

North Central US Climate- Drought Outlook 18 January 2024

Dr. Jerry Brotzge, Director
Kentucky Climatology Center
Western Kentucky University
jerald.brotzge@wku.edu
270-745-5983



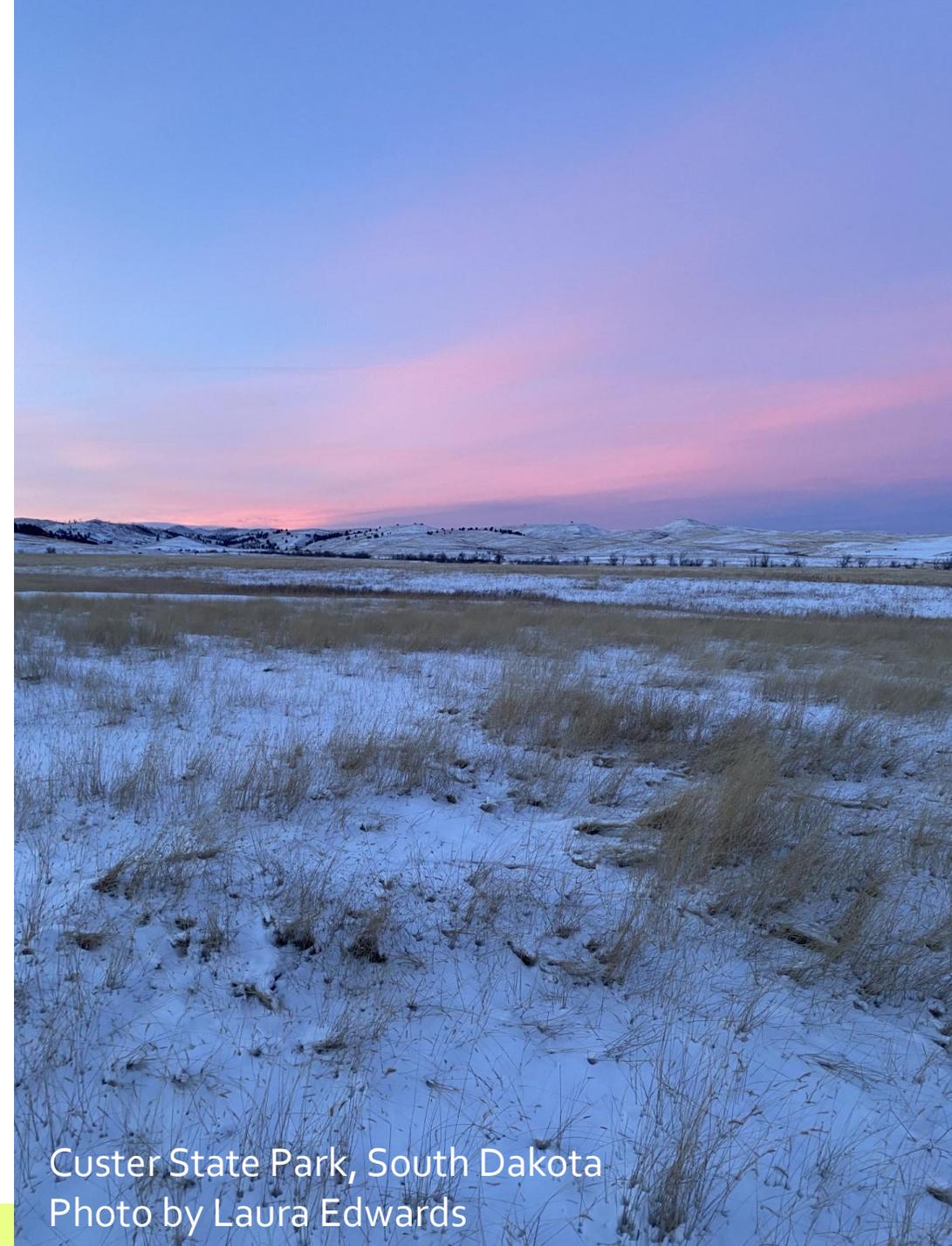
Photo – Courtesy of Matt Stiller



United States Department of Agriculture
Midwest Climate Hub

General Information

- **Providing climate services to the North Central US**
 - Collaboration Activity Among:
 - NOAA NCEI/NWS/OAR/NIDIS/
 - USDA Climate Hubs
 - American Association of State Climatologists
 - Midwest and High Plains Regional Climate Centers
 - National Drought Mitigation Center
- **Next Regular Climate/Drought Outlook Webinar**
 - February 15, 2024 (1 PM CDT) – Matt Sittel, Kansas Climate Office
- **Past webinars**
 - <https://mrcc.purdue.edu/webinars>
 - <https://hprcc.unl.edu/webinars.php>
- **Open for questions at the end (enter them along the way).**



Custer State Park, South Dakota
Photo by Laura Edwards

Agenda

- Recap
 - Last year
 - Last month
 - This month so far...
- Impacts
 - Drought
 - Snow/Cold
 - Other
- Outlooks
 - El Nino
 - Winter
 - Drought

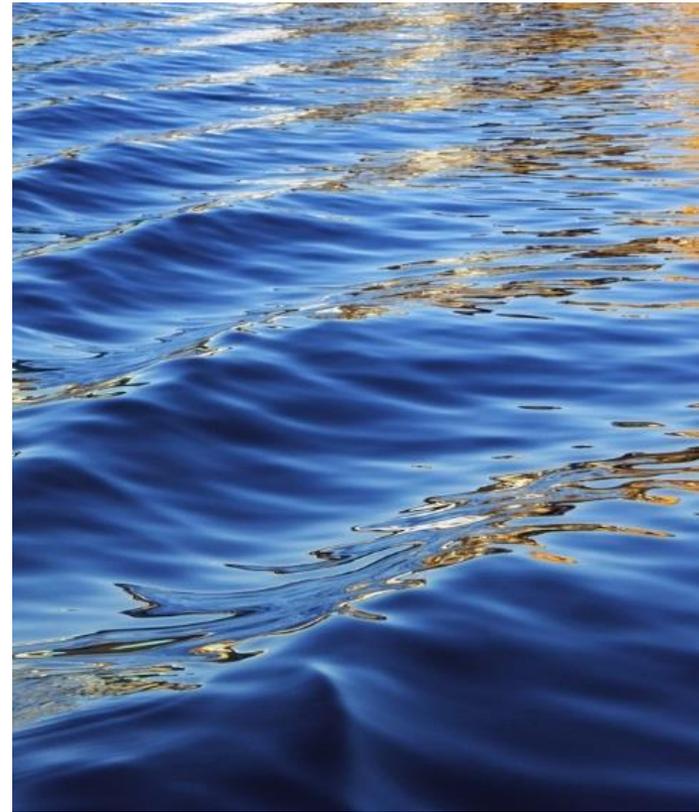


Pancake ice on Lake Huron, January 2024. Photo courtesy of G. Farina (NOAA)

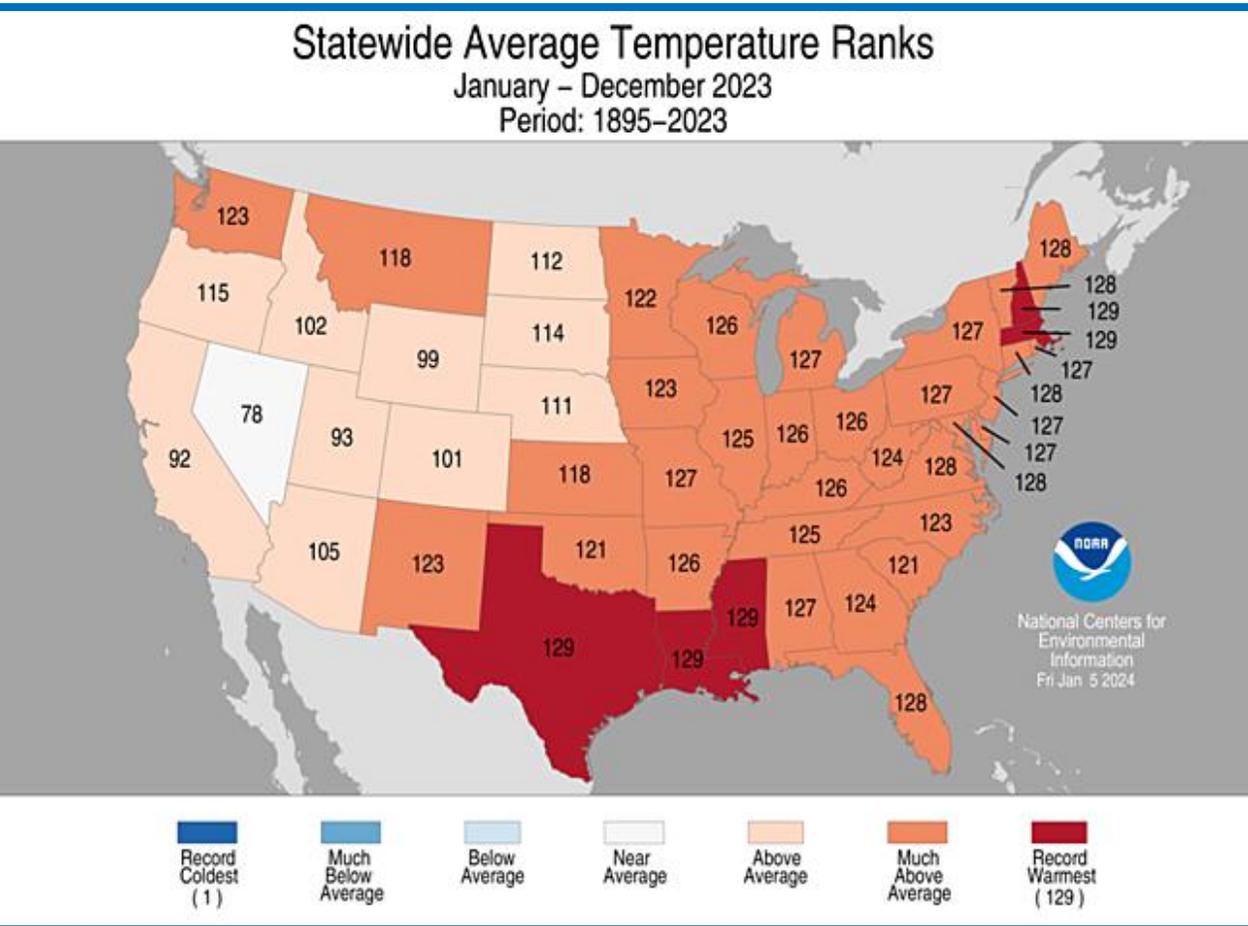


2023 Recap

Warm and Dry.



January – December, 2023

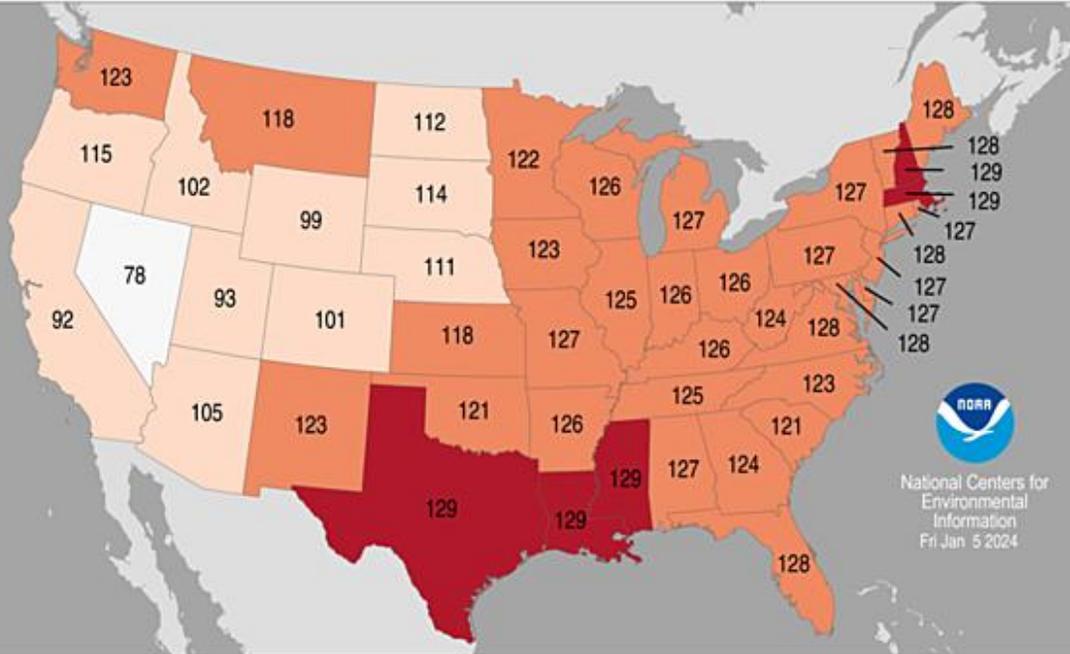


- 26 states had a Top 5 warmest year
IL, IN, KY, MI, MO, OH, WI
- 3rd warmest for MI, MO
- 4th warmest for IN, KY, OH, WI
- No state was below average.

January – December, 2023

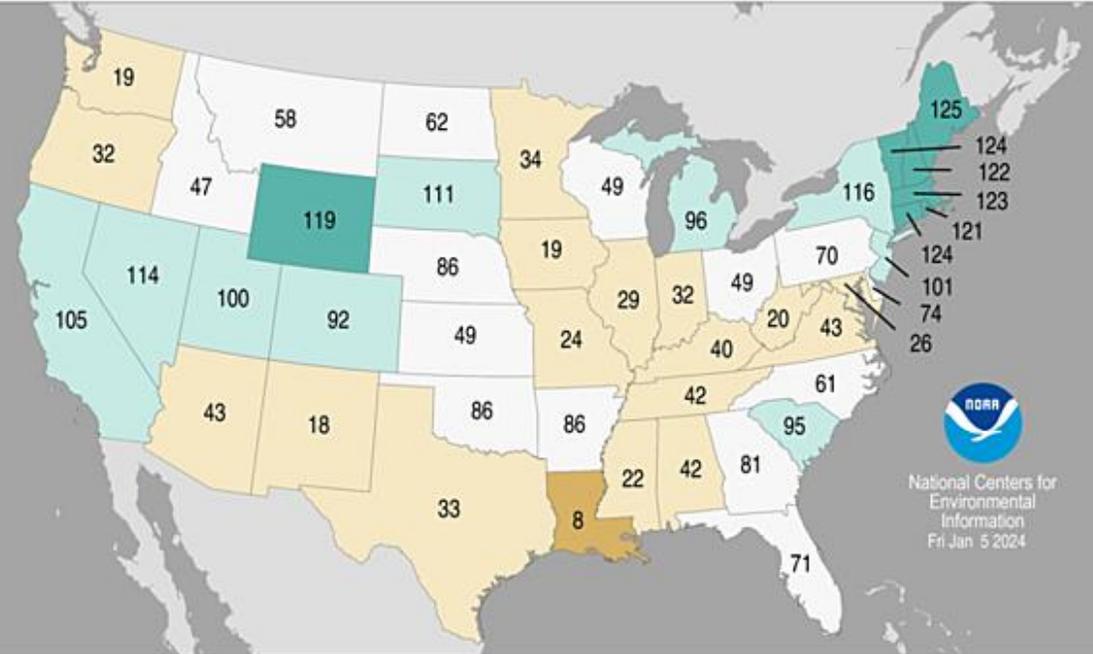
Statewide Average Temperature Ranks

January – December 2023
Period: 1895–2023



Statewide Precipitation Ranks

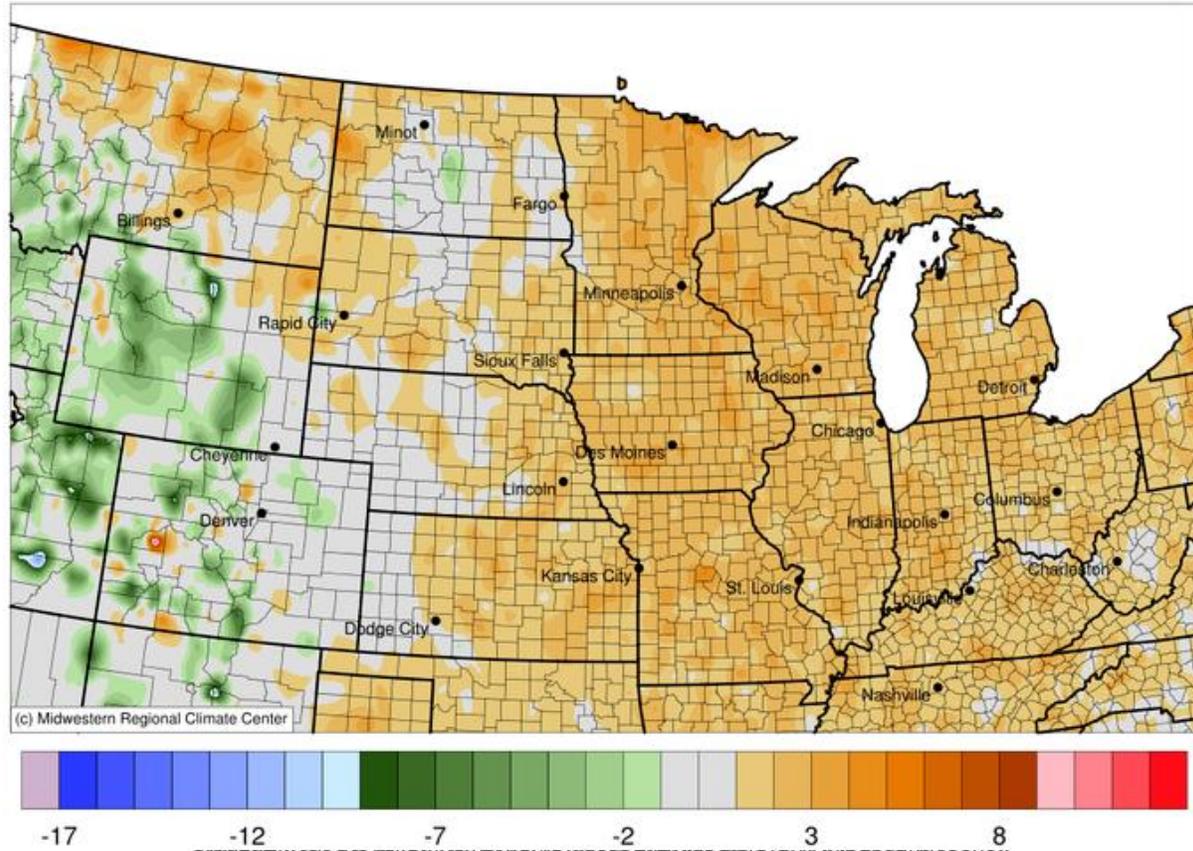
January – December 2023
Period: 1895–2023



January – December, 2023

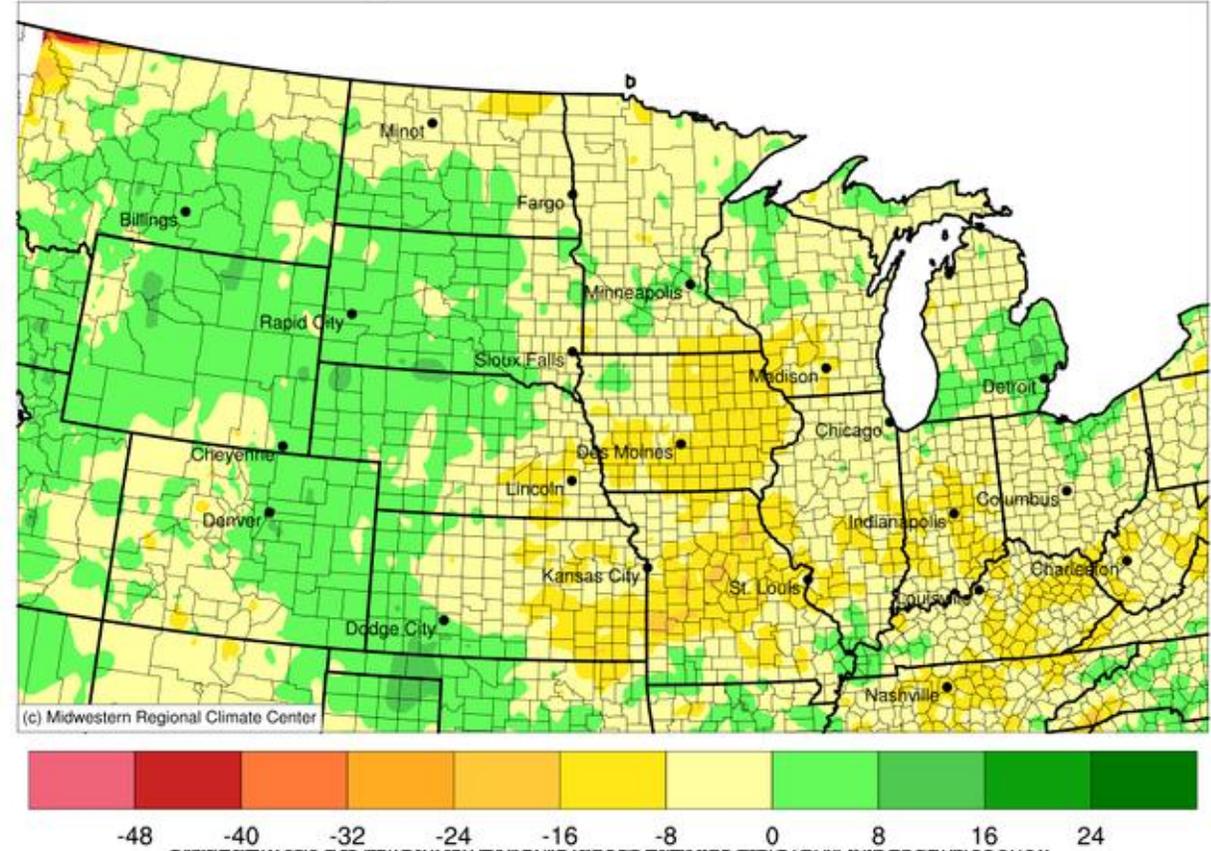
Average Temperature (°F): Departure from 1991-2020 Normals

