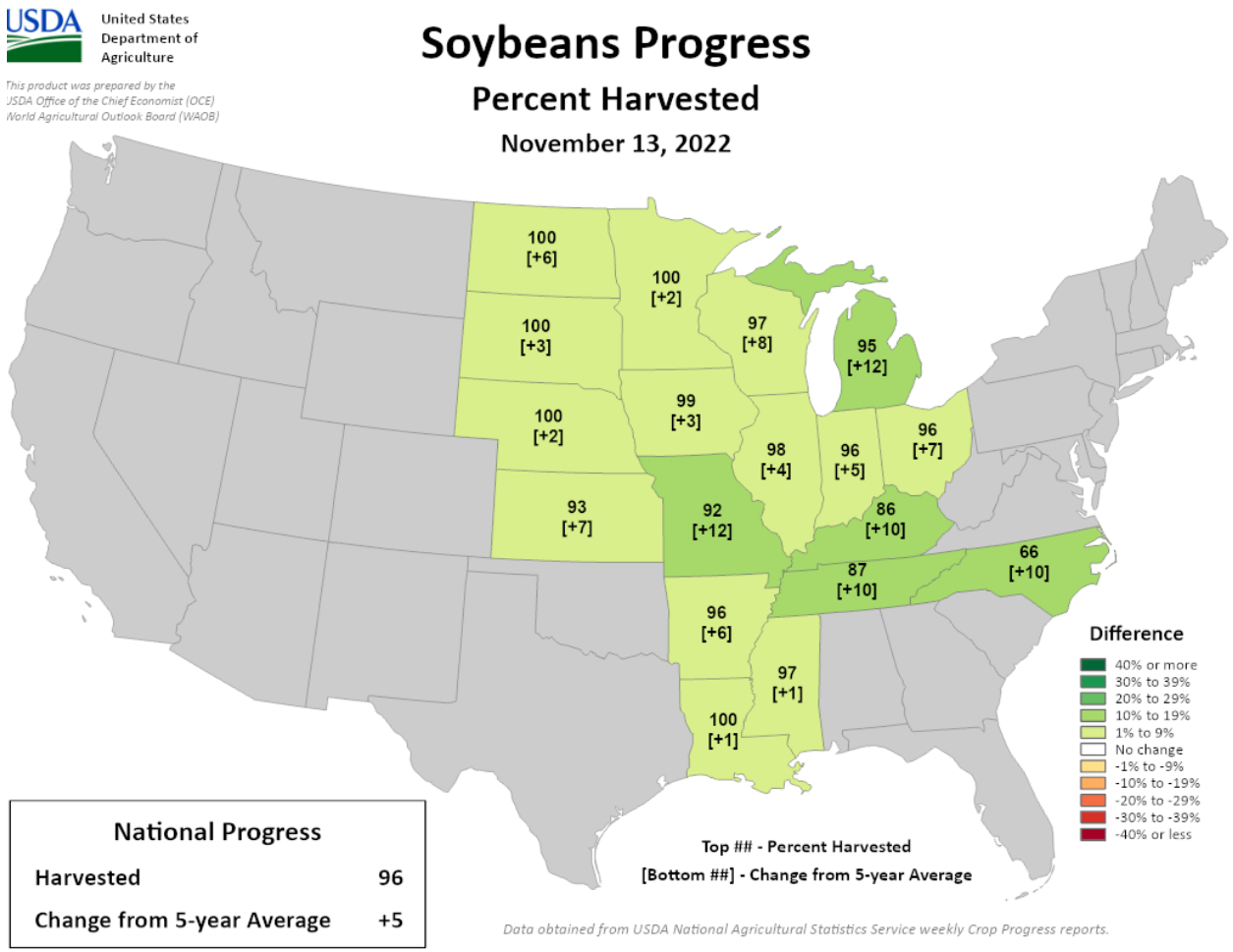
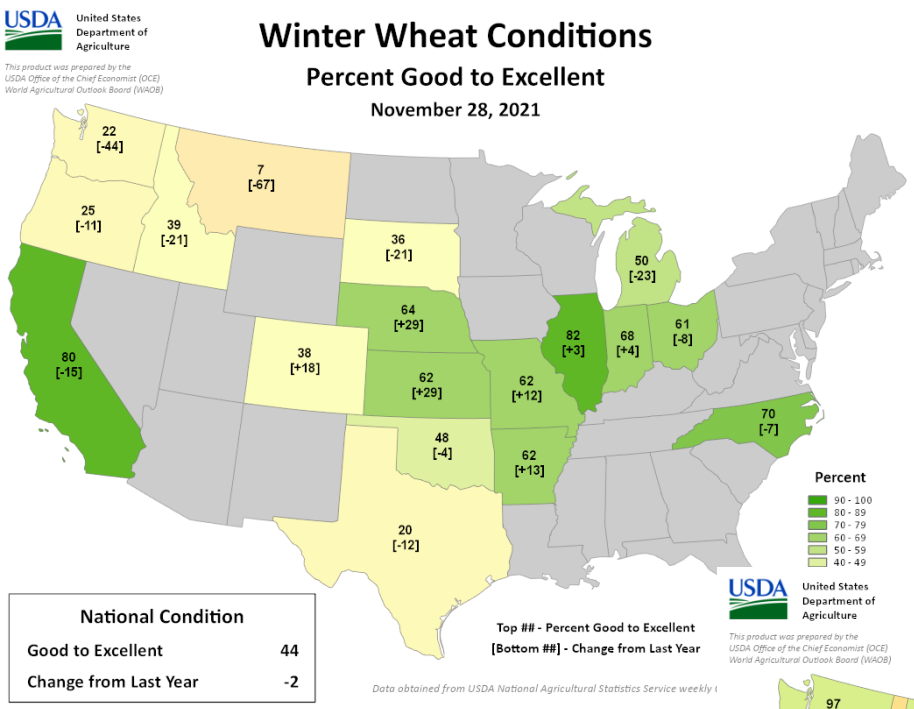
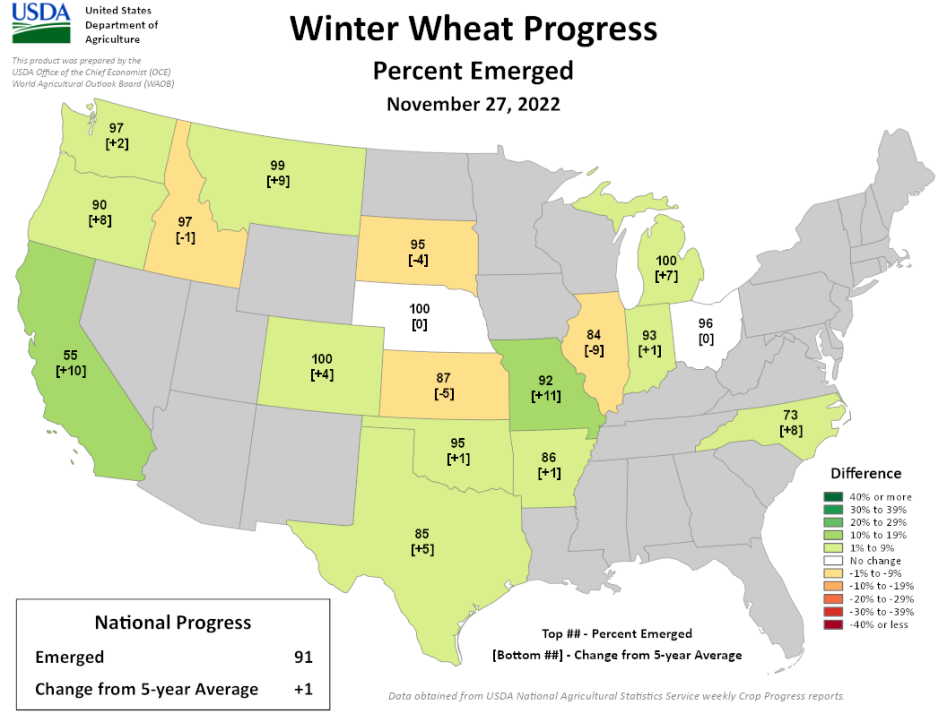


Figure Credit: Brad Rippey – USDA OCE/USDA NASS Data





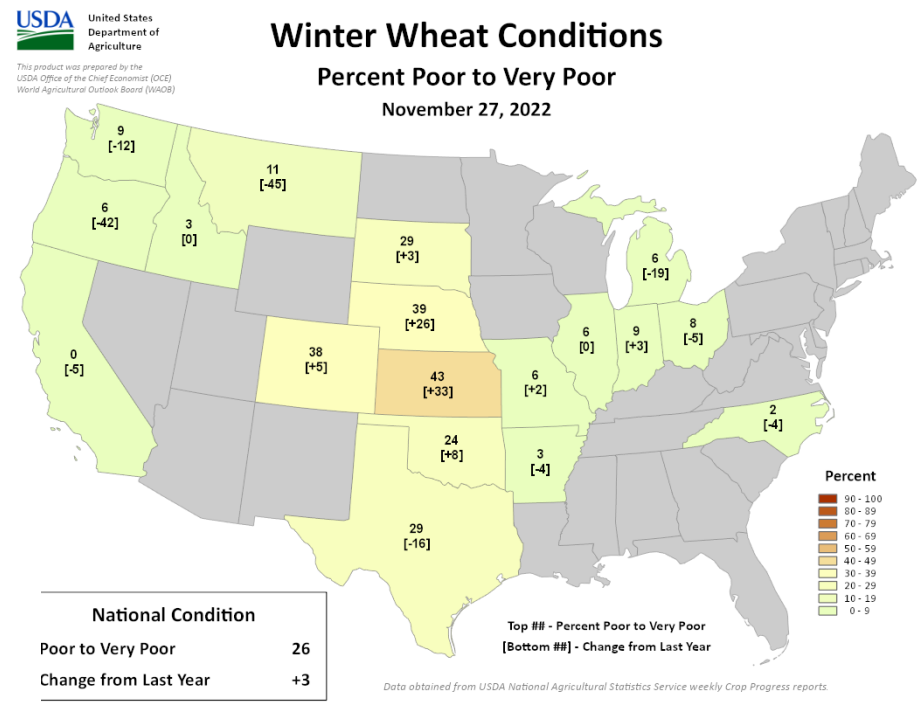
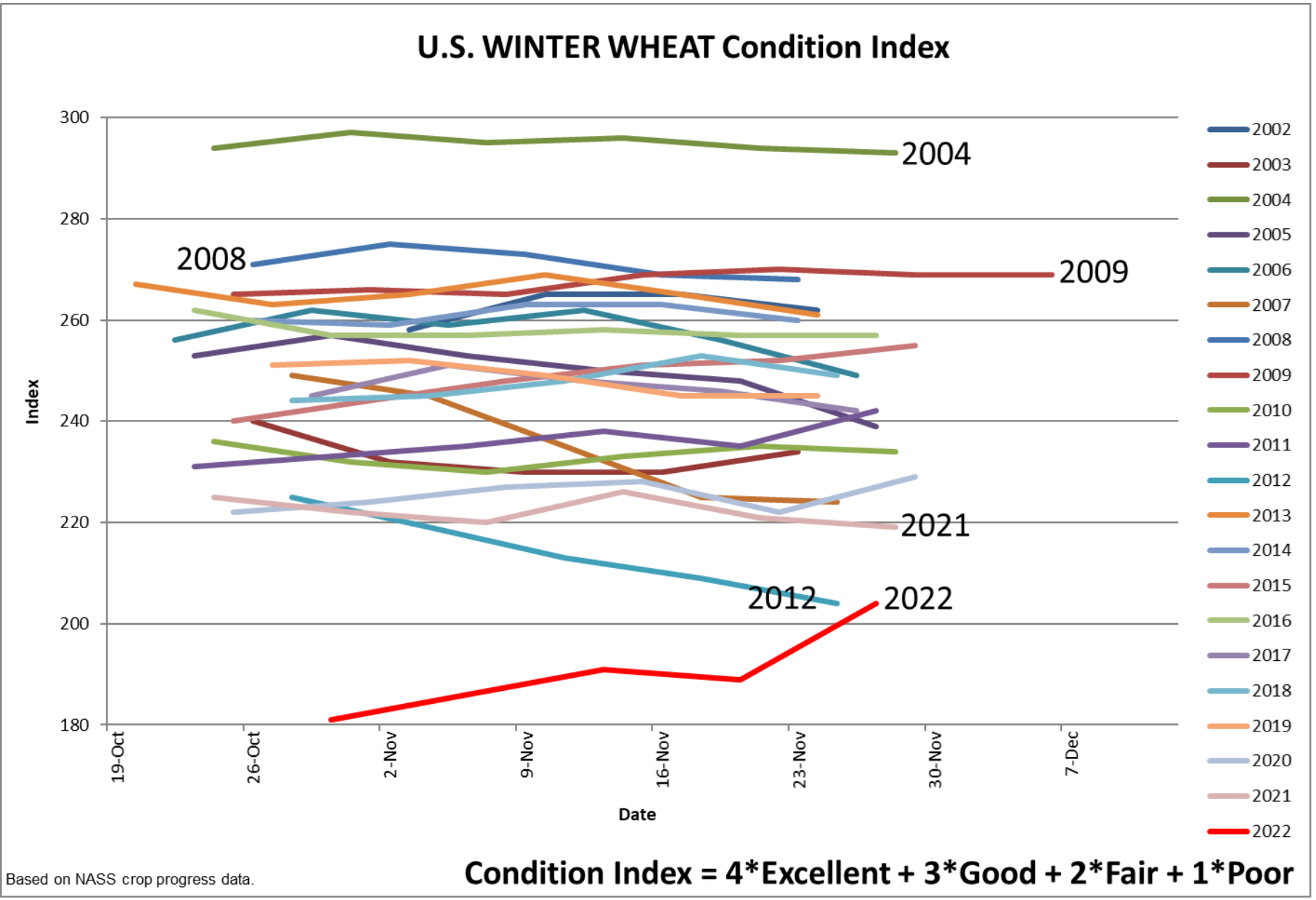


