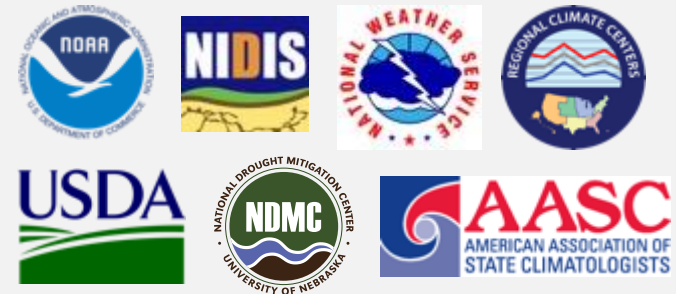


# North Central U.S. Climate and Drought Outlook

January 19<sup>th</sup>, 2023

**Dr. Martha E. Durr**  
**Nebraska State Climatologist**  
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**402-472-6711**

***School of Natural Resources***  
***University of Nebraska - Lincoln***



# General Information

- **Providing climate services to the North Central US**

Collaborative Activity Among:

NOAA NCEI/NWS/OAR/NIDIS

USDA Climate Hubs

American Association of State Climatologists

Midwestern and High Plains Regional Climate Centers

National Drought Mitigation Center

- **Access to Future Climate Webinars and Information**

<http://www.drought.gov/drought/content/regional-programs/regional-drought-webinars>

<https://mrcc.purdue.edu/multimedia/webinars.jsp>

<http://www.hprcc.unl.edu/webinars.php>

- **Open for questions at the end**



## Next Regular Climate/Drought Outlook Webinar

February 16<sup>th</sup>, 2023 (1 PM CDT)

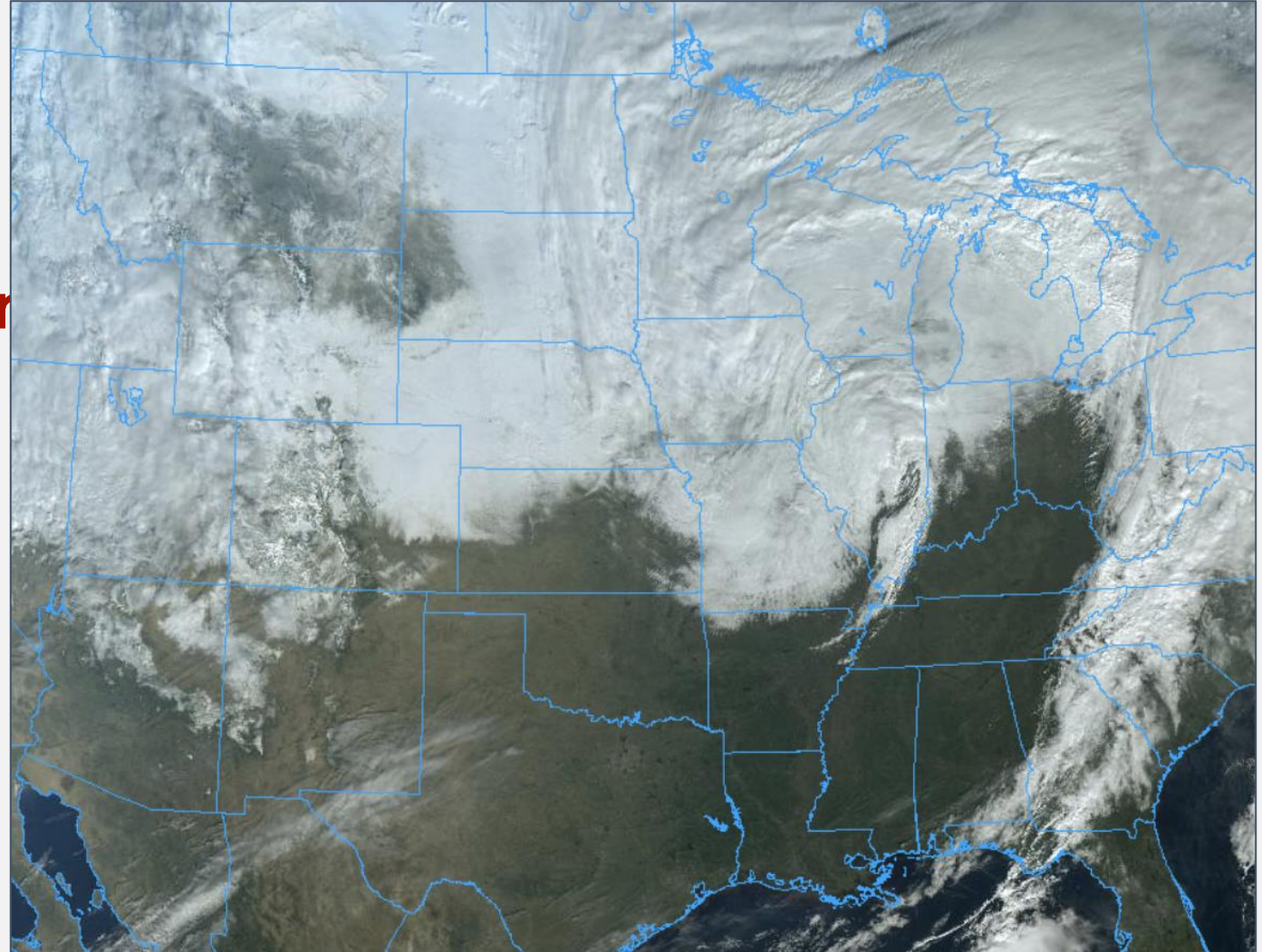
Dr. Becky Bolinger – Colorado State University



Freezing rain in Lincoln on January 18<sup>th</sup>. Courtesy Martha Durr.

# Today's webinar

- **2022 highlights.**
- **Recap and recent conditions.**
- **Drought changes.**
- **Impacts.**
- **Climate outlook.**

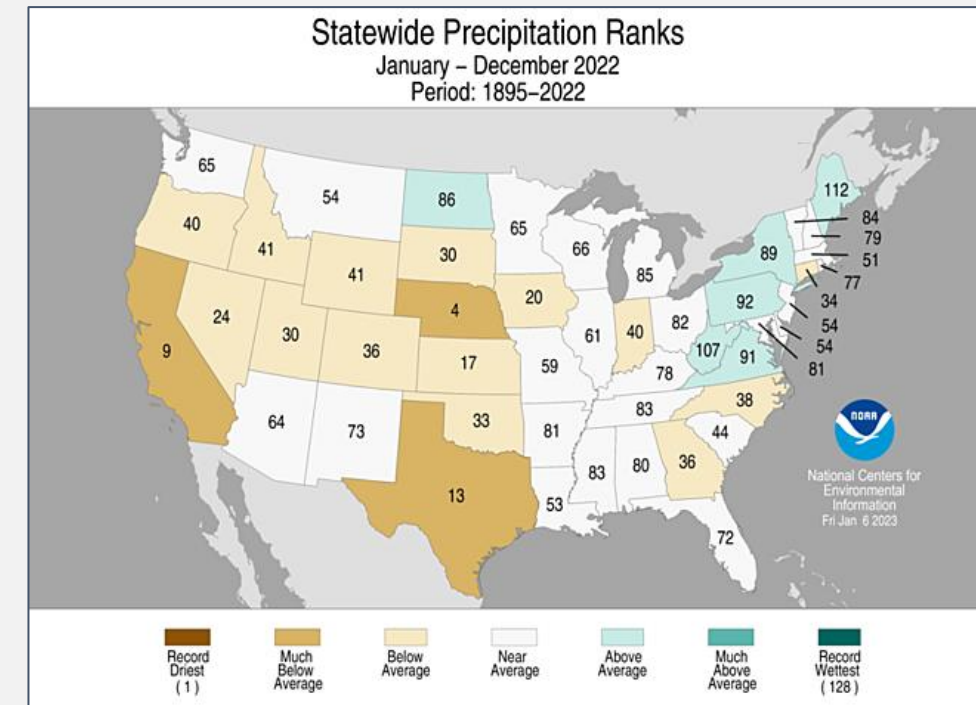
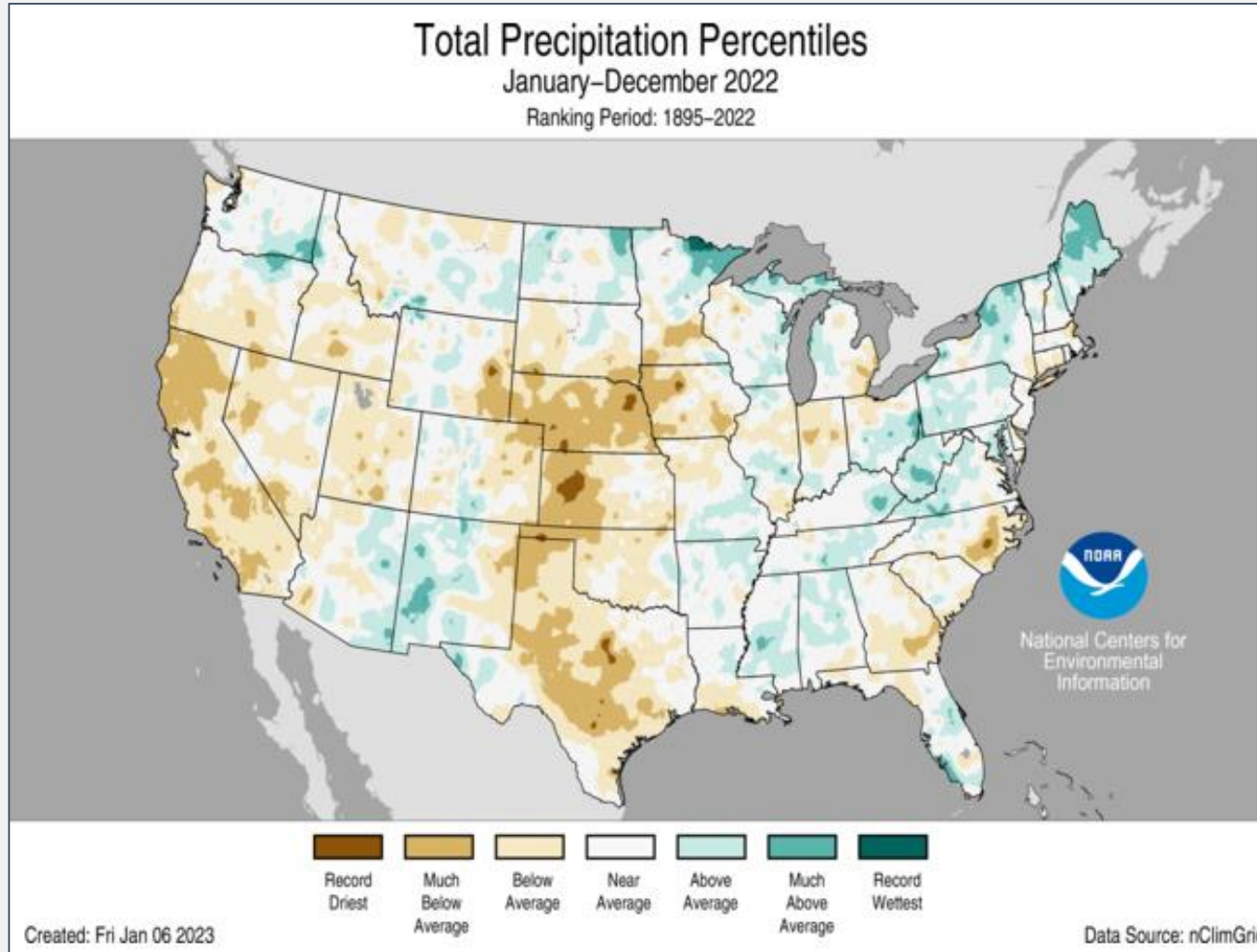


Visible satellite image of Jan 19, 2023 storm. Courtesy College of DuPage.



# 2022 highlights

Dry in central/southern Plains. Wet pockets across the region.

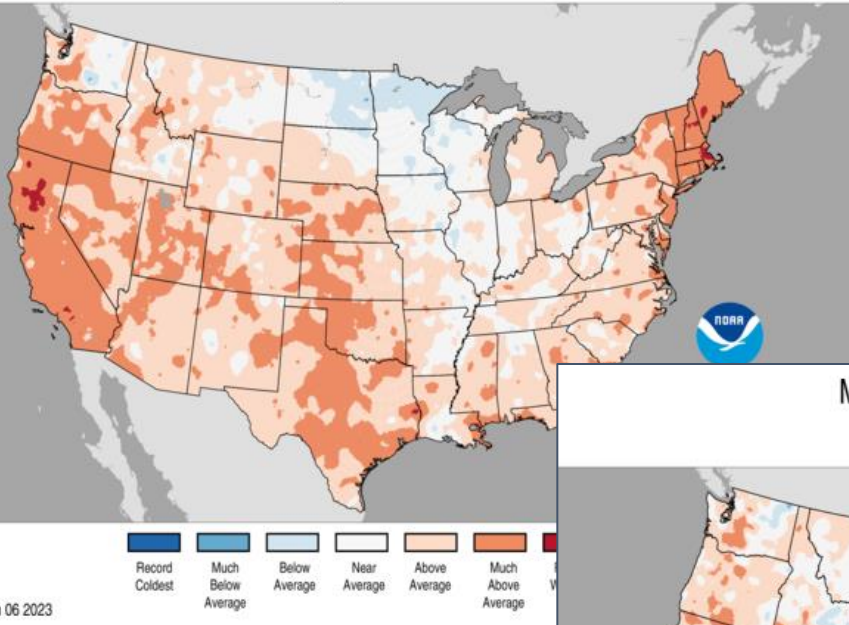




# 2022 highlights

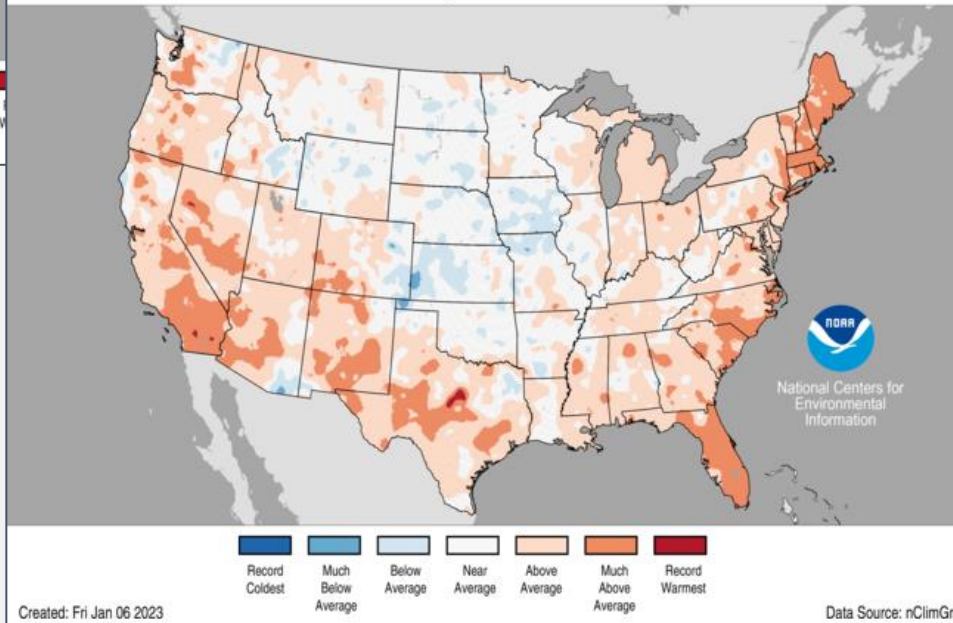
Relative warmth in daytime highs for western/southern parts of region.