January 01, 2023 to December 31, 2023



Accumulated Precipitation (in): Departure from 1991-2020 Normals

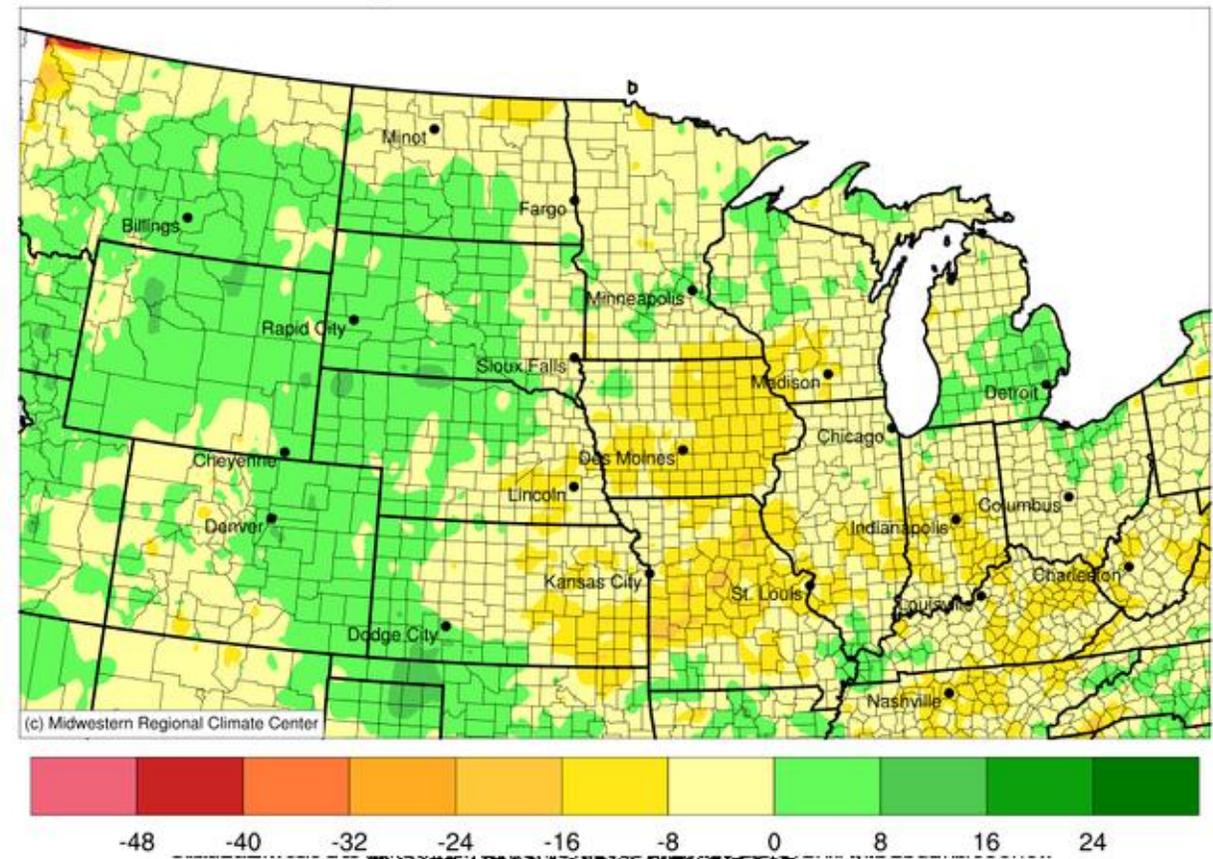
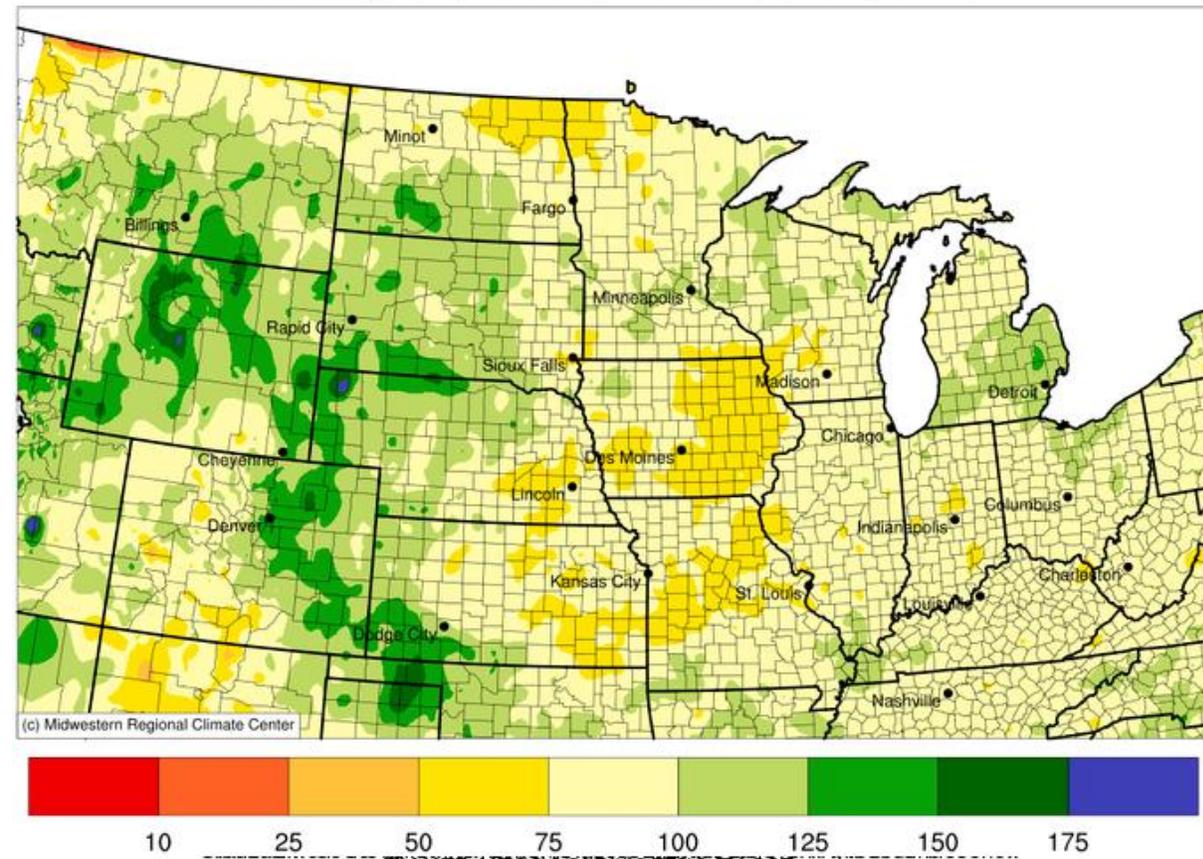
January 01, 2023 to December 31, 2023



January – December, 2023

Accumulated Precipitation (in): Percent of 1991-2020 Normals
January 01, 2023 to December 31, 2023

Accumulated Precipitation (in): Departure from 1991-2020 Normals
January 01, 2023 to December 31, 2023



2023 Billion \$ Disasters

- **March 2-3 – KY/IN - \$6B, 13 d:** Windstorm – Record Low pressures, severe straight-line winds, tornadoes
- **March 31 – Apr 1 – IL/IN/OH/MO/IA – \$5.7B, 33 d:** Tornado outbreak
- **April 4-6 – IL/KY/IA/IN/OH/MO/MI - \$2.9B, 5 d:** Severe weather – hail, winds, 35 tornadoes
- **April 15 – MO/IL - \$1.4B:** Severe weather – hail, winds, tornadoes
- **April 19-20– MO/NE/KS/IA/IL/WI - \$3B, 1 d:** Severe weather –hail, winds
- **May 6-8 – MO/IL/IA/IN - \$2.2B, 1 d:** Severe weather –tornadoes, hail, winds

2023 Billion \$ Disasters

- **Jun 28 – Jul 2 – MO/IL/IN - \$1.9B, 3 d:** Severe weather – wind and hail
- **Jul 19-21 – MI/WI/OH - \$1.9B, 1 d:** Severe storms – hail and winds
- **July 28-29 – MO/IL/IN/WI - \$1.5B, 2 d:** Severe weather – tornadoes, hail, winds
- **Aug 11 – MN - \$1.8B:** Hailstorm – Golf ball to baseball-sized hail
- **Apr – Sep – IL/MO/NE - \$14.5B, 247 d:** Drought

Other Memorable 2023 Events

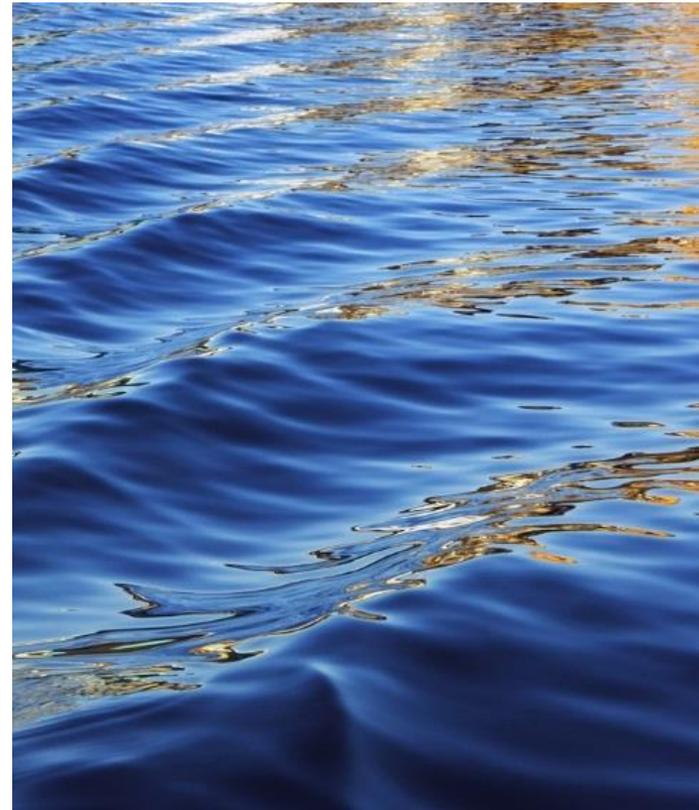
- **May 1 – Springfield, IL Dust storm – 72-vehicle pileup on a 2-mile stretch of I-55**
- **June – Canadian Wildfires and Poor Air Quality. AQI > 101.**
- **July 18-19 – New KY State 24-hr Rainfall Record set at 11.28" near Mayfield.**





December Recap

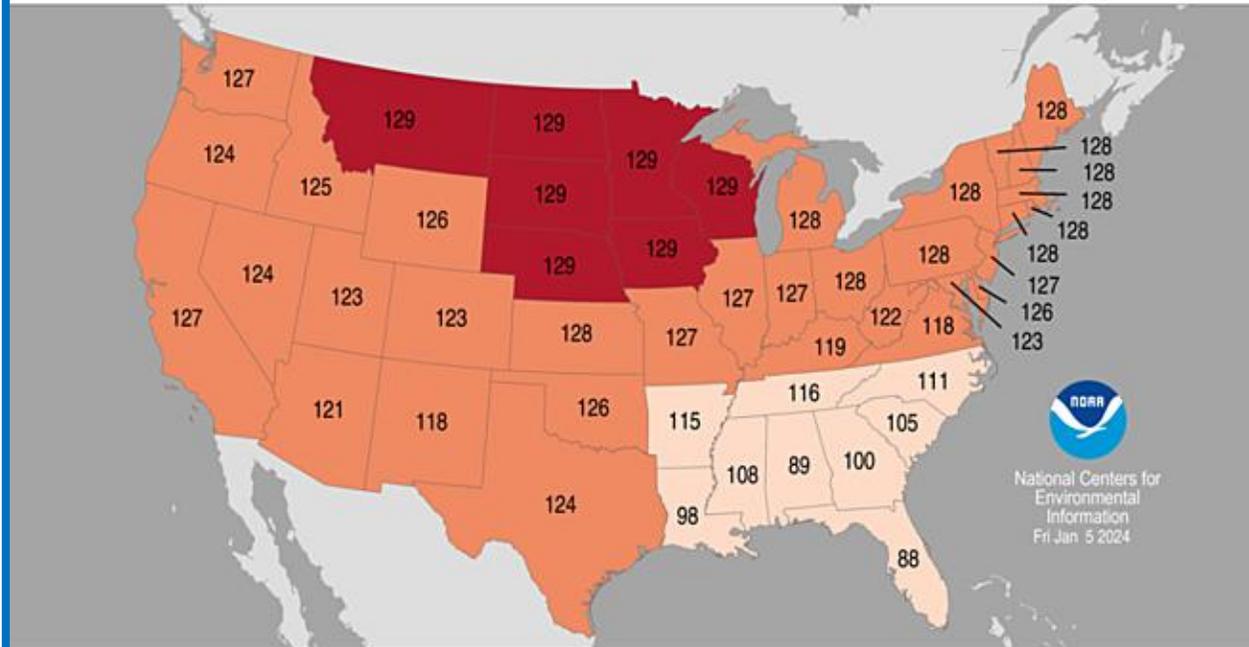
Mild and Dry.



December 2023

Statewide Average Temperature Ranks

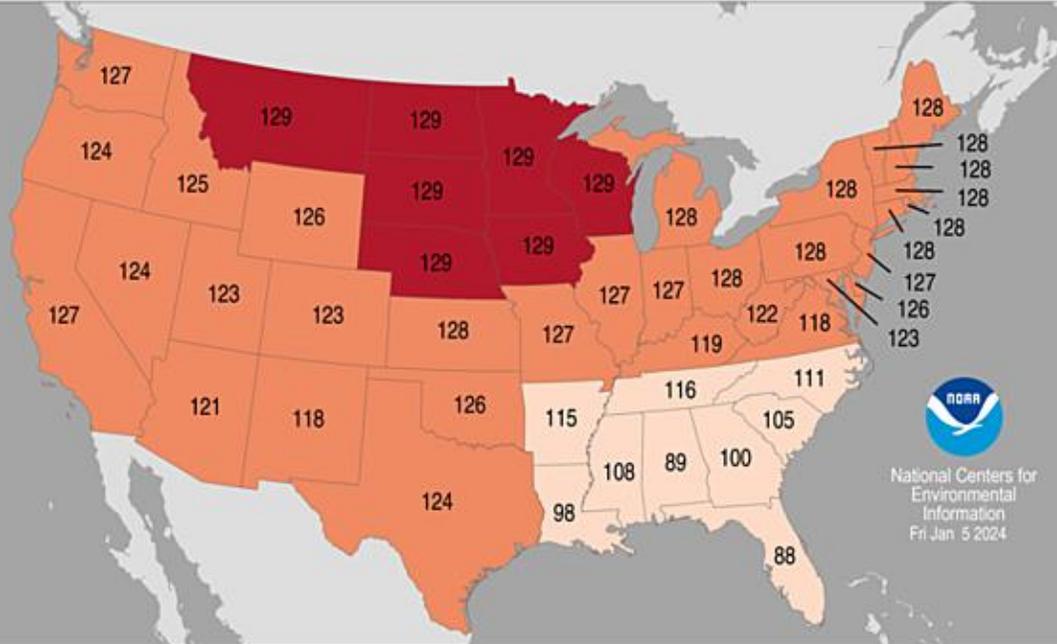
December 2023
Period: 1895–2023



- 7 states with their warmest Dec on record!
IA, MN, MT, ND, NE, SD, WI
- 11 states with their 2nd warmest on record.
- 5 states with their 3rd warmest on record.
- MN – No below-normal temps for Twin Cities or St. Cloud for the entire month.

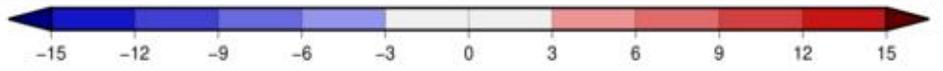
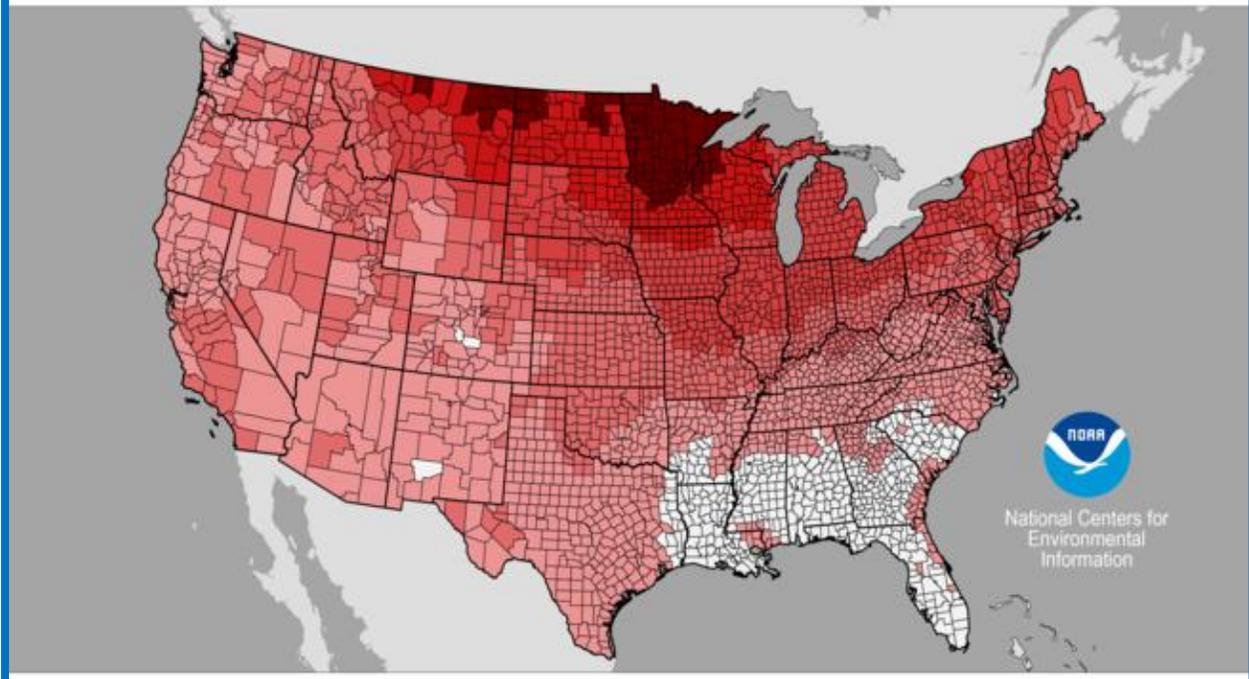
December 2023

Statewide Average Temperature Ranks
December 2023
Period: 1895–2023



NOAA
National Centers for Environmental Information
Fri Jan 5 2024

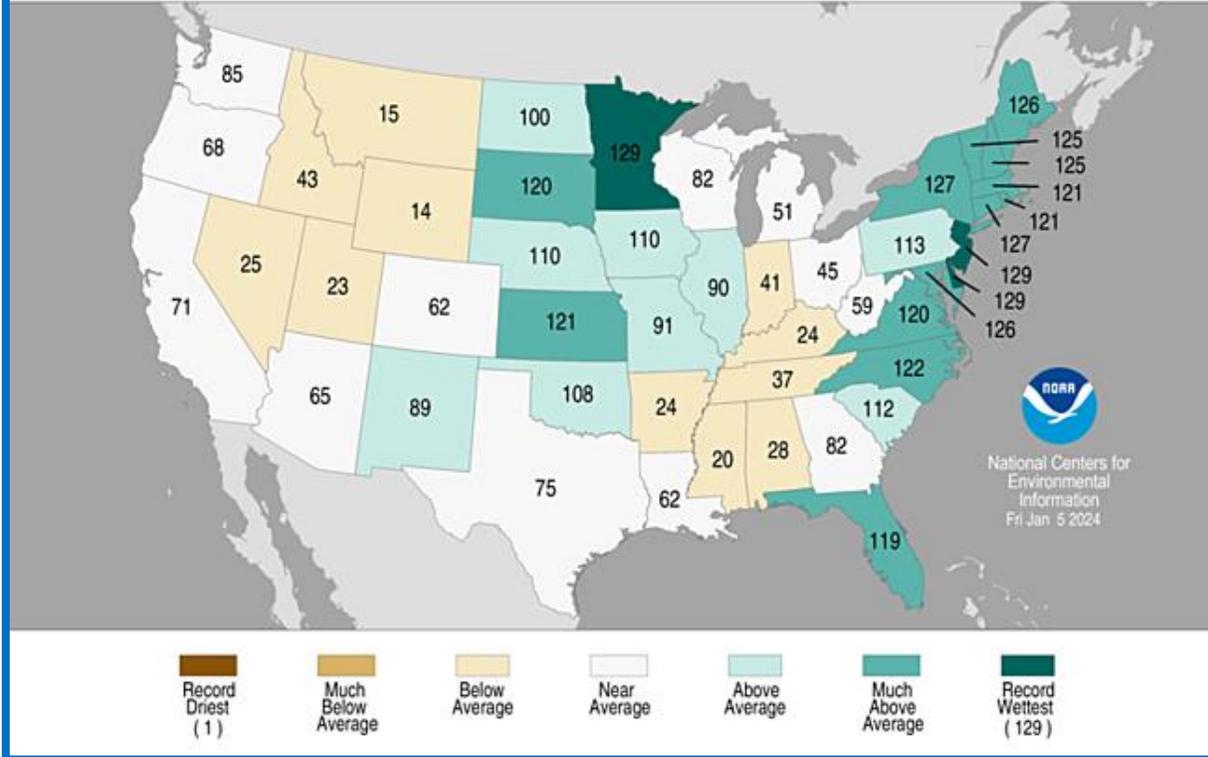
Mean Temperature Departures from Average
December 01–31, 2023
Base Period: 1991–2020



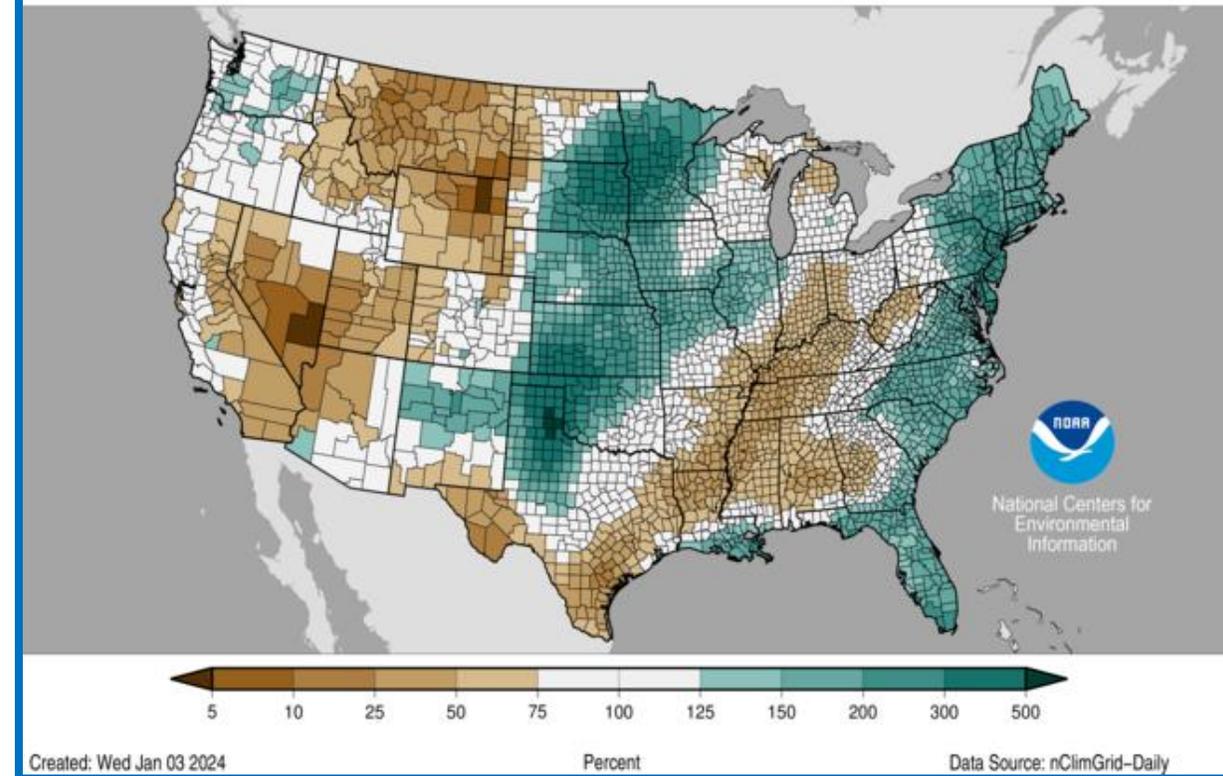
Created: Wed Jan 03 2024
Degrees Fahrenheit
Data Source: nClimGrid-Daily