Figure Credit: Brad Rippey – USDA OCE/USDA NASS Data

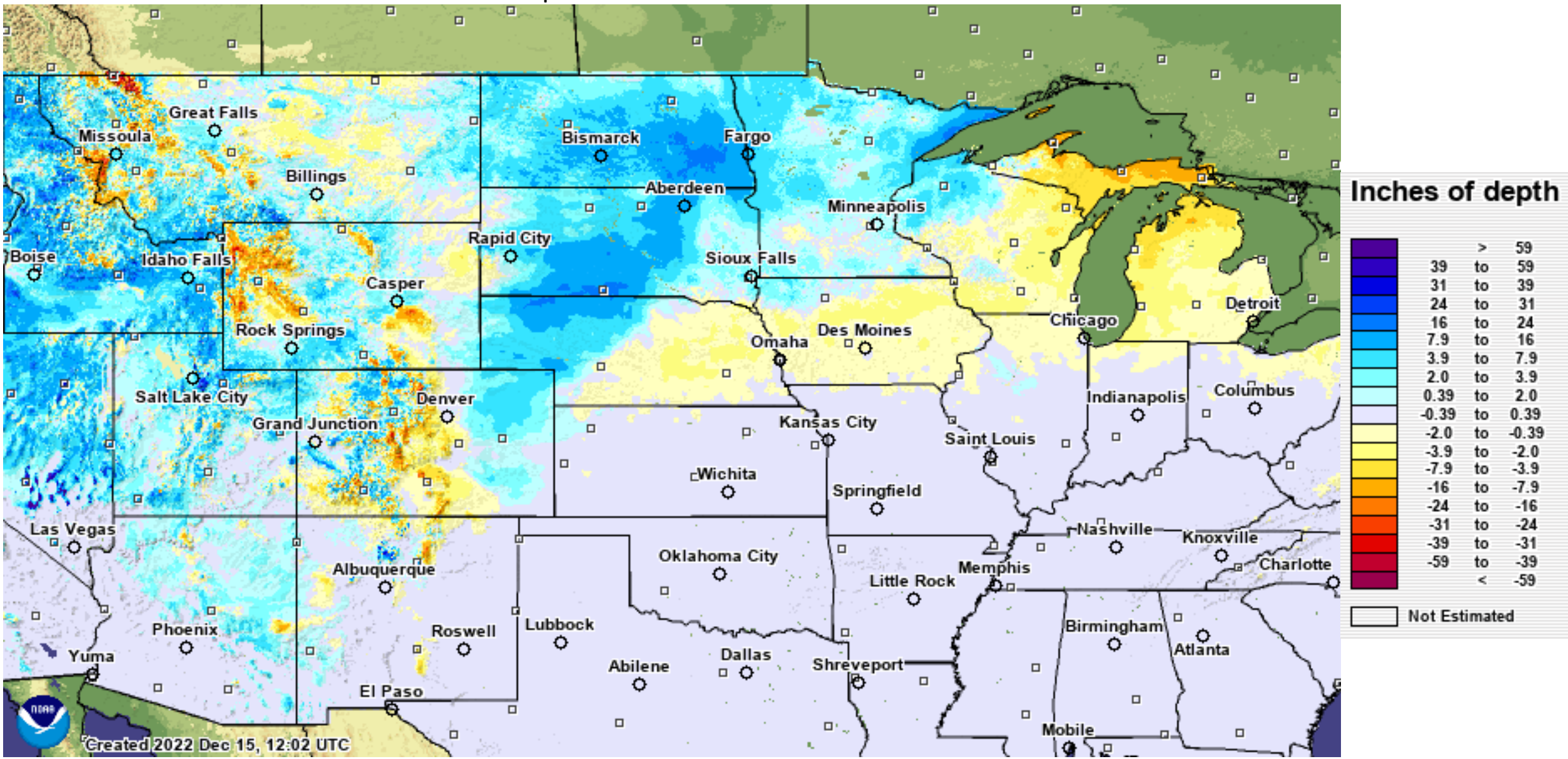


- Winter wheat crop conditions are historically low.
- There was modest improvement in November rain on the southern Plains and snow on the northern Plains.
- However, this year's wheat condition index (heading into dormancy) is tied with 2012 for the worst of the 21st century to date.

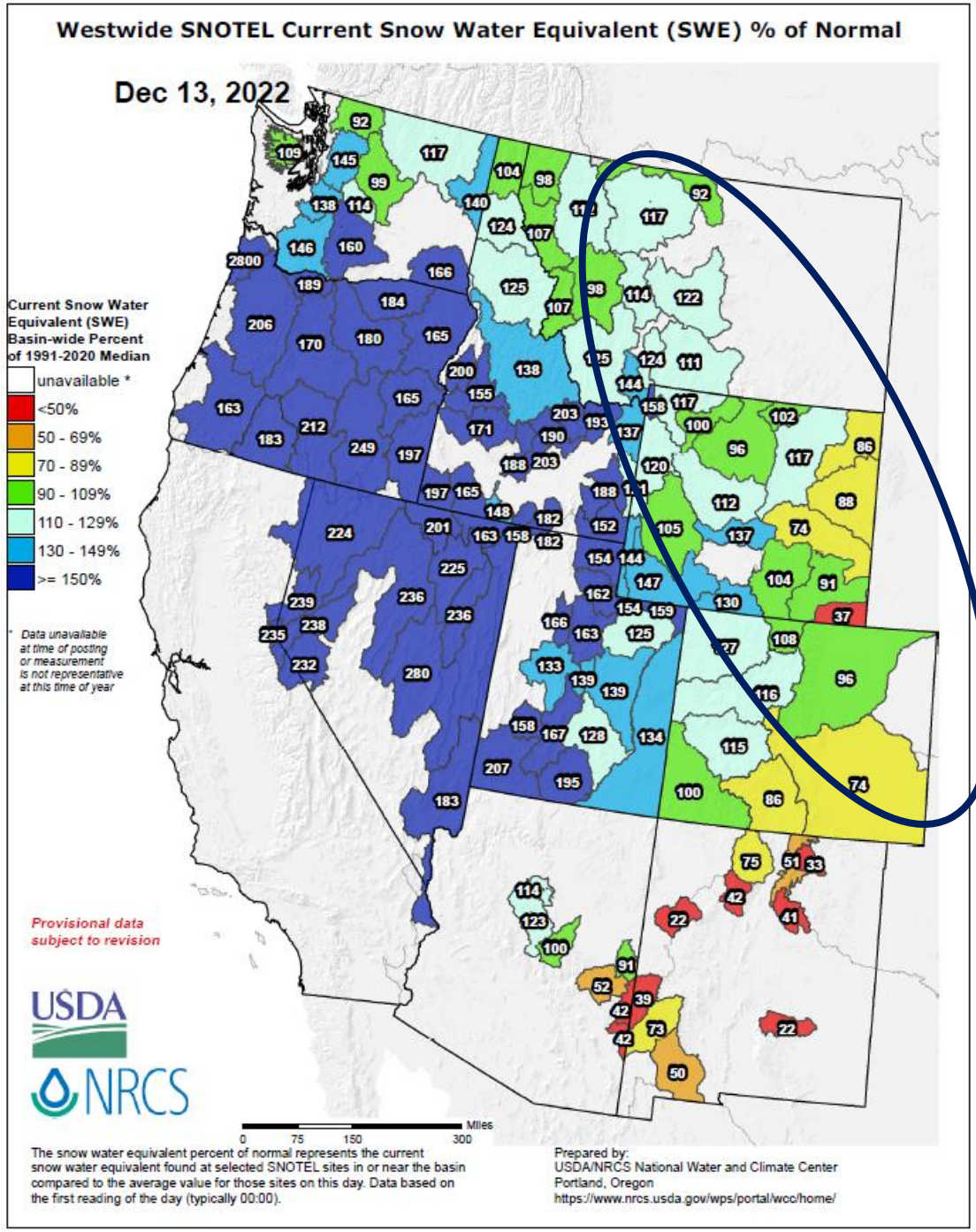
Figure Credit: Brad Rippey – USDA OCE/USDA NASS Data

Snow, Fire, Rivers and Lakes

Current Snowpack vs. Normal: Valid 12 UTC – Dec. 15



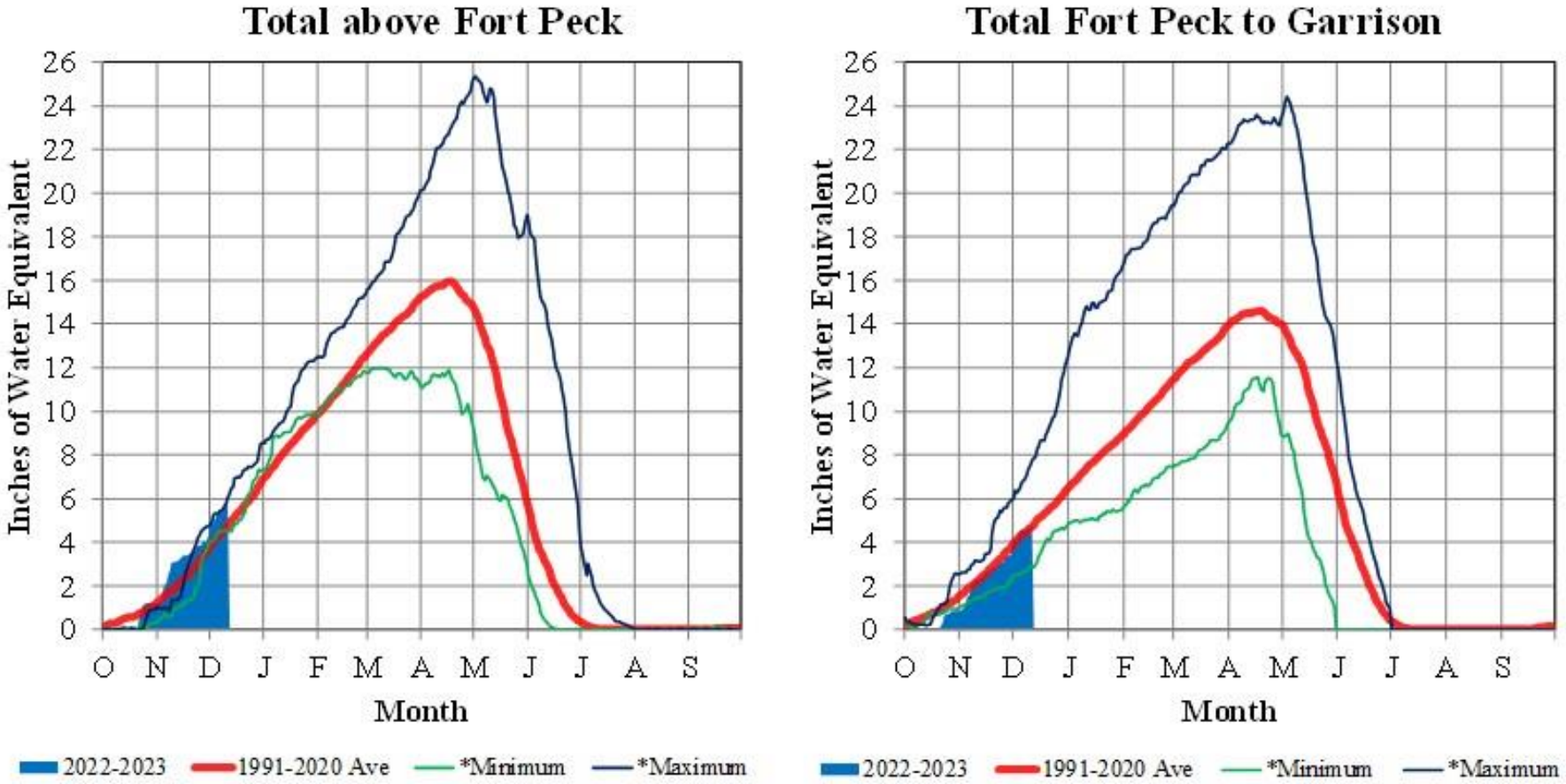
https://www.nohrsc.noaa.gov/nsa/



https://www.wcc.nrcs.usda.gov/ftpref/data/water/wcs/gis/maps/west_swepctnormal_update.pdf

Missouri River Basin – Mountain Snowpack Water Content
2022-2023 with comparison plots from recent high and low years

11-Dec-2022



On December 11, 2022 the mountain Snow Water Equivalent (SWE) in the "Total above Fort Peck" reach is 5.8" and 123% of the (1991-2020) average. The mountain SWE in the "Fort Peck to Garrison" reach is 4.8" and 102% of the (1991-2020) average. The normal peak for both reaches occurs near April 17.

*Minimum peak SWE between 1991-2020 occurred in 2015 above Fort Peck, and in 2001 between Fort Peck and Garrison.
Maximum peak SWE between 1991-2020 occurred in 2011 above Fort Peck, and in 1997 between Fort Peck and Garrison.

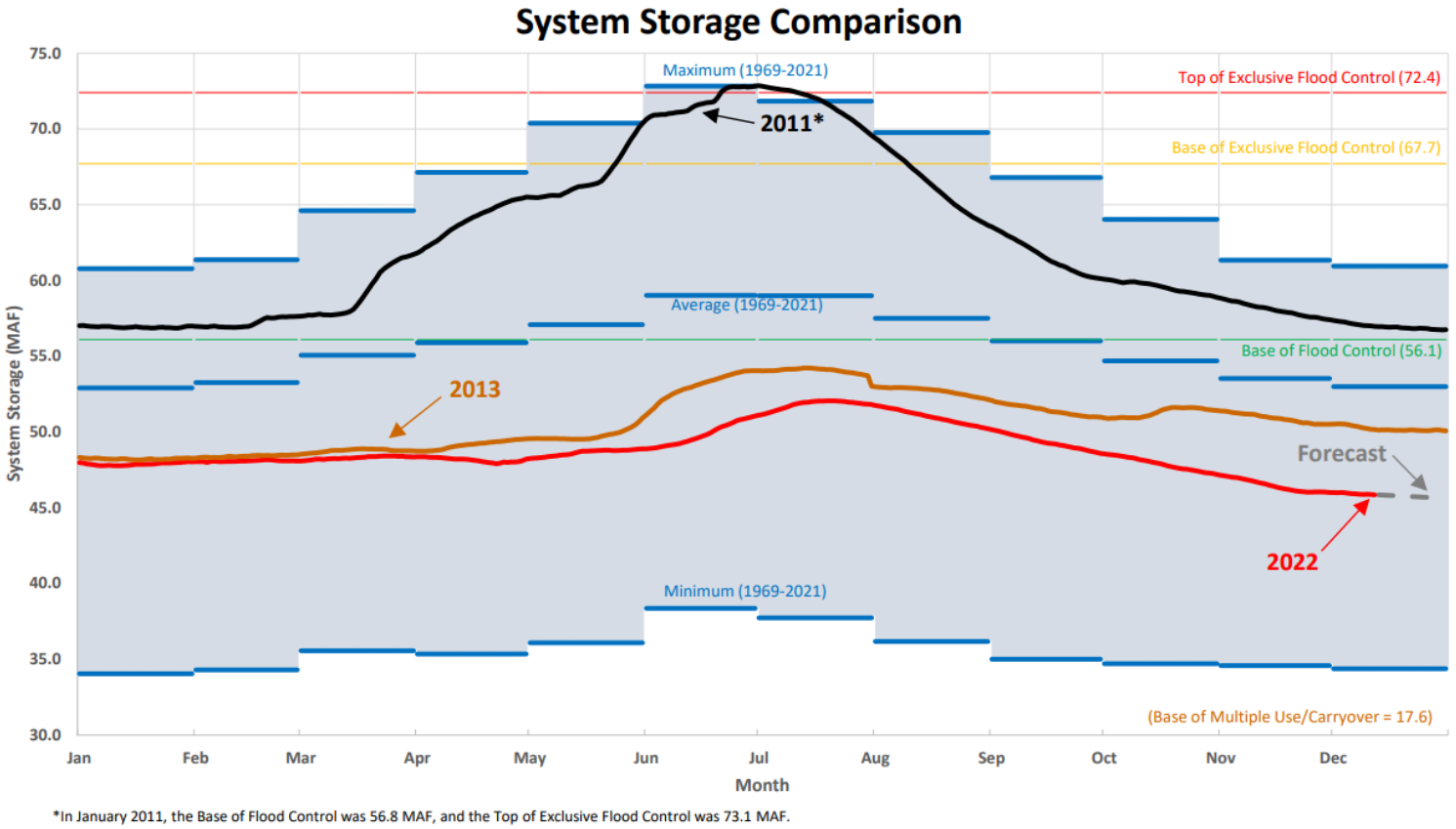
Provisional data. Subject to revision.

- Mountain SWE is at 123% of normal above Fort Peck and near the 1991-2020 average from Fort Peck to Garrison.
- Snow starting off well, but 75% accumulation to go.
- Both reaches normally peak on April 17.