Maximum Temperature Percentiles  
January–December 2022  
Ranking Period: 1895–2022



Created: Fri Jan 06 2023

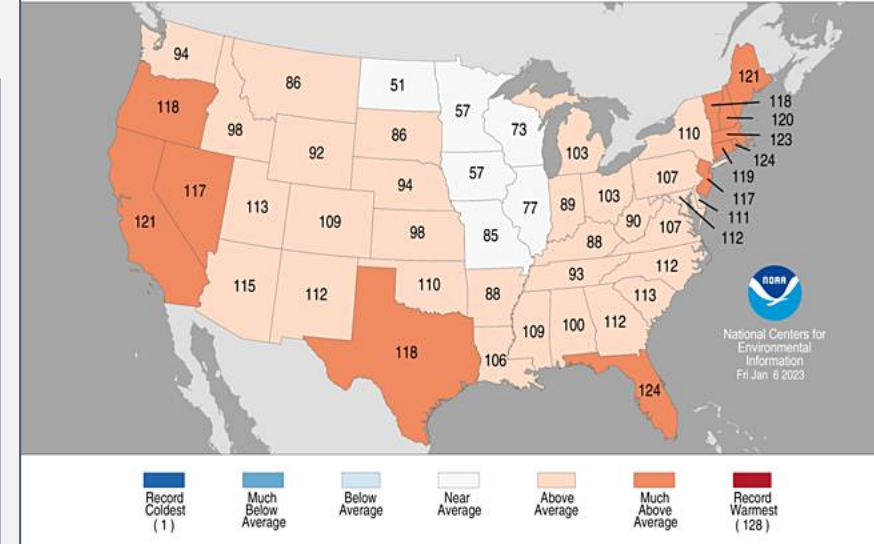
Minimum Temperature Percentiles  
January–December 2022  
Ranking Period: 1895–2022



Created: Fri Jan 06 2023

Data Source: nClimGrid

Statewide Average Temperature Ranks  
January – December 2022  
Period: 1895–2022

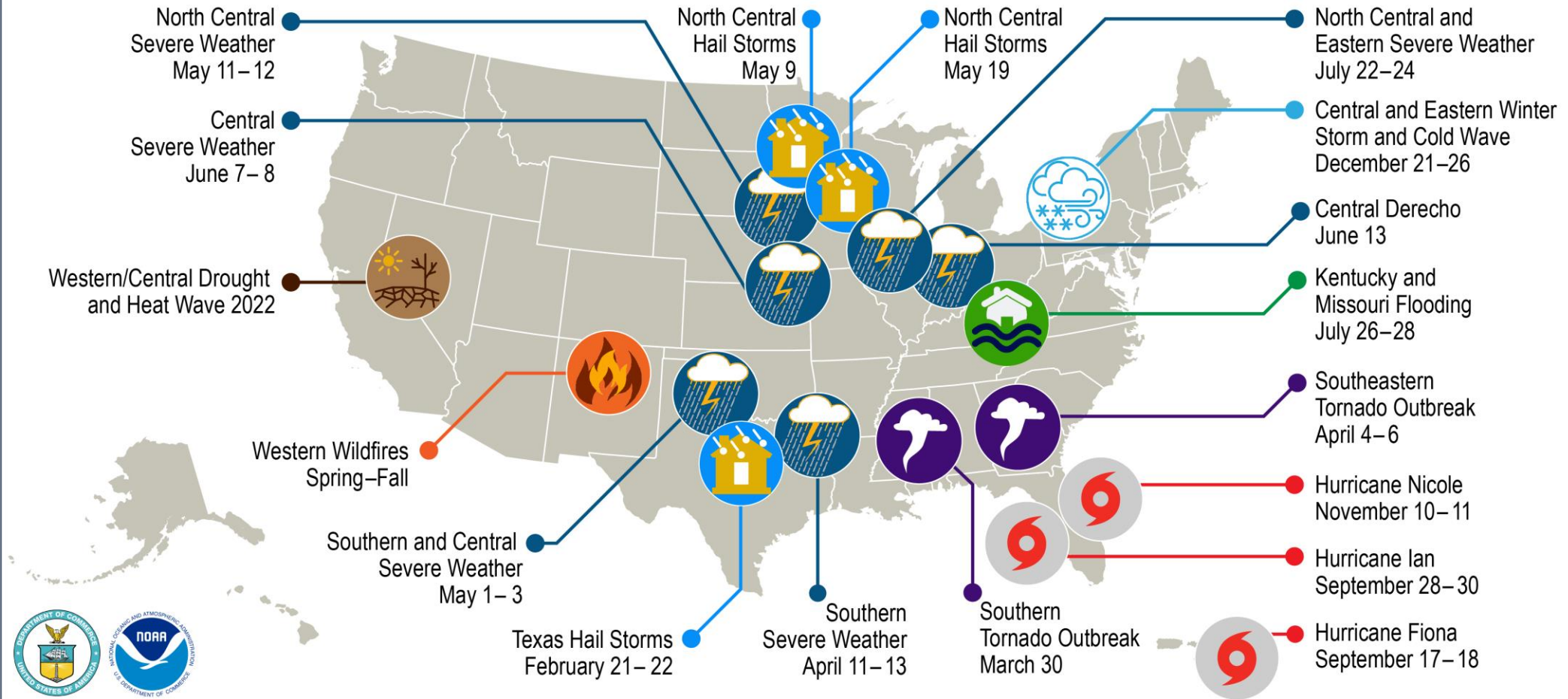


Source: <https://ncdc.noaa.gov/temp-and-precip/us-maps/>

# 2022 \$B disasters

## U.S. 2022 Billion-Dollar Weather and Climate Disasters

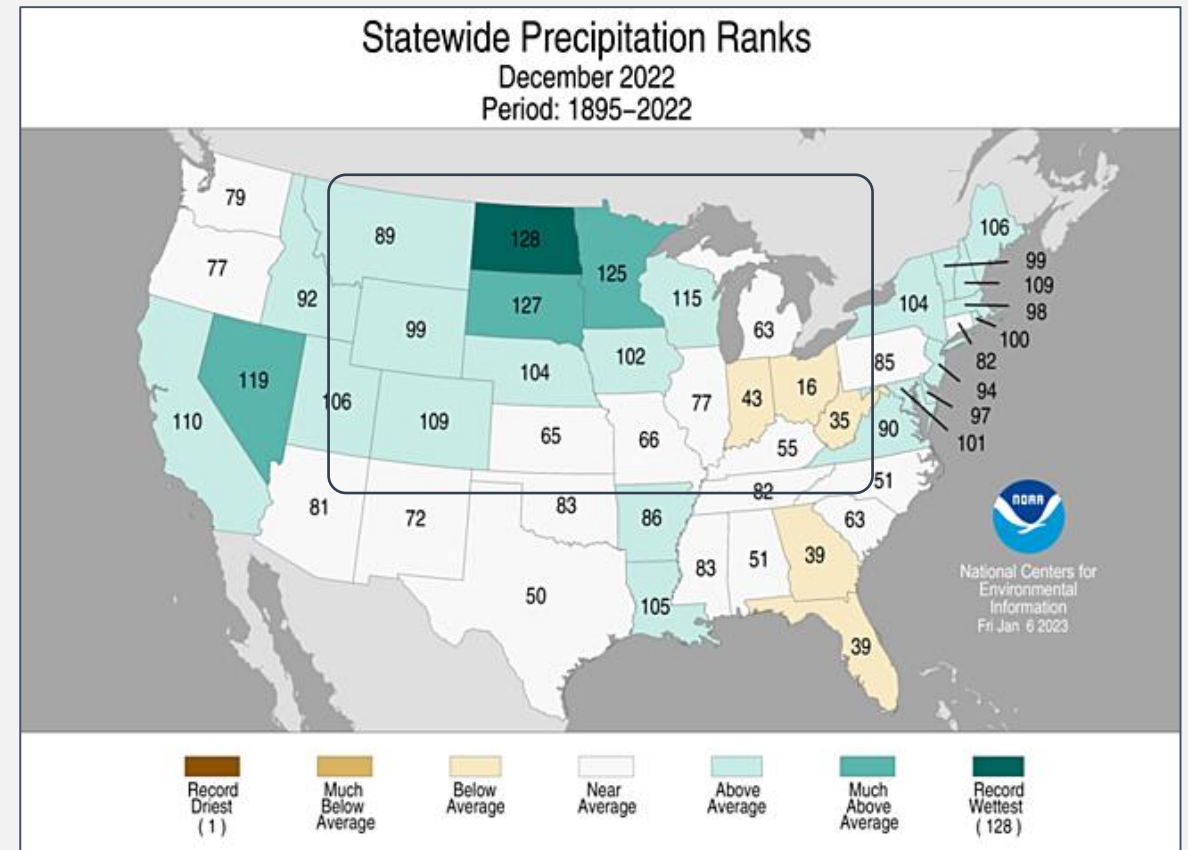
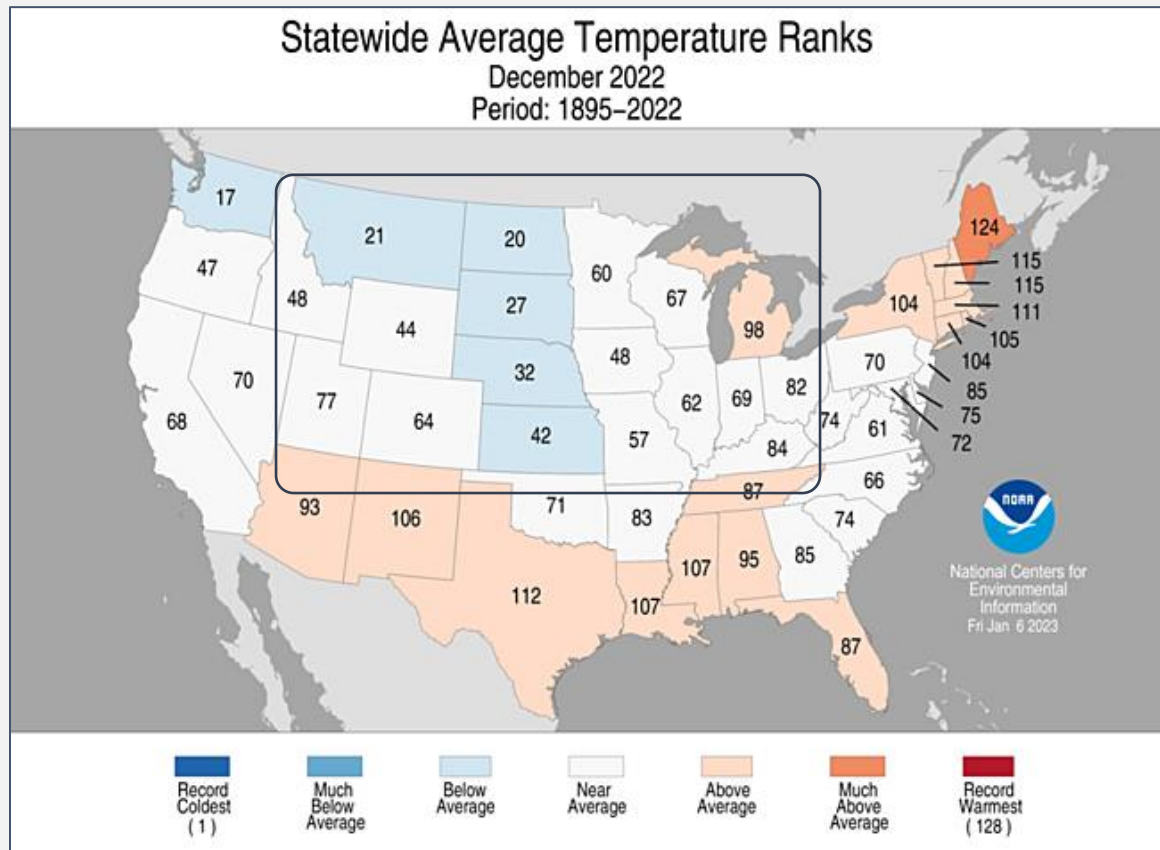
- Drought/Heat Wave
- Flooding
- Hail
- Hurricane
- Severe Weather
- Tornado Outbreak
- Wildfire
- Winter Storm/Cold Wave



This map denotes the approximate location for each of the 18 separate billion-dollar weather and climate disasters that impacted the United States in 2022.

# Recap

## December | **Wet and cold for central and northern portion of region.**

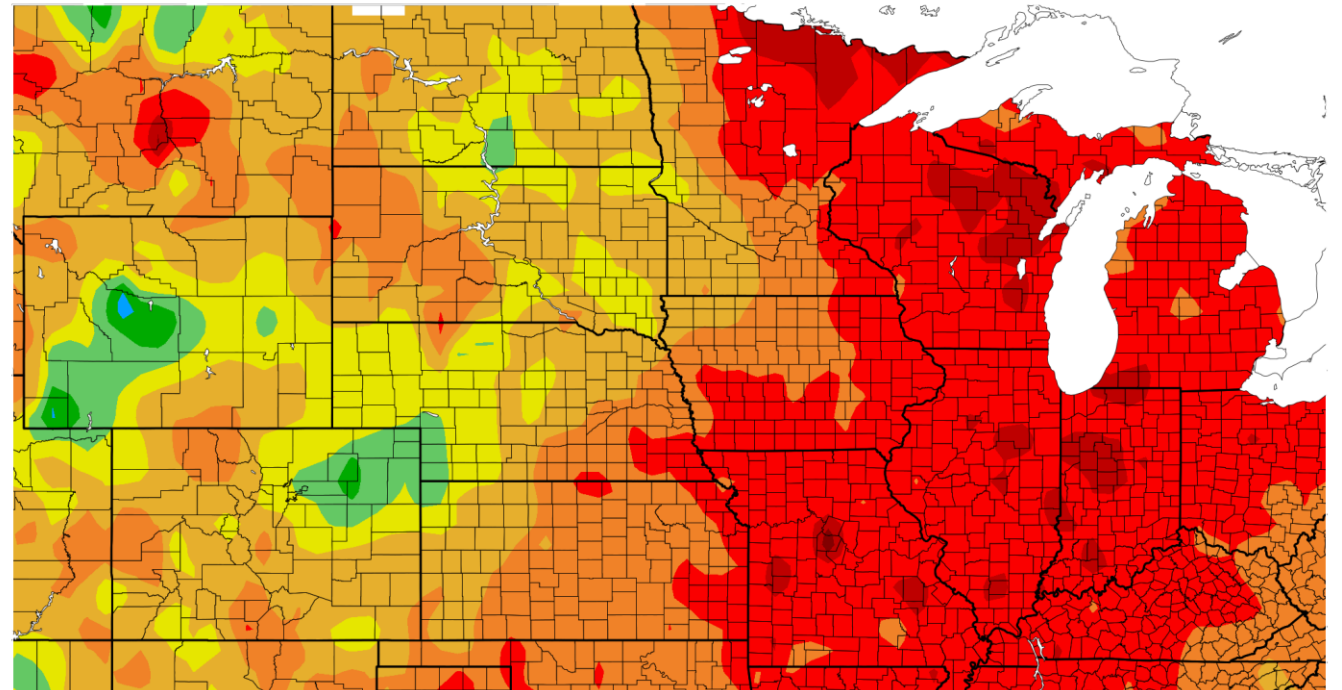




# Recent conditions

- YTD temperatures |
- **Significant warmth across eastern portion of region.**
  - **> 9°F above normal.**

Departure from Normal Temperature (F)  
1/1/2023 – 1/18/2023



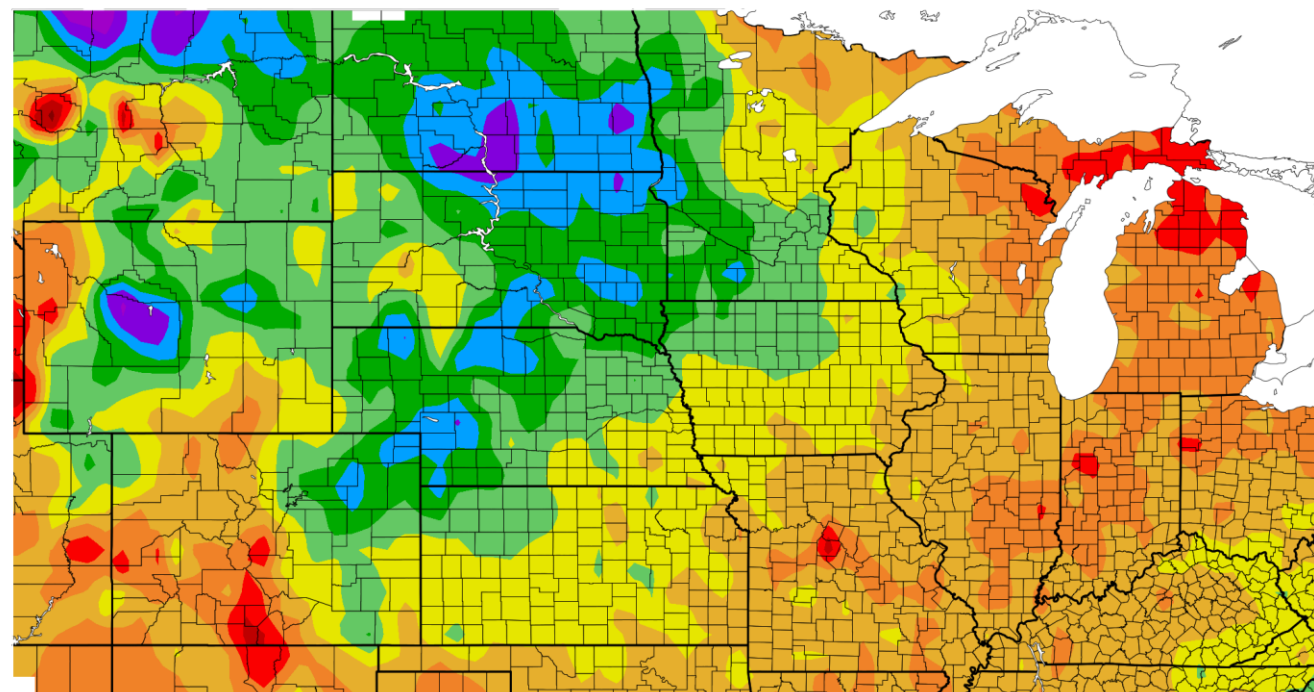
Generated 1/19/2023 at HPRCC using provisional data.