December 2023

Statewide Precipitation Ranks
December 2023
Period: 1895–2023



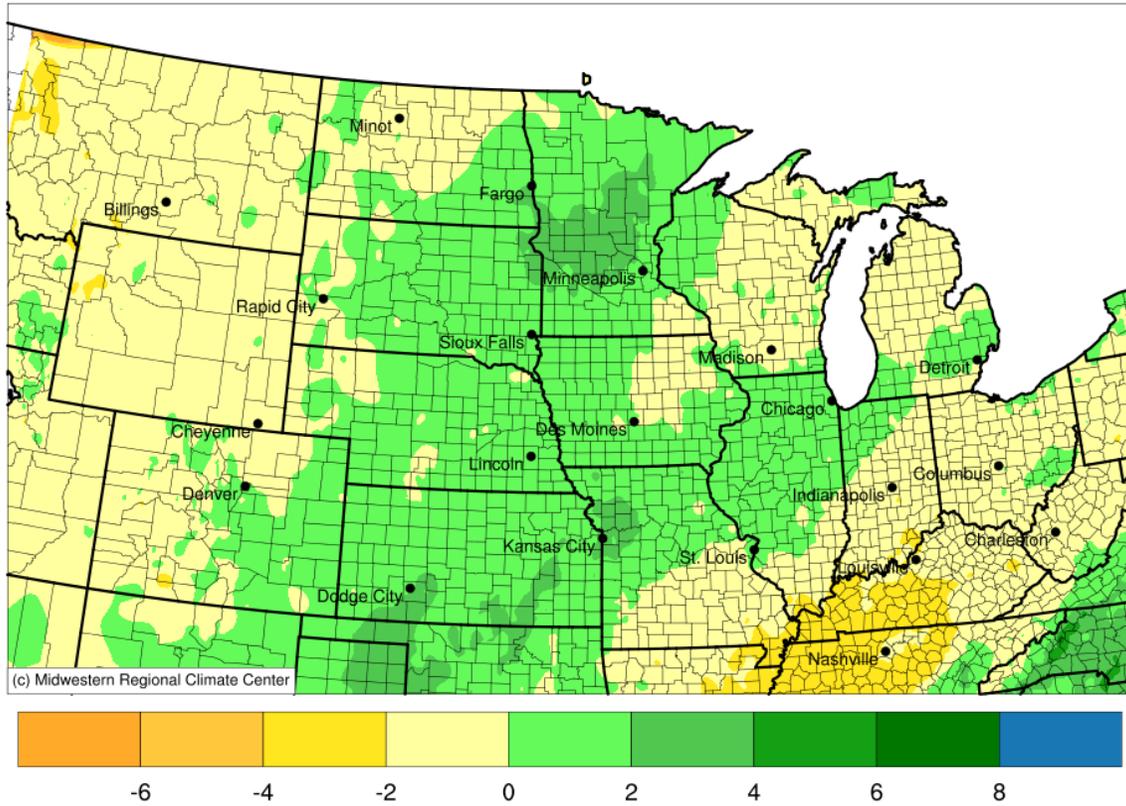
Precipitation Percent of Average
December 01–31, 2023
Base Period: 1991–2020



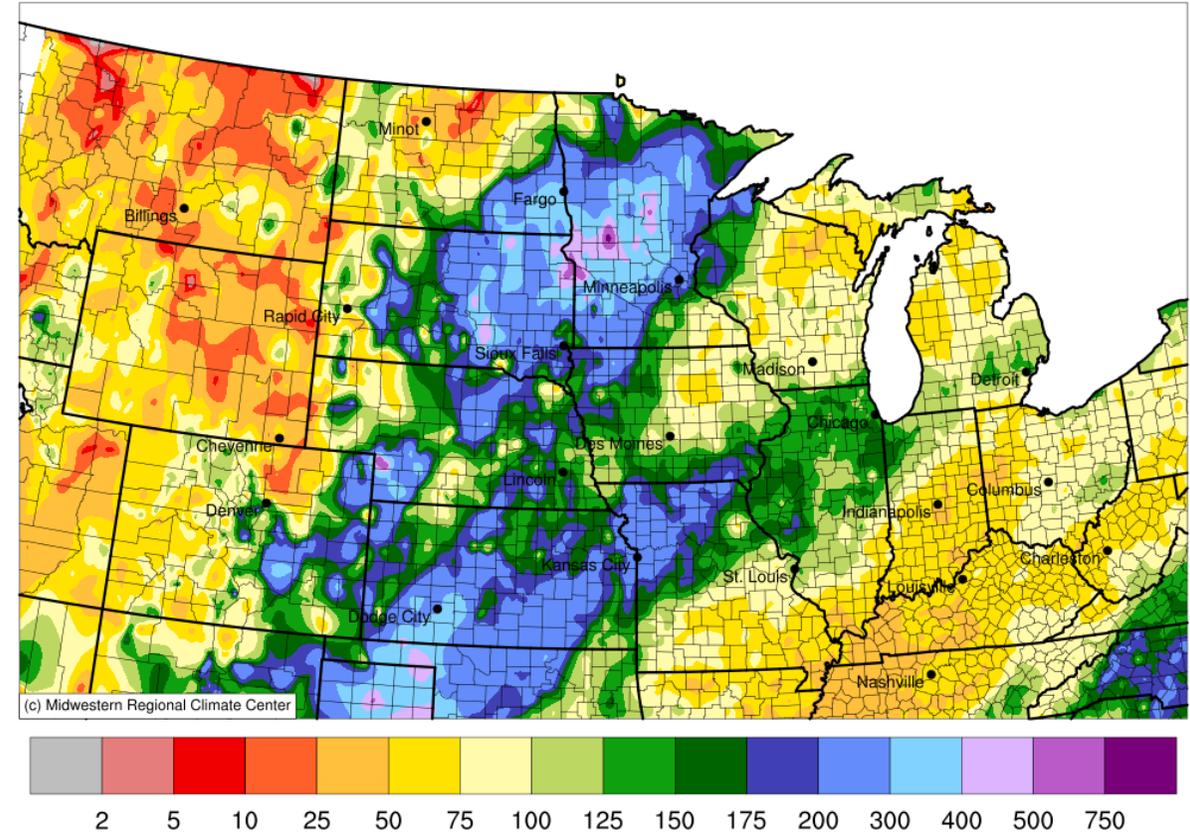
- MN wettest Dec on record!
 - Also, DE and NJ.
- 15 states with a Top 10 wettest on record.

December 2023

Accumulated Precipitation (in): Departure from 1991-2020 Normals
December 01, 2023 to December 31, 2023



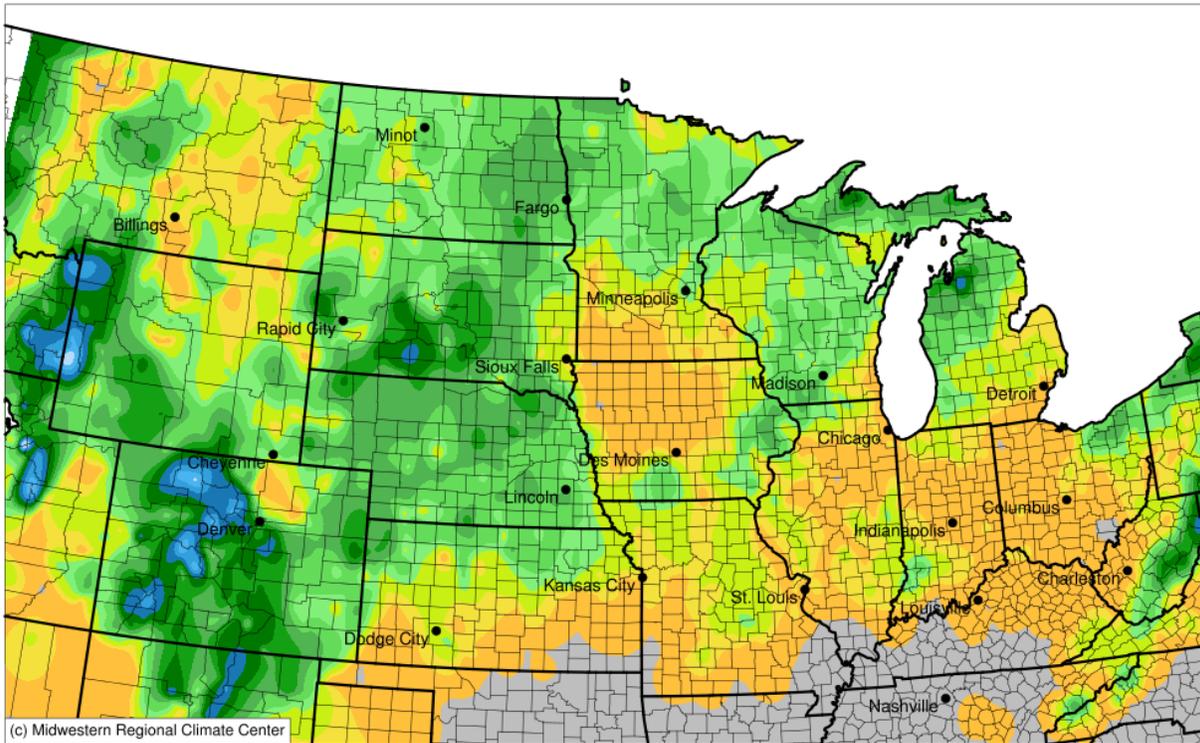
Accumulated Precipitation (in): Percent of 1991-2020 Normals
December 01, 2023 to December 31, 2023



December 2023

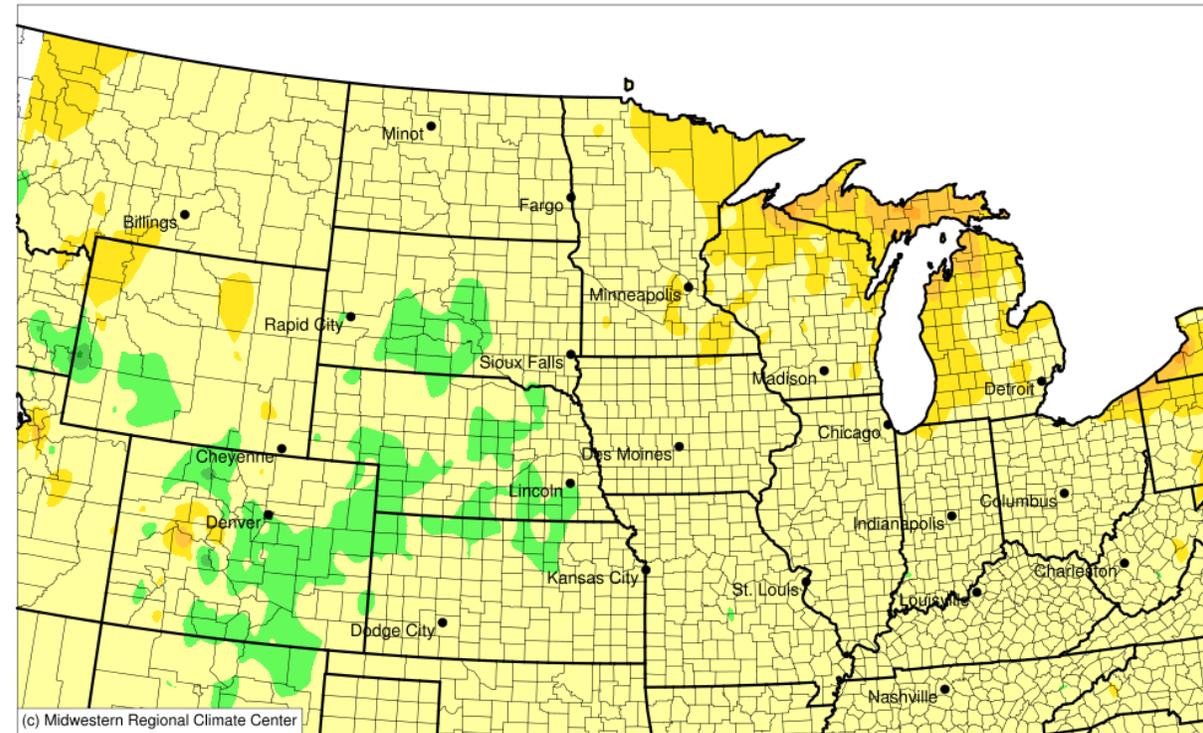
Accumulated Snowfall (in)

December 01, 2023 to December 31, 2023



Accumulated Snowfall (in): Departure from 1991-2020 Normals

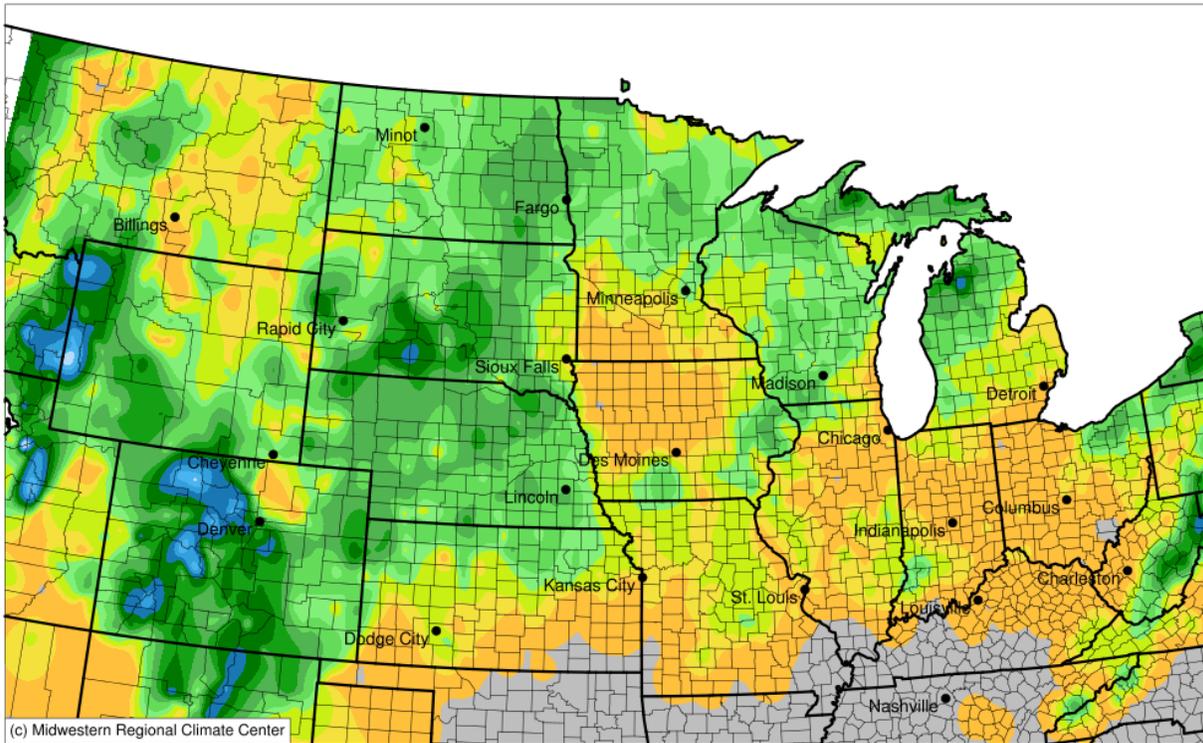
December 01, 2023 to December 31, 2023



December 2023

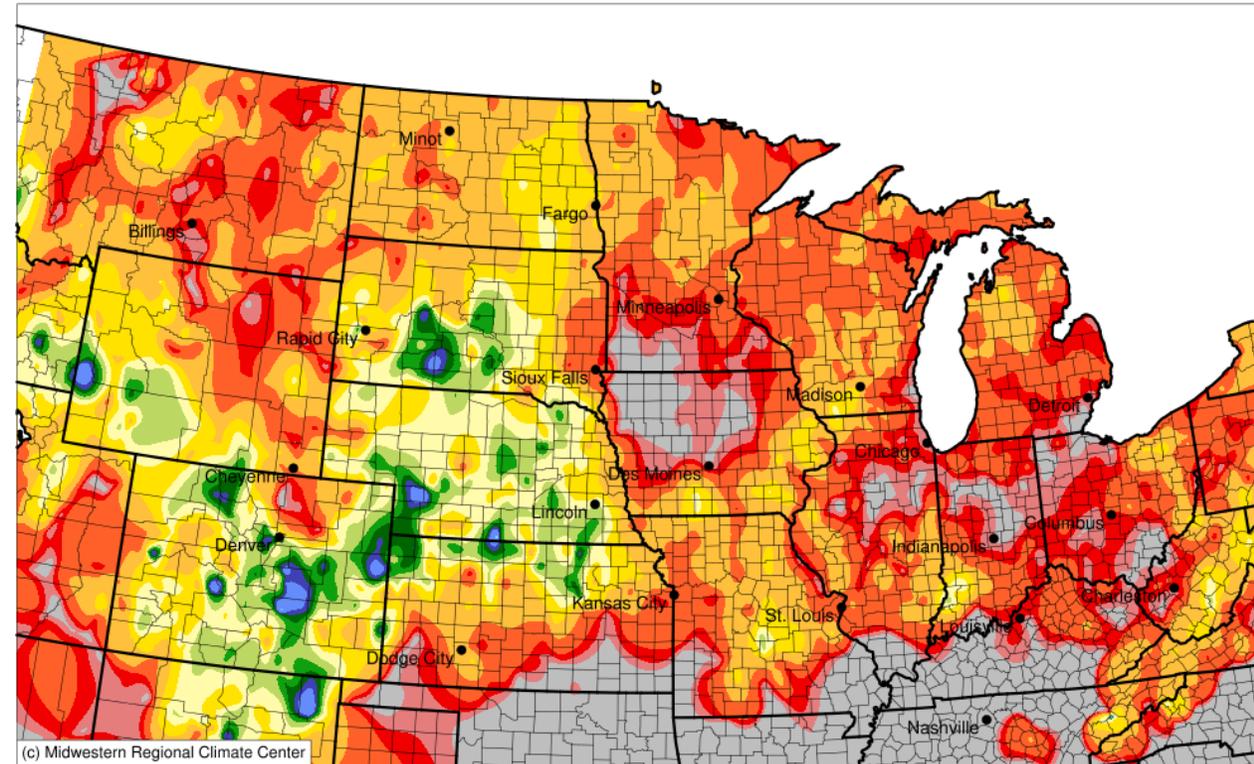
Accumulated Snowfall (in)

December 01, 2023 to December 31, 2023



Accumulated Snowfall (in): Percent of 1991-2020 Normals

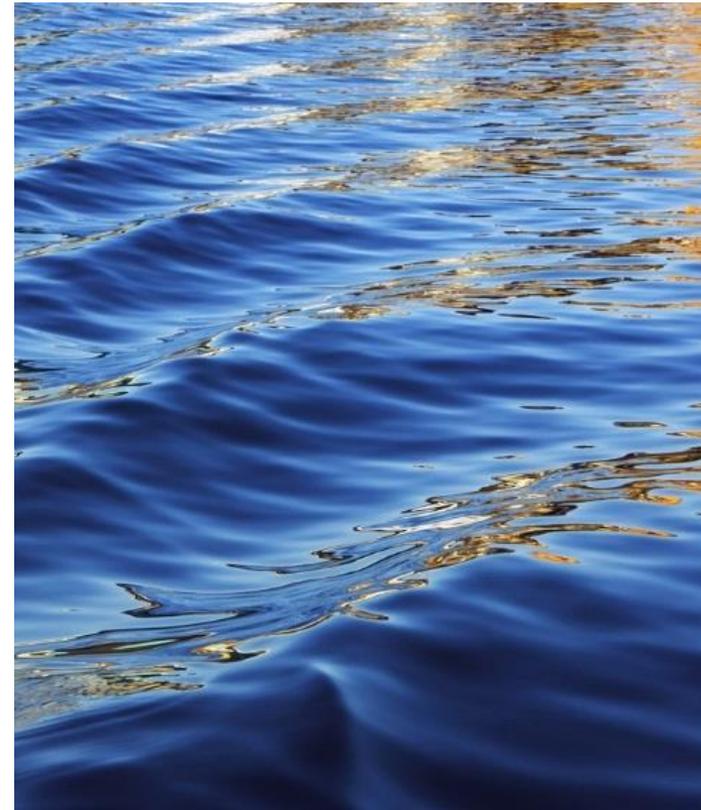
December 01, 2023 to December 31, 2023





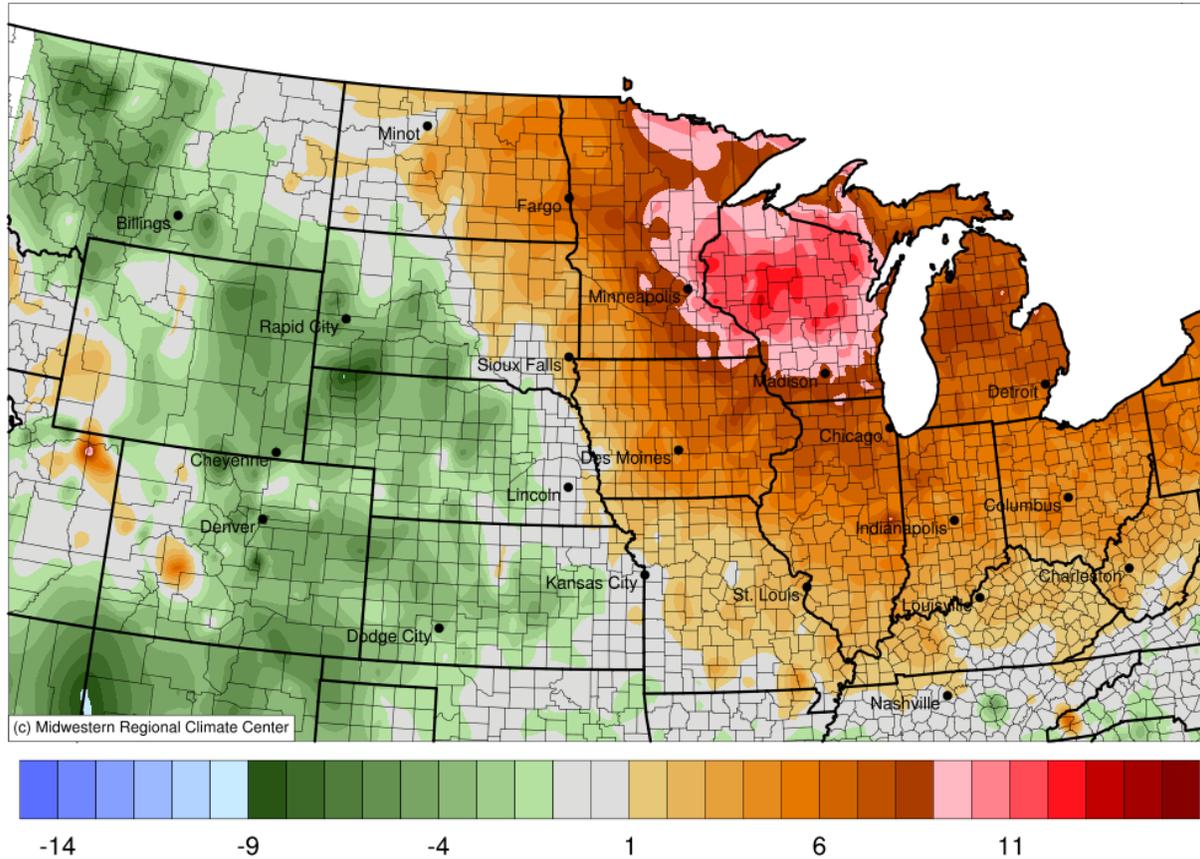
Current conditions January 2024

Warm. Very cold. Wet.