Missouri River System Storage

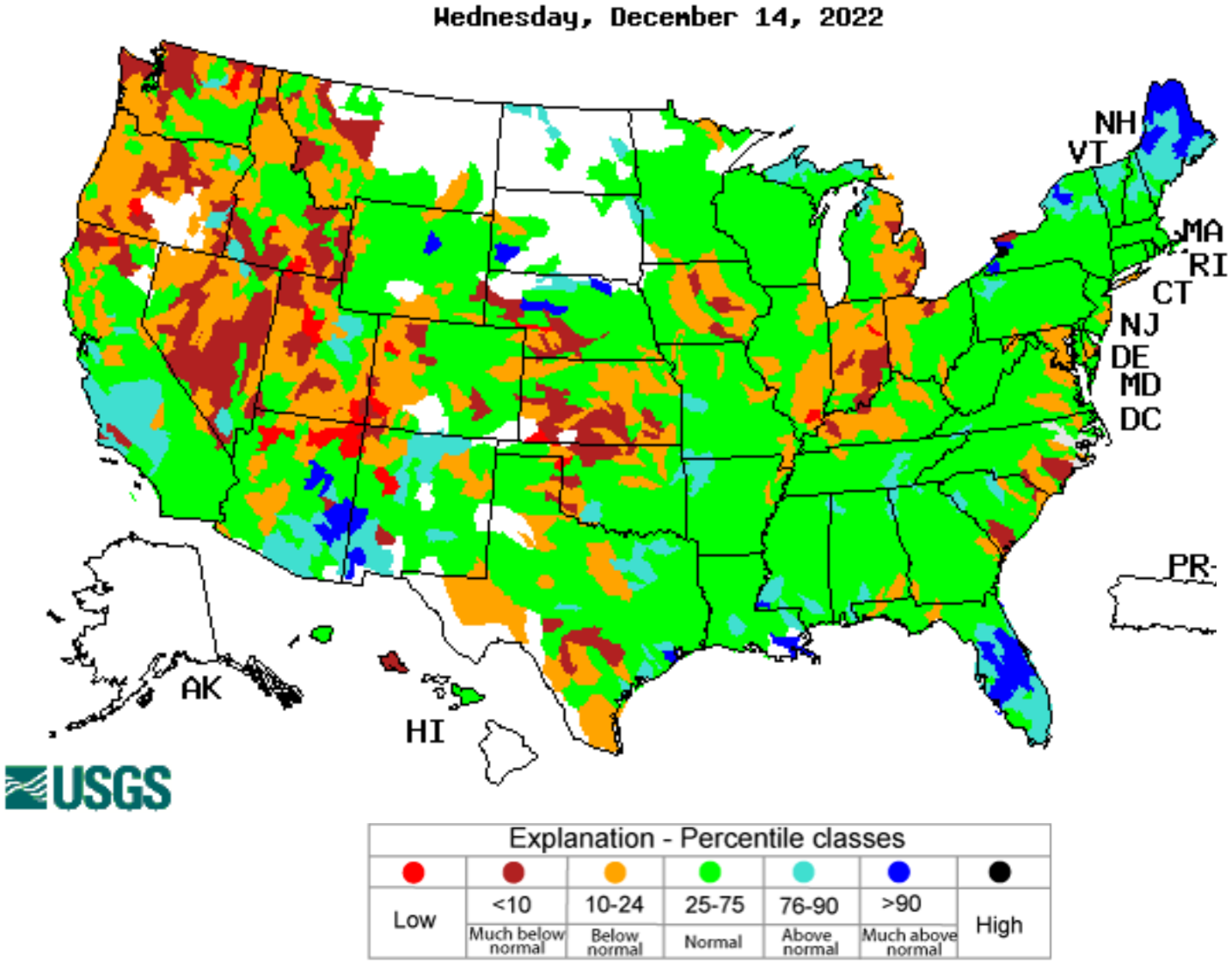
Missouri Mainstem Reservoir Status (as of 12/6/22):

- System storage is 46.0 million-acre feet, below the 2013 minimum
- The Gavins Point release is currently 13,000 cfs and forecasted to reach 12,000 cfs on Dec. 11.
- Total runoff above Sioux City:
  - Sep. 47% of average
  - Oct. 60% of average
  - Nov. 51% of average
  - S-O-N: 53% of average



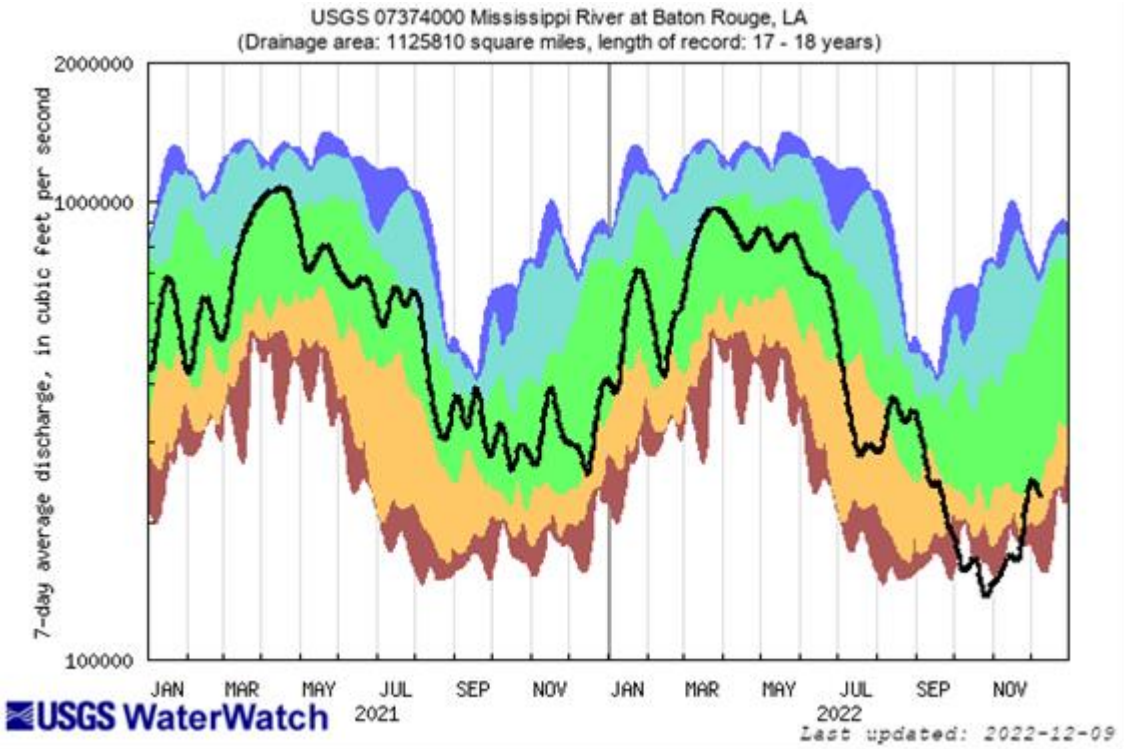
http://www.nwd-mr.usace.army.mil/rcc/reports/pdfs/weeklyupdate_previous.pdf

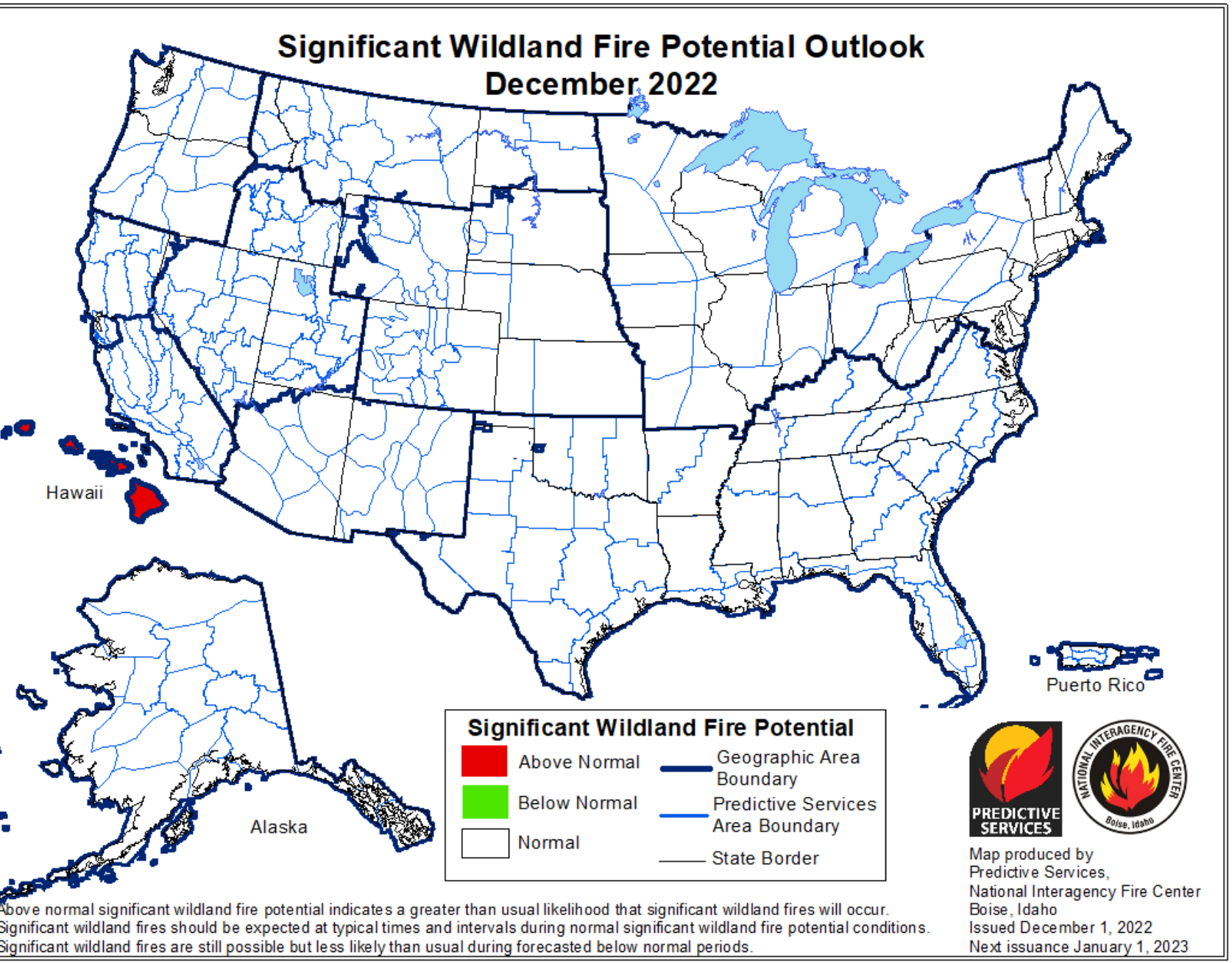
28-day Average Streamflow



http://waterwatch.usgs.gov/index.php?id=pa07d

- Although streamflows are below average overall, ice-over is expected on most Upper Plains streams over the next two weeks with the forecasted cold snap.
- Again, don't expect much in way of hydrologic hazards associated with the impending freeze-up.

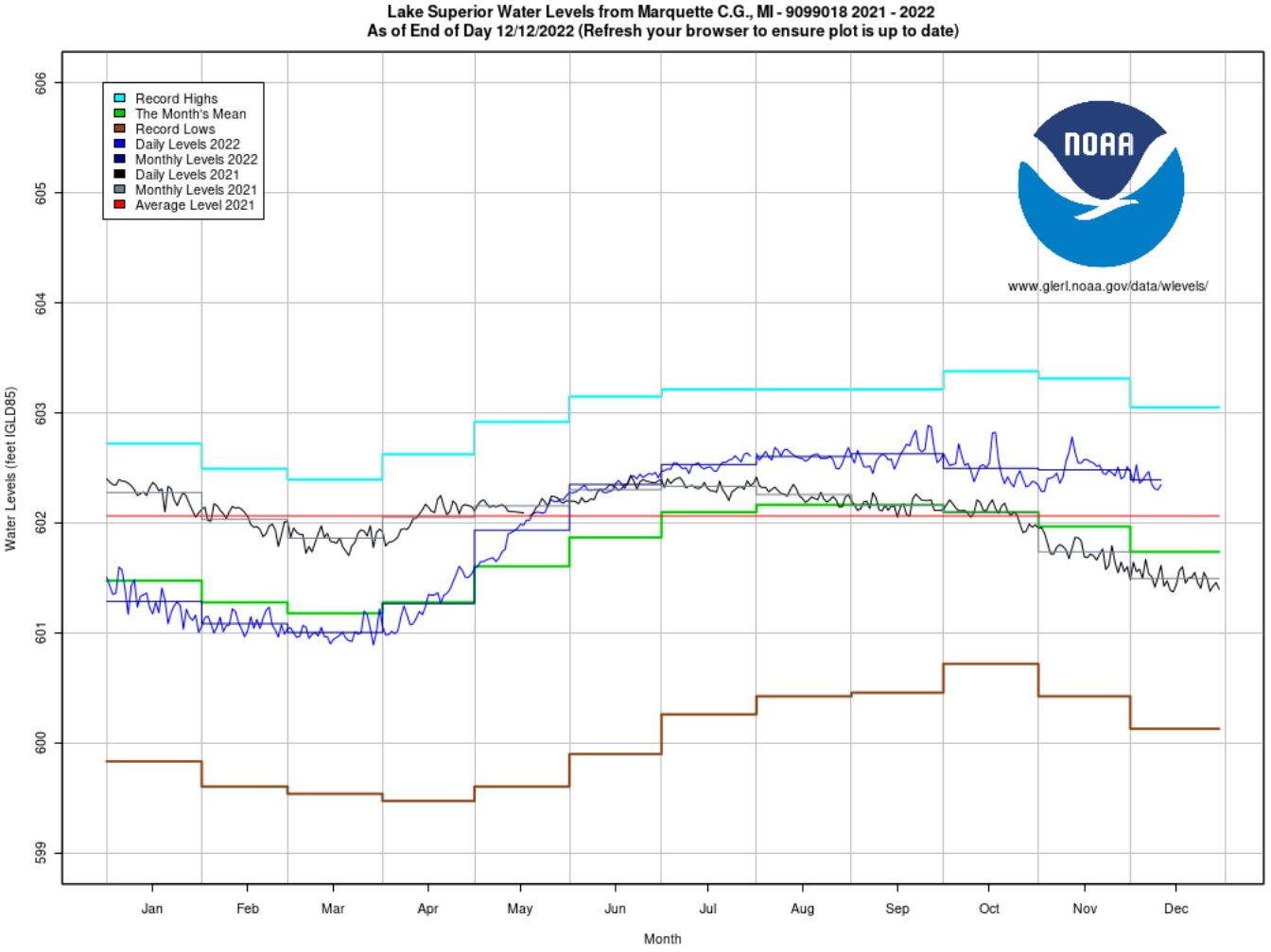




- No significant wildland fire potential through Winter 2022/2023
- There are several counties in ND that have burn bans or restrictions