NOAA Regional Climate Centers

# Recent conditions

- 30 day temperatures |
- Above normal temperatures in southwest and eastern portions of the region.
  - Below normal in the central and north.

Departure from Normal Temperature (F)  
12/19/2022 – 1/17/2023



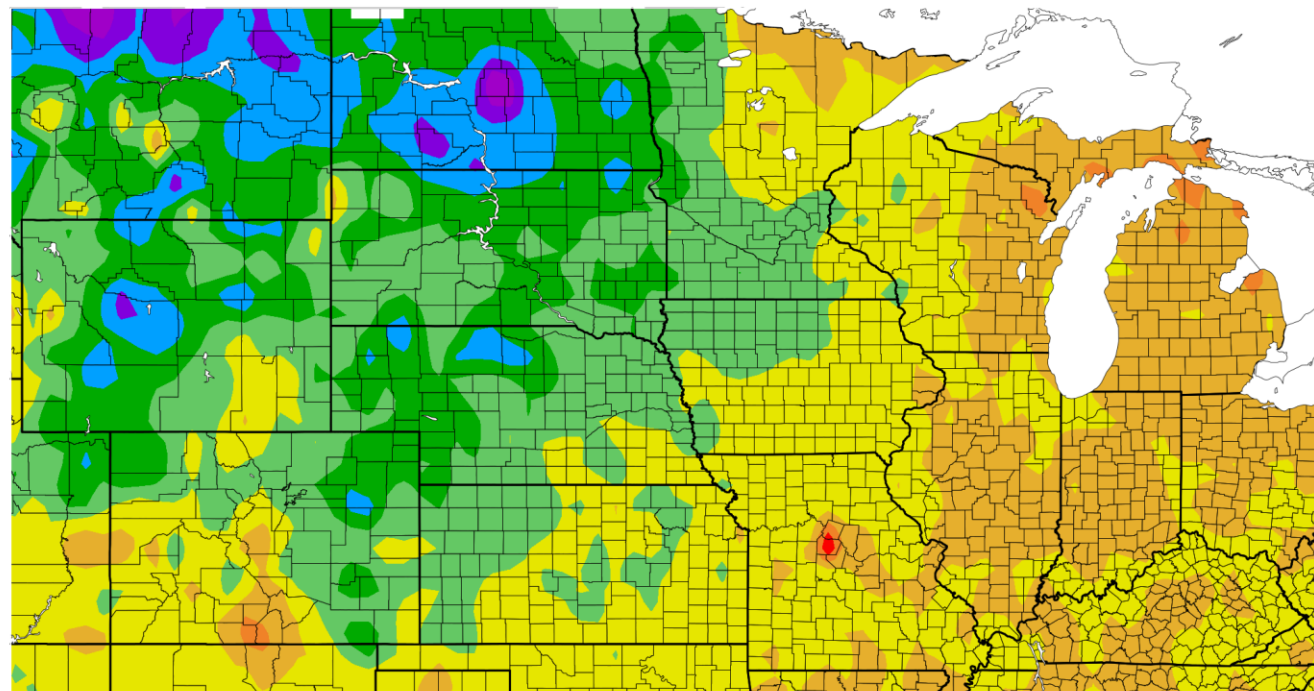
Generated 1/18/2023 at HPRCC using provisional data.

NOAA Regional Climate Centers

# Recent conditions

- 60 day temperatures |
- **Similar trend:**
  - **Above normal temperatures in southwest and eastern portions of the region.**
  - **Below normal in the central and north.**

Departure from Normal Temperature (F)  
11/19/2022 – 1/17/2023



Generated 1/18/2023 at HPRCC using provisional data.

NOAA Regional Climate Centers

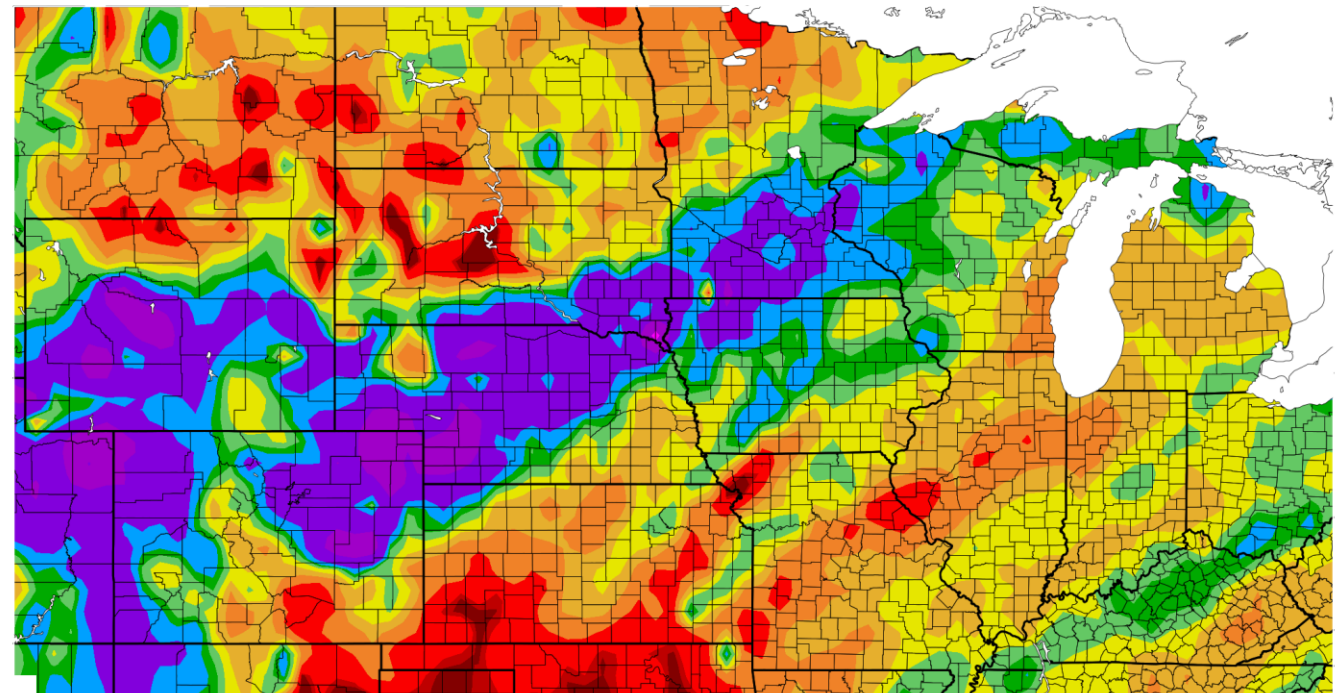


# Recent conditions

## 30 day precipitation |

- **Snowfall brings wetter than normal conditions across central portion of the region.**
- **Mostly dry in the south and northwest.**

Percent of Normal Precipitation (%)  
12/19/2022 – 1/17/2023



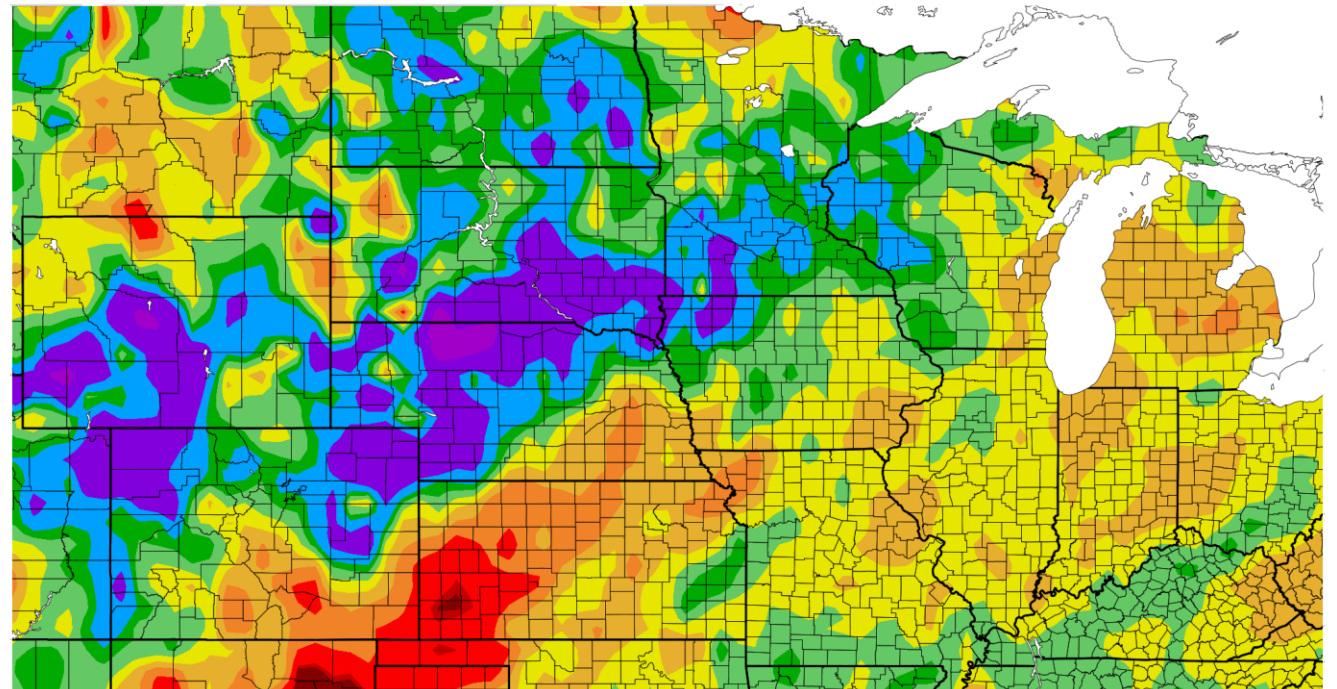
Generated 1/18/2023 at HPRCC using provisional data.

NOAA Regional Climate Centers

# Recent conditions

- 60 day precipitation |
- **General wetness across north central areas.**
  - **Dry across southwest KS and points eastward.**

Percent of Normal Precipitation (%)  
11/19/2022 – 1/17/2023



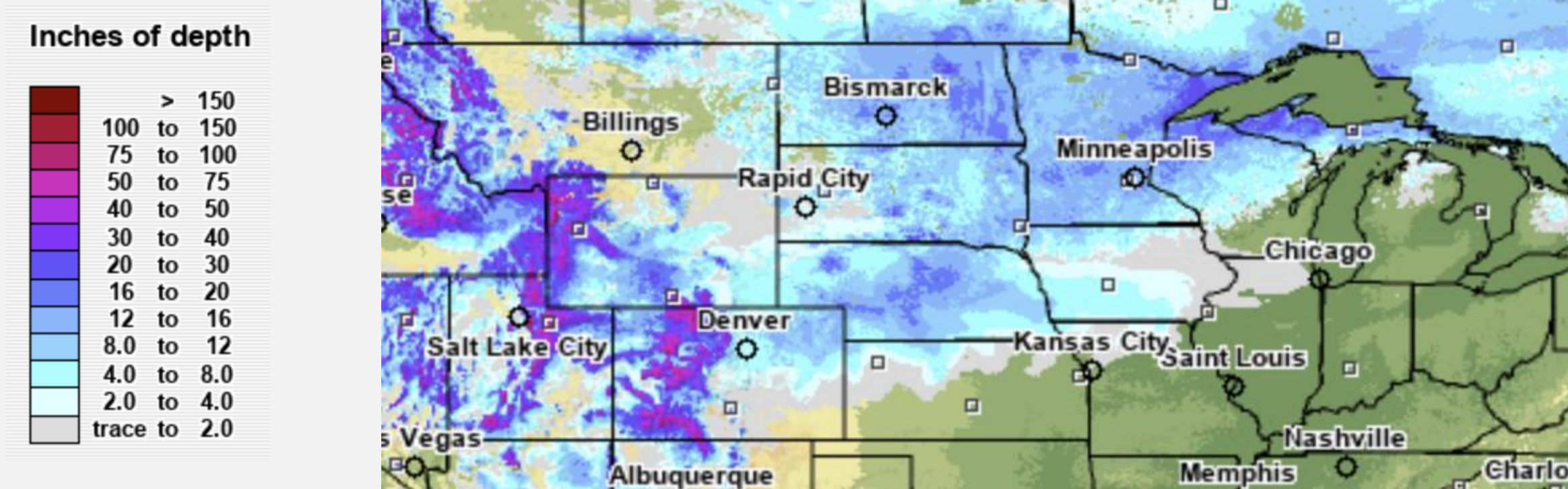
Generated 1/18/2023 at HPRCC using provisional data.

NOAA Regional Climate Centers

# Plains snow

- Plains snowpack greatest in north central states.
- 2+ inches water equivalence in the north, ~1" in Nebraska (with more added in latest storm).

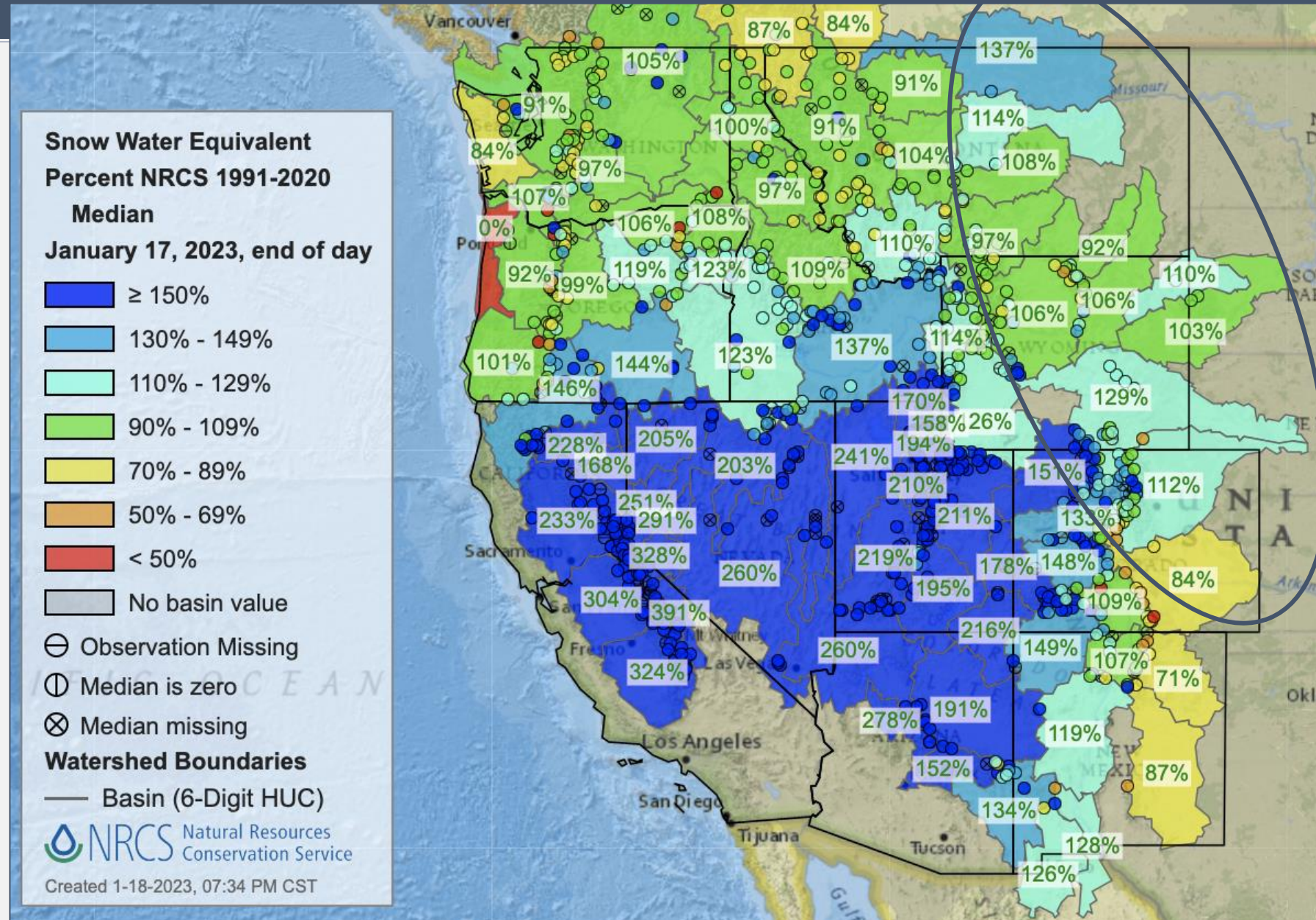
January 19<sup>th</sup> Snow Depth





# High elevation snow

- Mountain snowpack showing near to above normal for this point in the accumulation season (still early).