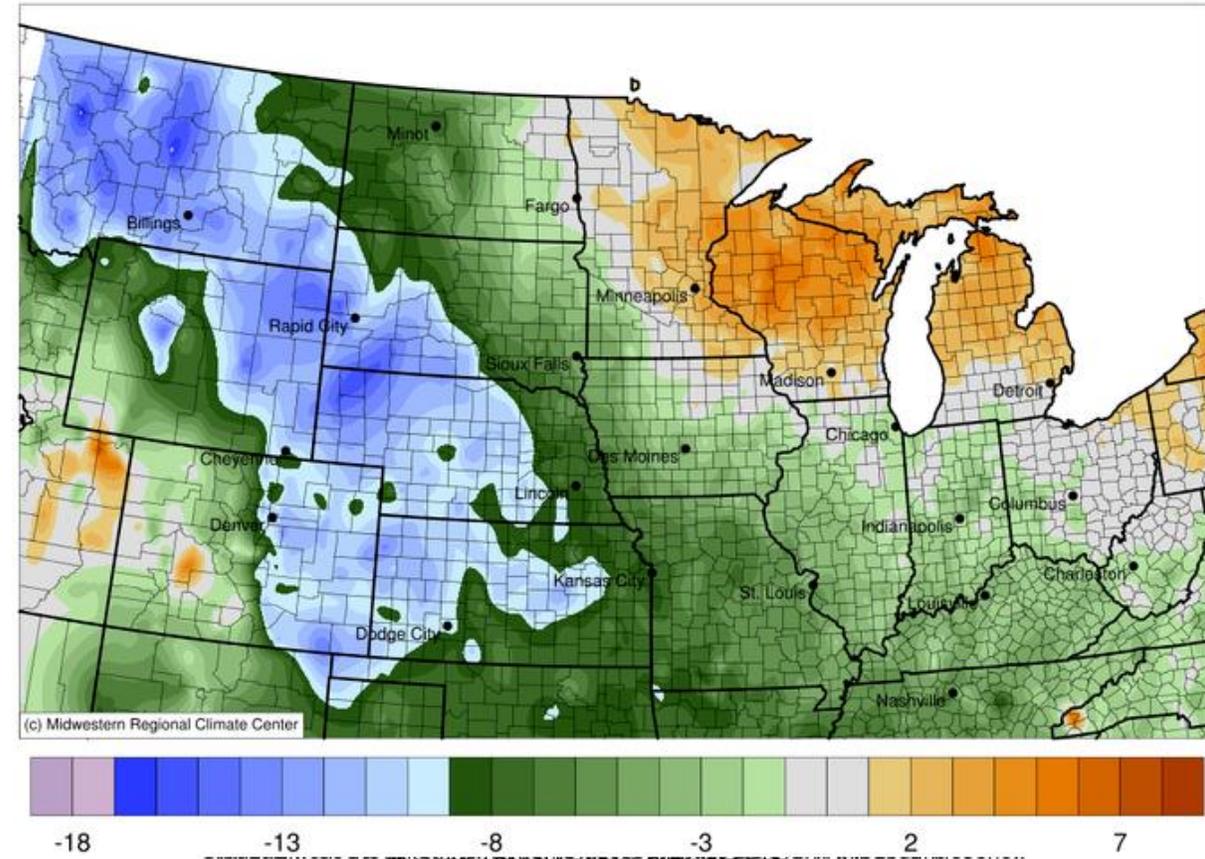


January 2024

Average Temperature (°F): Departure from 1991-2020 Normals
January 01, 2024 to January 13, 2024

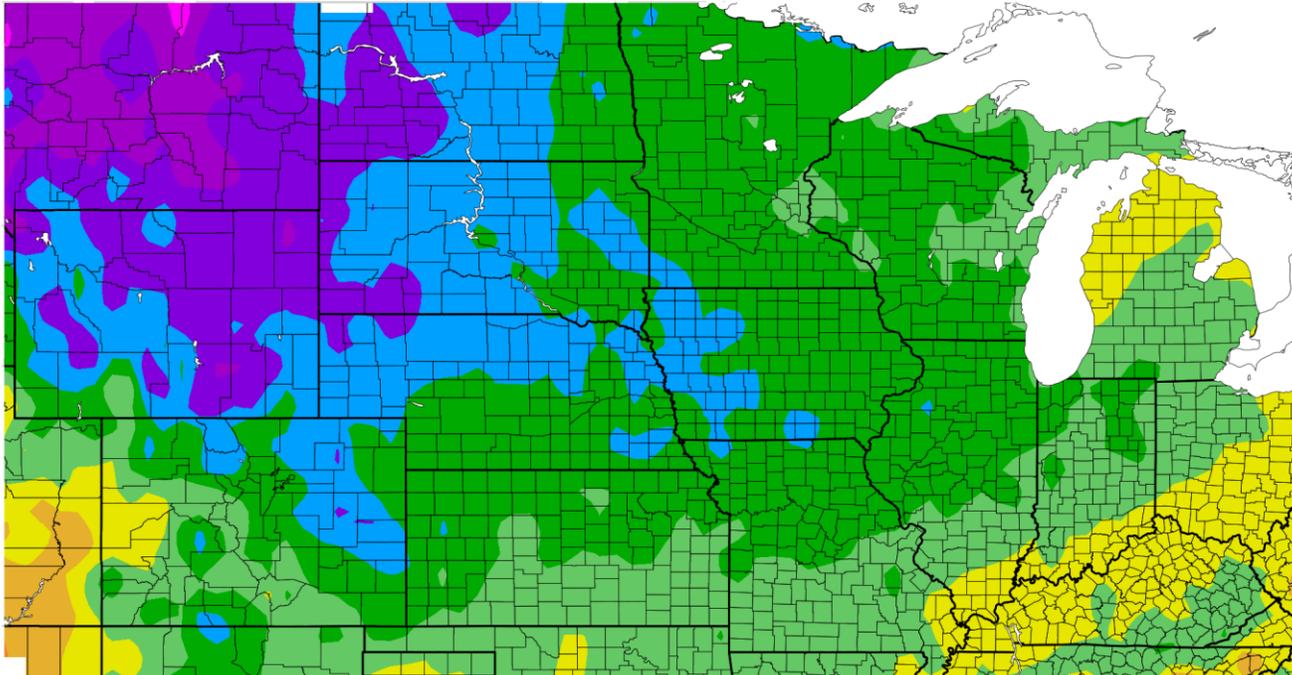


Average Temperature (°F): Departure from 1991-2020 Normals
January 01, 2024 to January 18, 2024



January 2024 'Polar Vortex'

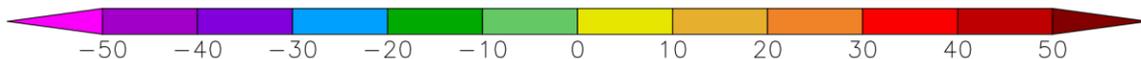
Lowest 1-Day Minimum Temperature (F)
1/11/2024 - 1/17/2024



Total Daily Records Broken – 2760
Jan 11-16
(Jan 14 – 799)

All Time Records Broken - 72:

- CO – 2
- KS – 8
- MT – 37
- NE – 13
- ND – 1
- SD – 6
- WY – 3



Generated 1/18/2024 at HPRCC using provisional data.

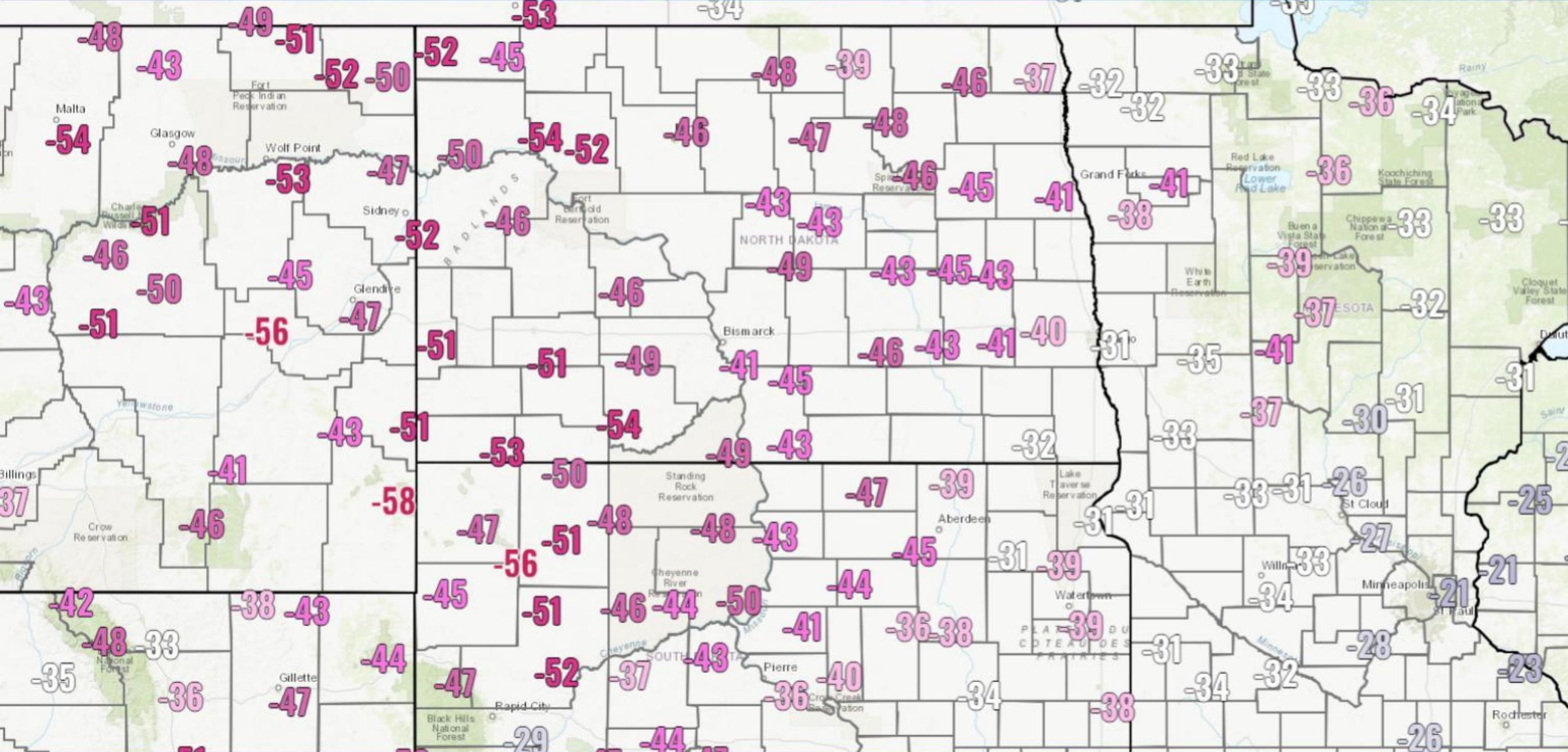
NOAA Regional Climate Centers

Wind Chill Values at 9:00 AM CST

National Weather Service
Bismarck, ND



Dangerous to Life Threatening Wind Chills Across The Region



January 15, 2024 9:02 AM CST

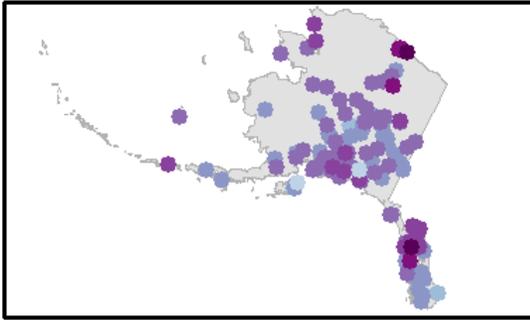
weather.gov/bismarck

Coldest Day of the Year

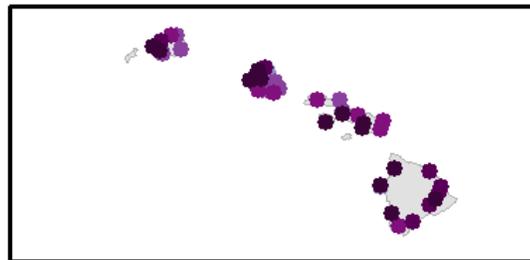
Day of Coldest Low Temperature from the 1991-2020 U.S. Climate Normals

<https://www.ncei.noaa.gov/news/coldest-day-of-the-year>

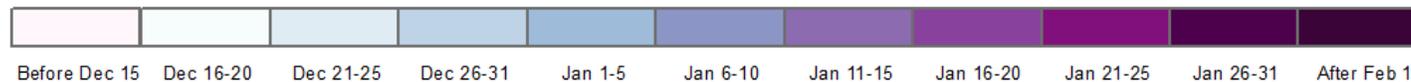
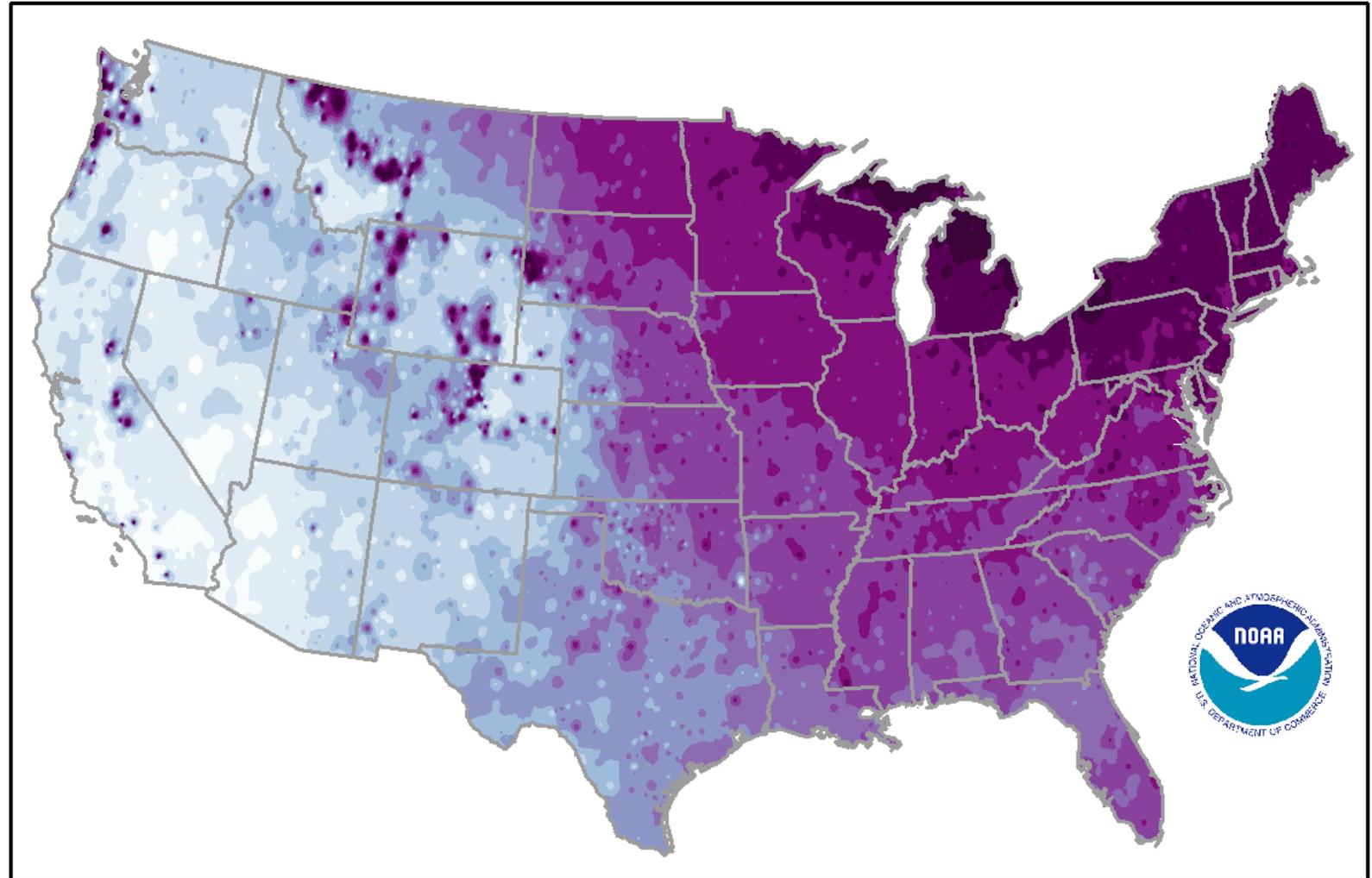
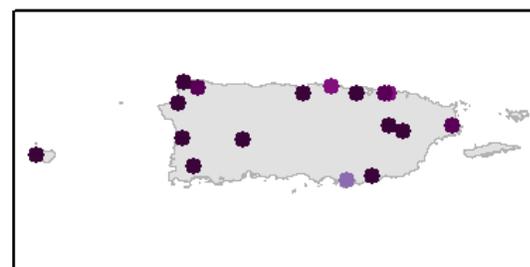
Alaska



Hawaii



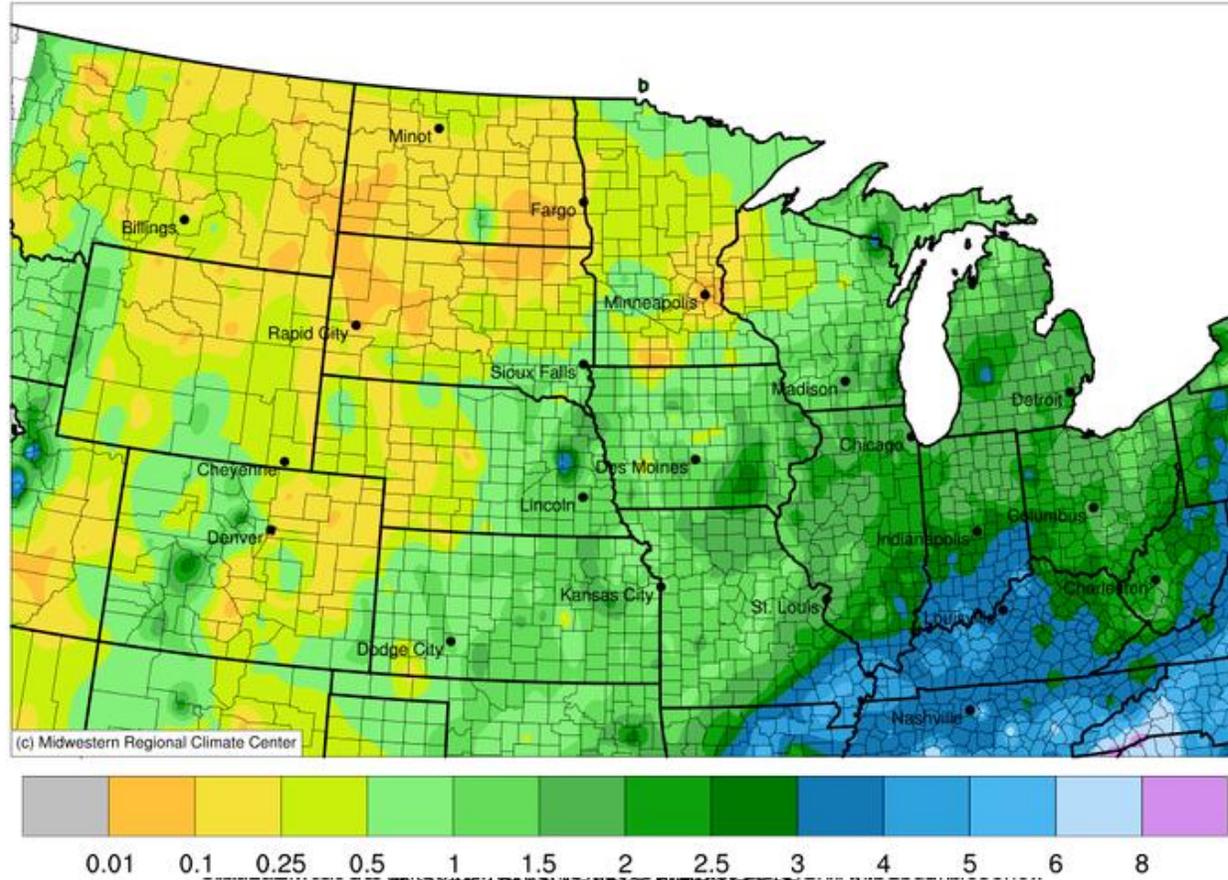
Puerto Rico



January 2024

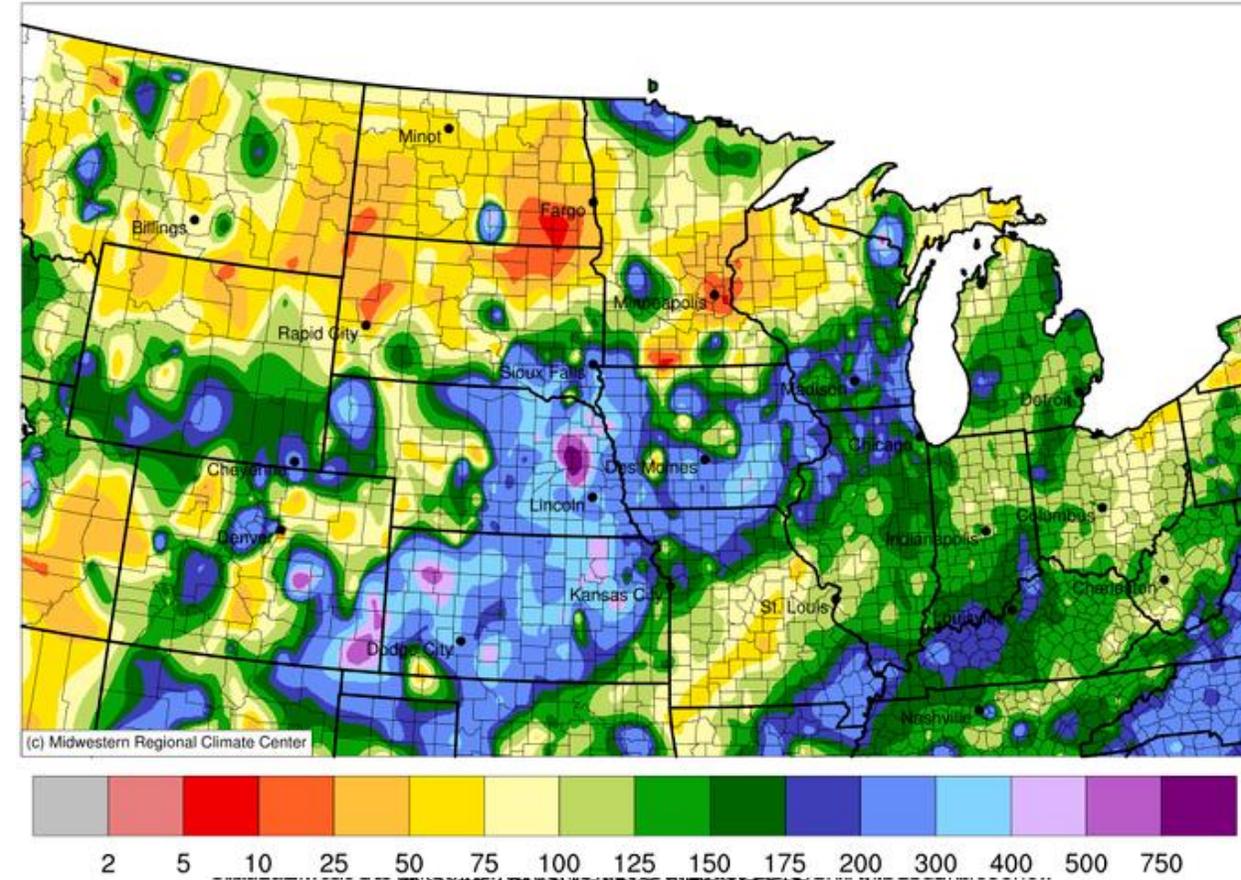
Accumulated Precipitation (in)