https://www.predictiveservices.nifc.gov/outlooks/outlooks.htm

Great Lakes Water Levels

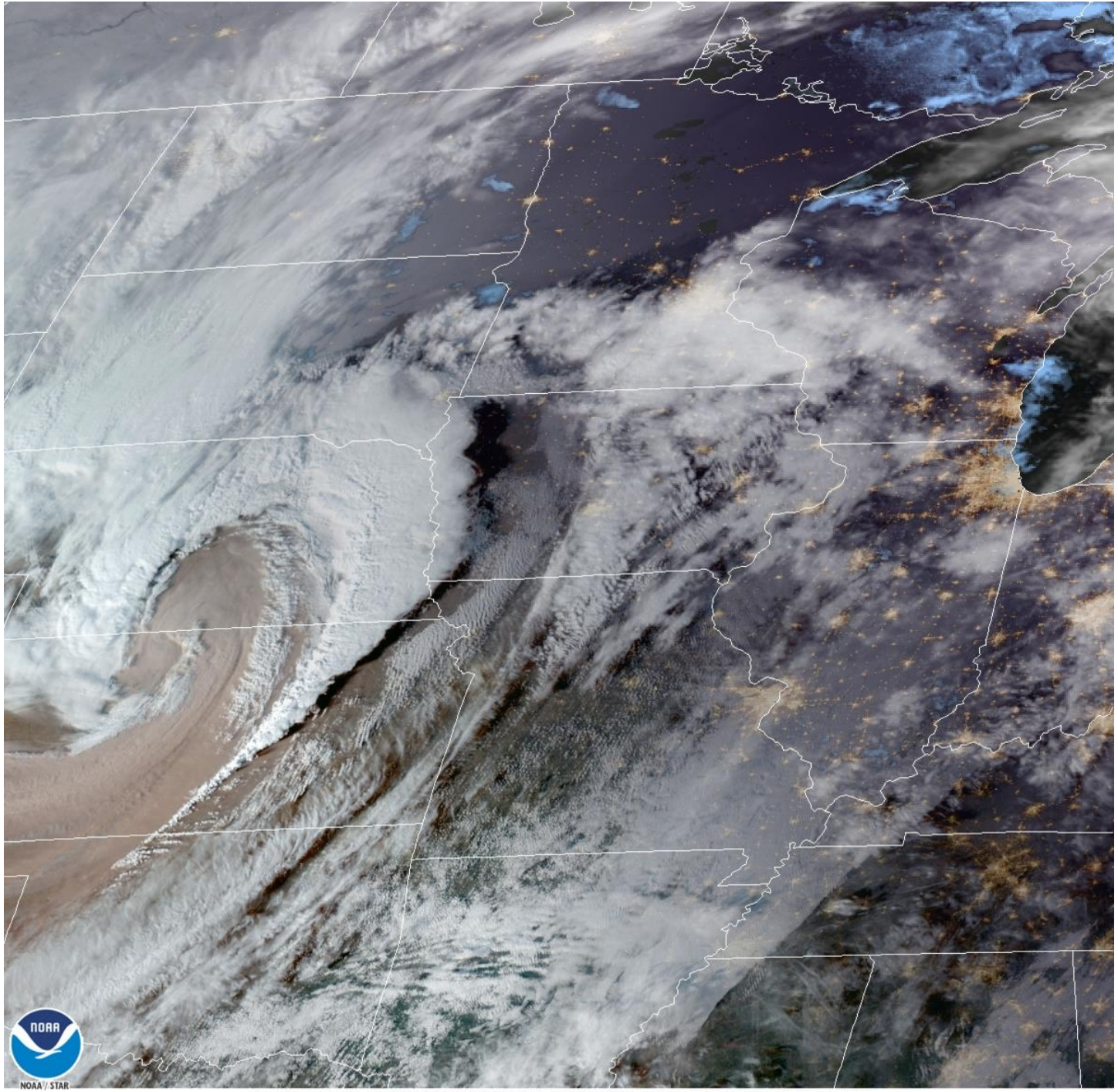


- All Great Lakes running near their long-term averages
- They have dropped from higher levels over the last several years
- Forecasted levels over the next six months should remain near the long-term average

https://www.glerl.noaa.gov/data/wlevels/data/superiorLevelsFeet.png

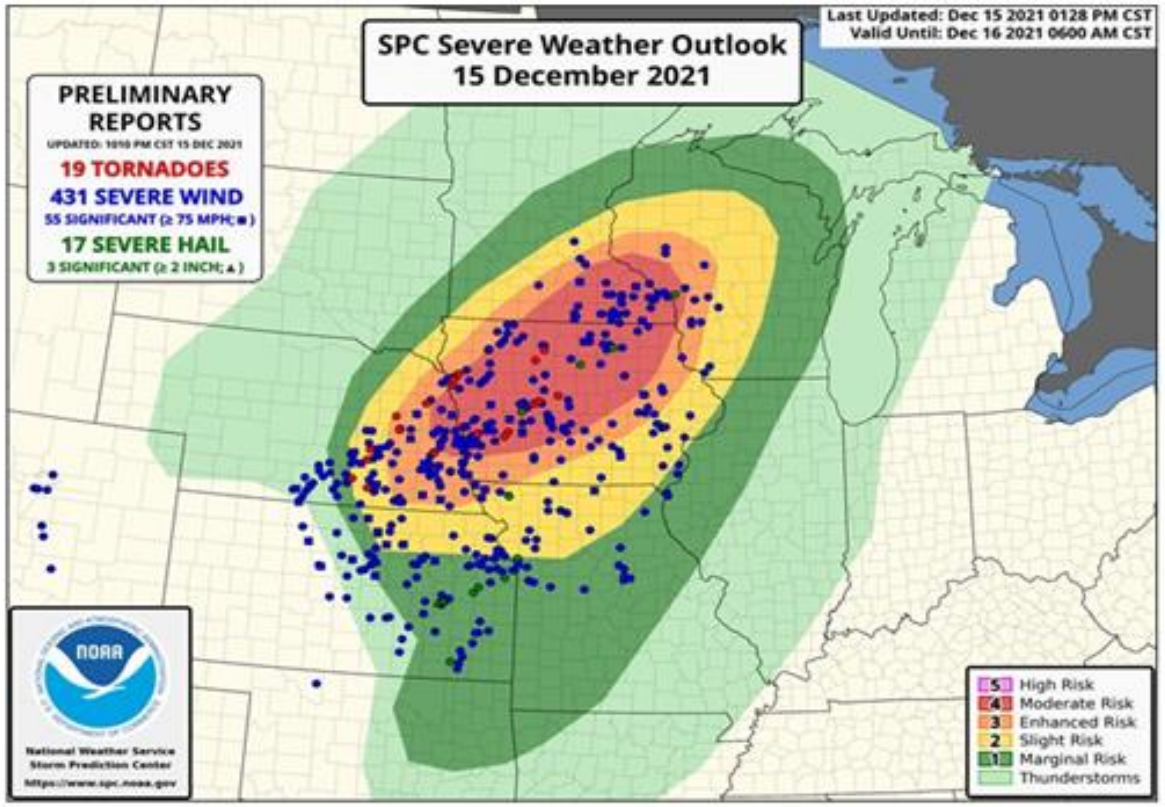
Impacts and Notable Events

Photo: National Park Service



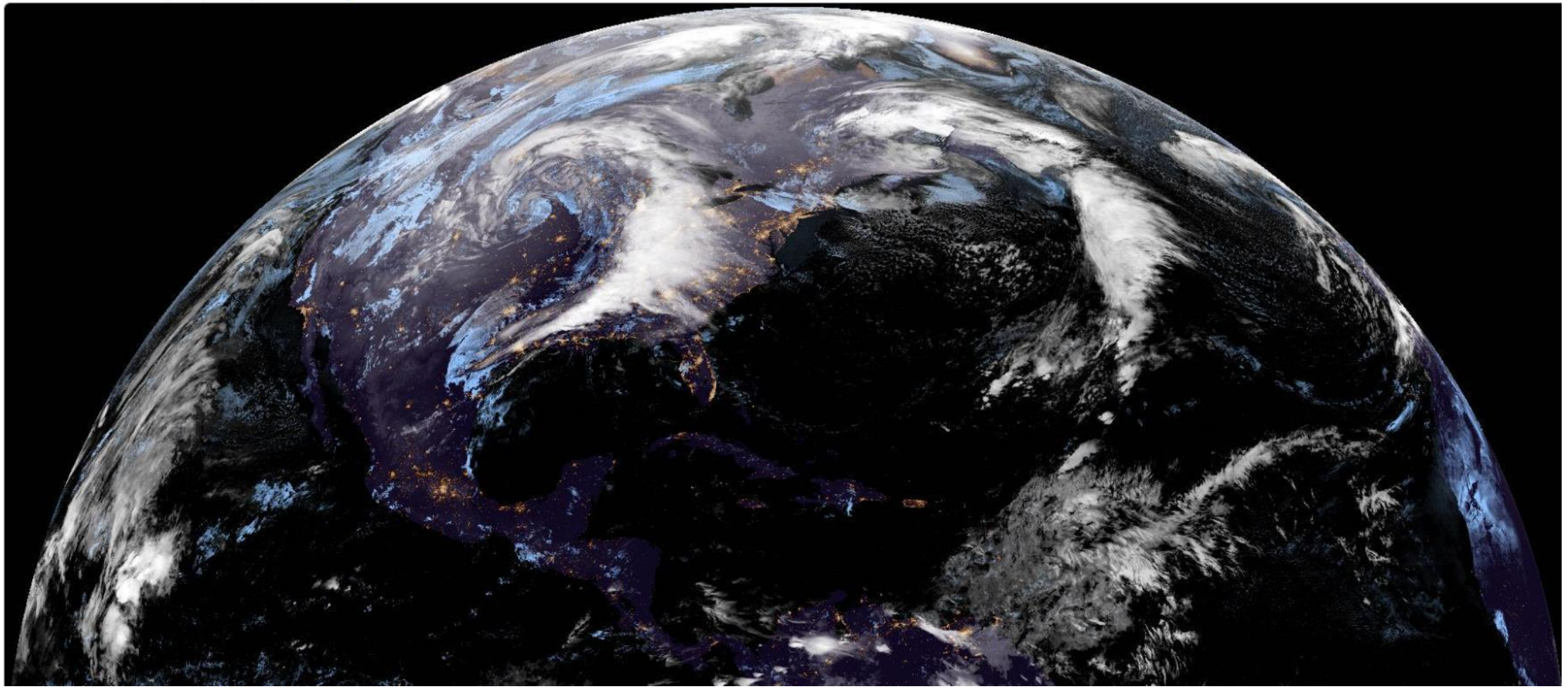
15 Dec 2021 21:26Z NOAA/NESDIS/STAR GOES-East GEOCOLOR

15 December 2021 Event



- First Moderate Risk area in the IA/MN/WI region during the month of December in SPC history.
- Widespread damage from severe thunderstorms with wind gusts exceeding 70 mph
- Multiple reports of 80 MPH winds with thunderstorms
- Multiple reports of 70+ MPH with non-thunderstorm winds
- At least 5 tornadoes in Iowa; surveys may reveal more
- 1 fatality with blown over semi-truck

GeoColor - True Color daytime, multispectral IR at night - 14 Dec 2022 - 0630 UTC



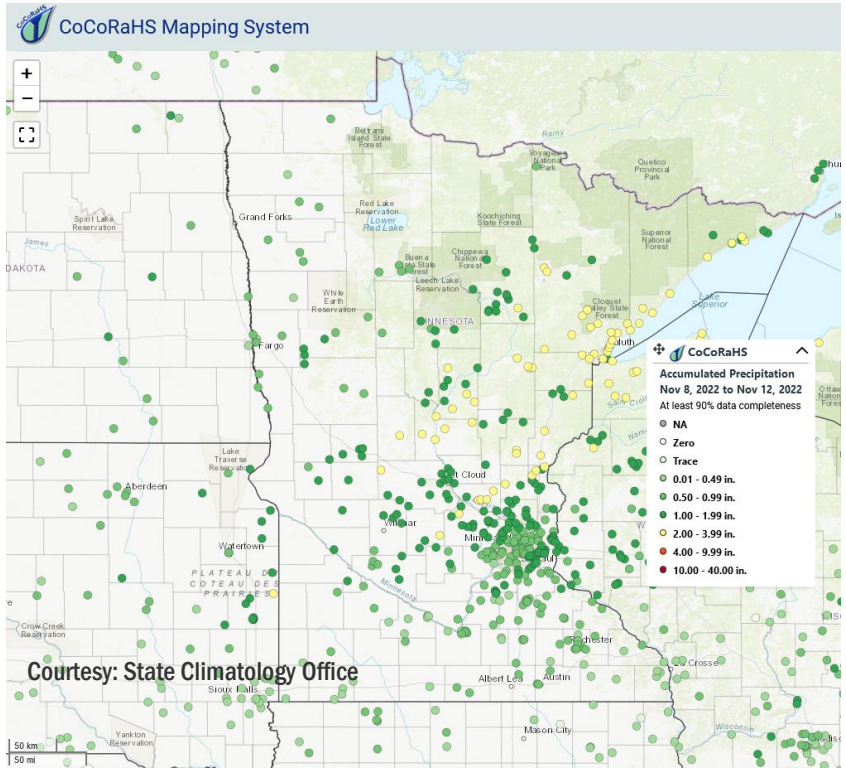
- Large, potent low pressure system moving through the US
- Blizzard conditions in the Dakotas
- Severe weather/tornadoes along the Gulf Coast
- Beneficial moisture over unfrozen ground

State Impacts

- Harvest generally completed without major delays or impacts.
- Dry and windy conditions impacting winter wheat.
- Montana/Wyoming snowpack doing well - 85%-100% of normal.
- Colorado starting off with good snowpack, especially west of the Continental Divide
- Late season, above-normal precipitation falling on still unfrozen soils.
- Minnesota: 10th wettest autumn

Photo Credit: MN State Climatology Office

State Impacts



- A dry fall across North Dakota has let to concerns on spring forage production
- Increased feed use due to cold weather, though no concerns of availability right now.

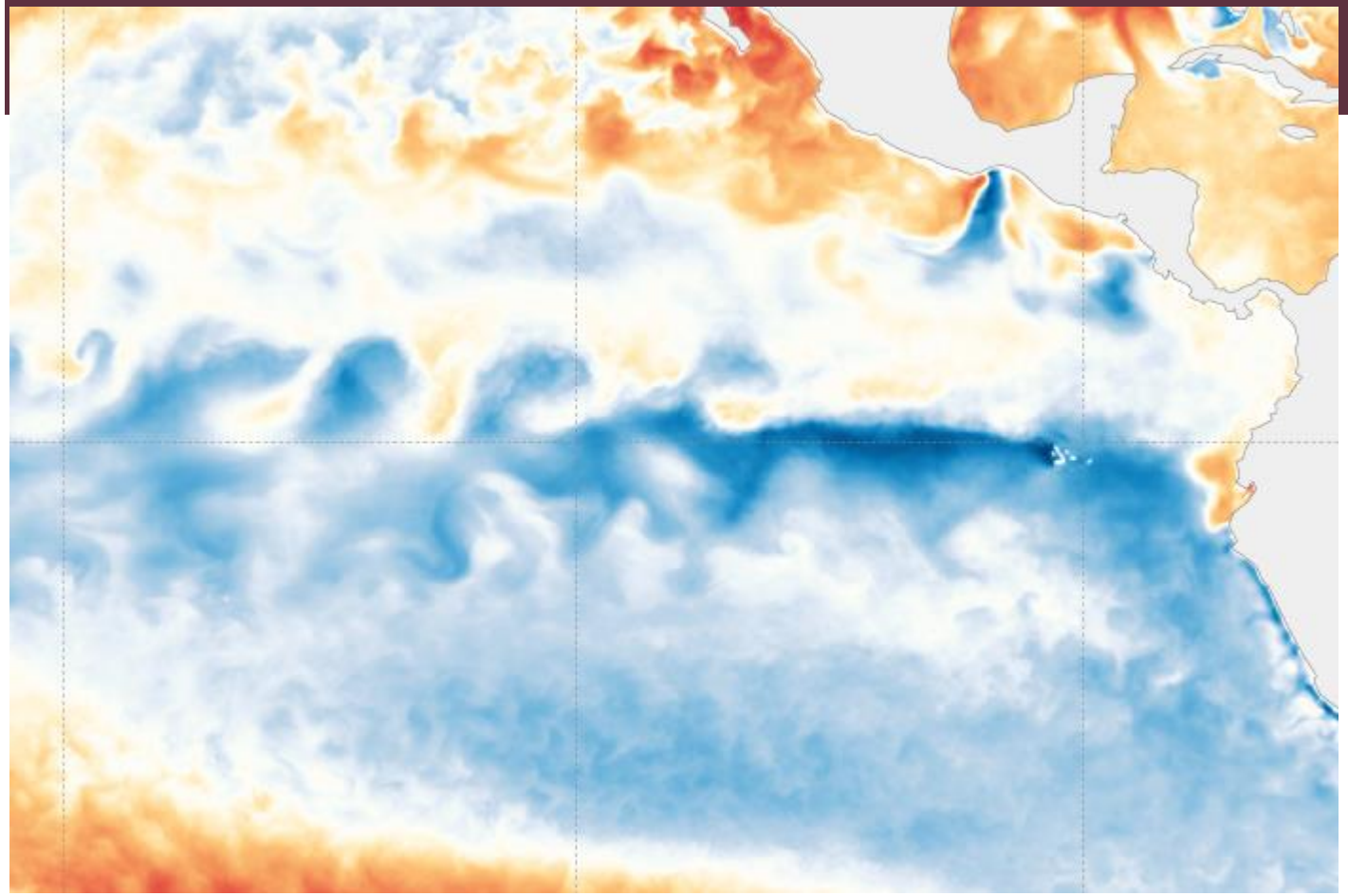
Powerful MN Fall Storm – Nov. 8-12, 2022