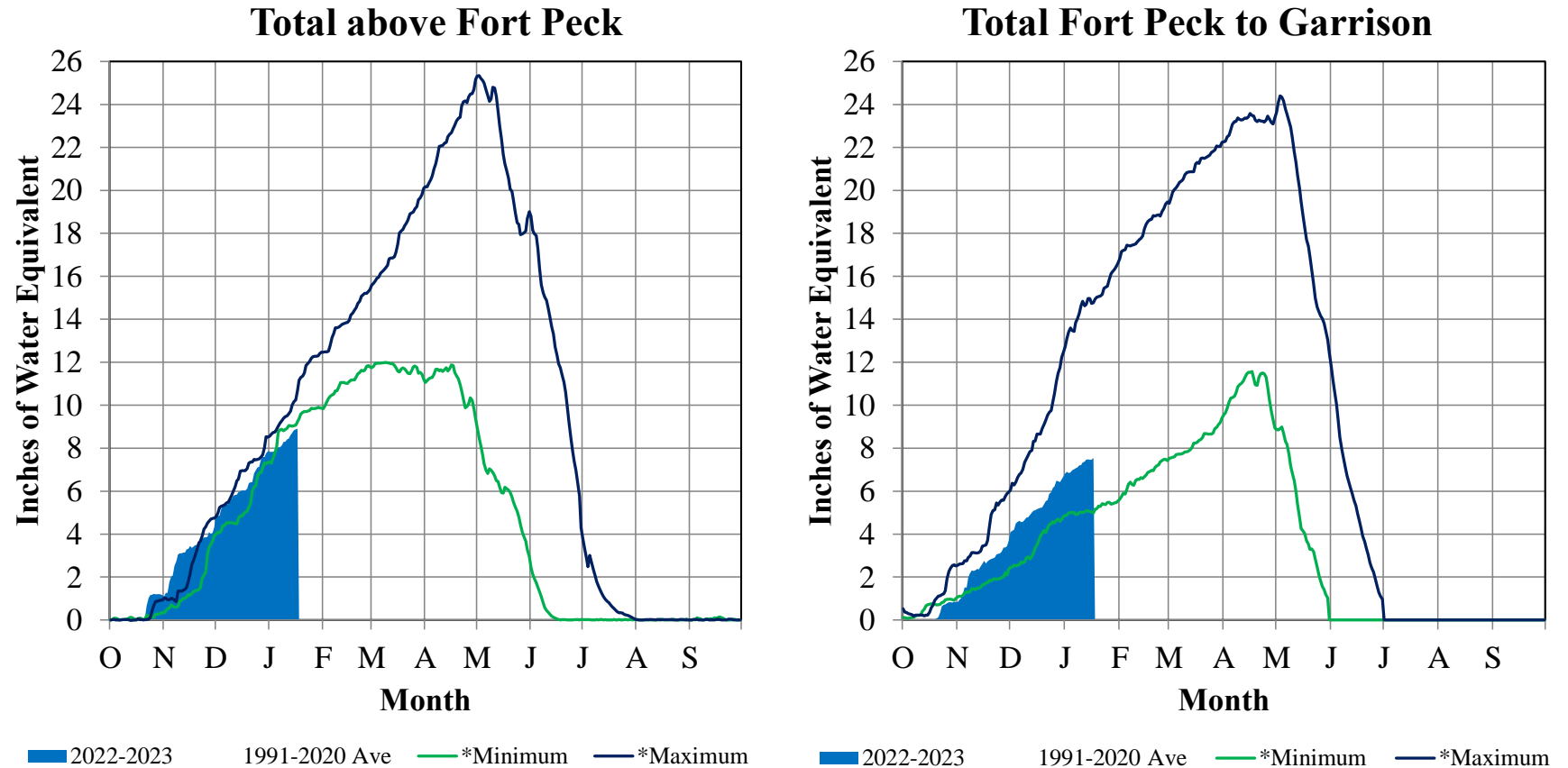


# Snowpack

- Tracking right around normal thus far.

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

17-Jan-2023



On January 17, 2023 the mountain Snow Water Equivalent (SWE) in the "Total above Fort Peck" reach is 8.9" and 104% of the (1991-2020) average. The mountain SWE in the "Fort Peck to Garrison" reach is 7.5" and 96% 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.

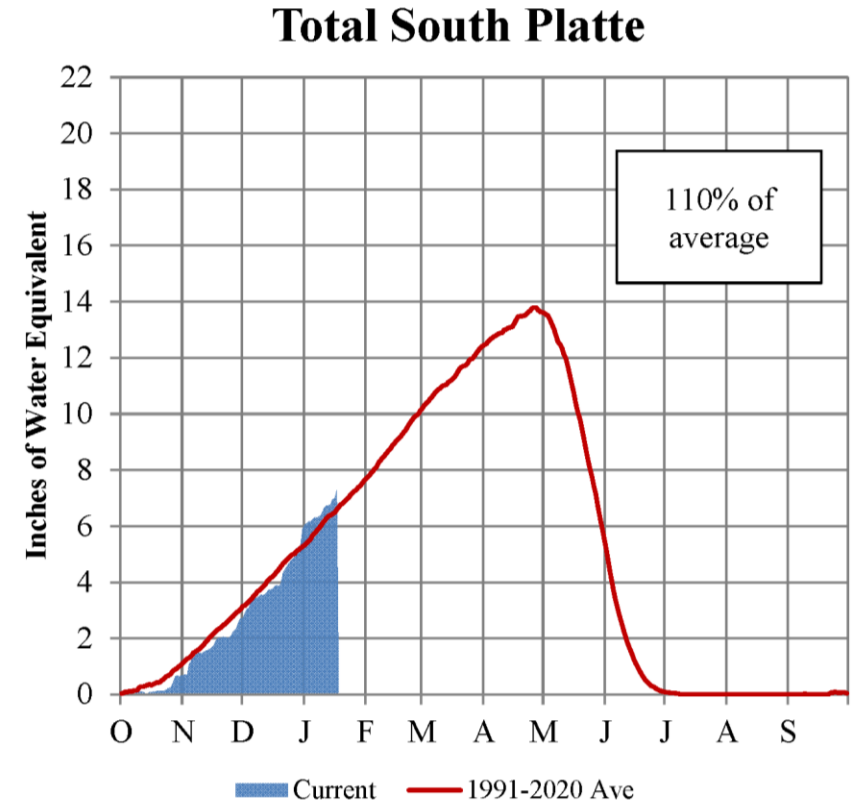
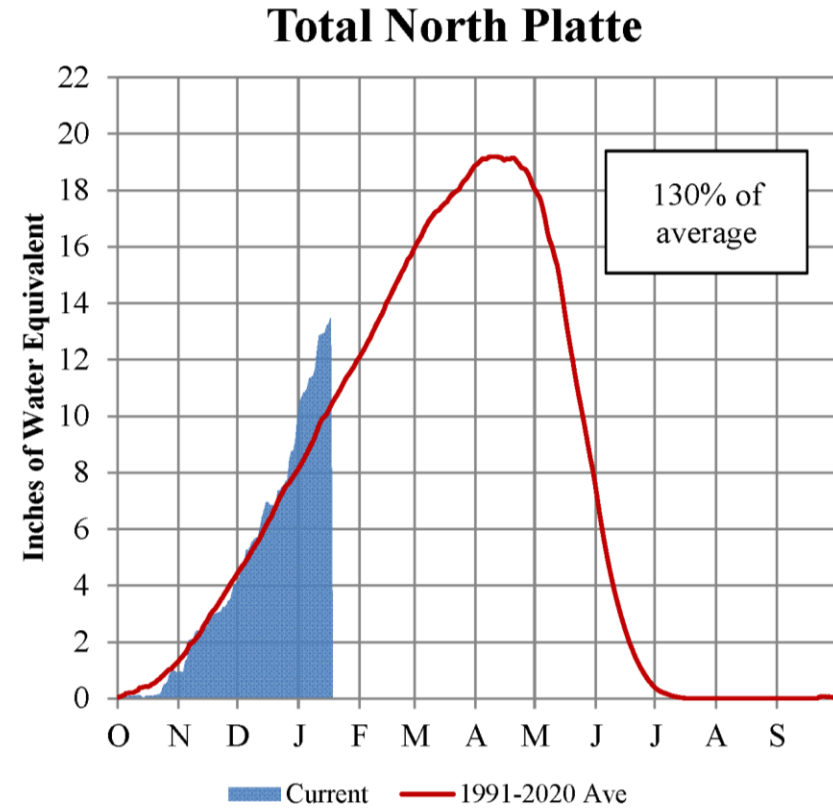
Provisional data. Subject to revision.

# Snowpack

- Tracking right around normal thus far in South Platte.
- North Platte trending slightly above normal.

## Platte River Basin - Mountain Snowpack Water Content Water Year 2021-2022

January 18, 2023



The North and South Platte River Basin mountain snowpacks normally peak near April 10 and the end of April, respectively. As of January 18, 2023, the mountain snowpack SWE in the "Total North Platte" reach is 13.5", 130% of the (1991-2020) average. The mountain snowpack SWE in the "Total South Platte" reach is 7.3", 110% of the (1991-2020) average.

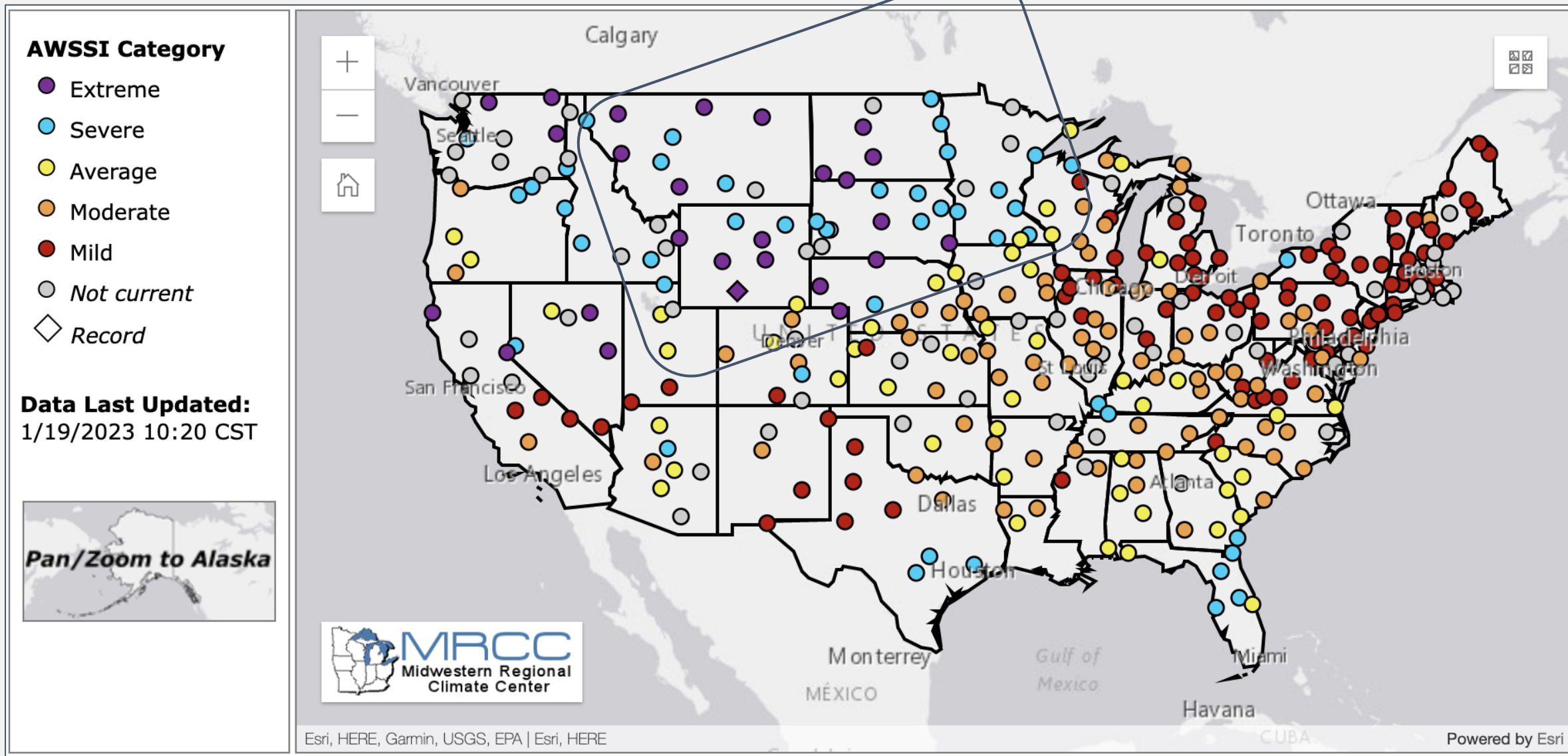
Source: USDA, Natural Resource Conservation Service

Provisional Data. Subject to Revision



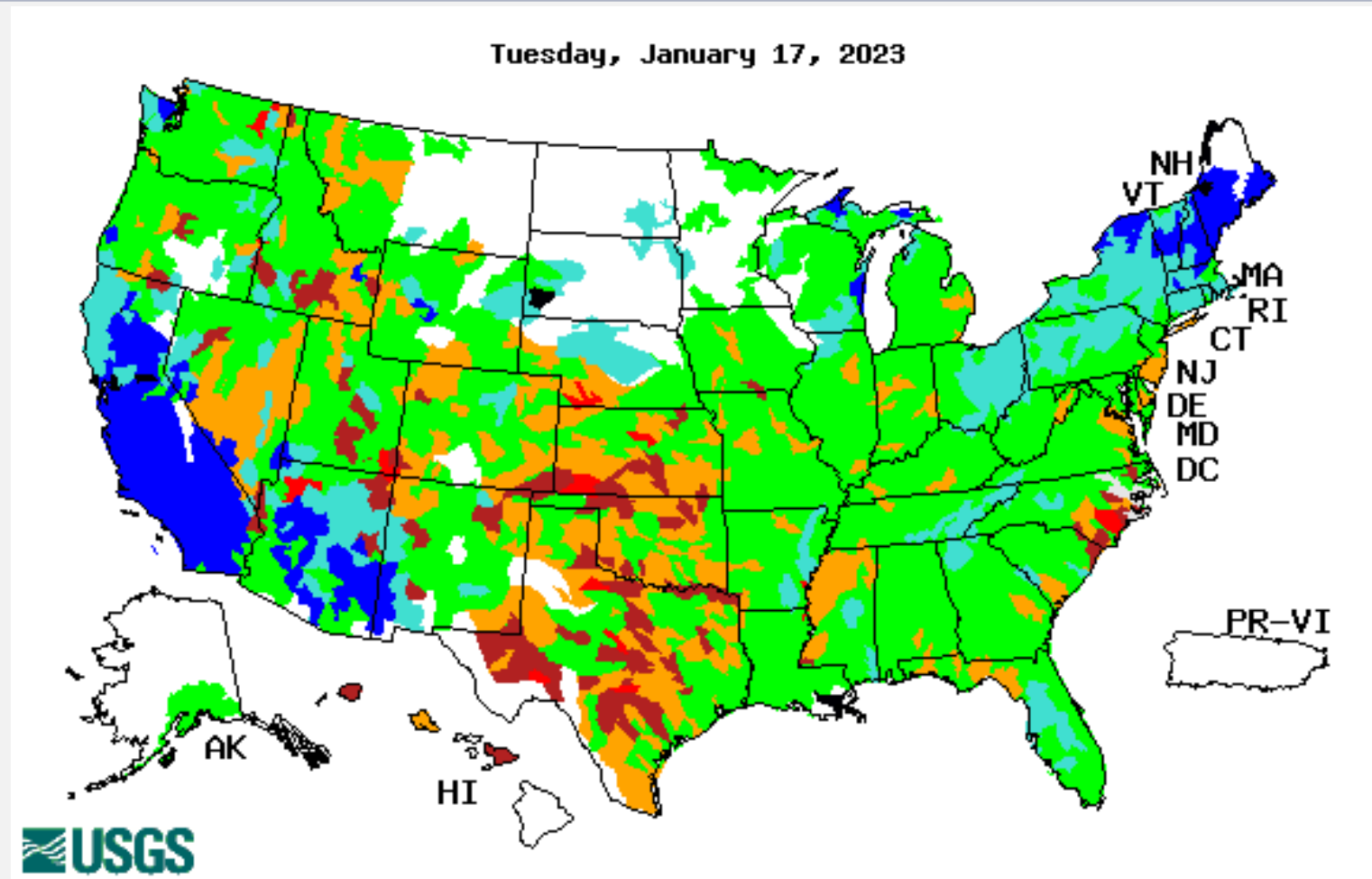
# Accumulated Winter Season Severity Index

NEBRASKA STATE  
CLIMATE OFFICE



# Streamflows

- Frozen conditions in north central.
- Evidence of dry conditions in areas with ongoing / persistent drought.