January 01, 2024 to January 18, 2024



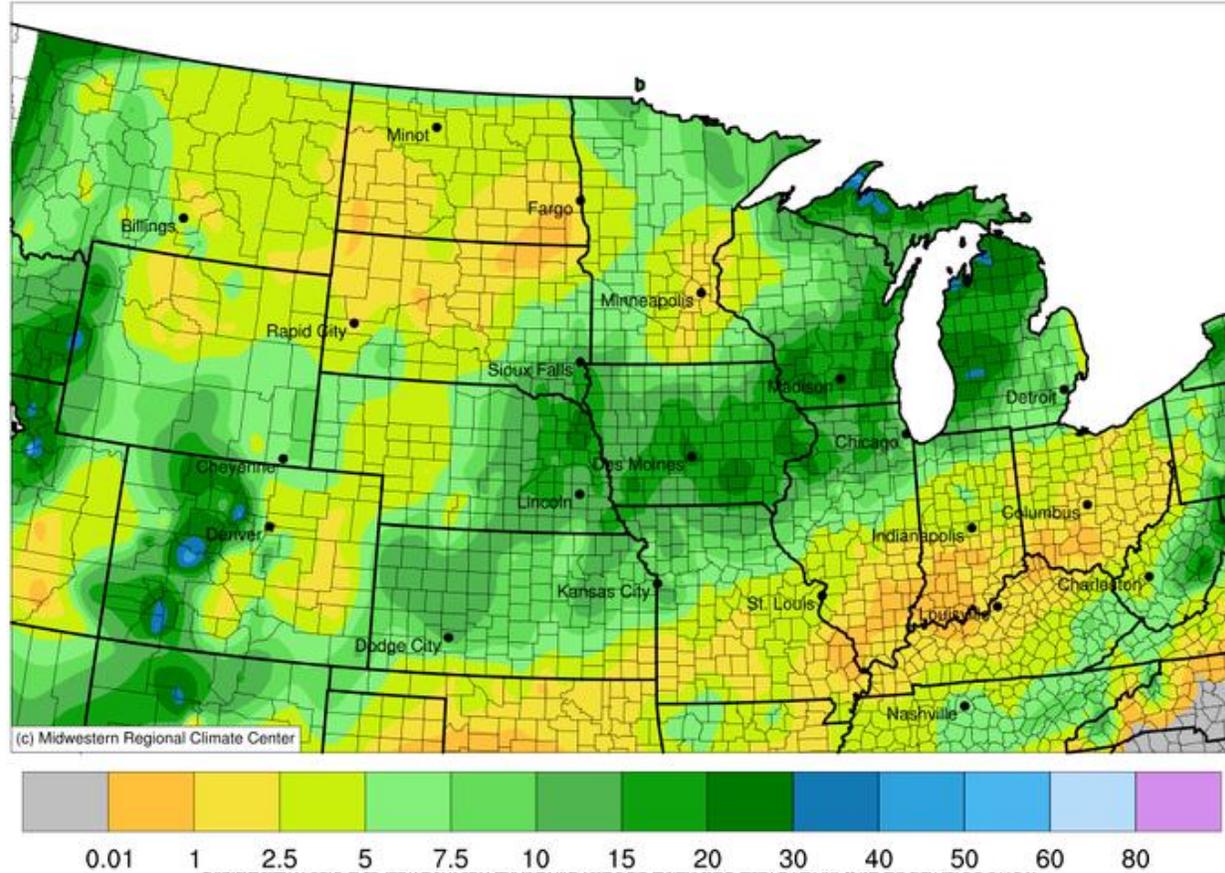
Accumulated Precipitation (in): Percent of 1991-2020 Normals

January 01, 2024 to January 18, 2024

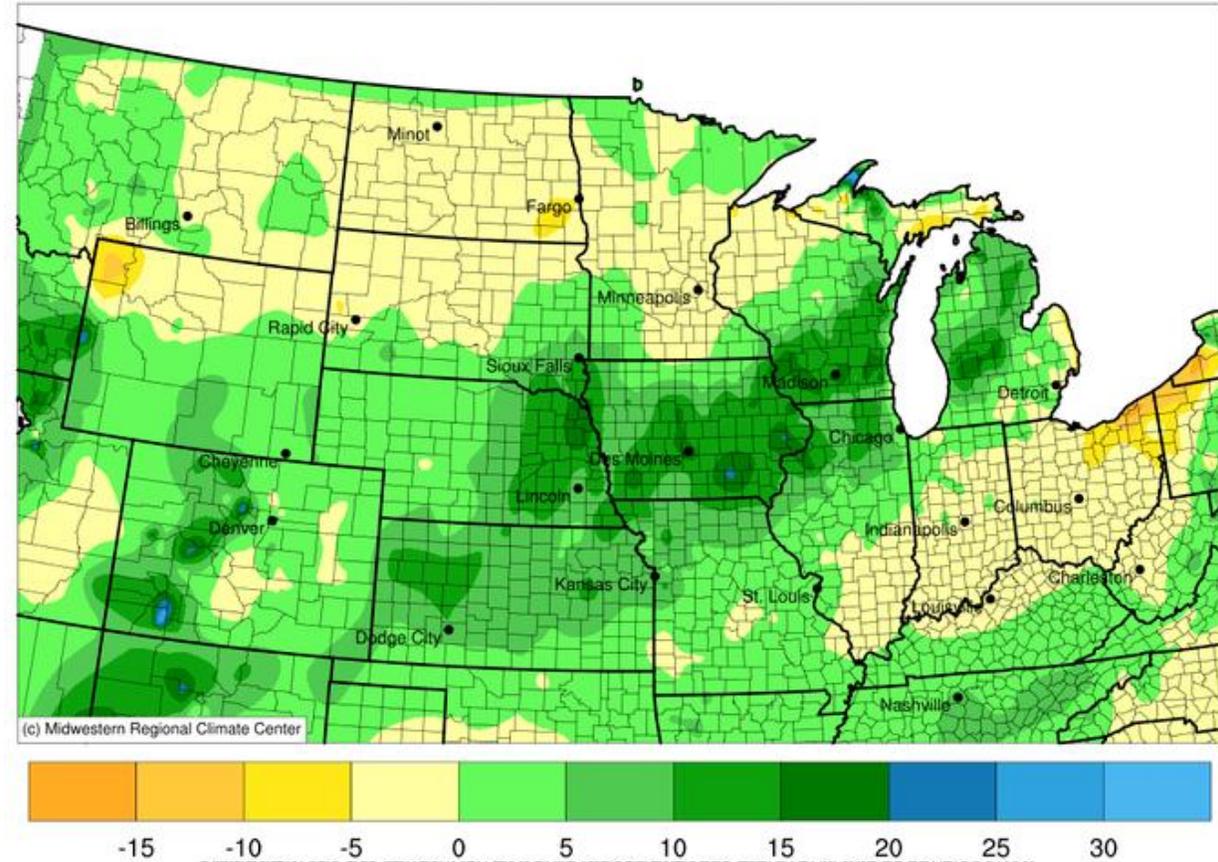


January 2024

Accumulated Snowfall (in)
January 01, 2024 to January 18, 2024



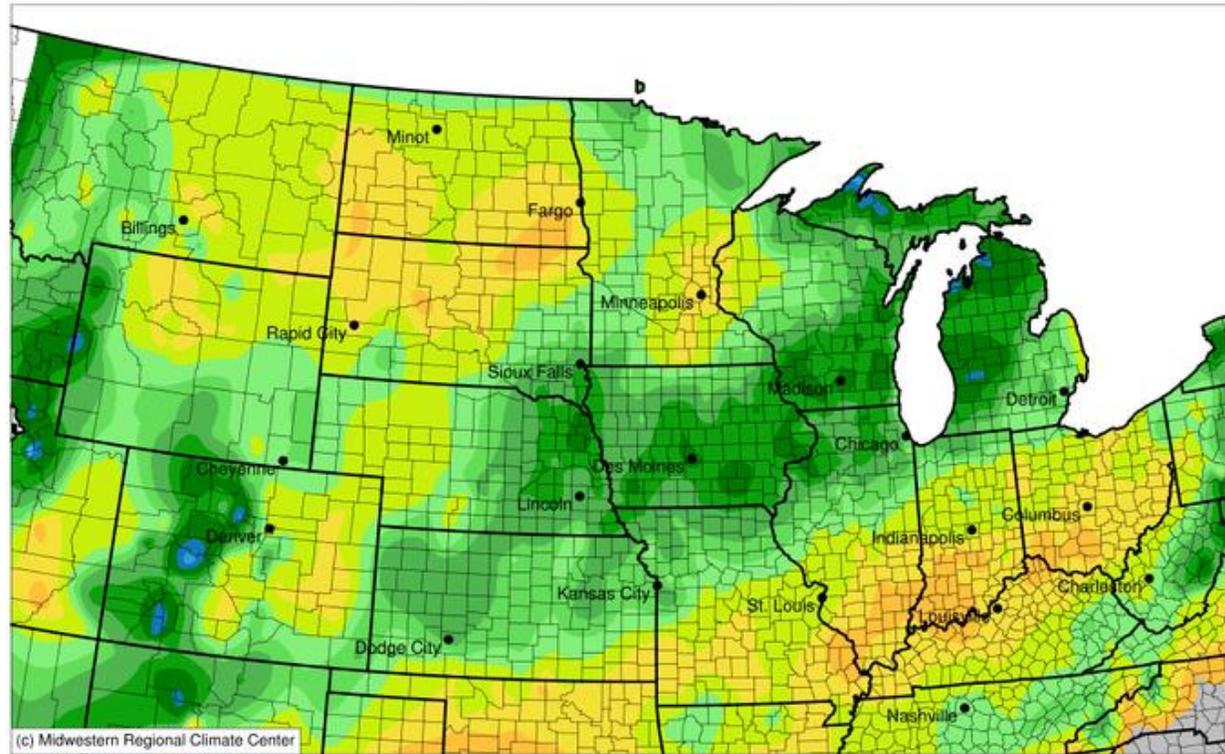
Accumulated Snowfall (in): Departure from 1991-2020 Normals
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January 2024

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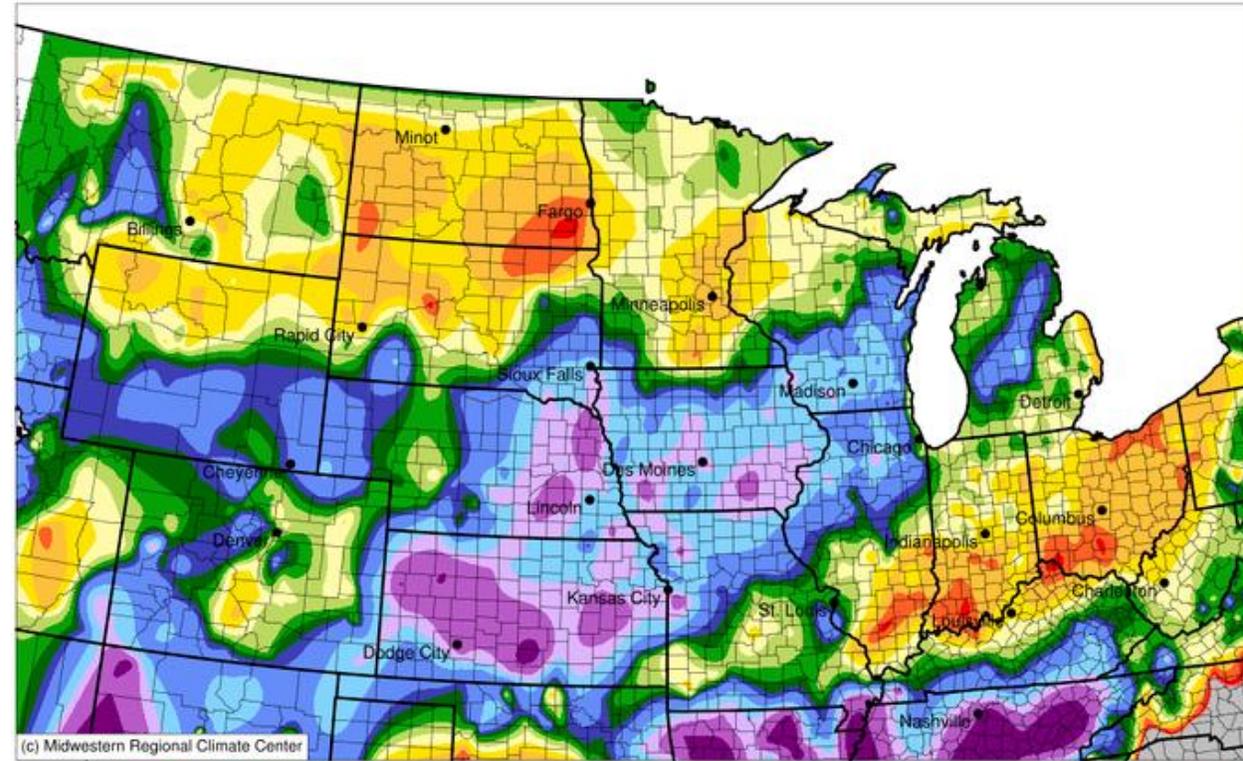


(c) Midwestern Regional Climate Center

0.01 1 2.5 5 7.5 10 15 20 30 40 50 60 80

Accumulated Snowfall (in): Percent of 1991-2020 Normals

January 01, 2024 to January 18, 2024

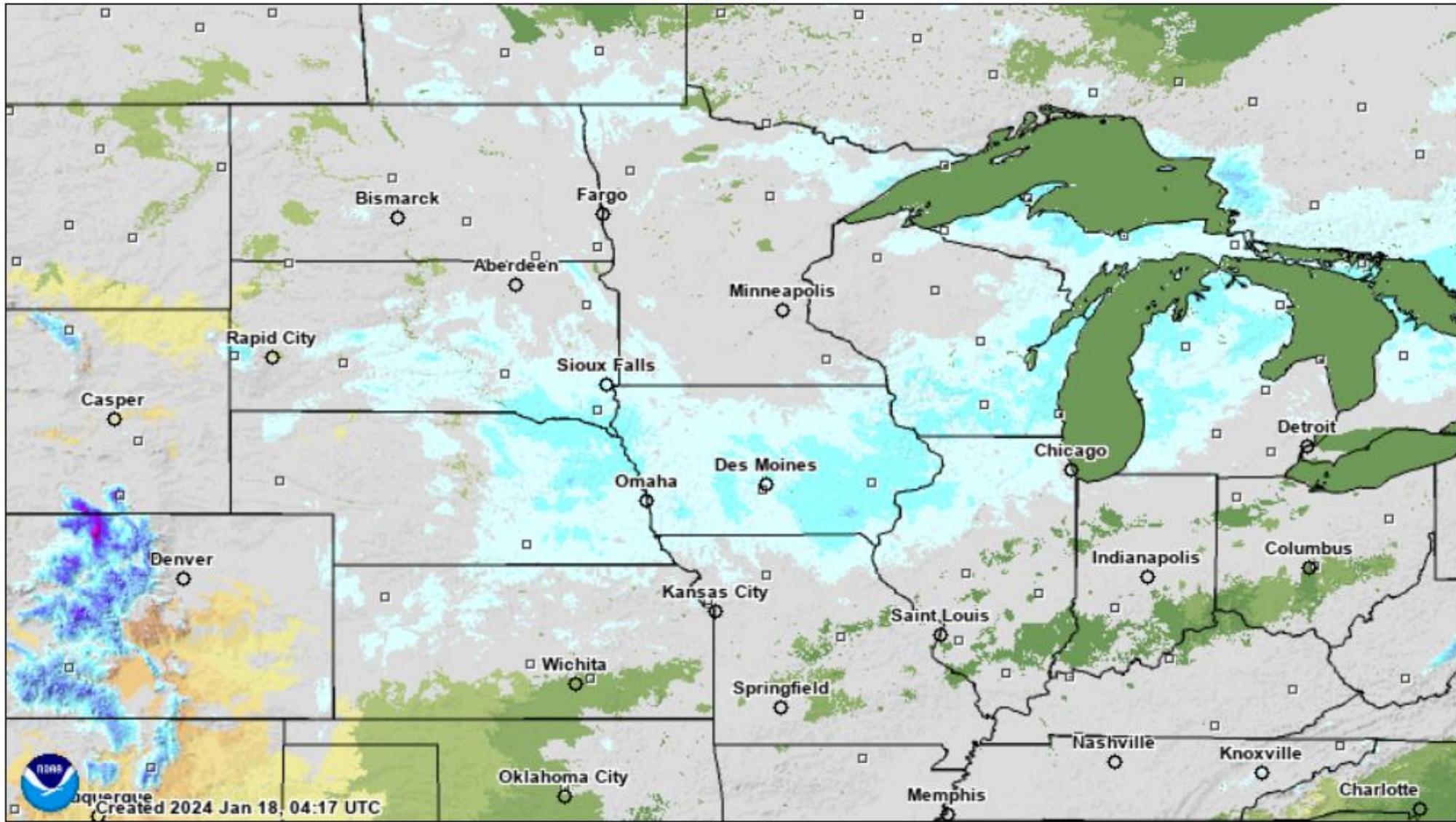
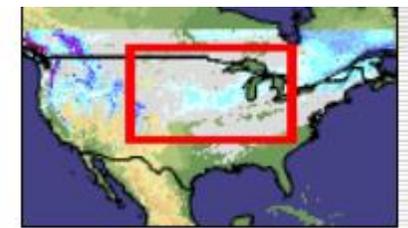


(c) Midwestern Regional Climate Center

2 5 10 25 50 75 100 125 150 175 200 300 400 500 750

Modeled Snow Water Equivalent for 2024 January 17, 21:00 UTC

1230 mi

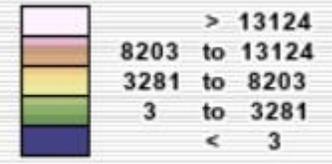


Inches of water equivalent



Not Estimated

Elevation in feet



1101 mi

1101 mi

1602 mi



Created 2024 Jan 18, 04:17 UTC

Frost Depth (inches)

In regions of the central U.S.

About This Map: This map displays recent frost depth measurements in terms of inches below the soil surface. Frost depth reports are commonly from frost tube instruments, visual reports from construction or cemetery sites, or other types of electronic probes.

To view all frost depth sites in the [NCRFC](#) service area, beyond those that recently reported, turn on the "All NCRFC Frost Depth Sites" layer using the layer list button in the top right. Click on any of the points on the map for site-specific information. Open the layer list to see additional data viewing options.

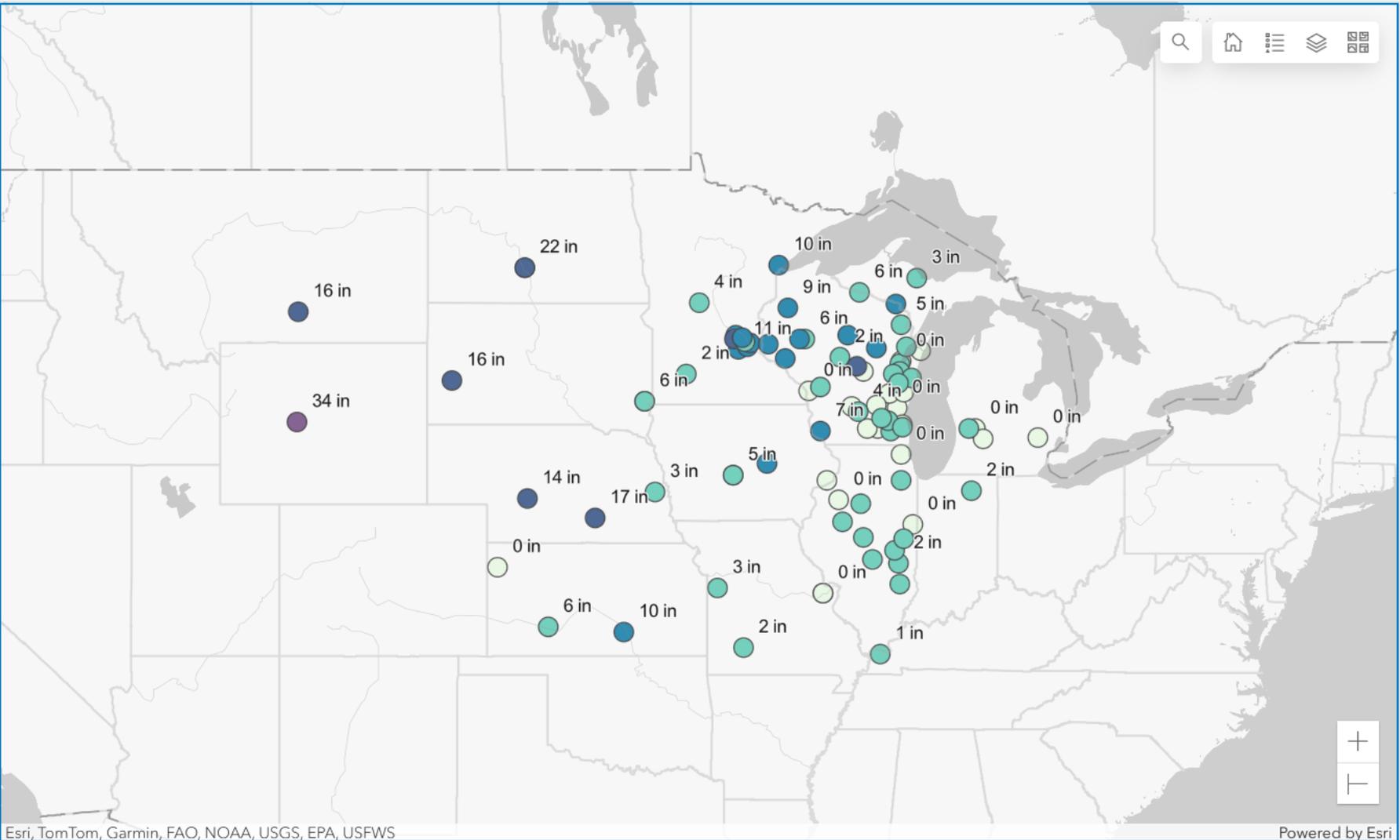
Download Soil Temperature Data: To download current and/or historical frost depth data, and to see metadata, please visit [this webpage](#) and use the links under the *Frost depth data download* section.

Coverage Area: This map only covers the north central United States. Please contact your local [River Forecast Center](#) or [Weather Forecast Office](#) if there is no data for the location(s) you are interested in.