- A long-lasting system brought rain, thunderstorms, warm air, record humidity, strong winds, a massively fast drop in temperatures, and even some ice and heavy snows
- A record-breaker, as it arrived with more moisture than ever observed during November in Minnesota

Climate Outlooks

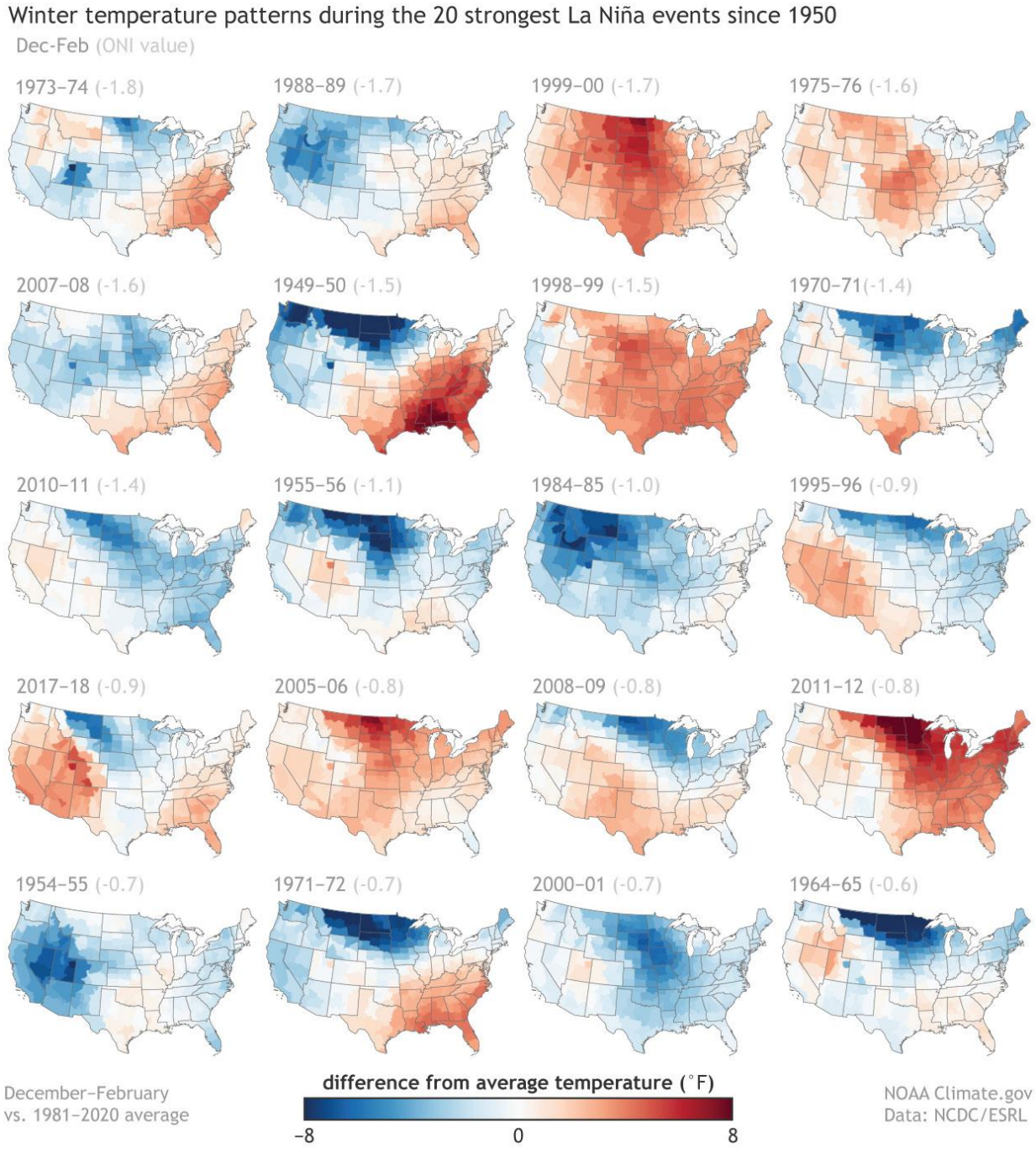
- La Niña
- 7-day Precipitation Forecast
- U.S. Hazard Outlooks
- 8 – 14 day Outlook
- JFM temperature and precipitation
- FMA temperature and precipitation

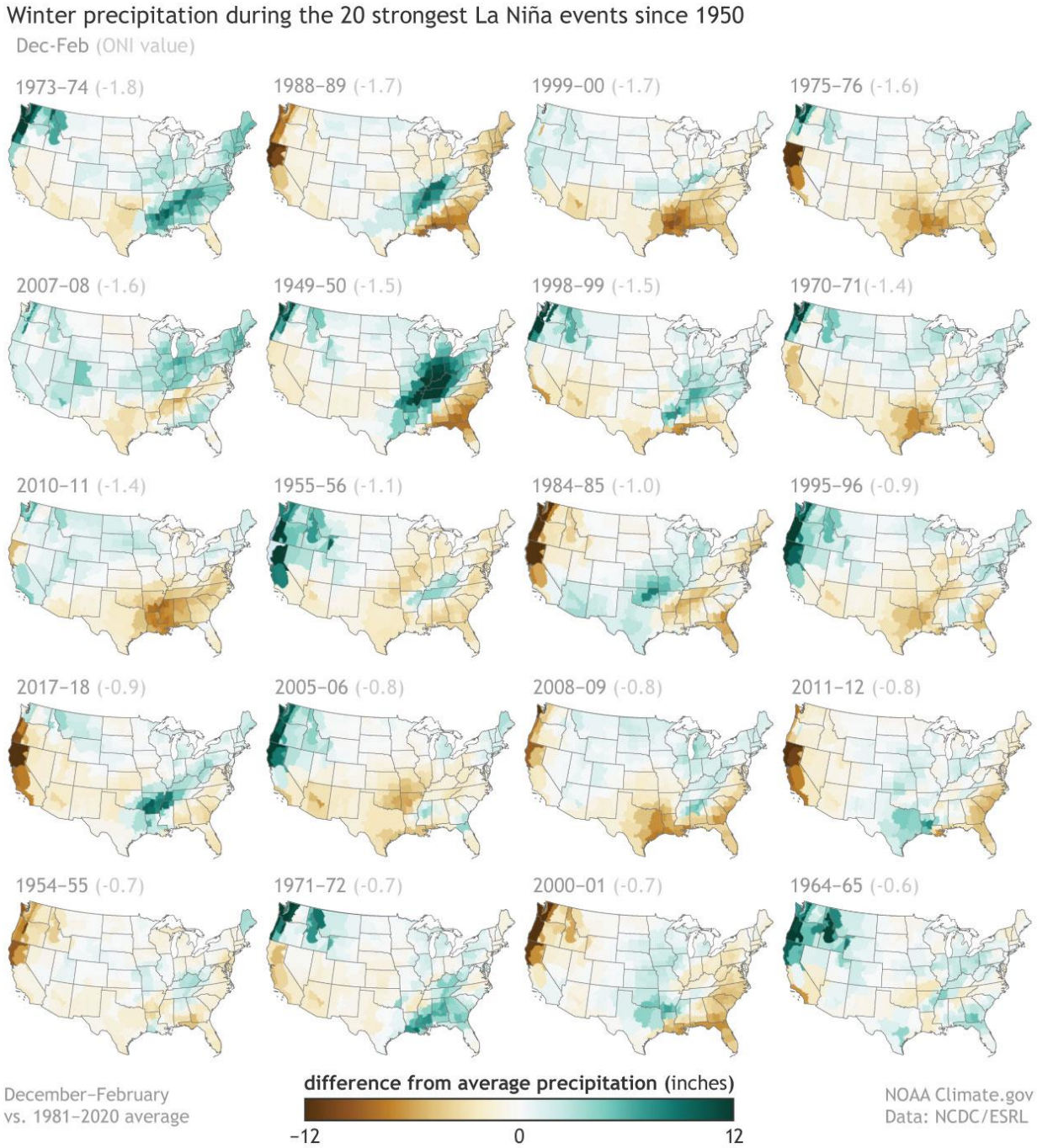
La Niña Advisory



- Third consecutive winter of La Nina – triple dip
- La Niña is likely to continue across the Northern Hemisphere winter
  - Equal chances of La Nina and ENSO-neutral during January-March 2023
  - ~71% chance of transitions to ENSO- neutral in the Feb. – Apr. 2023 timeframe
-

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


Winter temperature patterns during the 20 strongest La Niña events since 1950
Dec-Feb (ONI value)
1973–74 (-1.8)
1988–89 (-1.7)
1999–00 (-1.7)
1975–76 (-1.6)
2007–08 (-1.6)
1949–50 (-1.5)
1998–99 (-1.5)
1970–71(-1.4)
2010–11 (-1.4)
1955–56 (-1.1)
1984–85 (-1.0)
1995–96 (-0.9)
2017–18 (-0.9)
2005–06 (-0.8)
2008–09 (-0.8)
2011–12 (-0.8)
1954–55 (-0.7)
1971–72 (-0.7)
2000–01 (-0.7)
1964–65 (-0.6)
December–February
vs. 1981–2020 average
difference from average temperature (°F)
-8
0
8
NOAA Climate.gov
Data: NCDC/ESRL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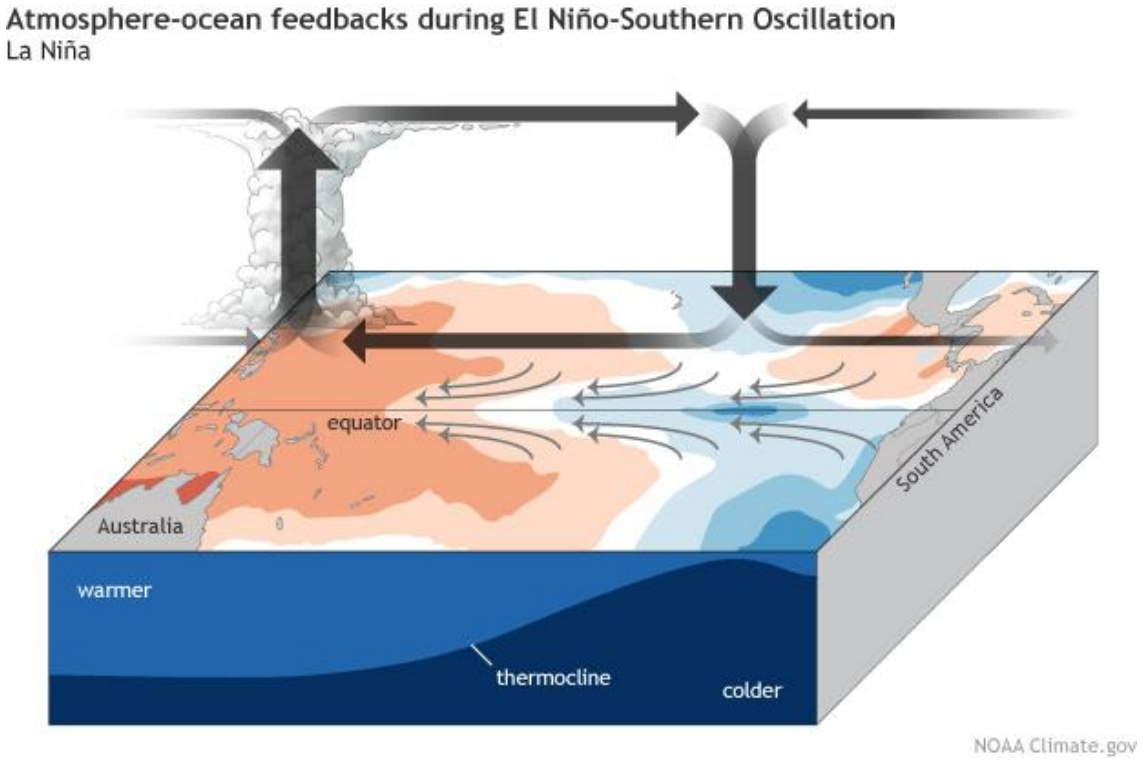
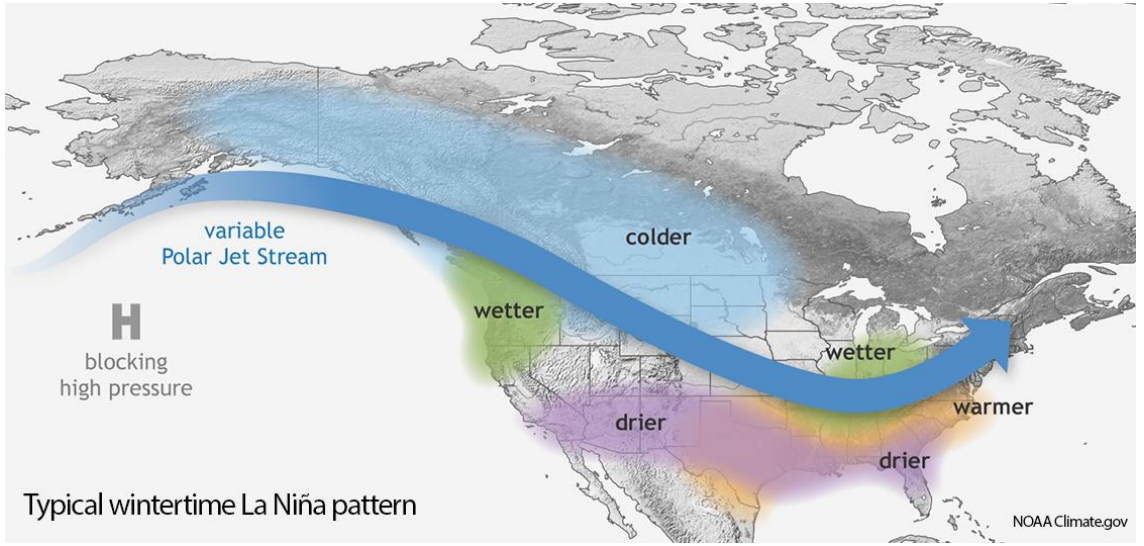
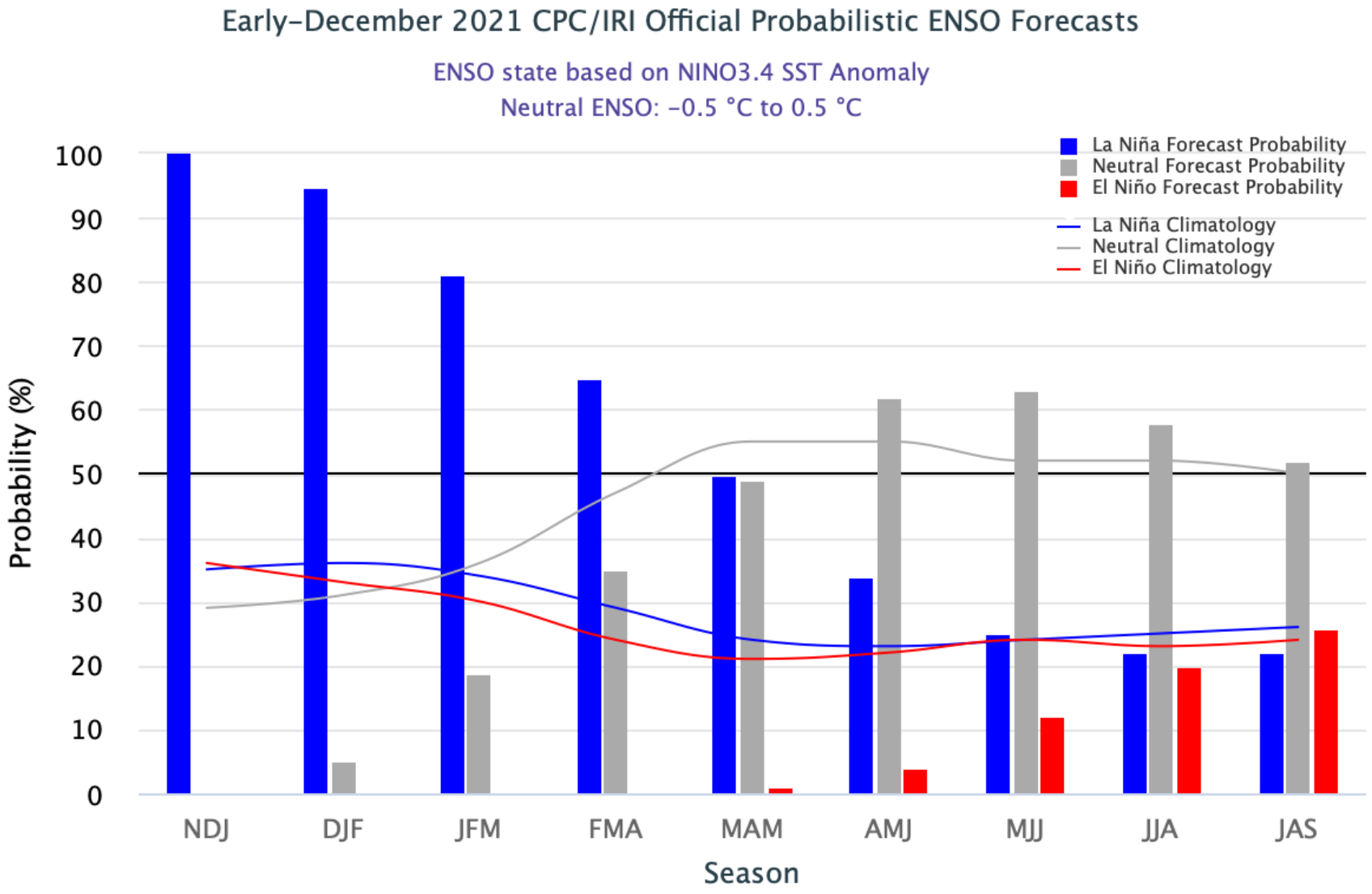
2000–01 (-0.7)
1964–65 (-0.6)
December–February
vs. 1981–2020 average
difference from average precipitation (inches)
−12
0
12
NOAA Climate.gov
Data: NCDC/ESRL