Explanation - Percentile classes

Low	<10	10-24	25-75	76-90	>90	High	No Data	
	Much below normal	Below normal	Normal	Above normal	Much above normal			

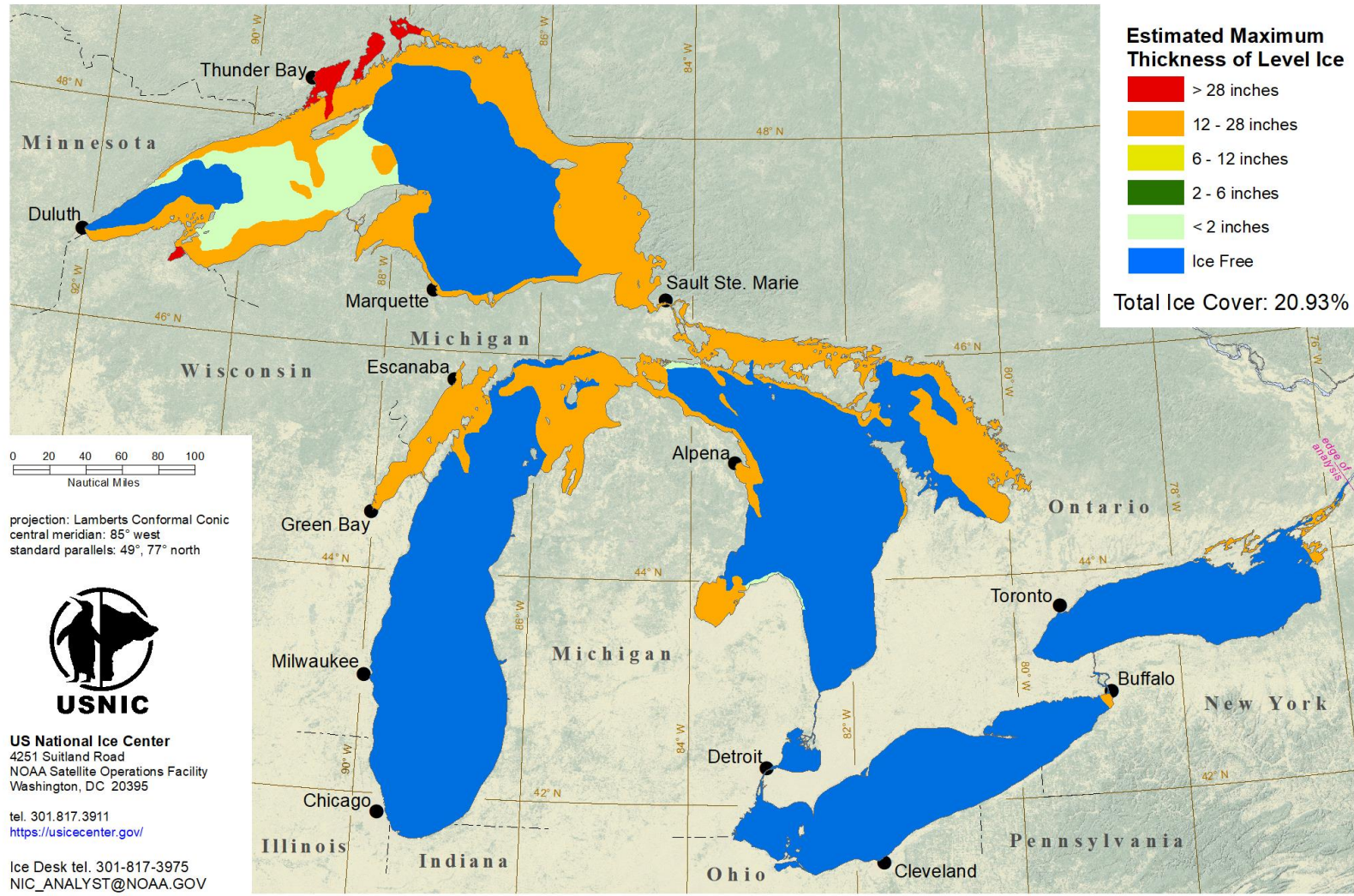


# Great Lakes

- **Near record low ice coverage with basin coverage less than 4%.**
- **Open water leads to enhanced potential for lake effect snow (if cold enough).**
- **Water levels continue to fall at a rate faster than seasonal decline.**
- **Helped bring conditions closer to long-term average levels after several years of higher than normal.**

U. S. NATIONAL ICE CENTER  
USCG DISTRICT 9 GREAT LAKES ICE  
ESTIMATED MAXIMUM THICKNESS OF LEVEL ICE

ICE DATE: 29 MAR 2022  
MAP PRODUCED: 29 MAR 2022

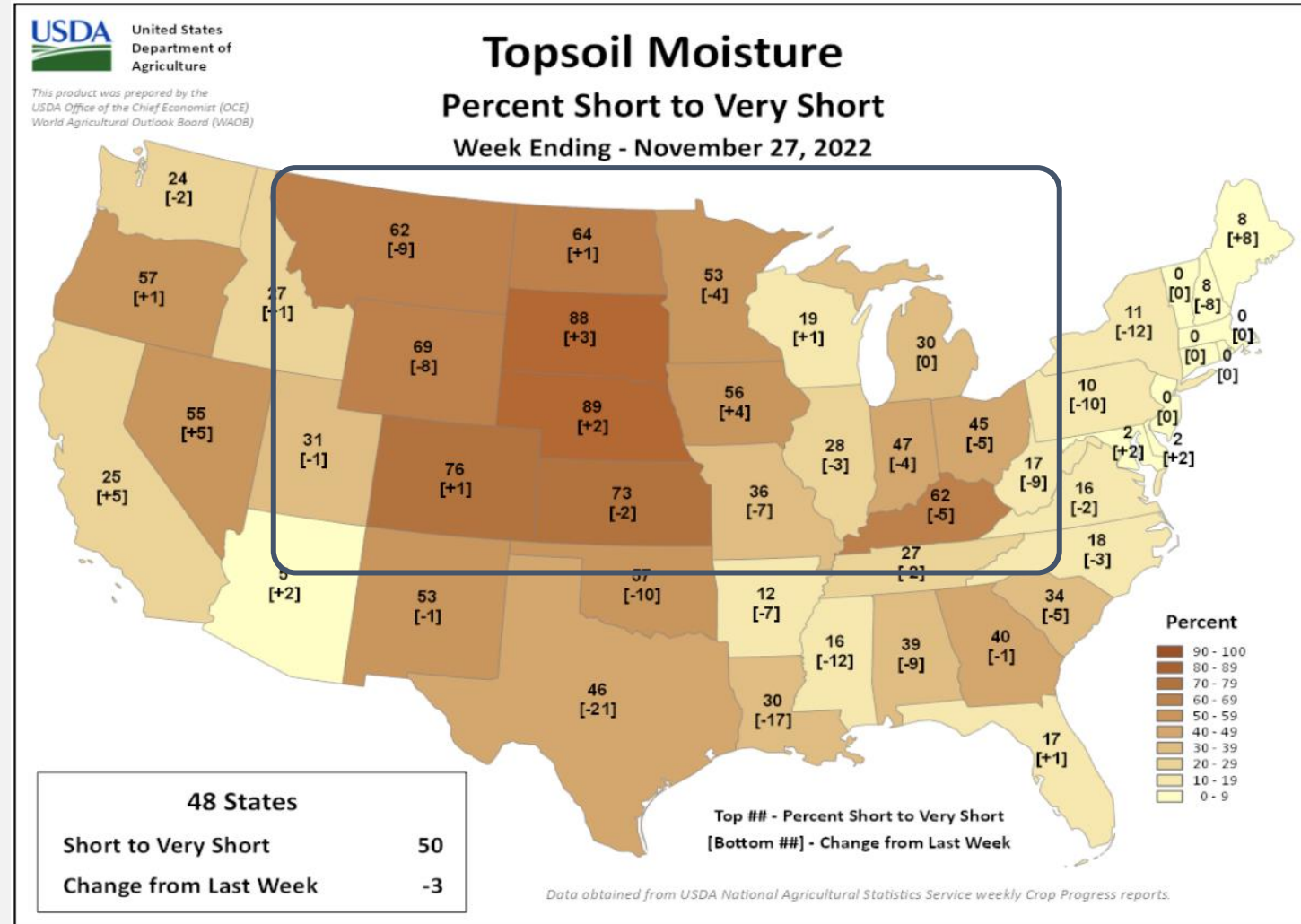




# Soil moisture, end of fall

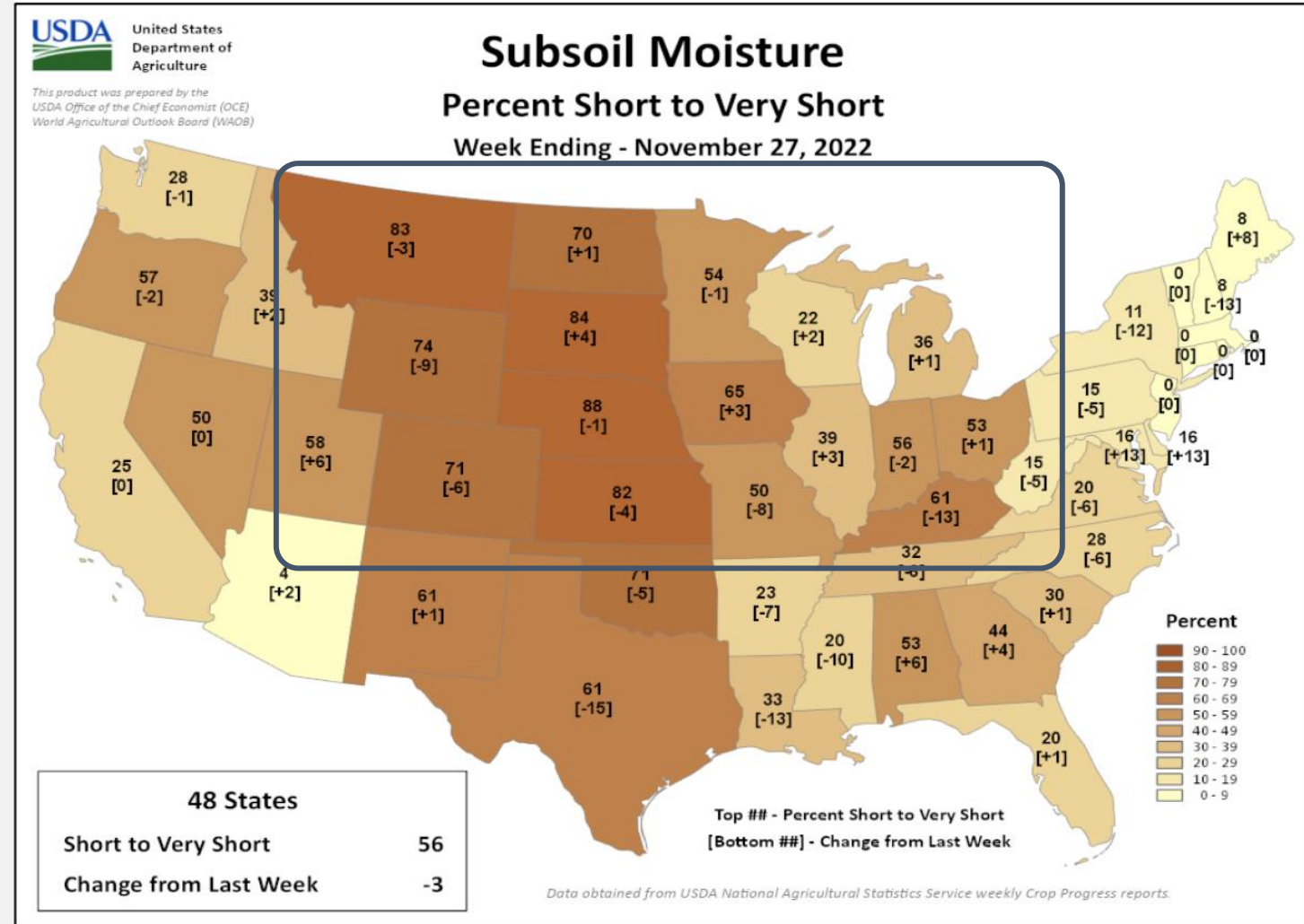
## Recall:

- We entered winter with low soil moisture for much of region.
- Topsoil (6") moisture illustrating drought conditions.



# Soil moisture, end of fall

- **Subsoils entered the winter with very dry conditions and little fall recharge.**



Thank you to Brad Rippey and USDA-OCE

<https://www.usda.library.cornell.edu/concern/publications/cj82k728n?locale=en>

# Current drought (USDM)

NEBRASKA STATE  
CLIMATE OFFICE

## Drought

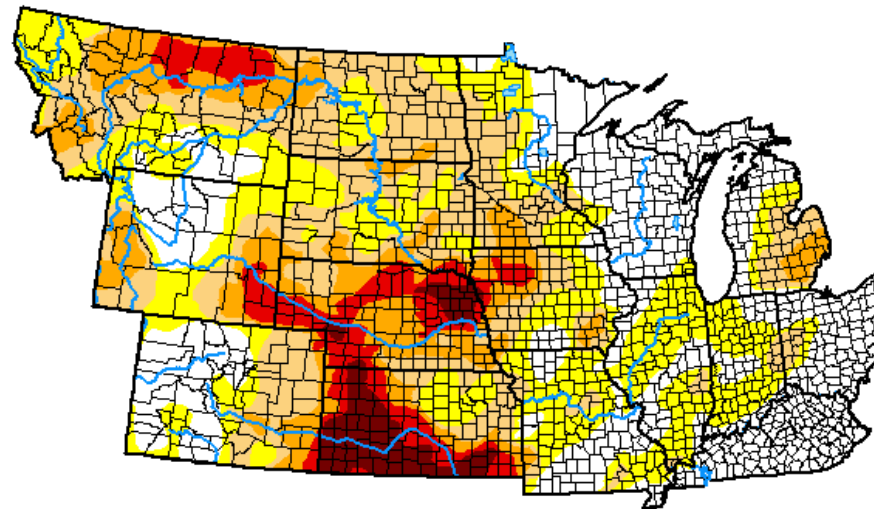
- South central portion of the region is in worst condition with highest moisture deficits.
- 45% of region in drought category.
- 10% in extreme (D3) drought.