Observation Dates: The data shown in this map are queried from the National Weather Service River Forecast Center (RFC) databases late morning each day. The values shown represent the

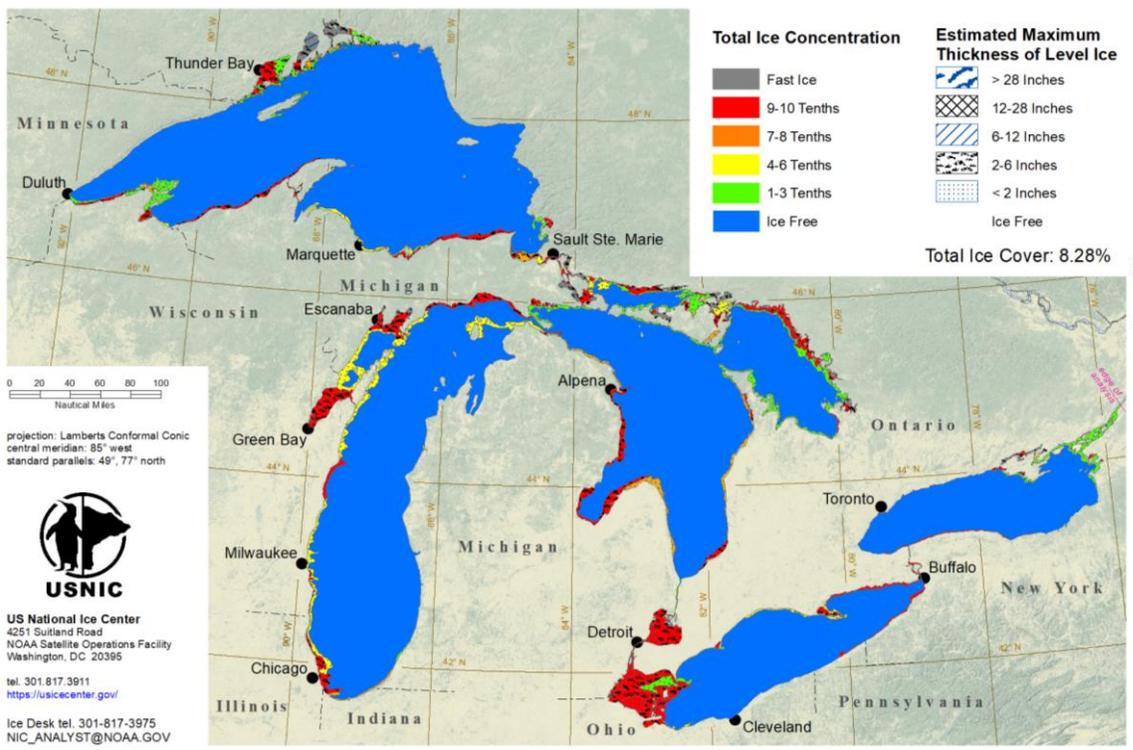
Soil Frost Depth (Inches)

- FrostDepth
- > 36" - 60"
 - > 24" - 36"
 - > 12" - 24"
 - > 6" - 12"
 - > 0" - 6"
 - 0"



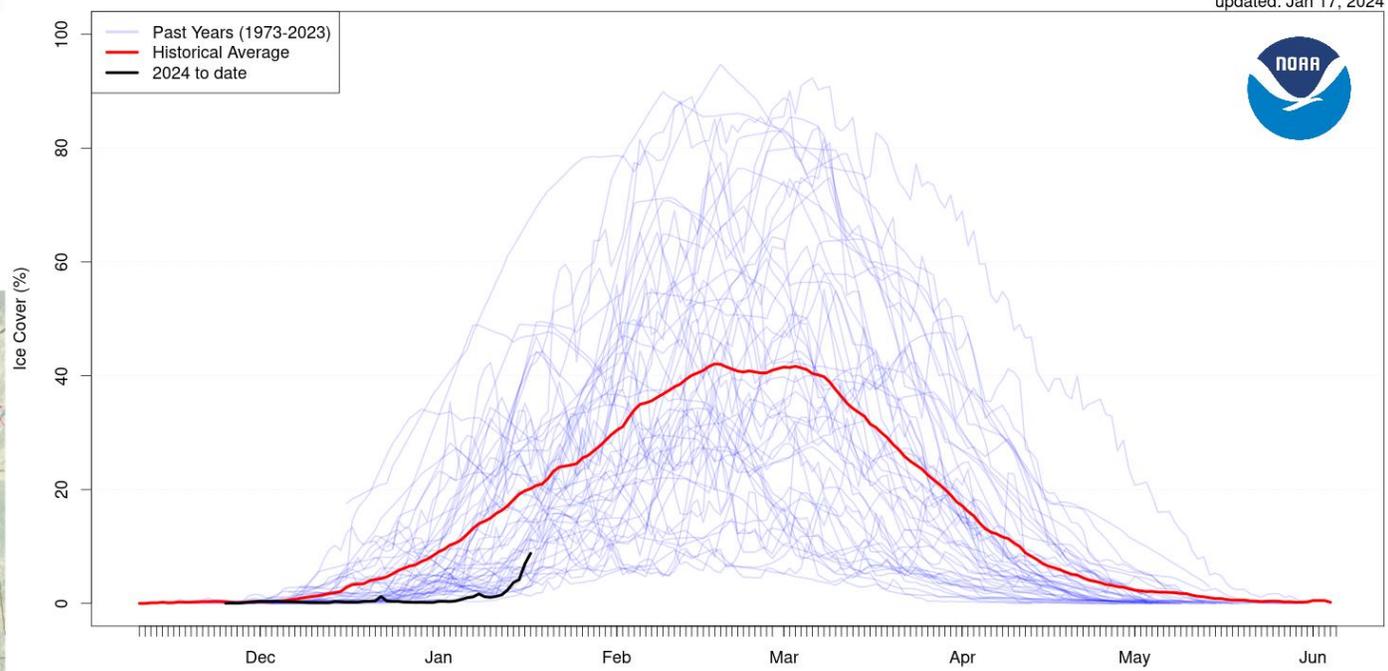
U. S. NATIONAL ICE CENTER
 USCG DISTRICT 9 GREAT LAKES ICE
 ICE CONCENTRATION AND LEVEL ICE THICKNESS

ICE DATE: 16 JAN 2024
 MAP PRODUCED: 16 JAN 2024

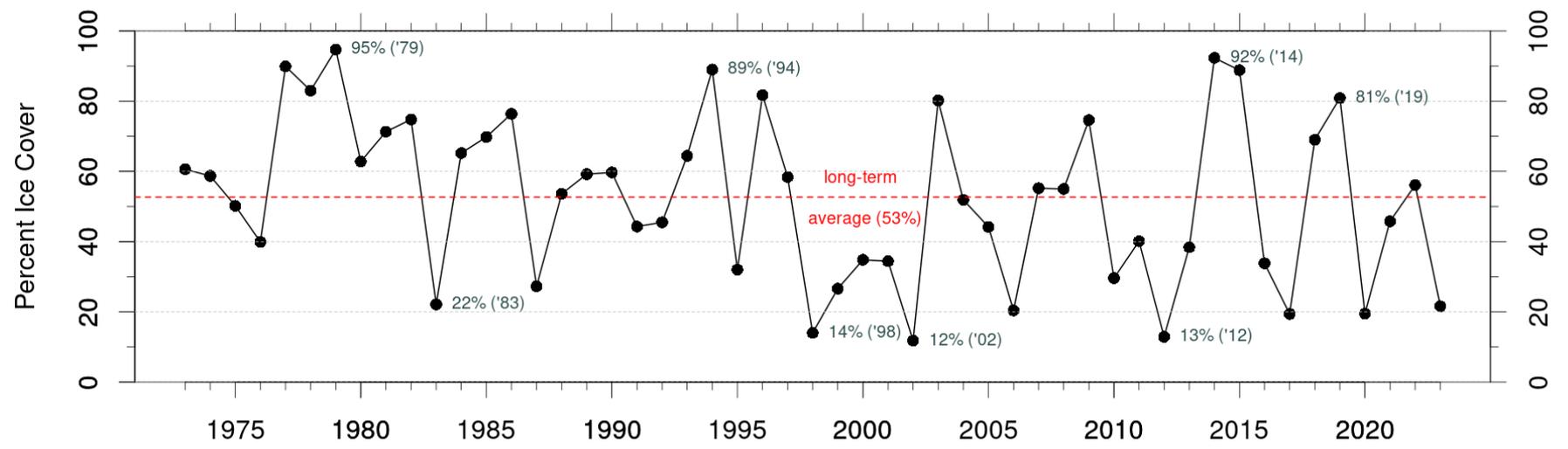


Great Lakes Average Ice Cover

updated: Jan 17, 2024



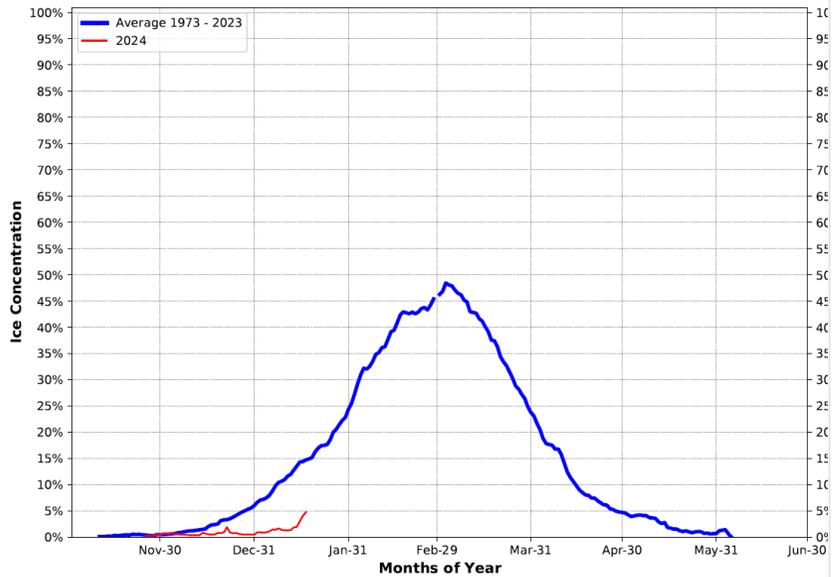
Annual Maximum Ice Cover - Great Lakes



- Total ice cover is 8.28%
- Rapid ice growth is forecast.



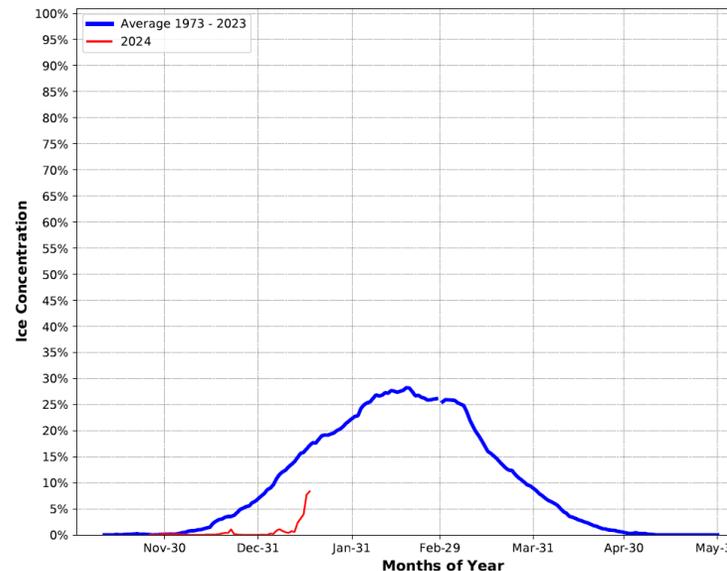
Lake Superior Long Term Average Ice Concentration Compared to Current Year



Lake-wide ice cover derived from data produced by the U.S. National Ice Center and Canadian Ice Service
NOAA CoastWatch Great Lakes January 17, 2024 21:28:03



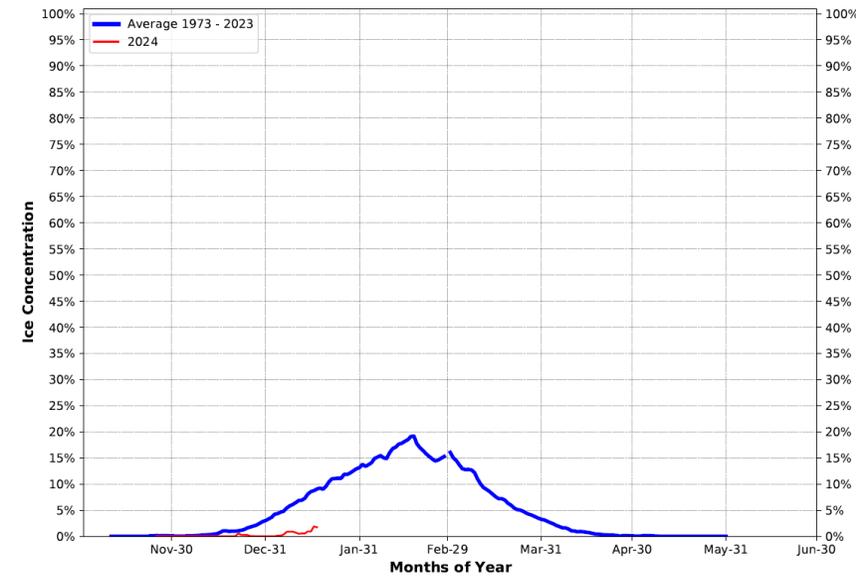
Lake Michigan Long Term Average Ice Concentration Compared to Current Year



Lake-wide ice cover derived from data produced by the U.S. National Ice Center and Canadian Ice Service
NOAA CoastWatch Great Lakes January 17, 2024 21:28:03



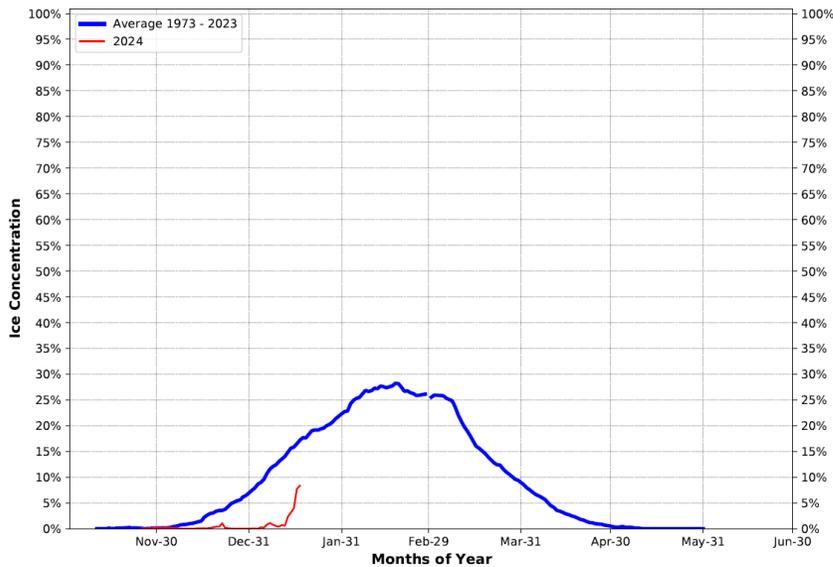
Lake Ontario Long Term Average Ice Concentration Compared to Current Year



Lake-wide ice cover derived from data produced by the U.S. National Ice Center and Canadian Ice Service
NOAA CoastWatch Great Lakes January 17, 2024 21:28:08



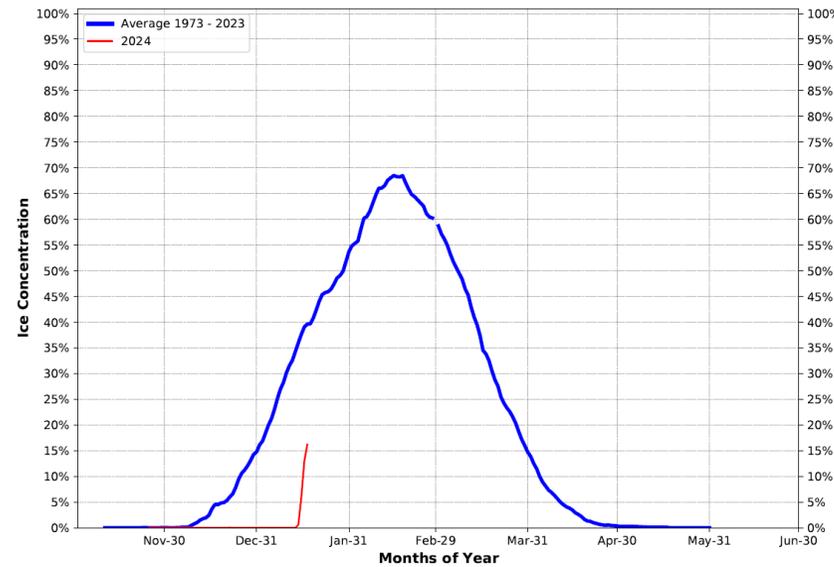
Lake Michigan Long Term Average Ice Concentration Compared to Current Year



Lake-wide ice cover derived from data produced by the U.S. National Ice Center and Canadian Ice Service
NOAA CoastWatch Great Lakes January 17, 2024 21:28:04



Lake Erie Long Term Average Ice Concentration Compared to Current Year



Lake-wide ice cover derived from data produced by the U.S. National Ice Center and Canadian Ice Service
NOAA CoastWatch Great Lakes January 17, 2024 21:28:07



Impacts/Events

Fall drought; snow drought; arctic air



Fall/Winter Drought

MO

City of Moberly blames animal fat and drought for odor complaints

Hay prices, major drought impacting farmers across the Ozarks

NE

Fontenelle Forest's 'Great Marsh' is completely dried up

KY

Beshear issues state of emergency for water shortage for Fleming-Neon

By TOM LATEK, Kentucky Today Jan 10, 2024 Updated Jan 11, 2024

The City of Berea issued a water shortage advisory due to the recent and progressing drought conditions. Voluntary water conservation was requested to avoid the potential for serious raw water supply shortages.

WBON TV (Richmond, Ky.), Jan 3, 2024

Stanford declares state of emergency amid drought, water shortage

Published 6:24 pm Friday, December 29, 2023

By Abigail Roberts

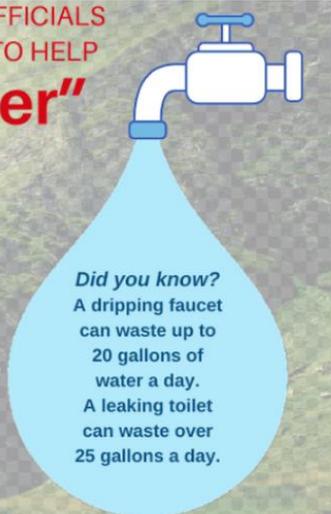
STANFORD & LINCOLN COUNTY OFFICIALS ARE ENCOURAGING ITS CITIZENS TO HELP

"Conserve Water"

Every Drop Counts!

Due to current drought conditions in our area we are in an advisory phase to encourage our citizens to help us conserve water. We are asking each home and business to reduce water usage by a minimum of 20%. If we all do this, then together we can make a huge difference in our community.

Did you know?
A dripping faucet can waste up to 20 gallons of water a day.
A leaking toilet can waste over 25 gallons a day.



Lack of Snow and Cold: 2024's slow start

This span of quiet not welcome

Warm winter leaves snowmobiling capital desperate for snow

EAGLE RIVER — Things are quiet here. Too quiet. Motels and hotels should have been packed this weekend along with bars and restaurants, gas stations and retail shops in this resort city known as the Snowmobile Capital of the World.



BARRY ADAMS

More than 8,000 spectators and up to 1,000 entries were supposed to crowd the World Championship Derby Complex this weekend for four days of vintage snowmobile

races, a winter tradition now in its 23rd year. But the only things circling the half-mile banked oval the past few weeks have been a couple of tanker trucks spraying thousands of gallons



This parking lot for snowmobiles at the Boulder Junction Motor Lodge is typically full, but on Jan. 6, with trails closed in Vilas County, there were no snowmobiles to be found.



Photo courtesy of Melissa Widhalm

Lack of Snow and Cold: 2024's slow start

Ice fishing turns deadly as climate change warms Minn. lakes

A record-warm December and balmy early January has turned lake ice into death traps. Fatalities, injuries and rescues are piling up.



BY: **DANIEL CUSICK** | 01/18/2024 06:38 AM EST

Steam fog and pancake ice forming on Lake Mendota on Jan 14 (from Mendota Today website).

Third or fourth latest freeze-up in 170 year-long record.



January 2024 'Polar Vortex'

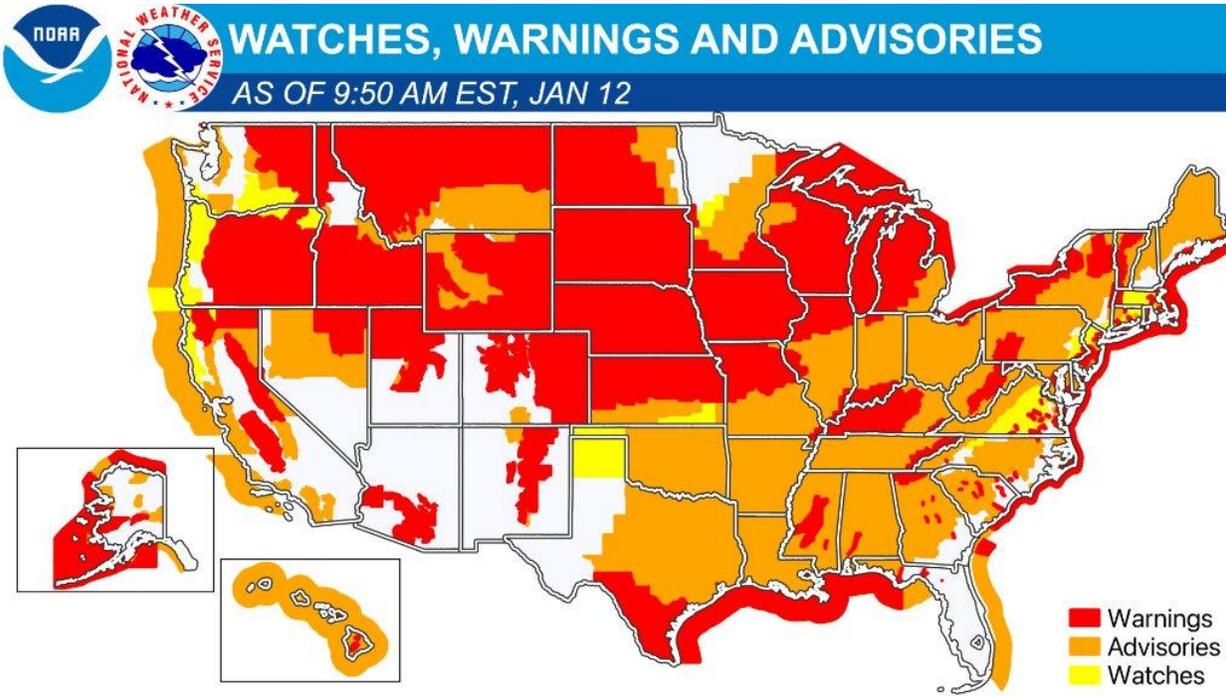


Iowa's I-80 – Truck accident stuck traffic for 5 hours.



Kansas City - 4th Coldest game in NFL history with -4F and a wind chill in the -20s at kickoff.

January 2024 'Polar Vortex'



Jan 12 – Every state had some type of NOAA warning, watch, or advisory.



Missouri River freezes, blocks of ice float downstream (KRCG 13)

Columbia Parks approves ice skating at Stephens Lake, fishing at Cosmo Bethel parks

<https://krcgtv.com/news/local/columbia-parks-approves-ice-skating-at-stephens-lake-fishing-at-cosmo-bethel-parks>

January 2024 'Polar Vortex'

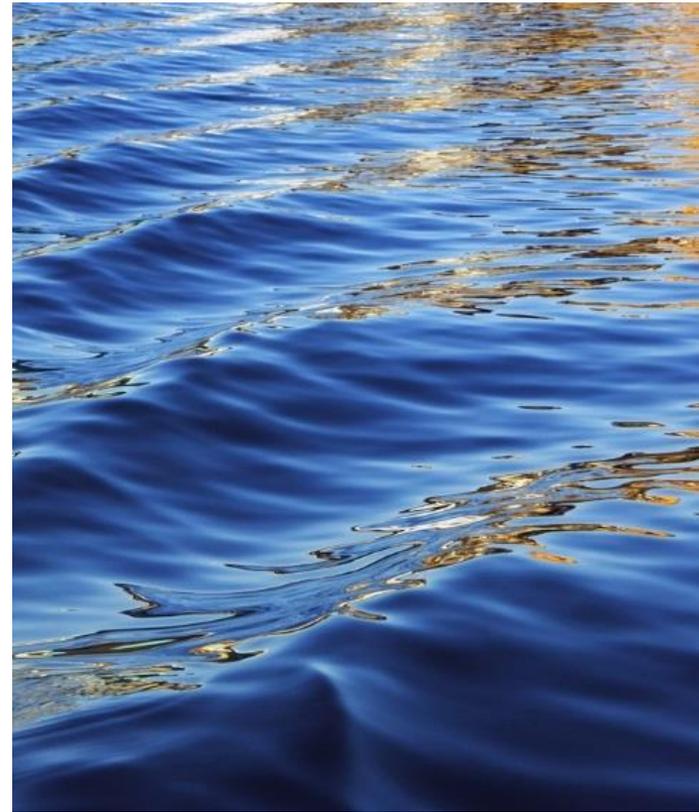
- Schools closed nationwide.
- Some areas near Quad Cities received 25-30".
- Moline (IL) 25.5", more than in all of 2023.
- Two "all-ground" orders at Chicago's O'Hare airport, the 2nd for nearly 3 hours.
- Chicago's most intense January cold since 2019; had 30 straight hours < -5F (15th time; first since 2014).
- Reports of "cryoseism".