La Niña Wintertime Pattern



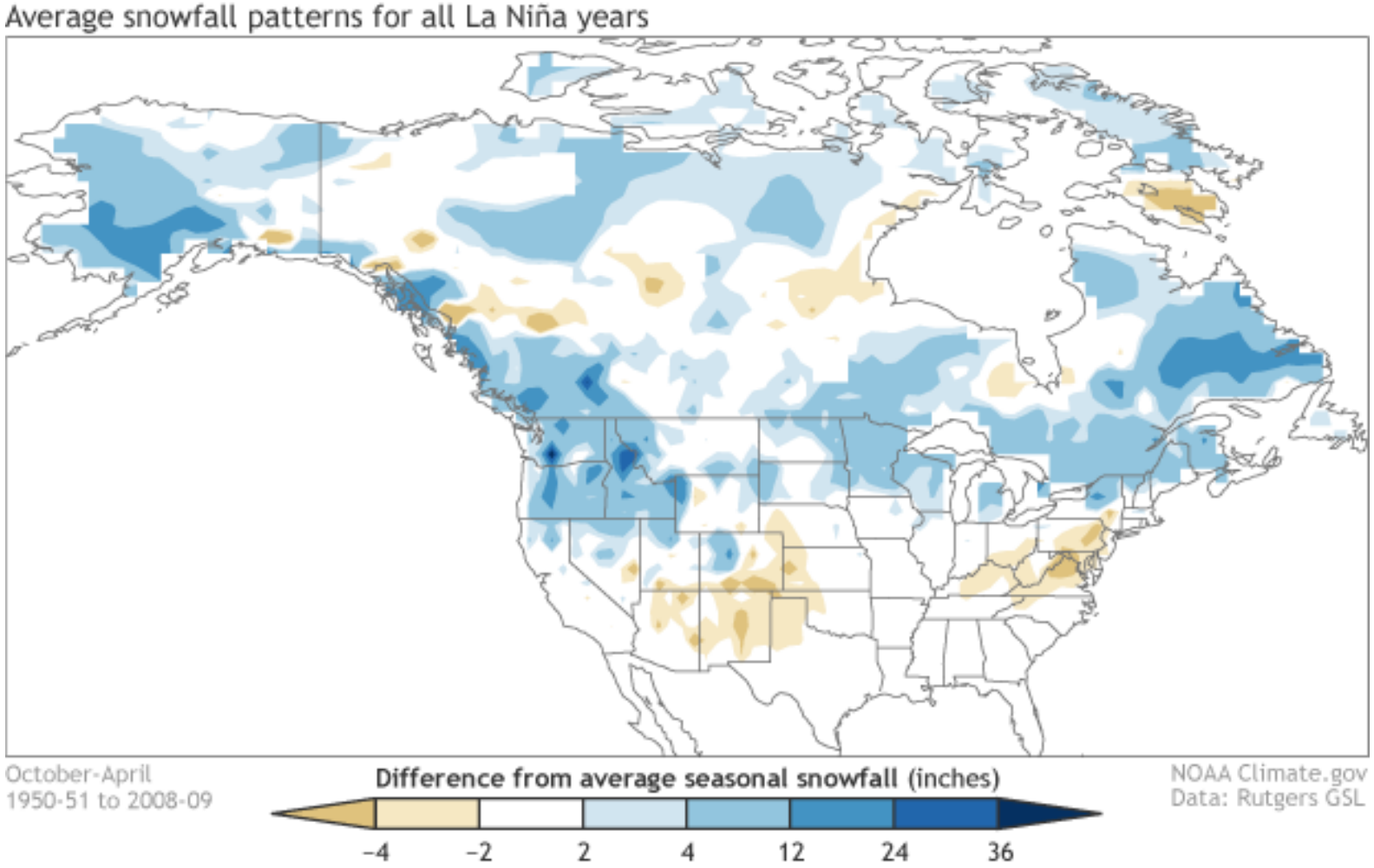


ENSO Probabilities



https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-cpc_plume

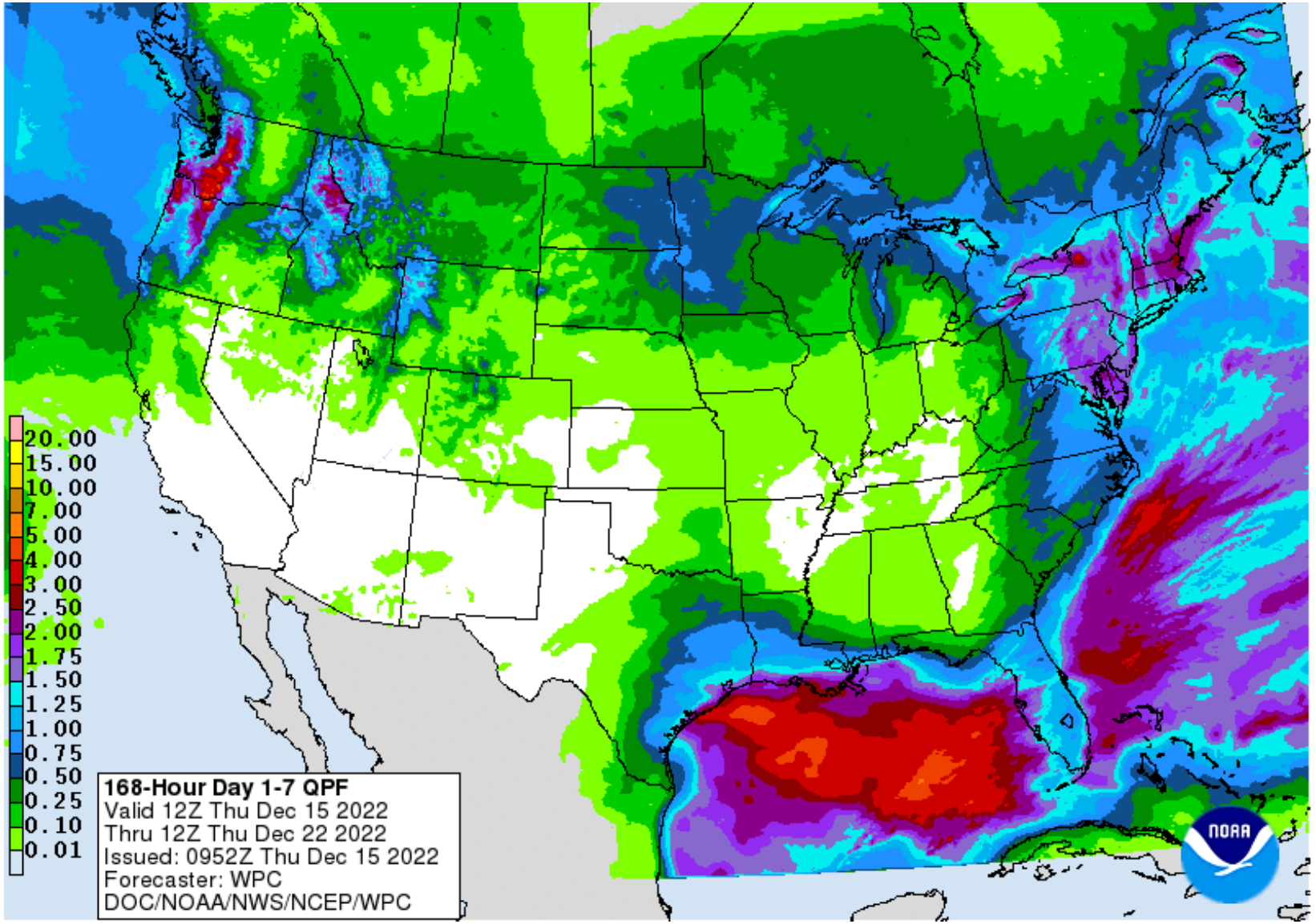
La Niña Snow Potential



https://www.climate.gov/news-features/blogs/enso/what-about-snow-during-la-ni%C3%B1a-winters

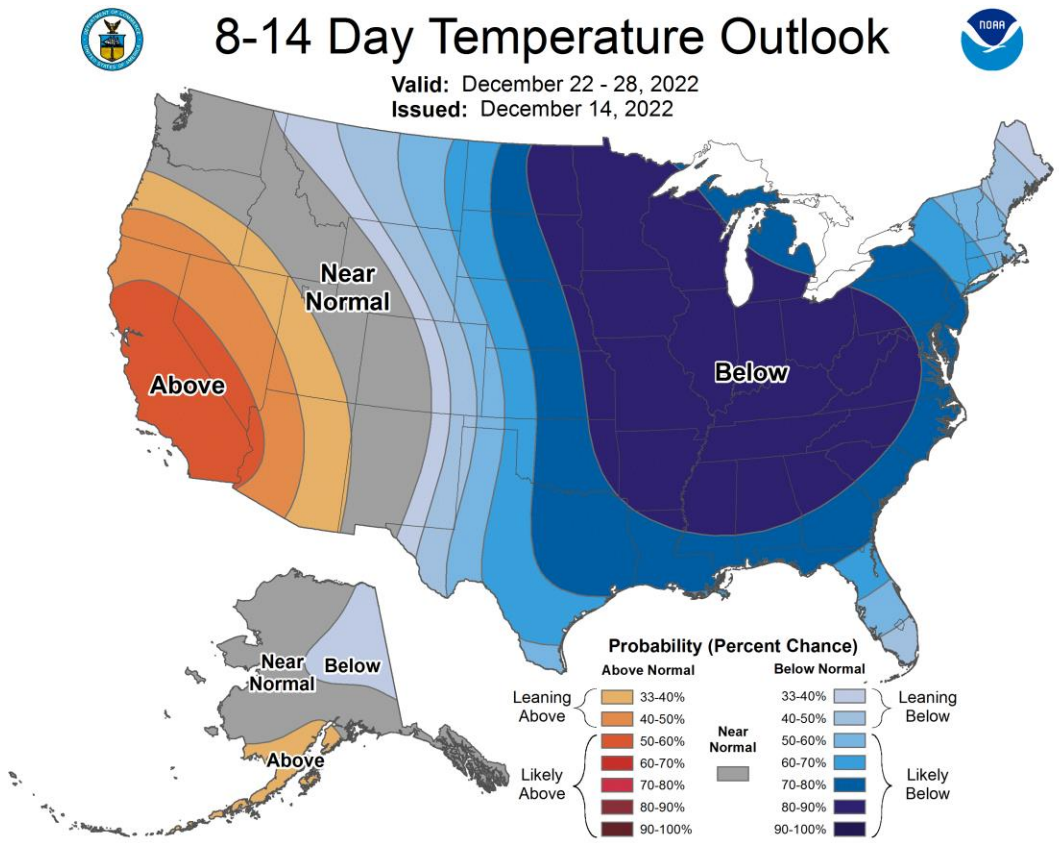
7-day Cumulative Precipitation Forecast

Valid: 15 Dec. – 22 Dec.

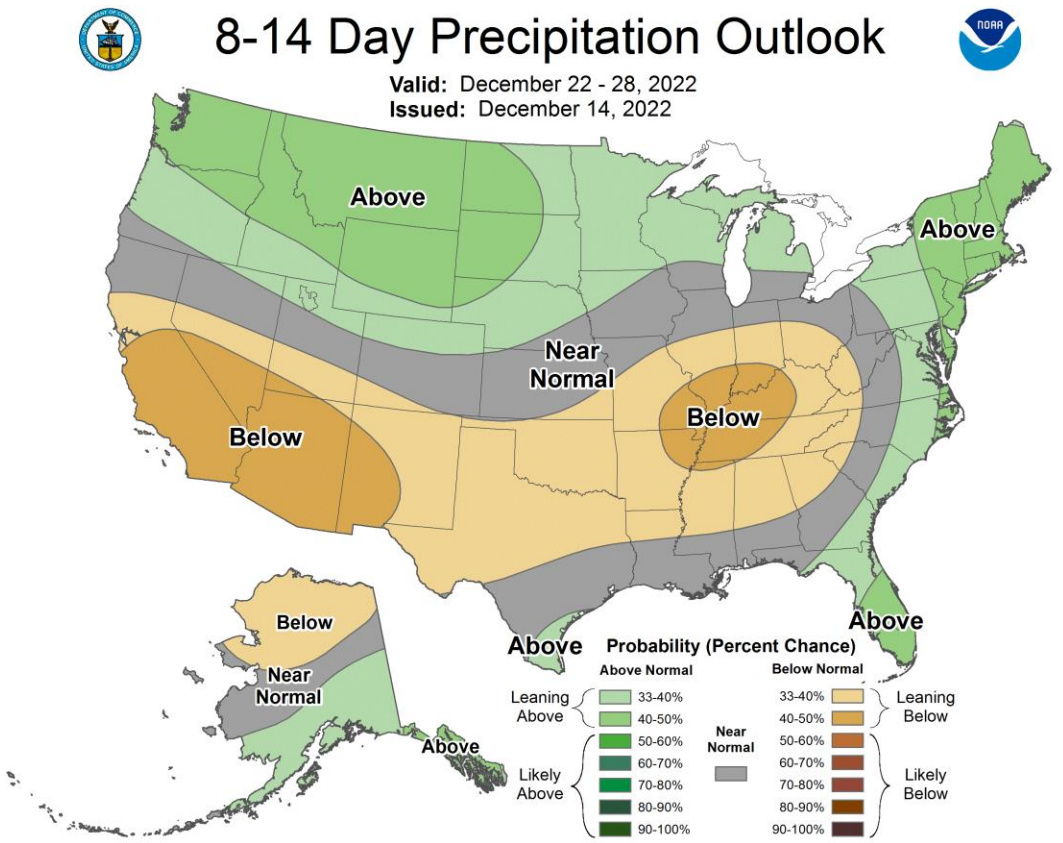


https://www.wpc.ncep.noaa.gov/qpf/day1-7.shtml

8-14 Day Outlook



Temperature



Precipitation

http://www.cpc.ncep.noaa.gov/products/predictions/814day/

KEY MESSAGES

Very cold Arctic air masses will envelop the nation during the week 2 period **(a)** including the busy holiday travel season.