### U.S. Drought Monitor NWS Central

**January 17, 2023**  
(Released Thursday, Jan. 19, 2023)  
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	29.08	70.92	44.90	22.56	9.76	3.40
<b>Last Week</b> <small>01-10-2023</small>	28.87	71.13	44.87	23.27	9.76	3.40
<b>3 Months Ago</b> <small>10-18-2022</small>	14.16	85.84	59.67	29.36	12.01	3.19
<b>Start of Calendar Year</b> <small>01-03-2023</small>	25.76	74.24	48.98	24.27	9.90	3.48
<b>Start of Water Year</b> <small>09-27-2022</small>	27.00	73.00	47.70	23.08	8.80	2.73
<b>One Year Ago</b> <small>01-18-2022</small>	33.21	66.79	46.86	27.52	9.11	0.91



#### Intensity:

None	D2 Severe Drought
D0 Abnormally Dry	D3 Extreme Drought
D1 Moderate 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:

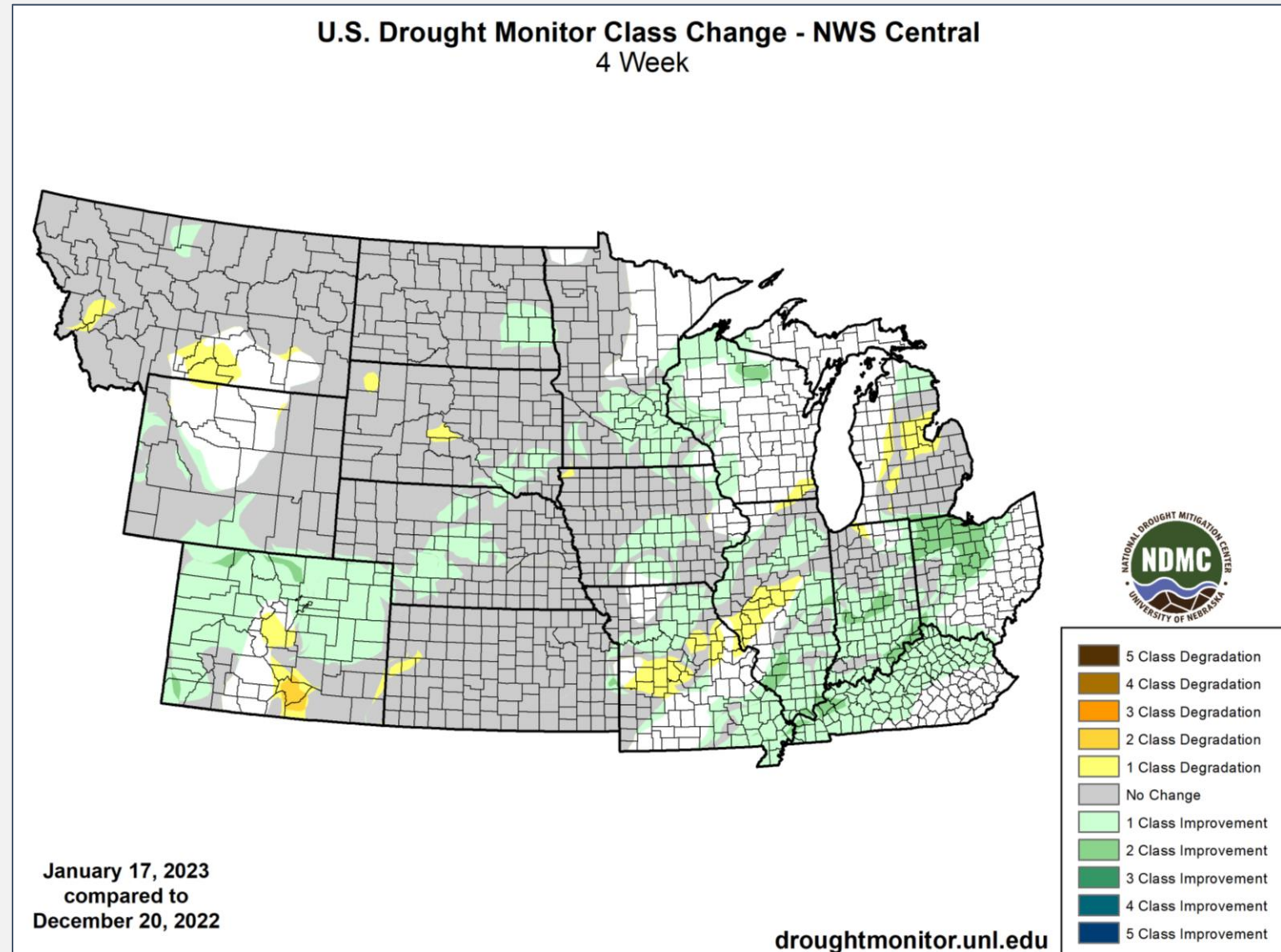
Deborah Bathke  
National Drought Mitigation Center





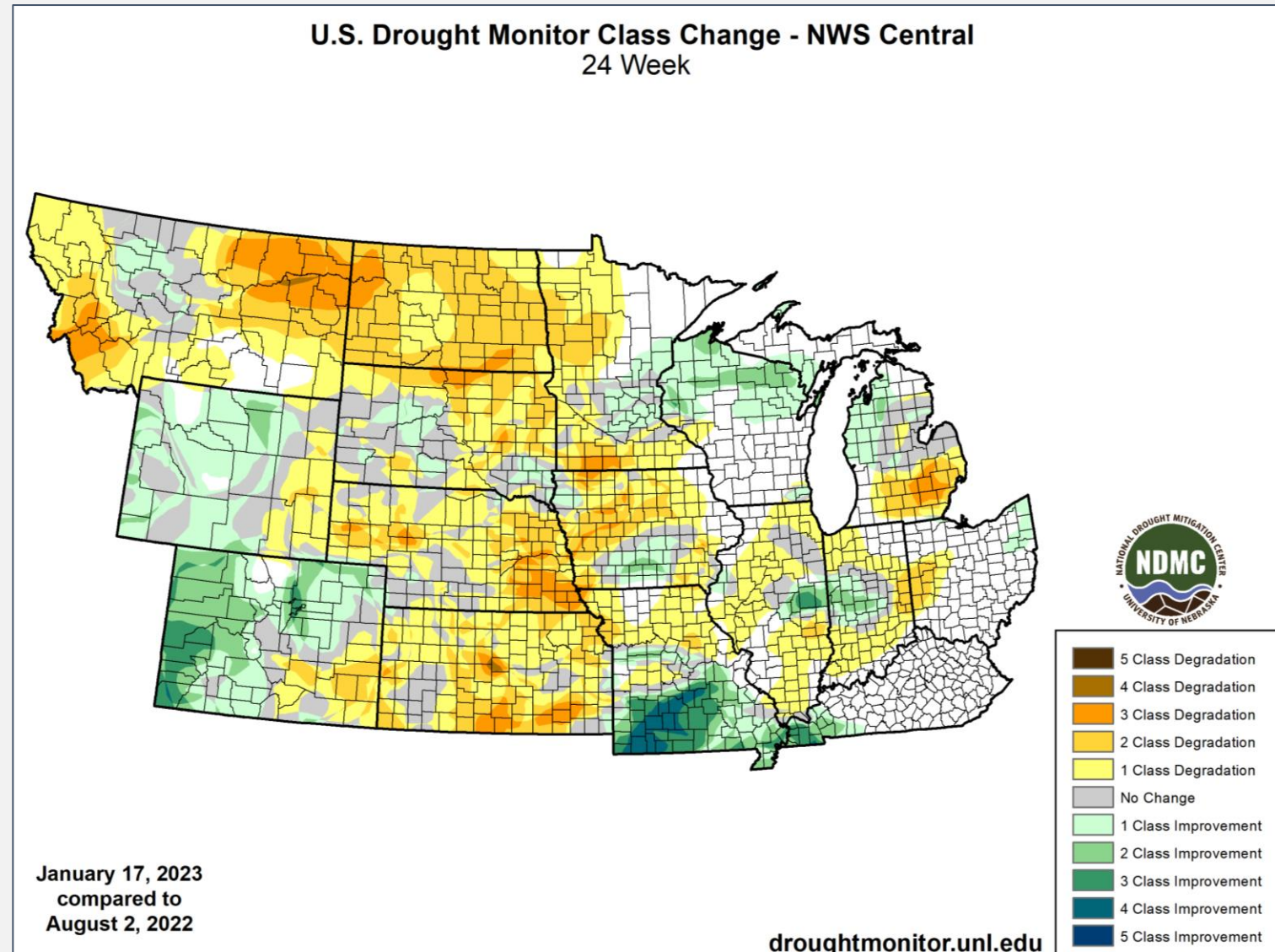
# One month drought changes

- Areas of improvements around the region.
- One – three category changes.
- Isolated pockets of degradation.



# Six month drought changes

- Areas of improvements around in CO/WY, WI, southern MO.
- Intensification with a dry fall in central portion of the region.



# Impacts around the region

## Heavy snow and impacts to Pine Ridge.

- > 2ft of snow in mid-December leads to state of emergency.

### LOCAL NEWS

## Pine Ridge restricts water due to recent snow

by: [Jazzmine Jackson](#)  
Posted: Dec 27, 2022 / 11:16 AM CST  
Updated: Dec 27, 2022 / 12:34 PM CST



ALERT

## Thousands trapped on Pine Ridge burn clothes for warmth in wake of storm



# Impacts around the region

NEBRASKA STATE  
CLIMATE OFFICE

## History making storms in Minnesota.

- Impacts of 'bomb' cyclone felt in MN.
- Already season's worth of snow to date.
- Natural and built infrastructure damage.
- Degrading ice conditions.

## Accumulating Snow and Arctic Ground Blizzard, December 21-24, 2022

An enormous, powerful, and deadly winter storm overtook much of Minnesota and the surrounding region after an abundant and powdery snowfall ending on Thursday December 22, 2022, set the stage for a long-lasting and brutally cold regional ground blizzard.\* The virtually impossible and life-threatening conditions on nearly all

<https://www.dnr.state.mn.us/climate/journal/snowstorm-and-arctic-ground-blizzard-december-21-24-2022.html>



Deep, damaging snow, forcing trees to "bow" towards the ground and break, as seen from the Yukon Trail outside of Two Harbors. Courtesy P. Goff

# Impacts around the region

## Ice jams on Missouri River.

- Power plant temporarily closed due to low water levels.

TOP STORY

## Nearly 20-mile ice jam on Missouri River poses risks through winter

Nancy Gaarder Jan 13, 2023 Updated Jan 13, 2023 0

## Ice jam on the Missouri River



©Mapcreator.io | ©SMEng, Lee Enterprises graphic

# Impacts around the region

## Relative warmth in the east.

- Recreational impacts in Wisconsin due to lack of snow across south. Hazardous ice fishing conditions.
- Winter severe weather in Iowa (2 tornados in Jan), Illinois (8 tornados in Jan)

## Dry across southwest.

- Blowing soil reported around region.

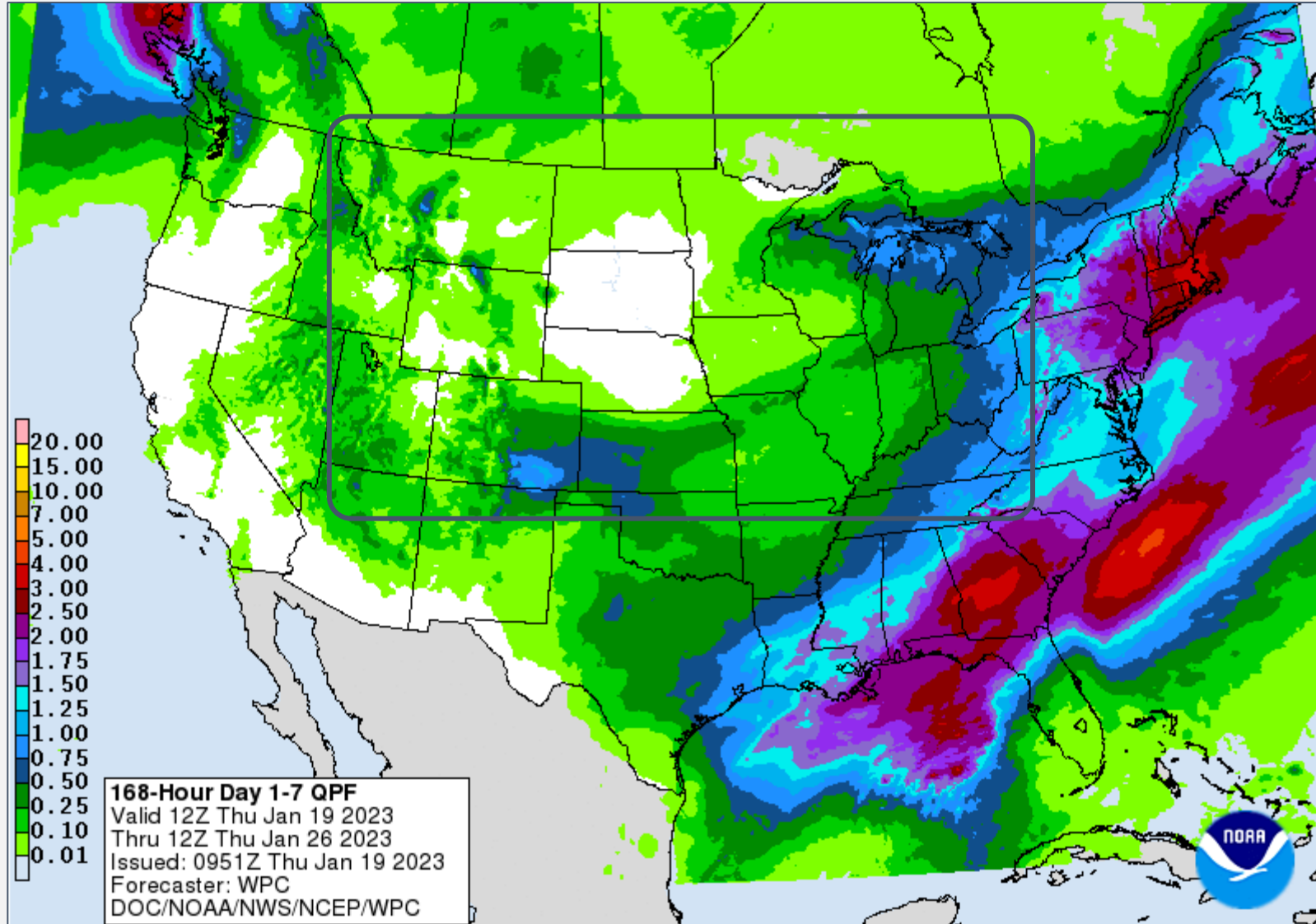


Tornado damage in McLean County, IL. Courtesy National Weather Service via Trenton Ford.