Hydrology

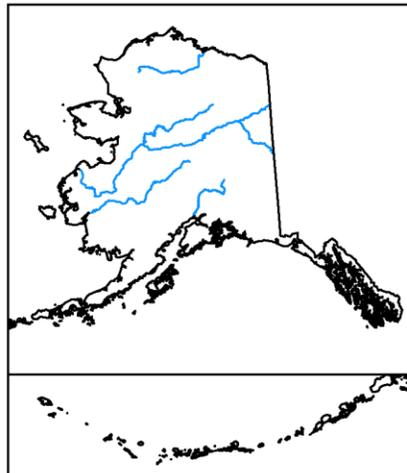
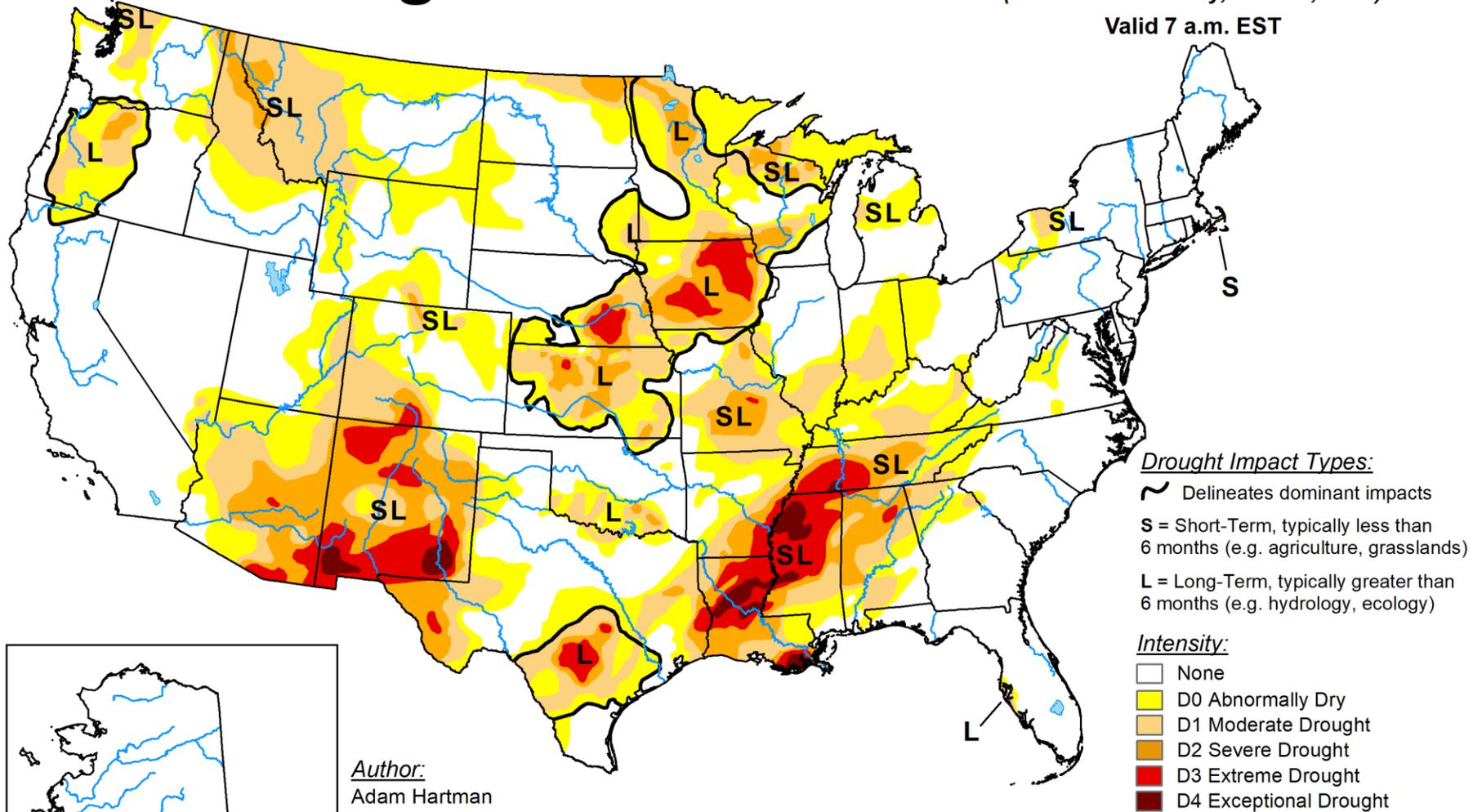
Winter recharge?



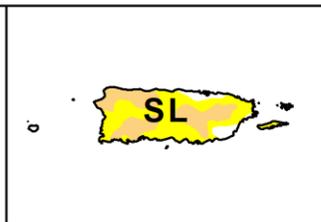
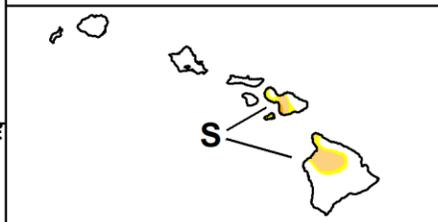
U.S. Drought Monitor

January 16, 2024
(Released Thursday, Jan. 18, 2024)

Valid 7 a.m. EST



Author:
Adam Hartman
NOAA/NWS/NCEP/CPC

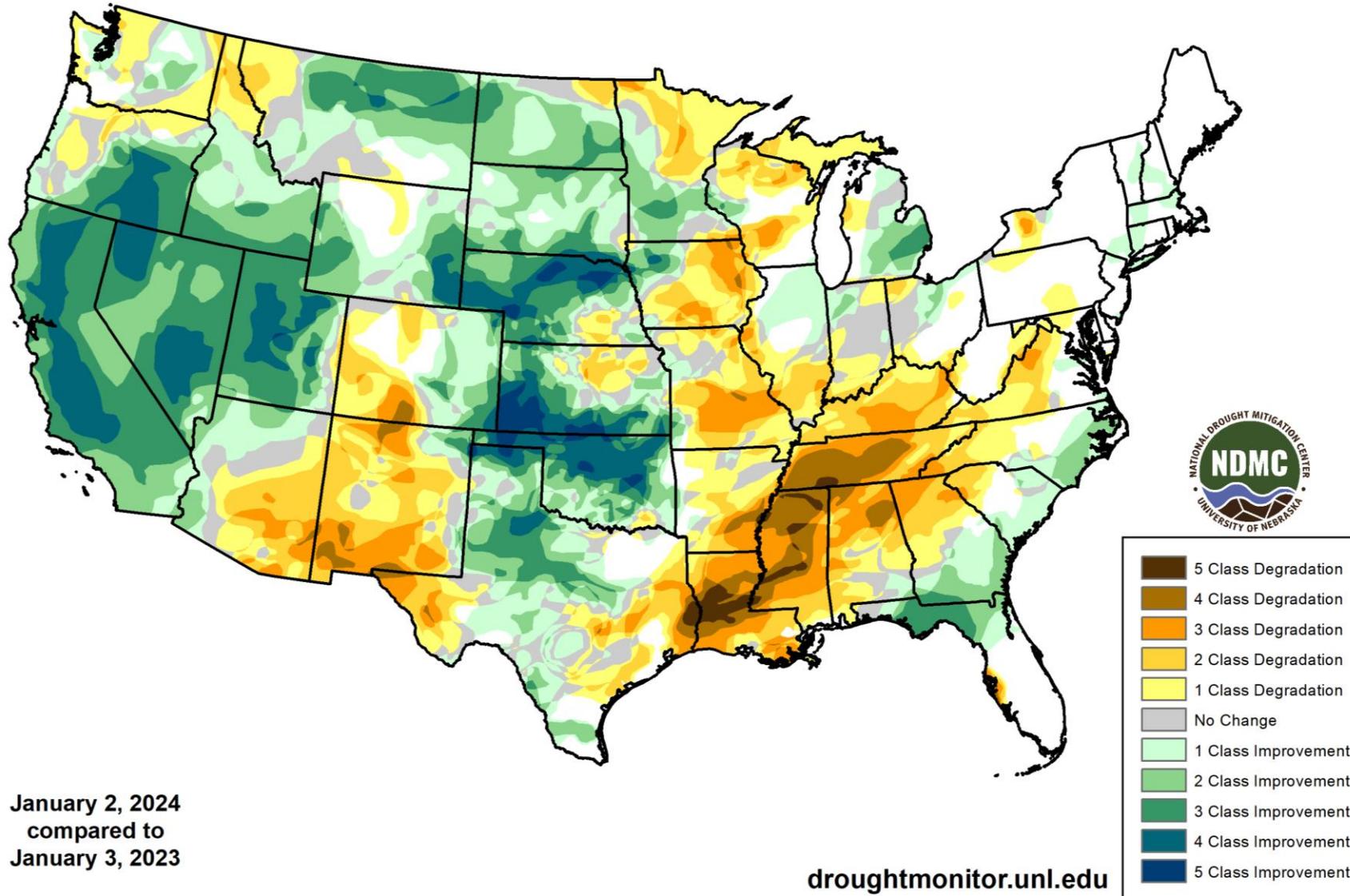


The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>



droughtmonitor.unl.edu

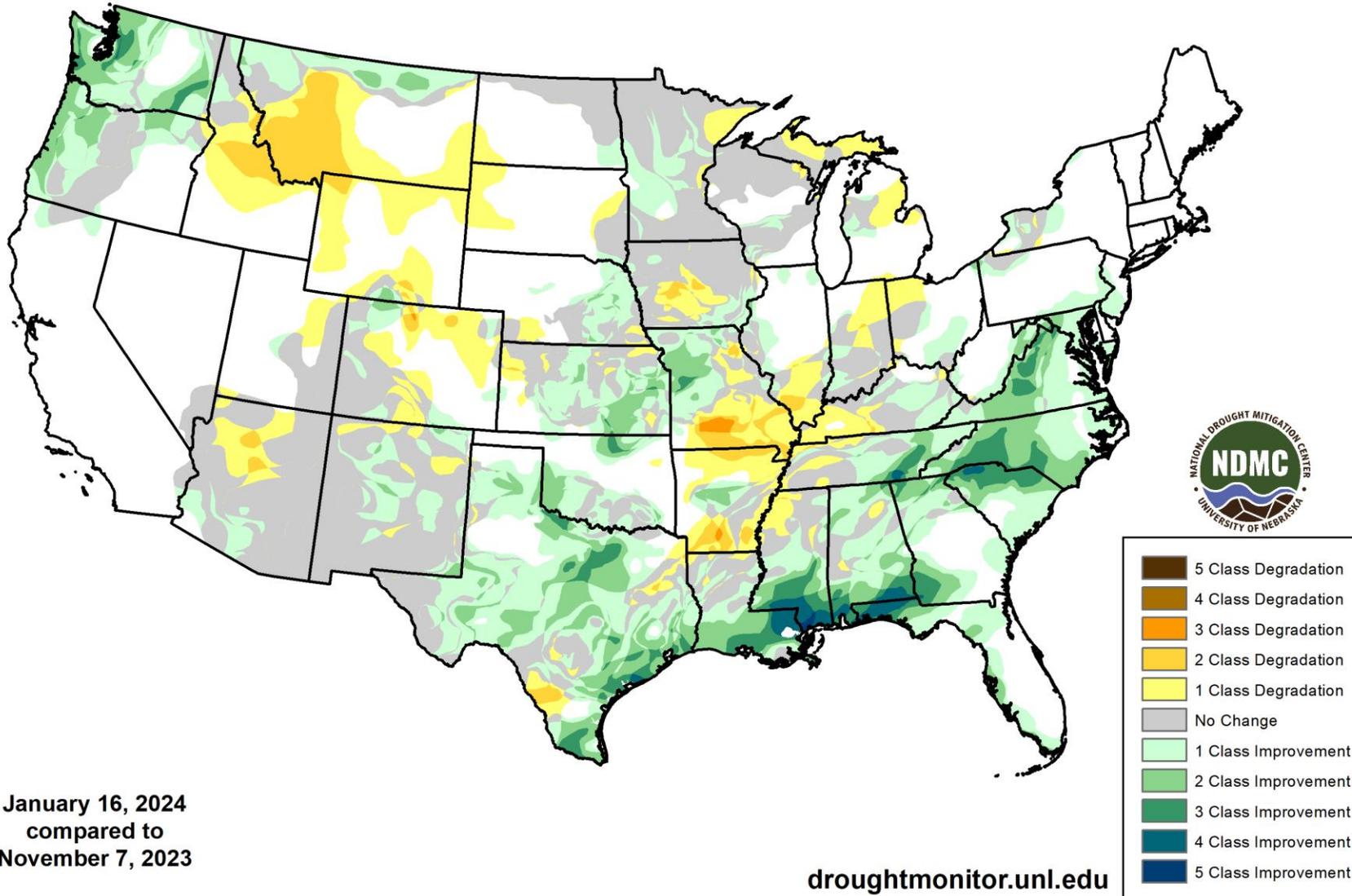
U.S. Drought Monitor Class Change - CONUS 52 Week



January 2, 2024
compared to
January 3, 2023

- Great improvement across much of the West and Plains
- Significant drying across the Southwest, Miss. and Ohio Valley and Deep South

U.S. Drought Monitor Class Change - CONUS 10 Week

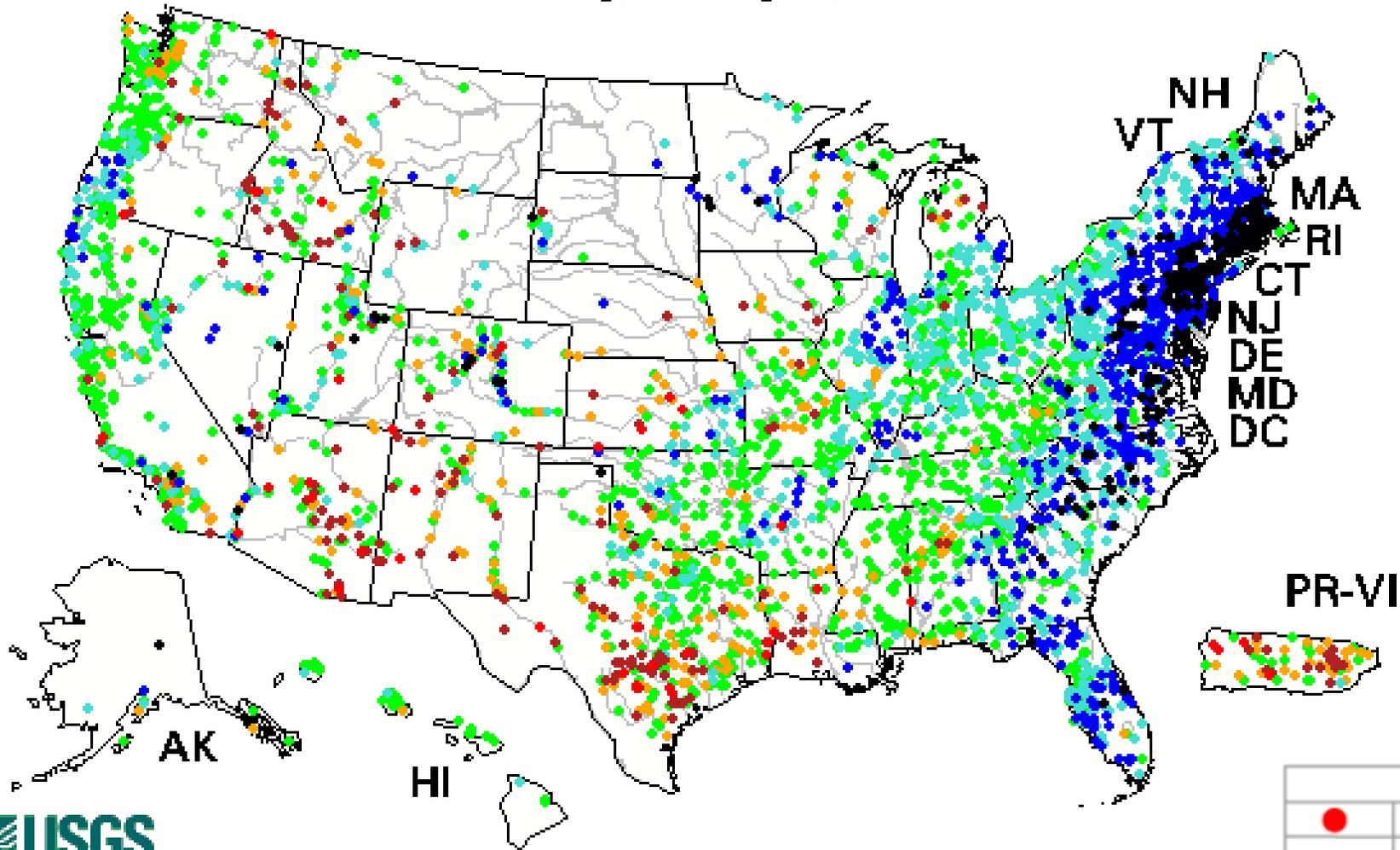


January 16, 2024
compared to
November 7, 2023

- Improvement across the Deep South and upper Plains
- Dry in lower Miss. and Ohio Valley regions
- Very typical El Nino!

7-Day Average Streamflow

Wednesday, January 17, 2024

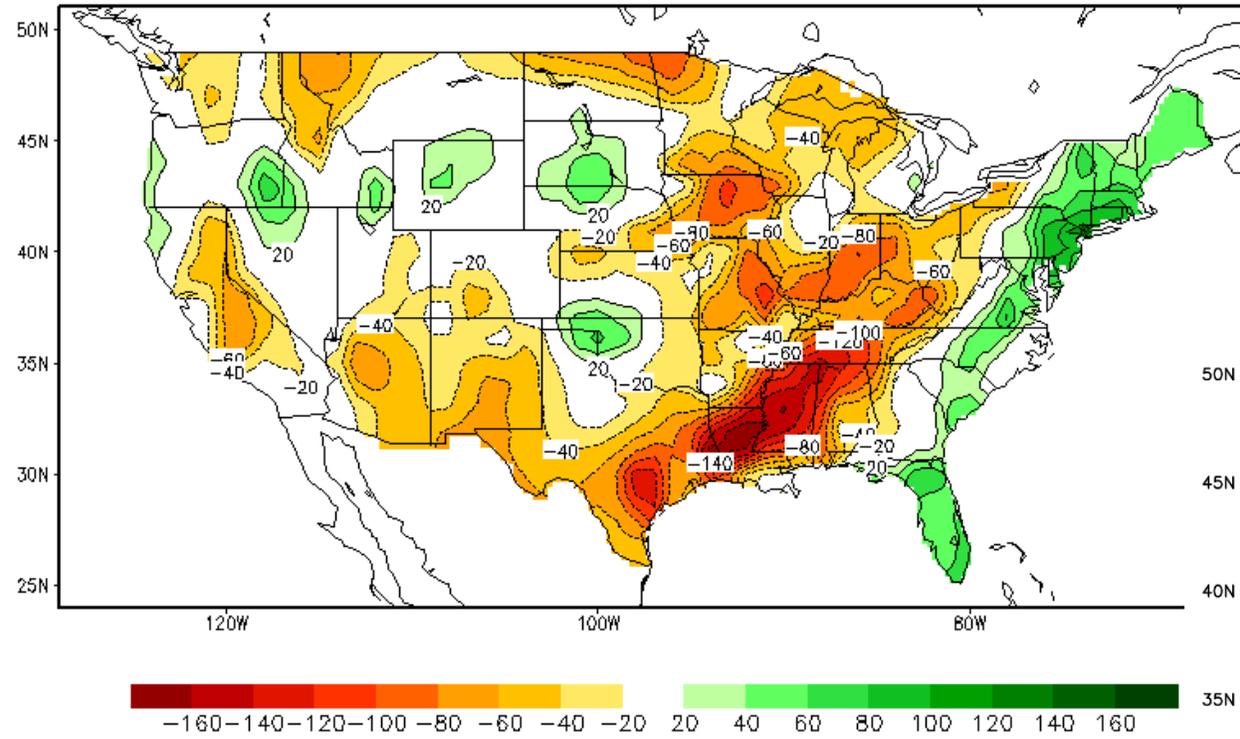


Explanation - Percentile classes						
Low	<10	10-24	25-75	76-90	>90	High
	Much below normal	Below normal	Normal	Above normal	Much above normal	



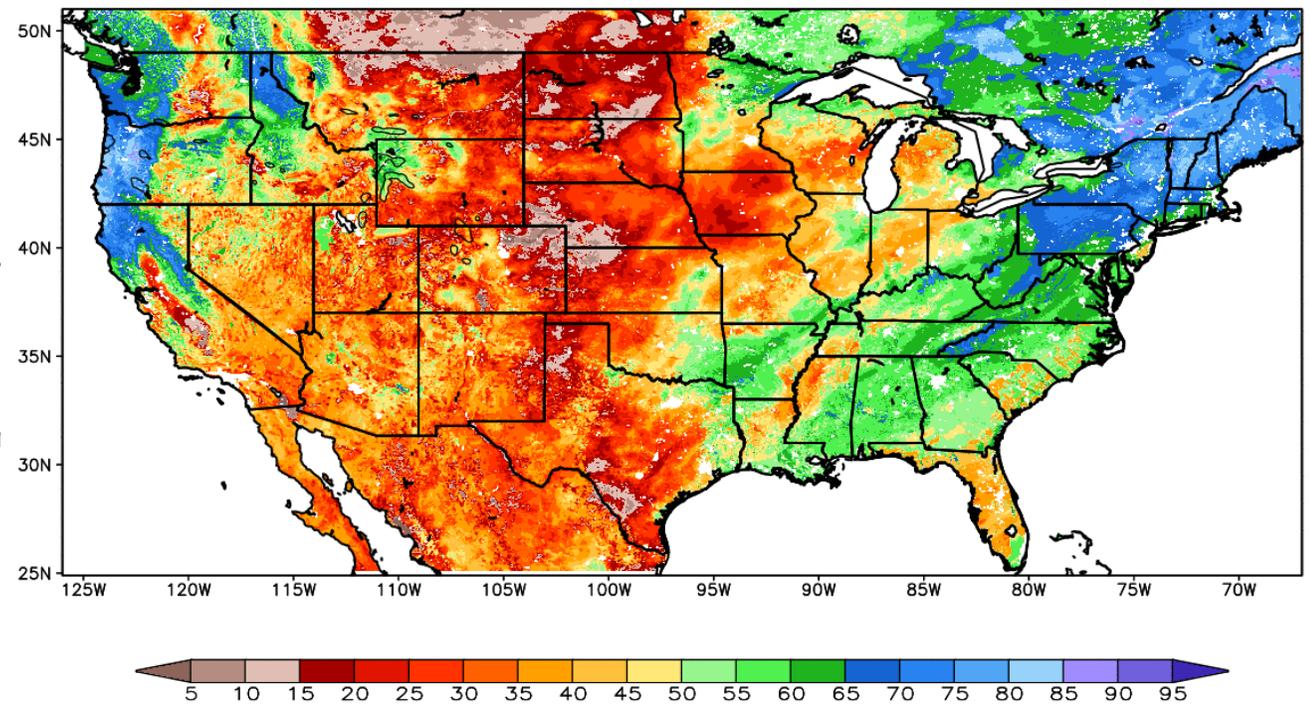
Soil Moisture

Calculated Soil Moisture Anomaly (mm)
JAN 17, 2024



https://www.cpc.ncep.noaa.gov/products/Soilmst_Monitoring/US/Summary_anom.shtr

0–100 cm Relative Soil Moisture (available water; %) valid 12z 18 Jan 2024
Precipitation in previous hour (1,2,5,10,15,20,25 mm contours)