Temperatures in the negative teens are possible in the Northern Rockies and Northern Plains, with sub-zero temperatures reaching as far south as the Central Plains **(b)**.

Areas farther south and east, such as the Great Lakes, Ohio Valley, Mid-Atlantic, and Northeast are favored to have temperatures reach the single digits and teens. Well below freezing temperatures are also expected throughout the Southern Plains and Southeast.

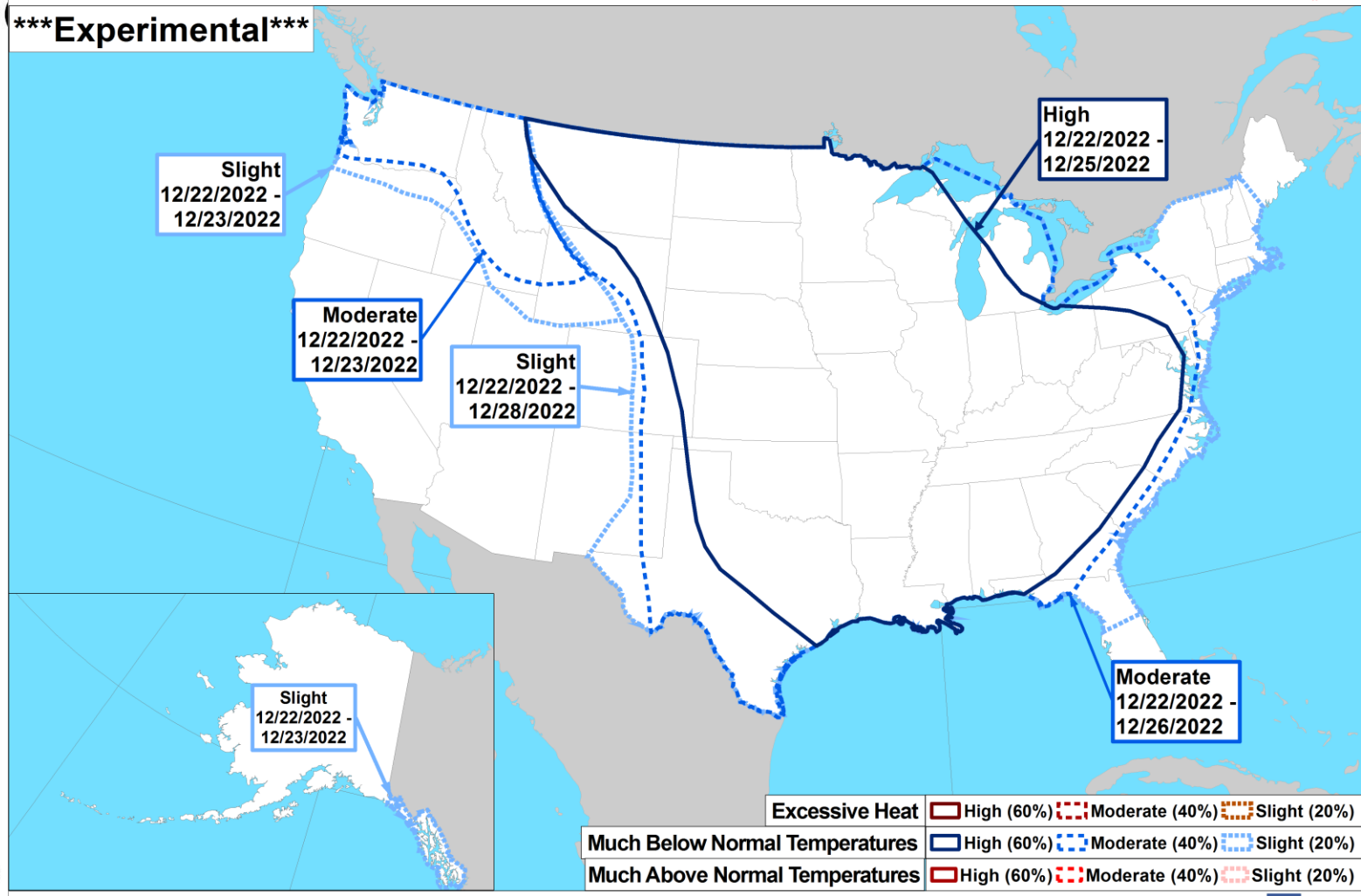
Timing: Leading up to* and continuing from December 20, 2022 - December 26, 2022. The cold is expected to move southward then eastward as the Week-2 period progresses.

The upper level pattern is favorable to sending several bitterly cold Arctic air masses southward into the lower 48 states that may persist into week 3 **(c)**.

** For short-term forecasts (prior to December 20), visit www.wpc.ncep.noaa.gov and weather.gov.*

National Oceanic and Atmospheric Administration
U.S. Department of Commerce

Risk of Hazardous Temperatures
Valid: 12/22/2022-12/28/2022

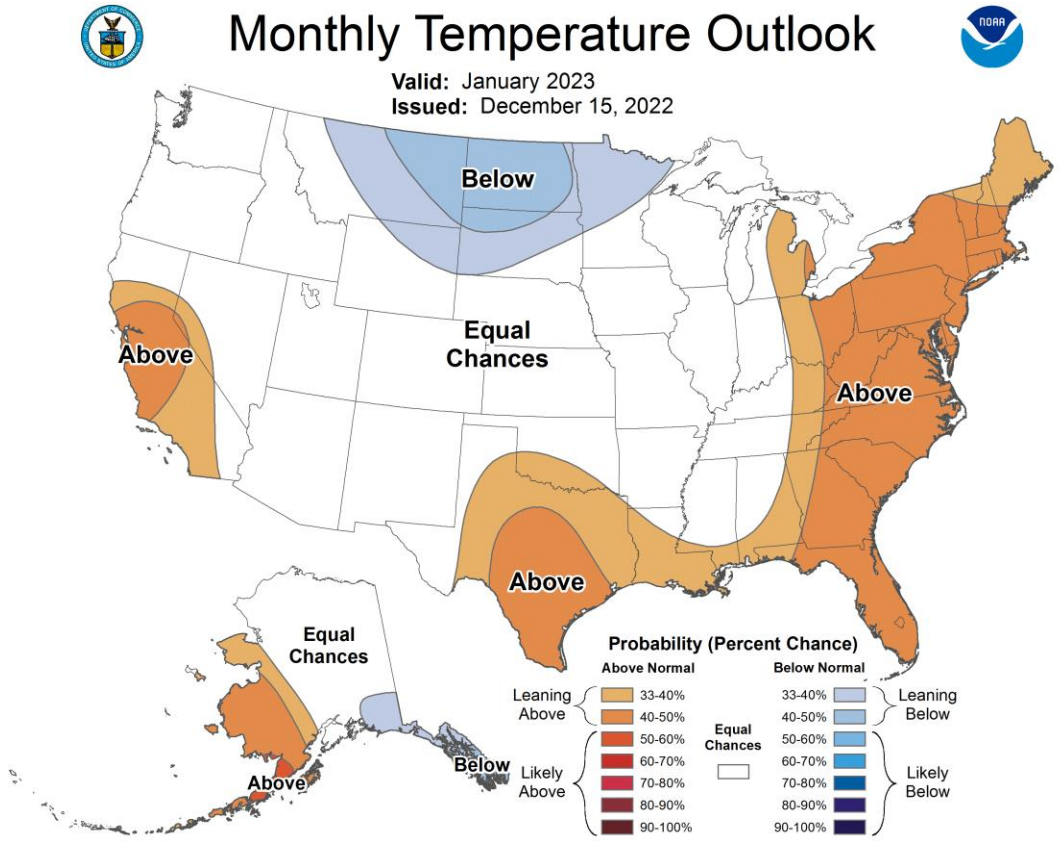


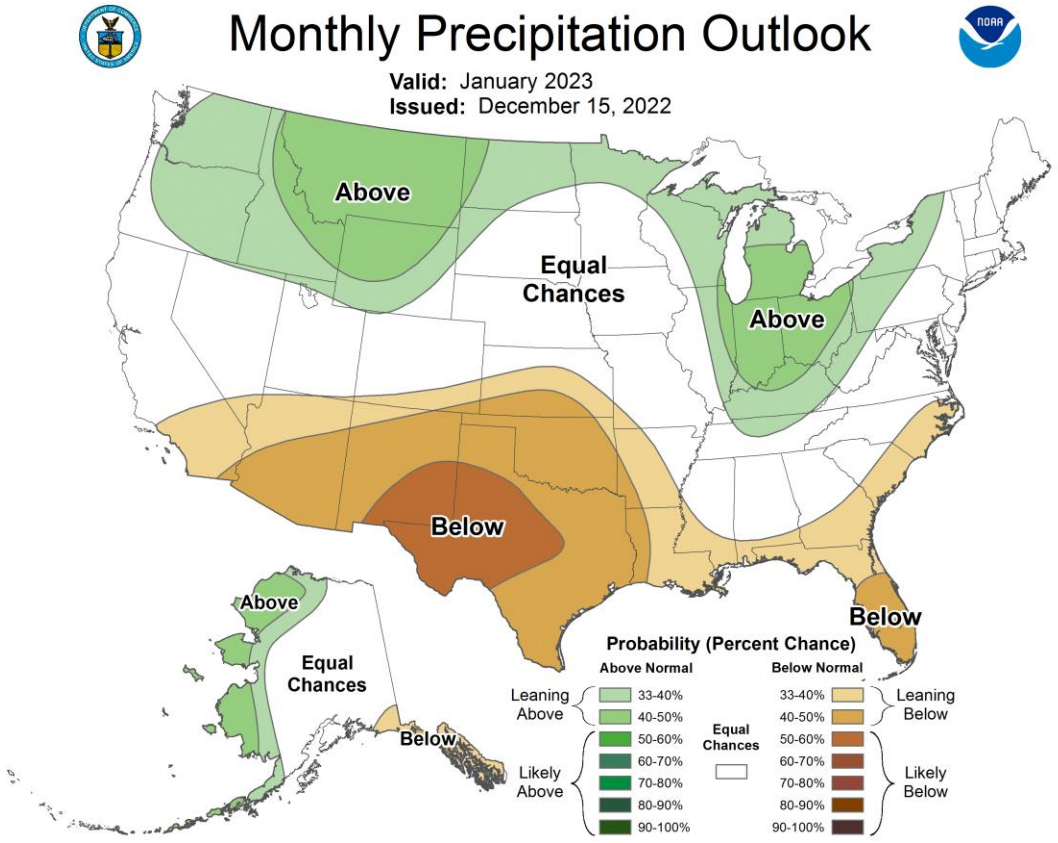
Climate Prediction Center
Made: 12/14/2022 3PM EST

Follow us:
www.cpc.ncep.noaa.gov

https://www.cpc.ncep.noaa.gov/products/predictions/threats/temp_probhazards_d8_14_contours.png