# Precipitation outlook (Jan 19 - 26)

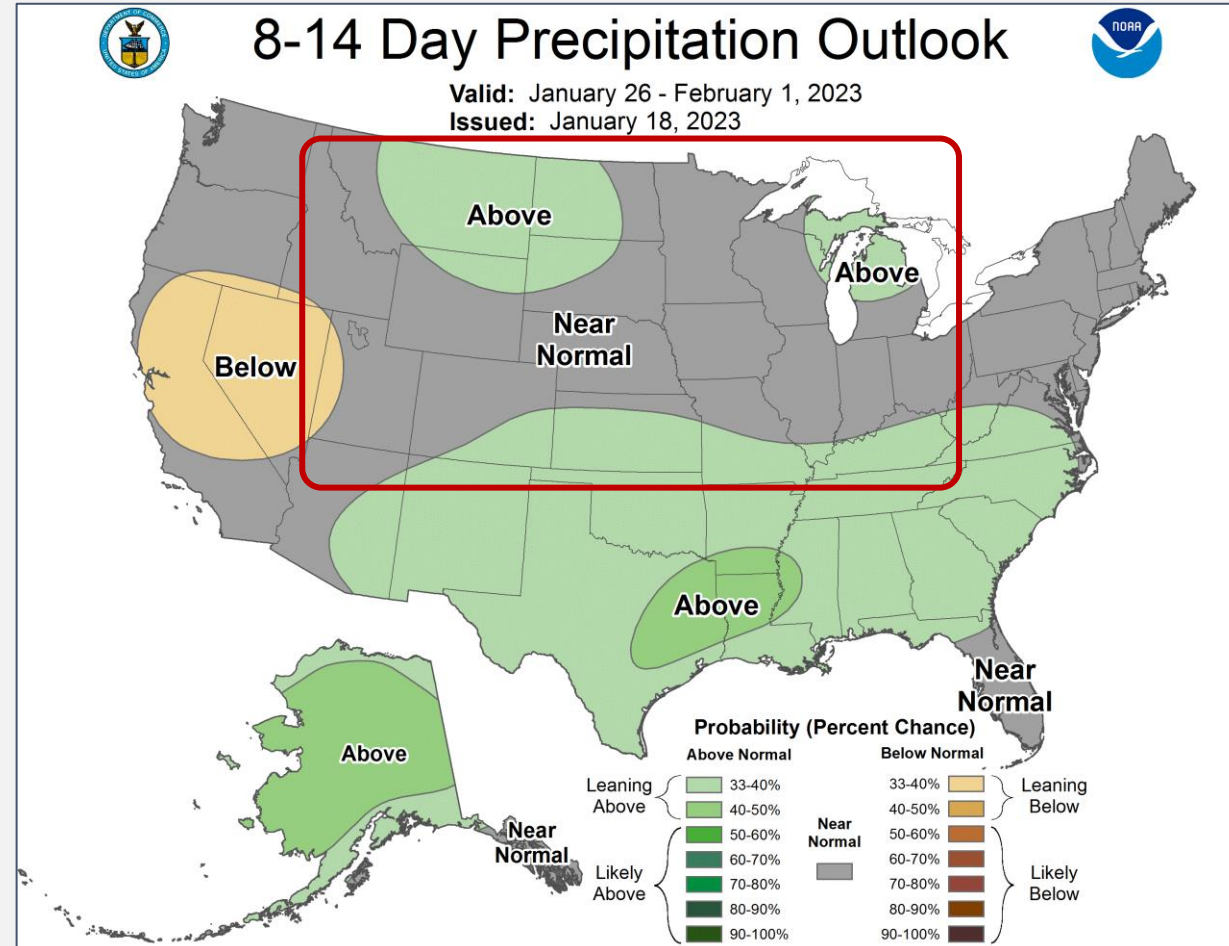
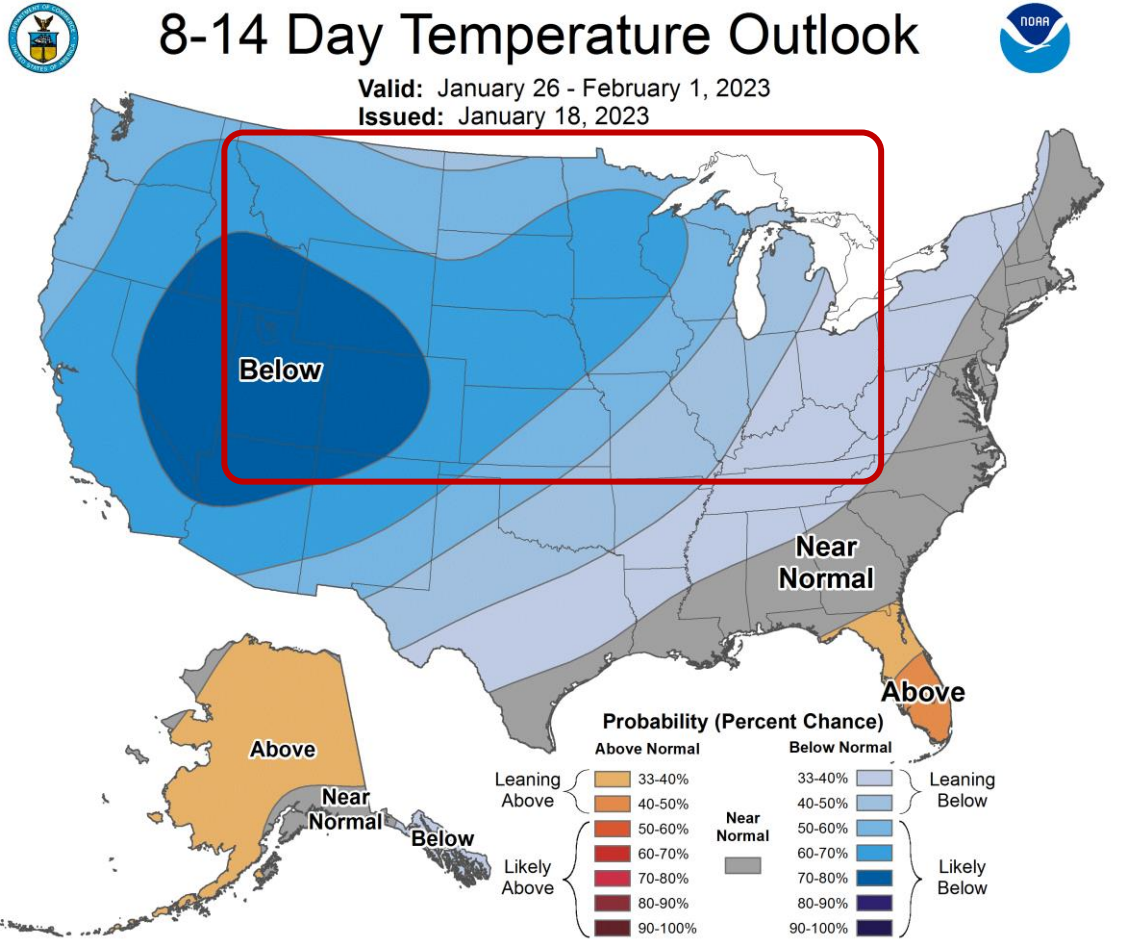
NEBRASKA STATE  
CLIMATE OFFICE



[https:// www.wpc.ncep.noaa.gov/qpf/day1-7.shtml](https://www.wpc.ncep.noaa.gov/qpf/day1-7.shtml)

# Short-term outlook (Jan26 – Feb1)

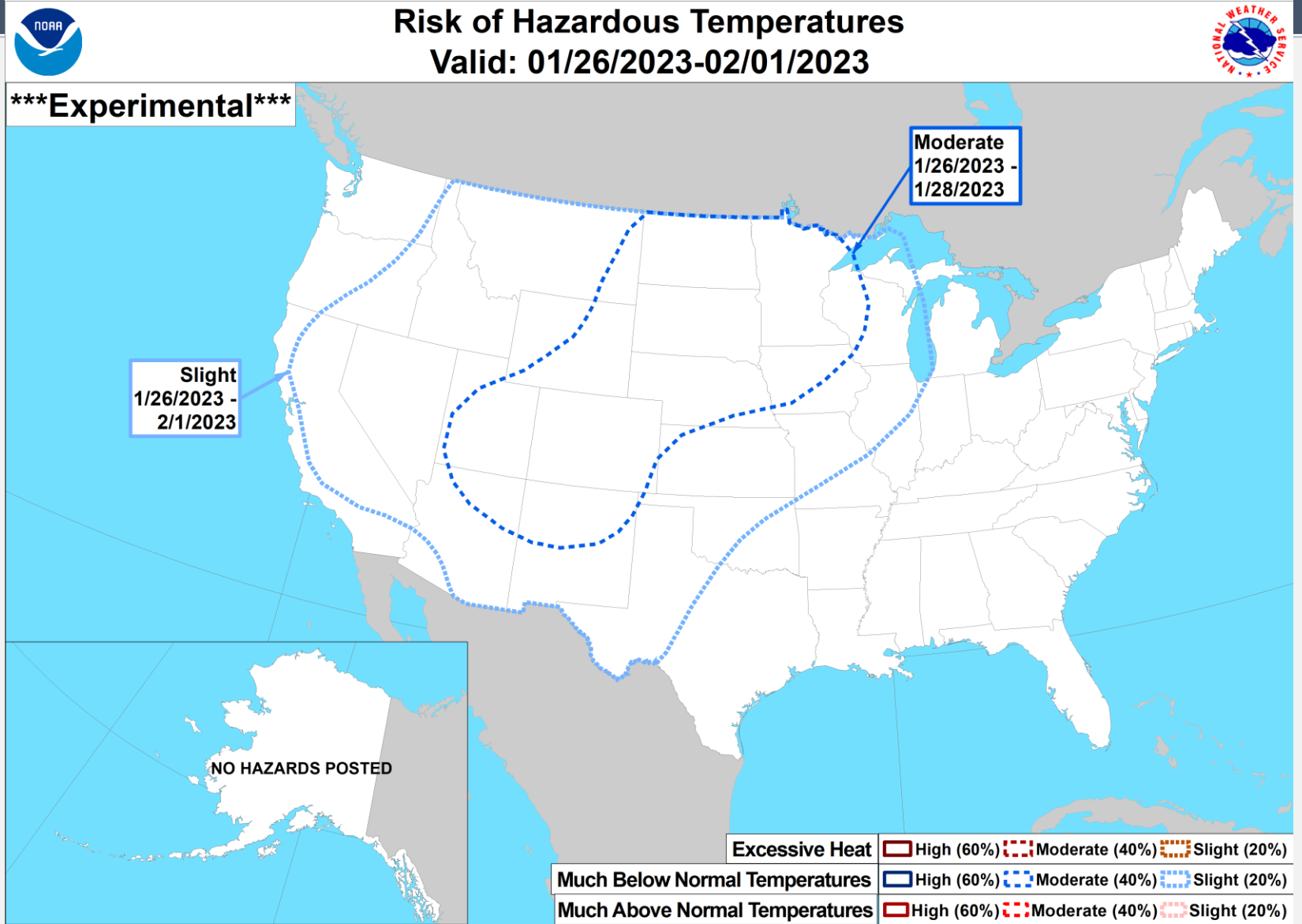
- Odds tilted to colder than normal for much of the country.
- Chances for above normal precipitation for portions of the region.



# Short-term hazards (Jan 26 – Feb 1)

NEBRASKA STATE  
CLIMATE OFFICE

- Slight to moderate risk of much below normal temperatures for the end of January.



Climate Prediction Center

Made: 01/18/2023 3PM EST

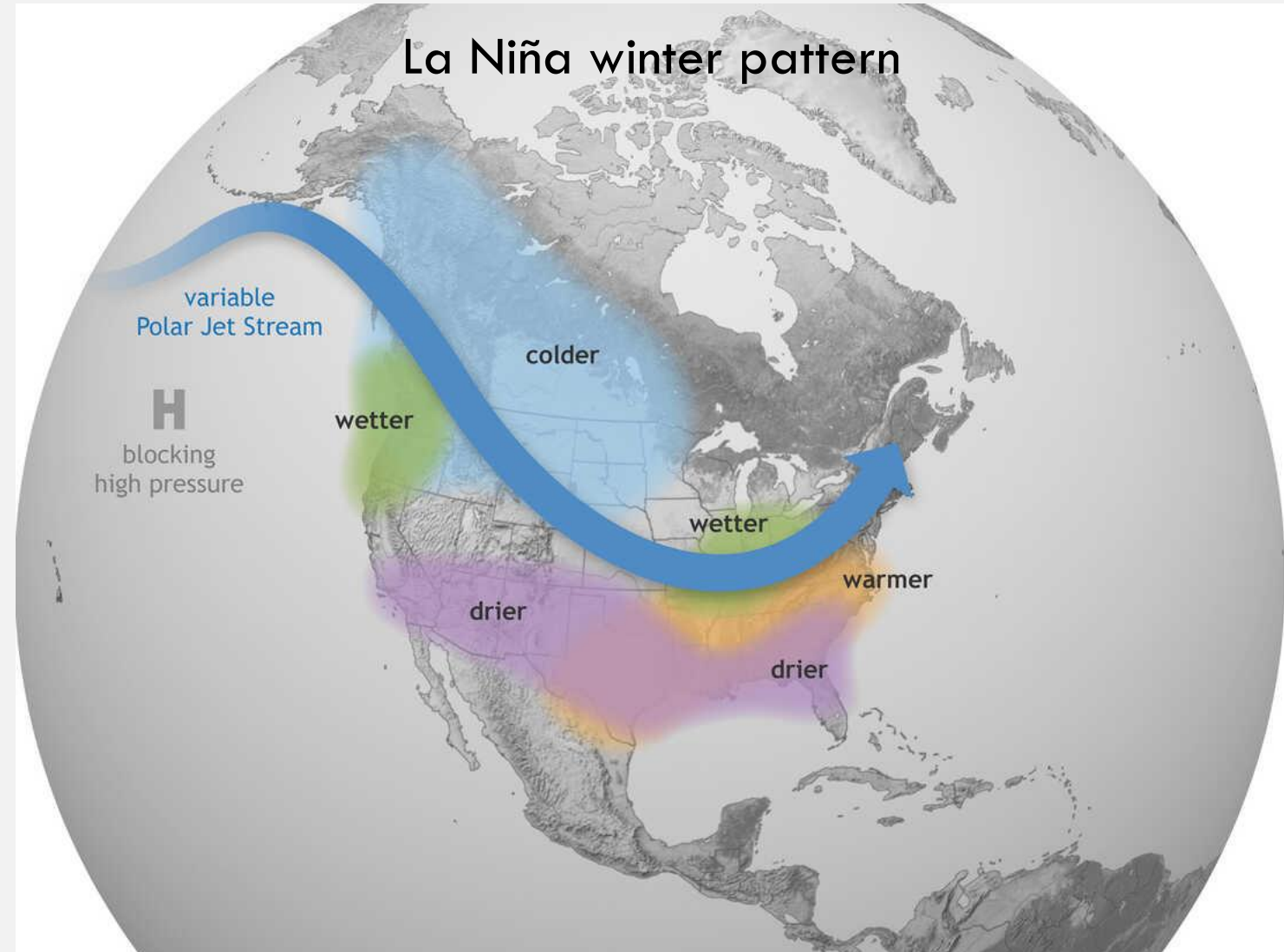
Follow us:  

[www.cpc.ncep.noaa.gov](http://www.cpc.ncep.noaa.gov)



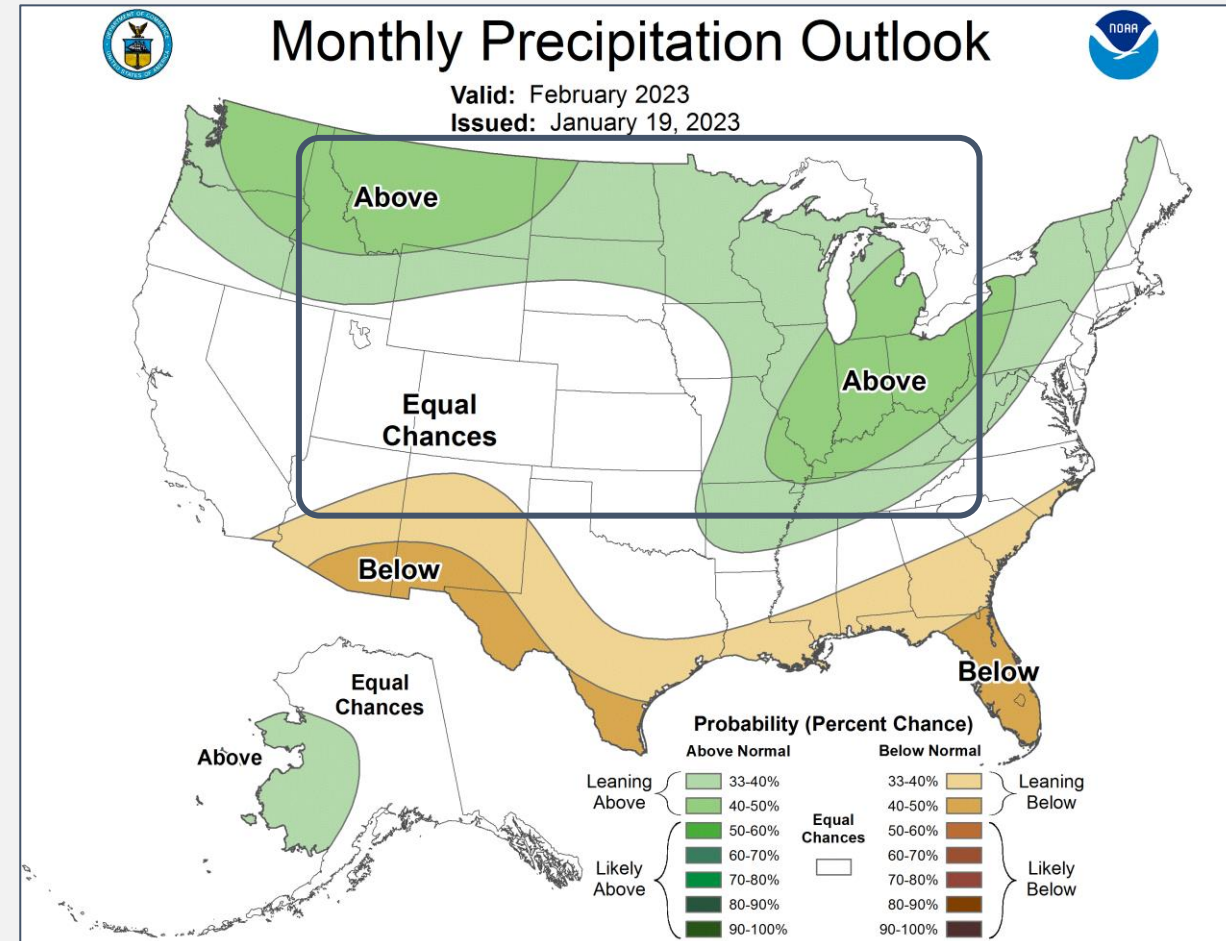
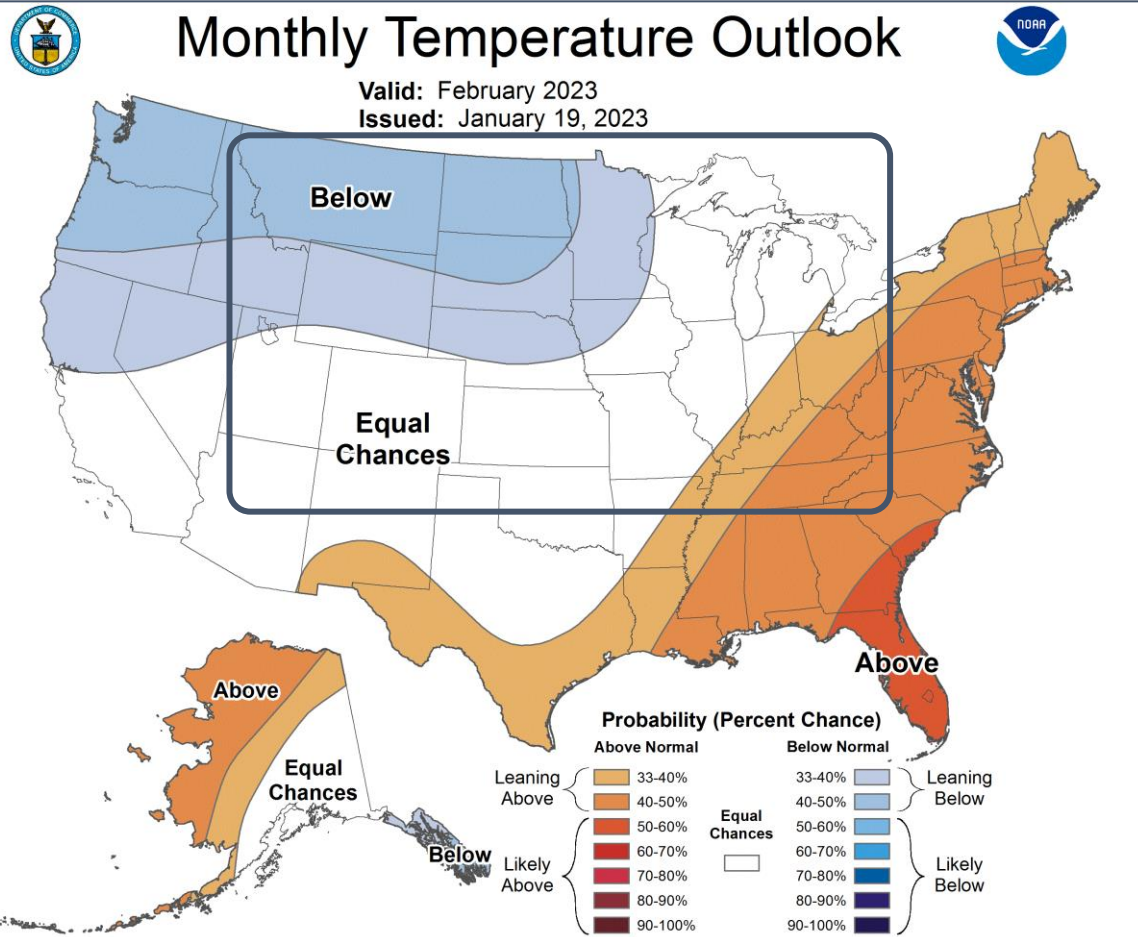
## La Niña advisory

- **Third consecutive La Niña.**
- **Currently in a weakening La Niña.**
- **Shift to neutral is very likely scenario by spring.**



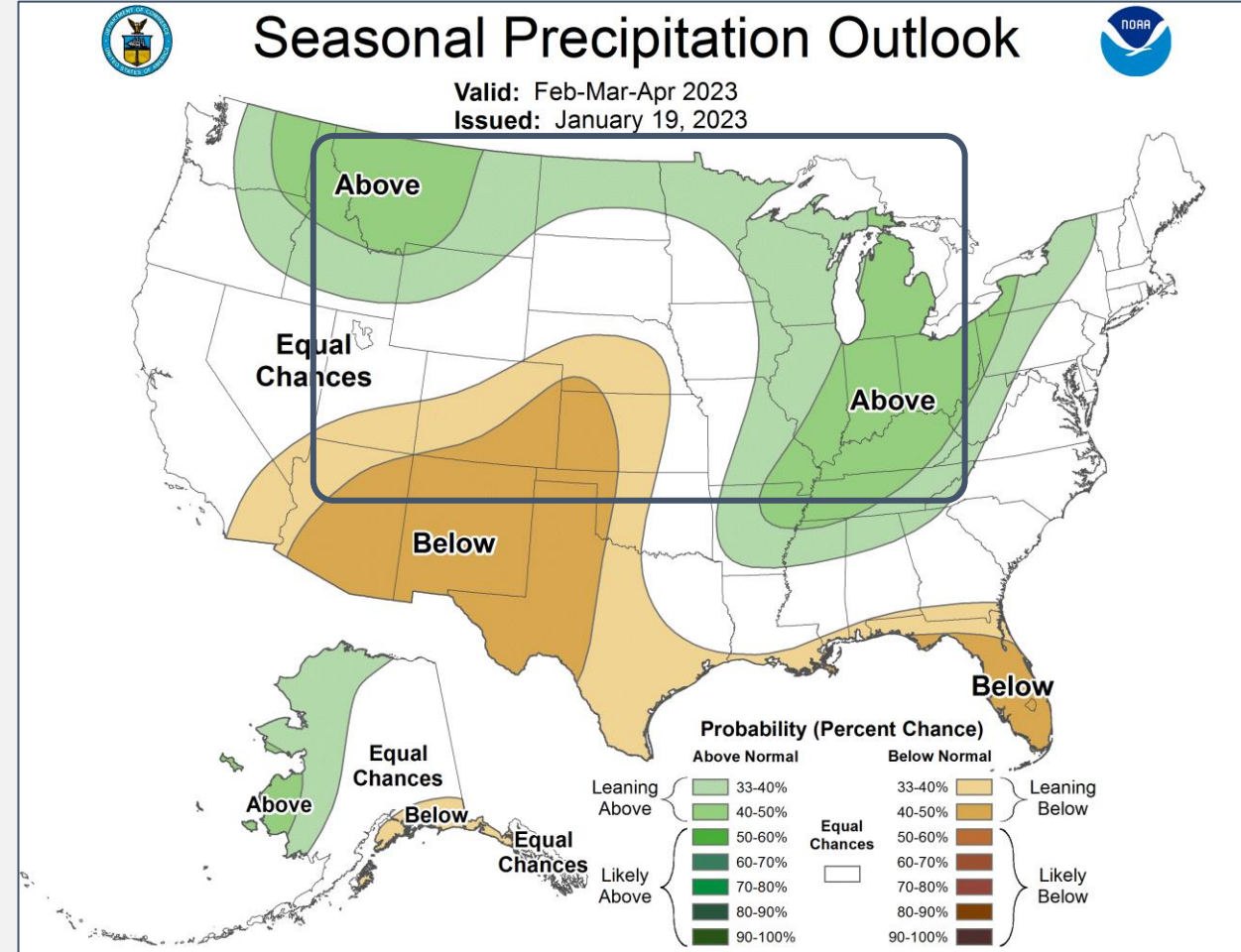
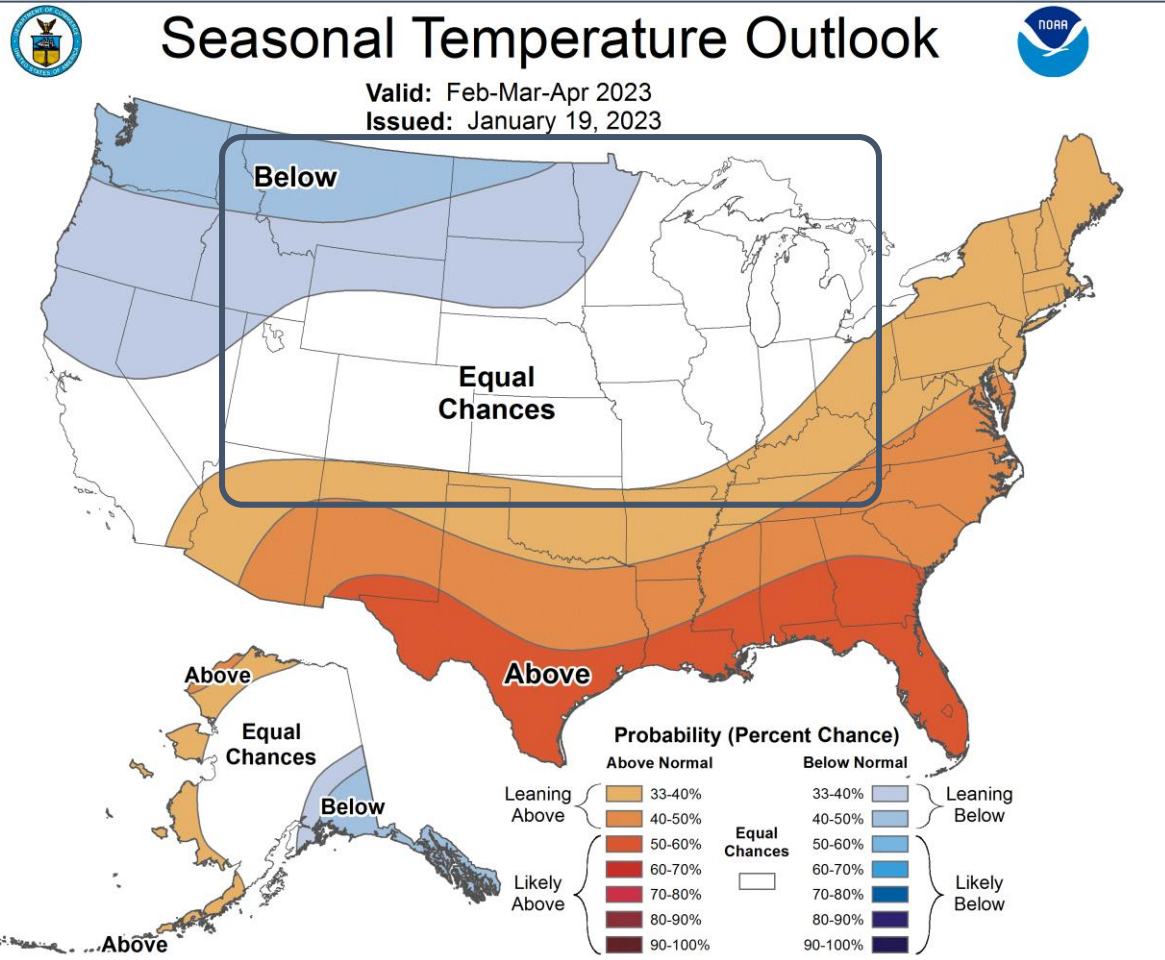
# February outlook

- **Temperatures leaning colder than normal in the northwest. Warmer than normal in southeast. Precipitation trending above normal north, east.**



# Seasonal outlook (Feb – Apr)

**- General persistence of prior conditions – cool signal in northwest, warm signal across east. Wet in north, east and dry pocket in CO/NE/KS.**

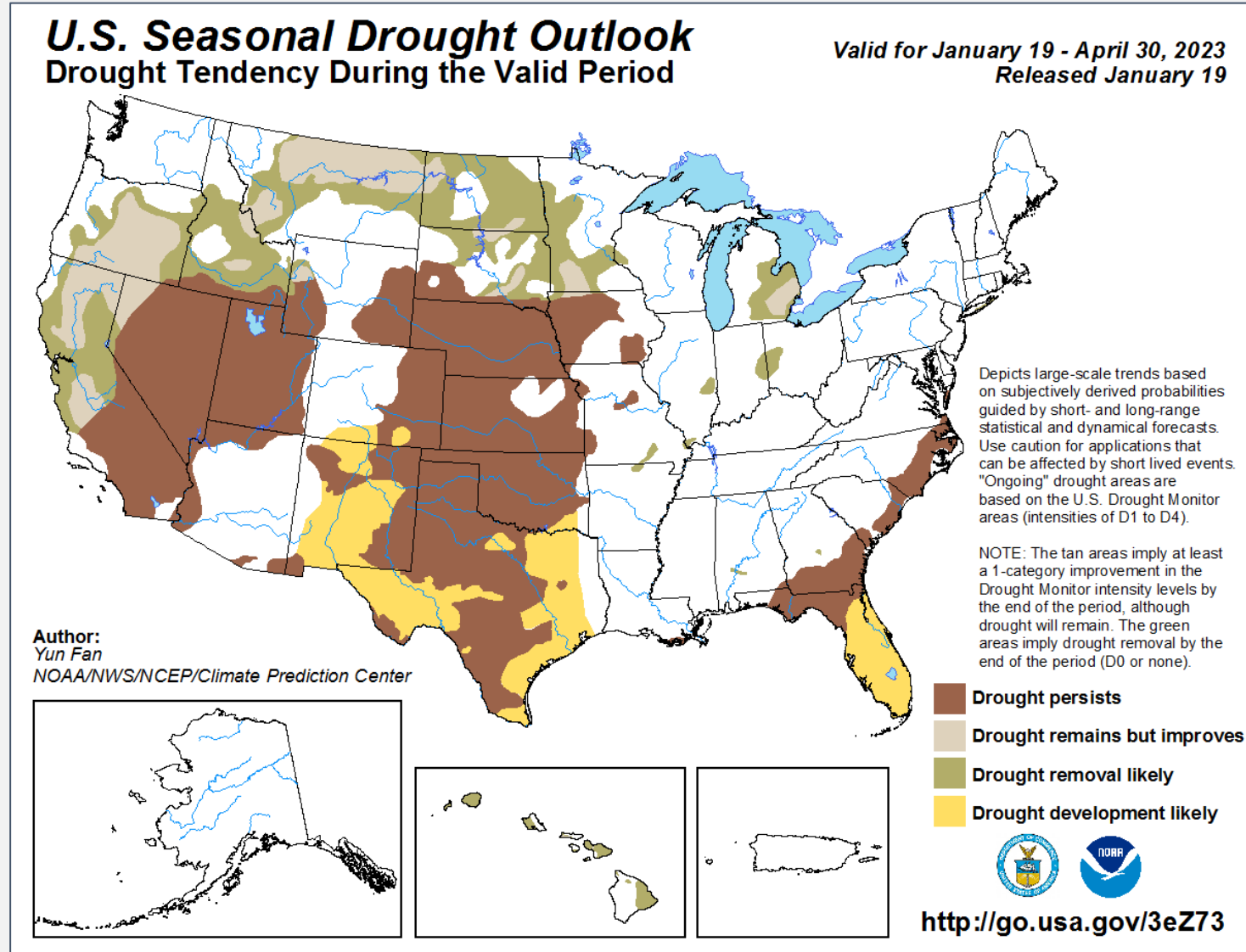




# Drought outlook (Jan – Mar)

NEBRASKA STATE  
CLIMATE OFFICE

- Areas of improvement in the Upper Missouri and Ohio basins associated with wet signal.
- Persistence of drought in the central and southern Plains.
- Drought development likely in south central CO.



# Outlook summary

- **La Niña advisory in effect, likely transition to neutral by spring.**
- **Northwest and eastern portions of the region expecting to see wetter than normal conditions. Potential for drought removal.**
- **Dryness leads to likelihood of drought going into 2023 growing season for CO/NE/KS area.**
- **Warmer than normal continuation in the far eastern portion of region.**
- **Spring flood outlook will be discussed in next webinar.**

# For additional information

NEBRASKA STATE  
CLIMATE OFFICE

## Recording of today's and past presentations:

<https://mrcc.purdue.edu/multimedia/webinars.jsp>

<http://www.hprcc.unl.edu>

## NOAA's National Centers for Environmental Information

[www.ncdc.noaa.gov](http://www.ncdc.noaa.gov)

**Monthly Climate Reports** [www.ncdc.noaa.gov/sotc/](http://www.ncdc.noaa.gov/sotc/)

**NOAA's Climate Prediction Center** [www.cpc.ncep.noaa.gov](http://www.cpc.ncep.noaa.gov)

**U.S. Drought Portal** [www.drought.gov](http://www.drought.gov)

**National Drought Mitigation Center** [drought.unl.edu](http://drought.unl.edu)

**State Climatologists** [www.stateclimate.org](http://www.stateclimate.org)

**Regional Climate Centers** [www.hprcc.unl.edu](http://www.hprcc.unl.edu) [mrcc.purdue.edu](http://mrcc.purdue.edu)



Missouri River at NP Dodge Park looking upstream December 24, 2022. Courtesy Ryan Larsen



# Questions

- **Martha Durr:** [mdurr9@unl.edu](mailto:mdurr9@unl.edu)
- **Dennis Todey:** [dennis.todey@usda.gov](mailto:dennis.todey@usda.gov)
- **Doug Kluck:** [doug.kluck@noaa.gov](mailto:doug.kluck@noaa.gov)
- **Melissa Widhalm:** [mwidhalm@purdue.edu](mailto:mwidhalm@purdue.edu)
- **Molly Woloszen:** [molly.woloszen@noaa.gov](mailto:molly.woloszen@noaa.gov)
- **Brian Fuchs:** [bfuchs2@unl.edu](mailto:bfuchs2@unl.edu)



Freezing rain in Lincoln and low water level on pond. January 18<sup>th</sup>. Courtesy Martha Durr.