January Outlooks



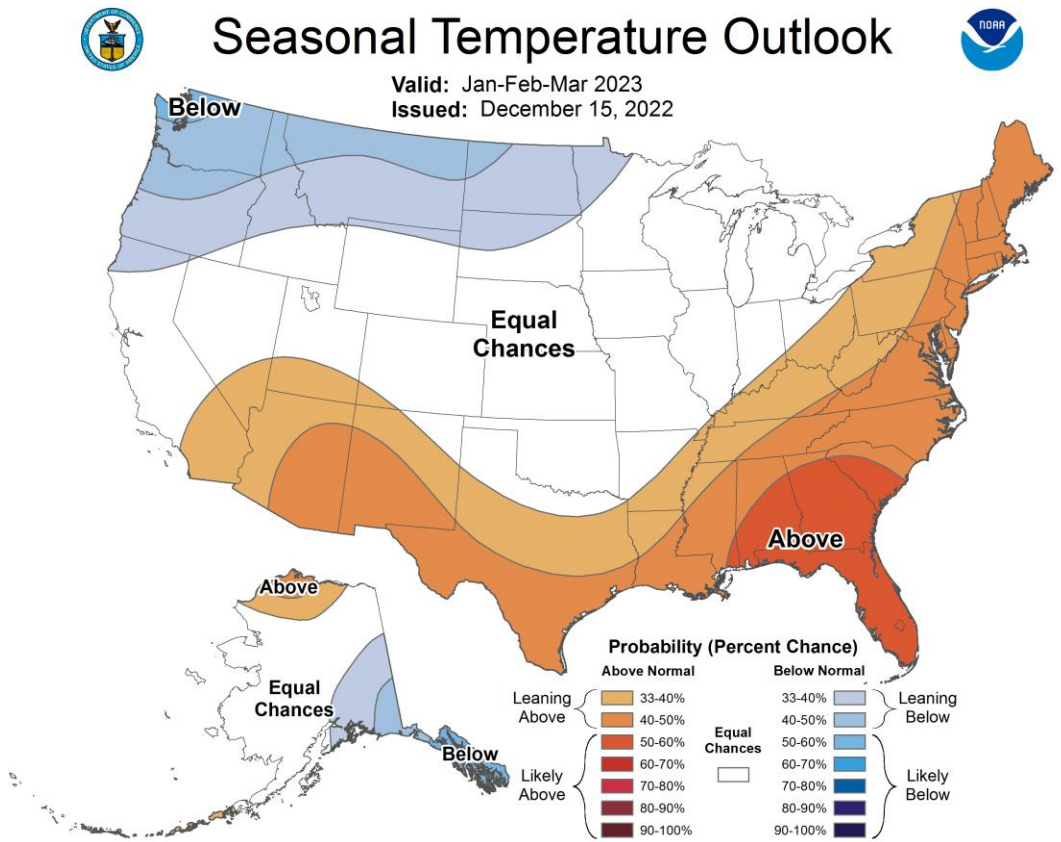


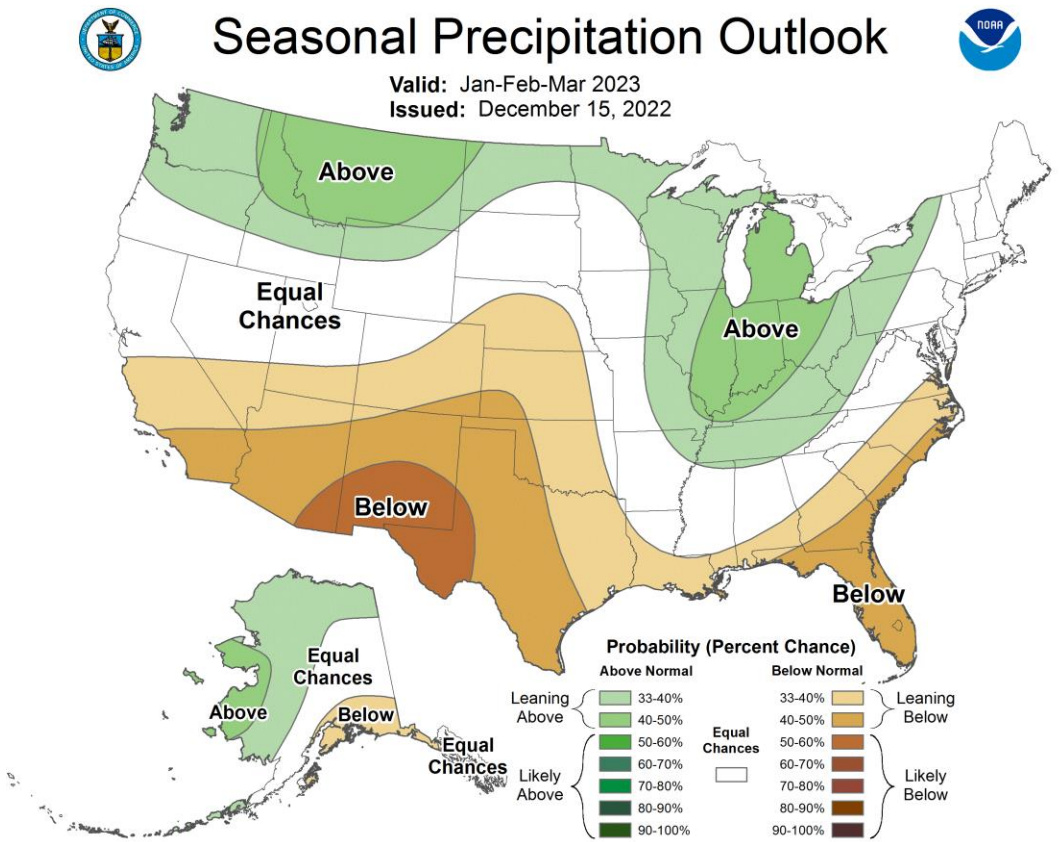
Temperature

Precipitation

http://www.cpc.ncep.noaa.gov/products/predictions/long_range/lead14/

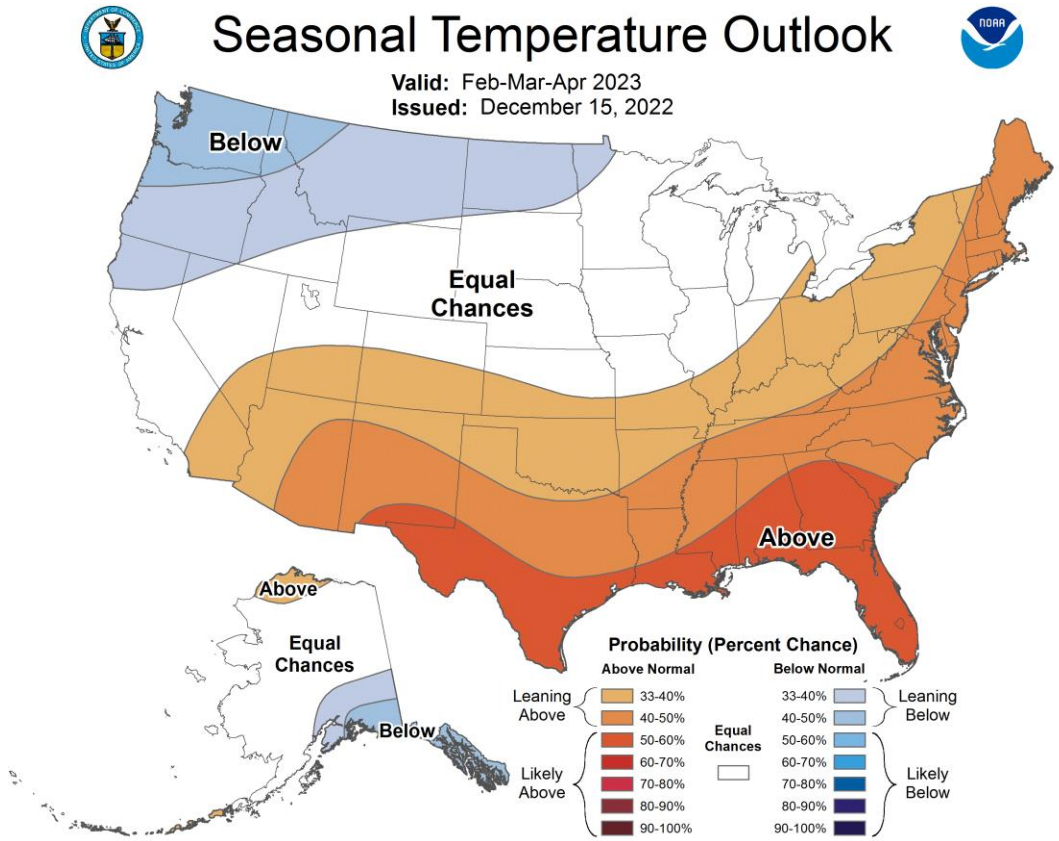
JFM 2023 Outlooks

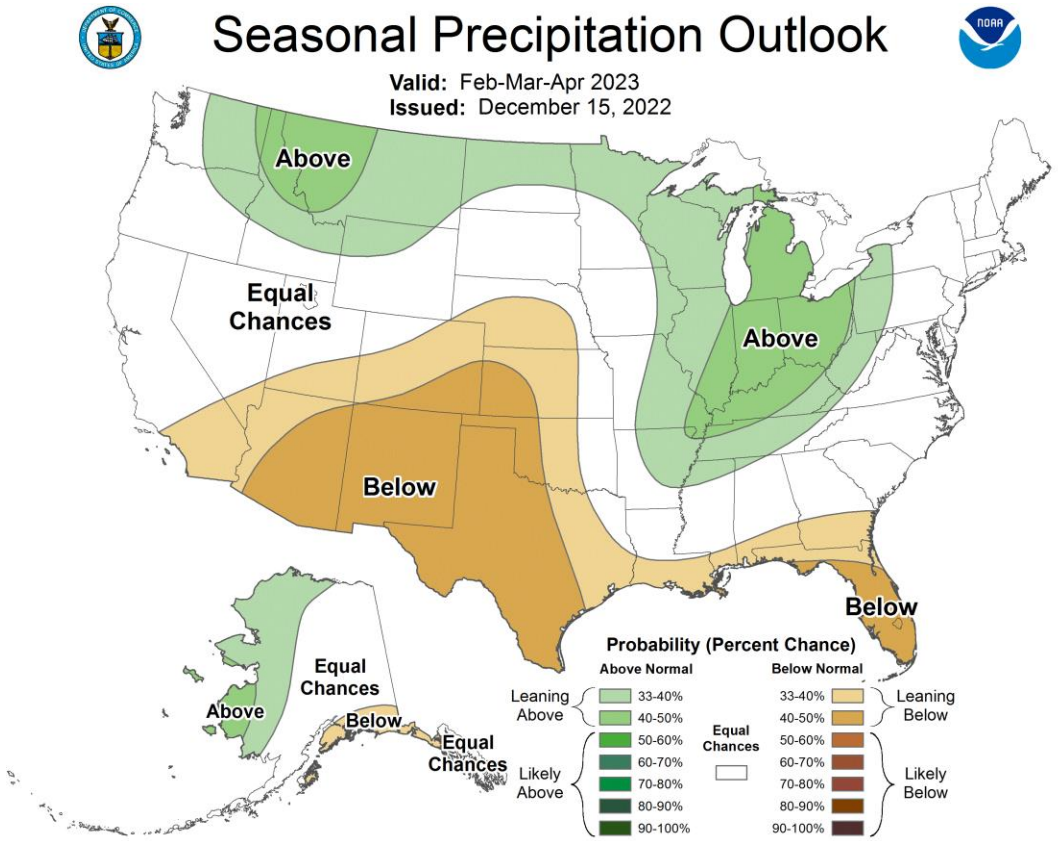




https://www.cpc.ncep.noaa.gov/products/predictions/long_range/

FMA 2023 Outlooks



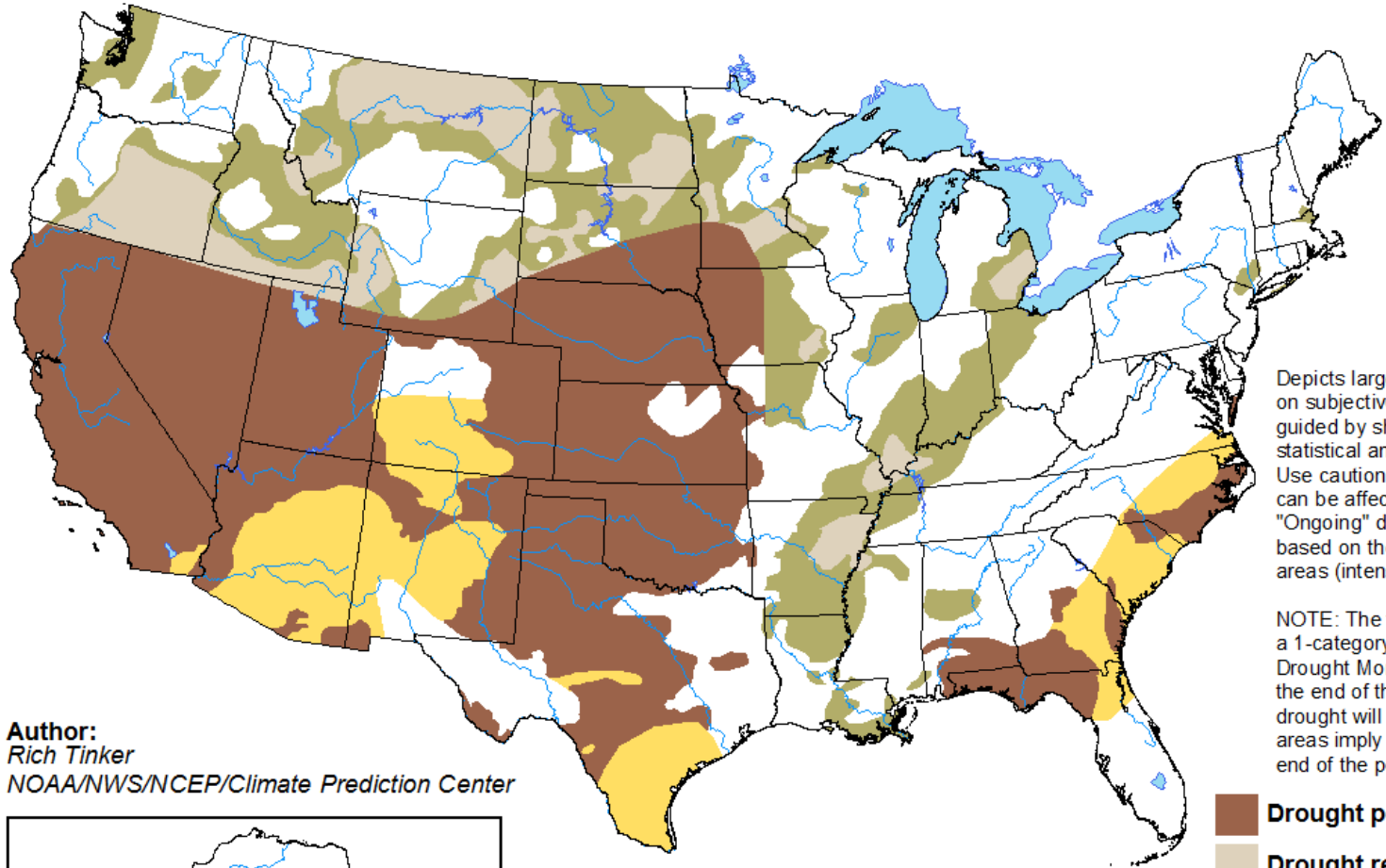


https://www.cpc.ncep.noaa.gov/products/predictions/90day/

U.S. Seasonal Drought Outlook

Drought Tendency During the Valid Period

Valid for December 15, 2022 - March 31, 2023
Released December 15, 2022



Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4).

NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).

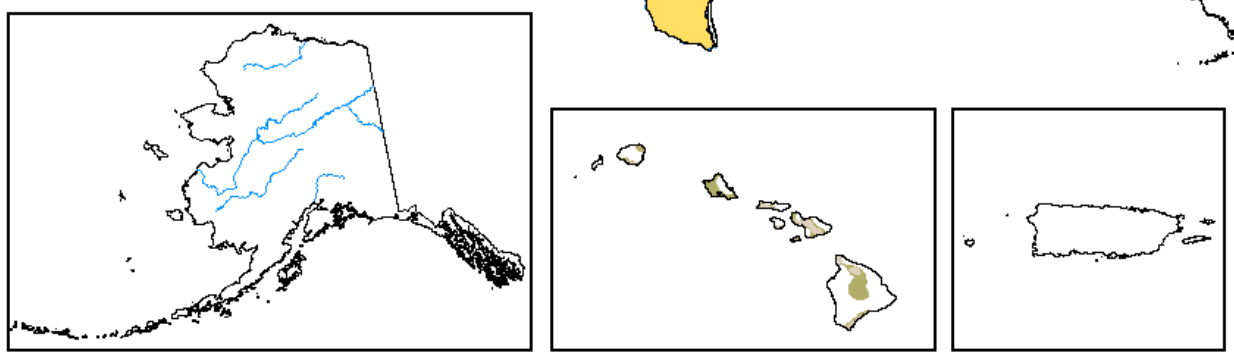
Drought persists

Drought remains but improves

Drought removal likely

Drought development likely

Author:
Rich Tinker
NOAA/NWS/NCEP/Climate Prediction Center



http://go.usa.gov/3eZ73

http://www.cpc.ncep.noaa.gov/products/expert_assessment/season_drought.png

Outlook Summary

- Short-term outlooks showing high probabilities of anomalous cold for most of CONUS and wetter to near-normal precip. potential.
- The La Niña signal persist through Winter 2022/2023
  - Widespread precipitation variability of the wintertime LN pattern
  - Dominant behavior in precipitation shifting west into Midwest
  - Strength of LN will be a good indicator of snowpack potential
- Higher chances of a transition to ENSO-neutral into spring
  - This will be a slow transition as the atmosphere respond to oceanic behavior
  - Climatology and recent trends will provide better guidance as opposed to an EN/LN phase.
- Potential drought improvement Upper Midwest through eastern Corn Belt

Further Information - Partners

- **Today's and Past Recorded Presentations:**
- http://www.hprcc.unl.edu/webinars.php
- http://www.hprcc.unl.edu
- NOAA's National Centers for Environmental Information: www.ncdc.noaa.gov
  - ➢ Monthly climate reports (U.S. & Global): www.ncdc.noaa.gov/sotc/
- NOAA's Climate Prediction Center: www.cpc.ncep.noaa.gov
- Climate Portal: www.climate.gov
- U.S. Drought Portal: www.drought.gov
- National Drought Mitigation Center: http://drought.unl.edu
- State climatologists
  - http://www.stateclimate.org
- Regional climate centers
  - https://mrcc.purdue.edu
  - http://www.hprcc.unl.edu

Thank You and Questions?

- Questions:

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  - Beth Hall: bethhall@purdue.edu; 765-494-8060
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  - Brian Fuchs: bfuchs2@unl.edu 402-472-6775

  - **Weather:**
  - crhroc@noaa.gov