NOTE
Experimental

https://weather.ndc.nasa.gov/sport/viewer/?dataset=lis_conus&product=rsoimo-100

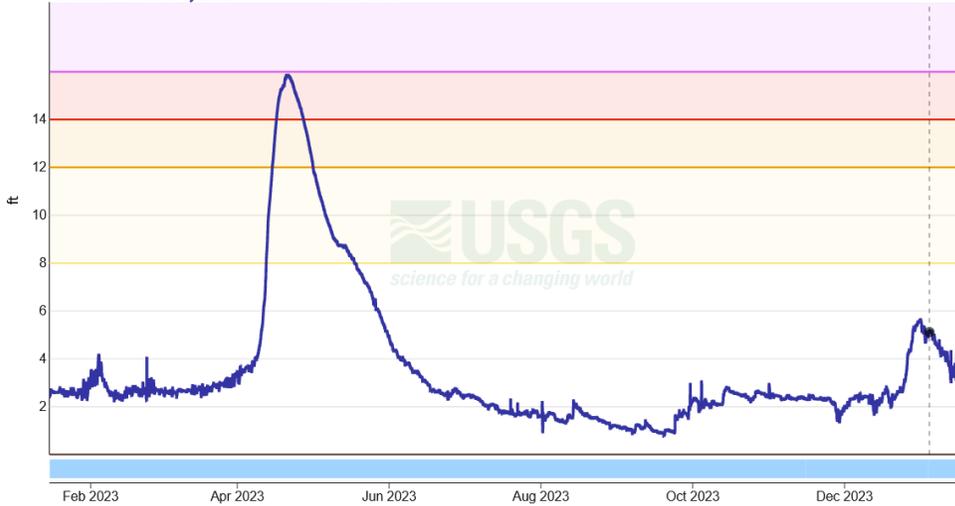
Mississippi River at Hwy 610 IN Brooklyn Park, MN - 05288500

January 15, 2023 - January 15, 2024

Gage height, feet

Gage height, feet

5.12 ft - Jan 04, 2024 03:00:00 AM CST

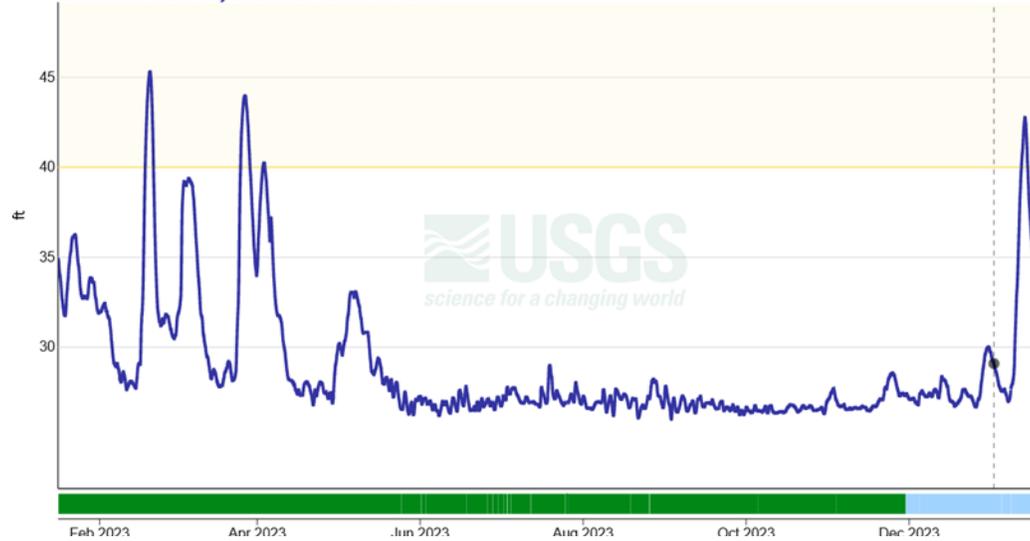


Ohio River at Cincinnati, OH - 03255000

January 16, 2023 - January 16, 2024

Gage height, feet

29.09 ft - Jan 01, 2024 05:45:00 PM EST



Mississippi River at Memphis, TN - 07032000

January 15, 2023 - January 15, 2024

Gage height, feet

-1.54 ft - Jan 11, 2024 04:00:00 PM CST

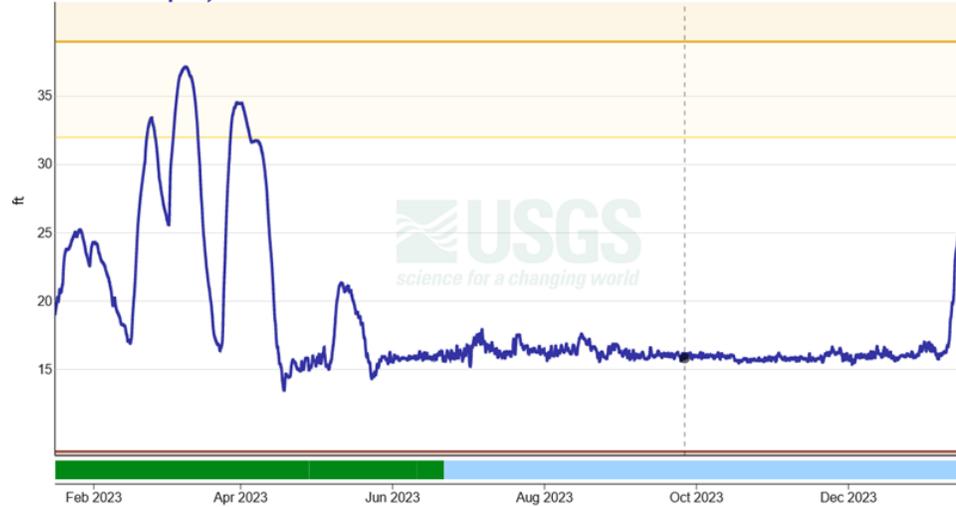


Ohio River at Paducah, KY - 03611000

January 16, 2023 - January 16, 2024

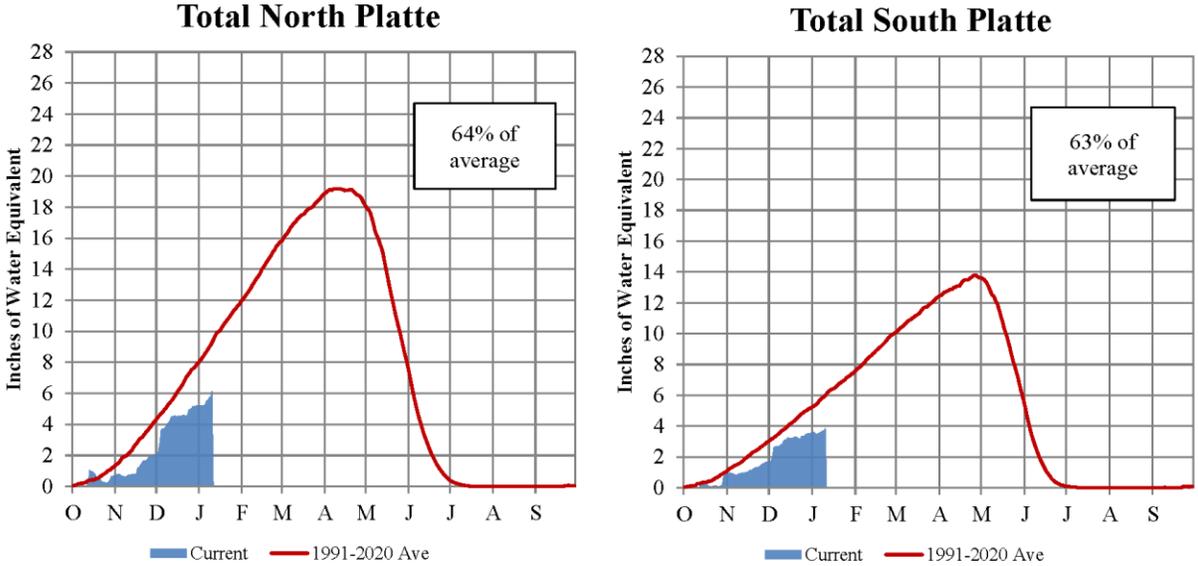
Gage height, feet

15.82 ft - Sep 26, 2023 06:30:00 AM CDT



Mountain Snowpack

Platte River Basin - Mountain Snowpack Water Content
Water Year 2023-2024
 January 09, 2024

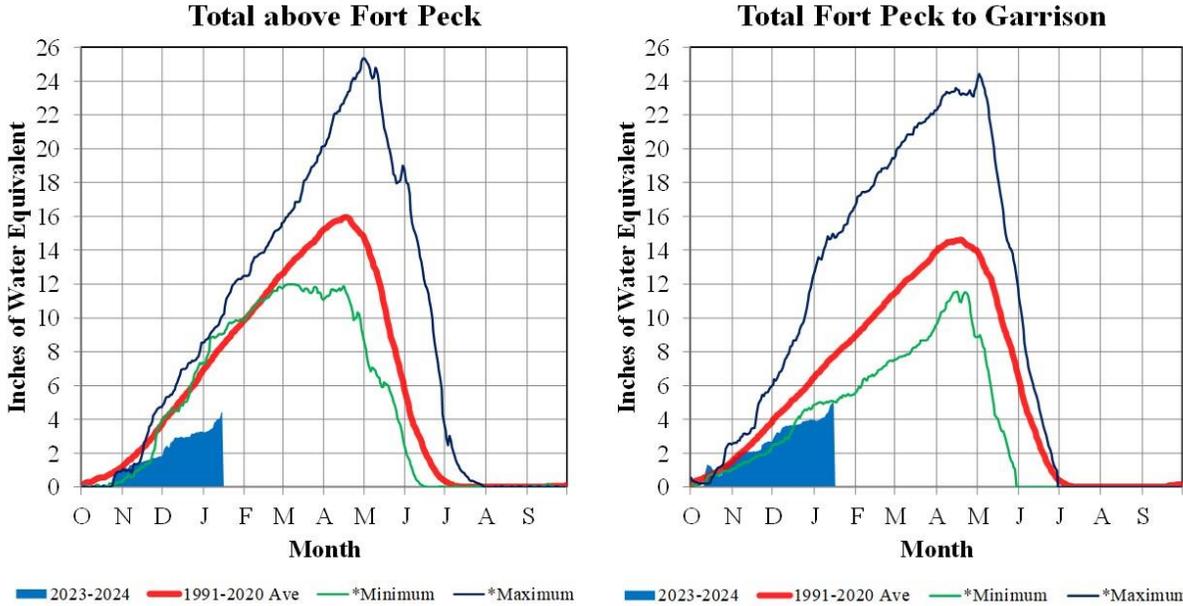


The North and South Platte River Basin mountain snowpacks normally peak near April 10 and the end of April, respectively. As of January 9, 2024, the mountain snowpack SWE in the "Total North Platte" reach is 5.8", 64% of the (1991-2020) average. The mountain snowpack SWE in the "Total South Platte" reach is 3.7", 63% of the (1991-2020) average.

Source: USDA, Natural Resource Conservation Service

Provisional Data. Subject to Revision

Missouri River Basin – Mountain Snowpack Water Content
2023-2024 with comparison plots from recent high and low years
 15-Jan-2024

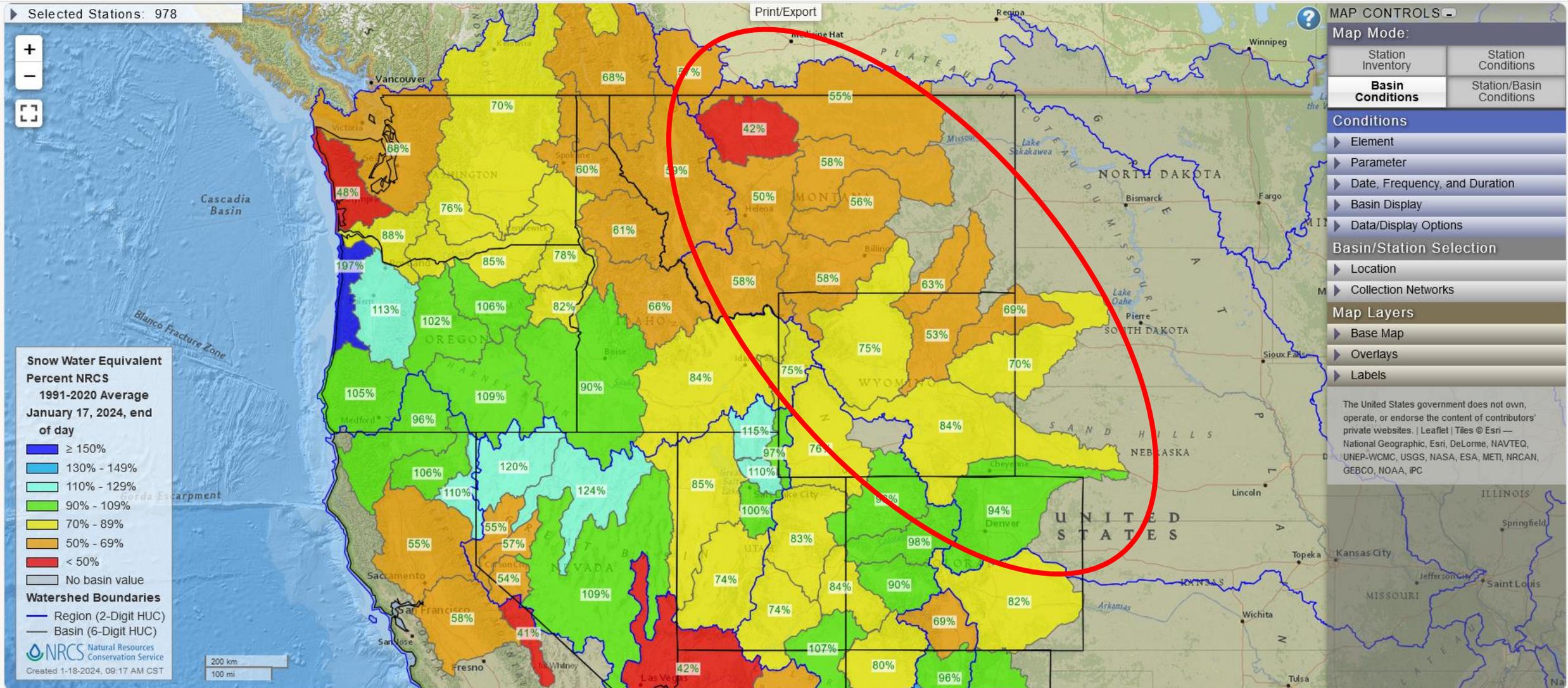


On January 15, 2024 the mountain Snow Water Equivalent (SWE) in the "Total above Fort Peck" reach is 4.4" and 53% of the (1991-2020) average. The mountain SWE in the "Fort Peck to Garrison" reach is 5.0" and 65% of the (1991-2020) average. The normal peak for both reaches occurs near April 17.

*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.

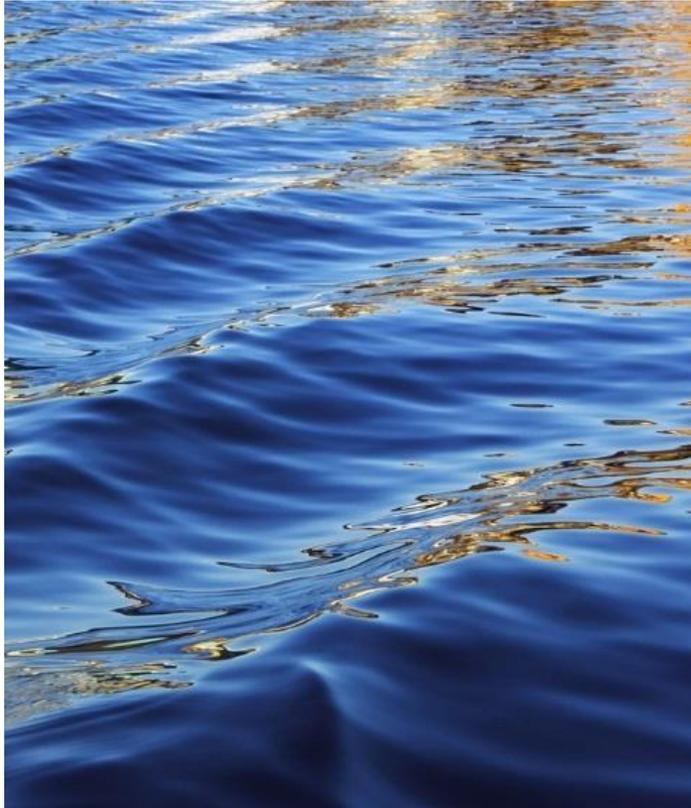
Basin Snow Water Equivalent (SWE)

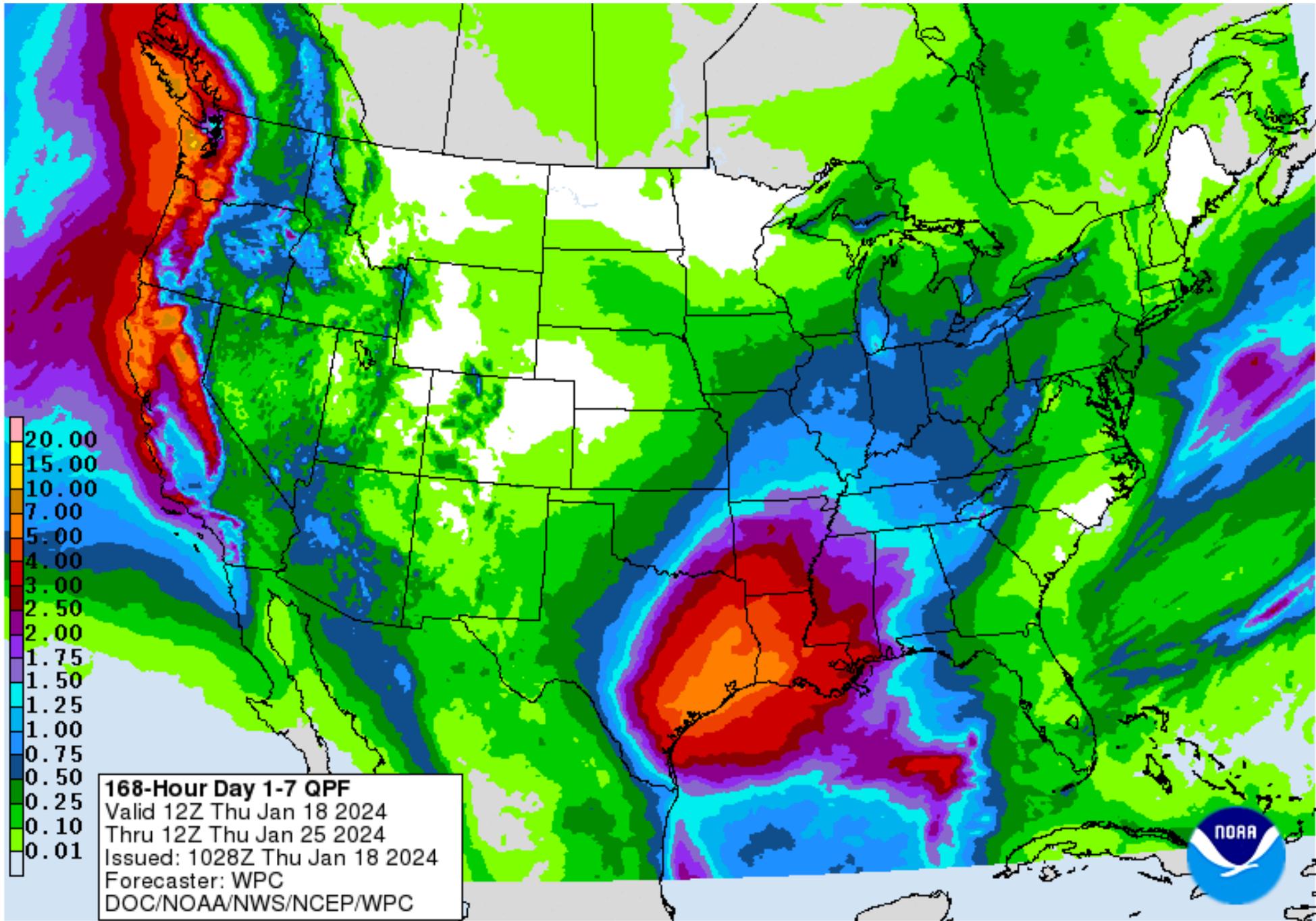




Outlook

Recharge for Spring, Delayed El Nino transition?

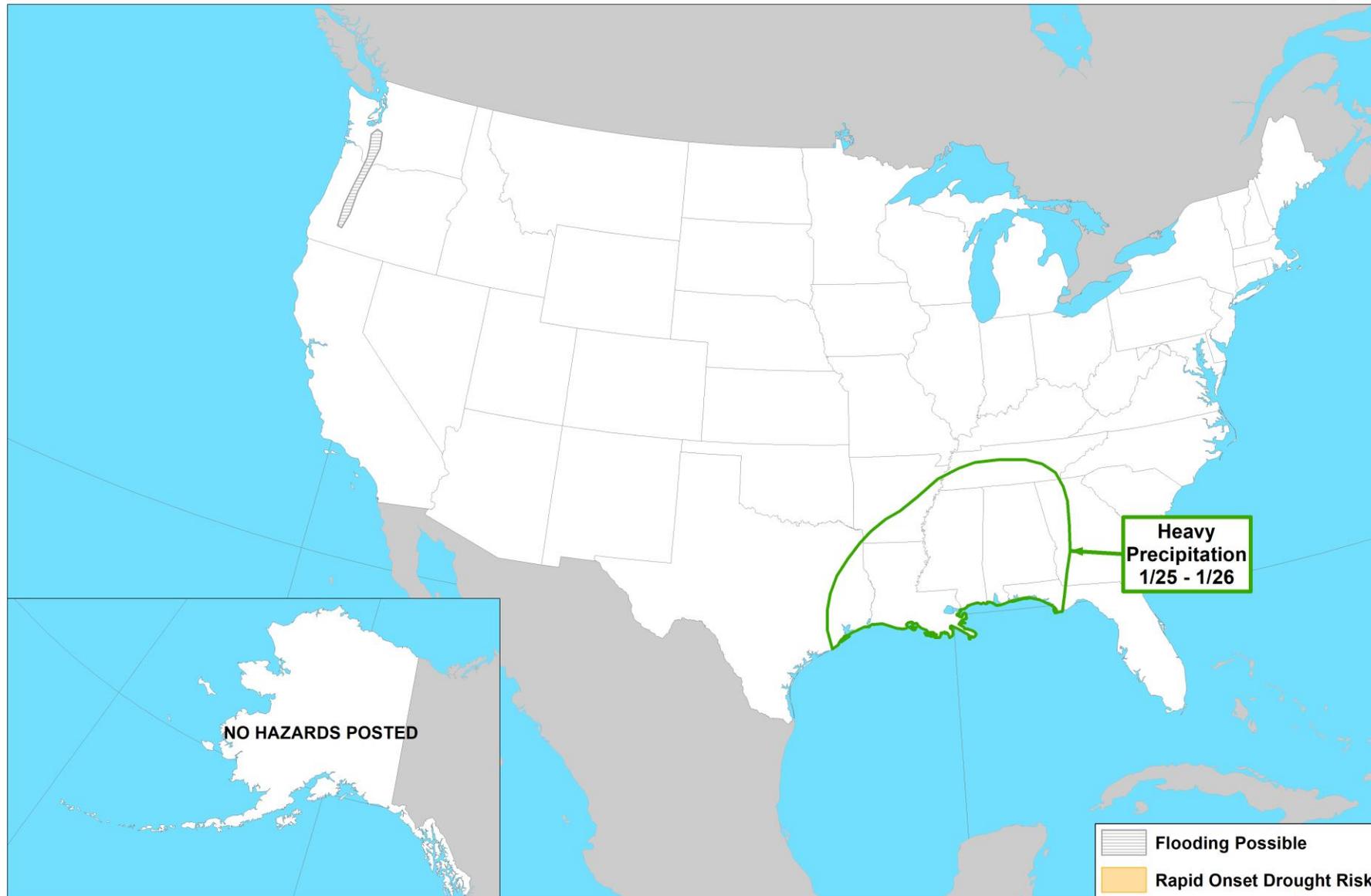






Day 8-14 U.S. Hazards Outlook

Valid: 01/25/2024-01/31/2024



Climate Prediction Center

Made: 01/17/2024 3PM EST

Follow us:

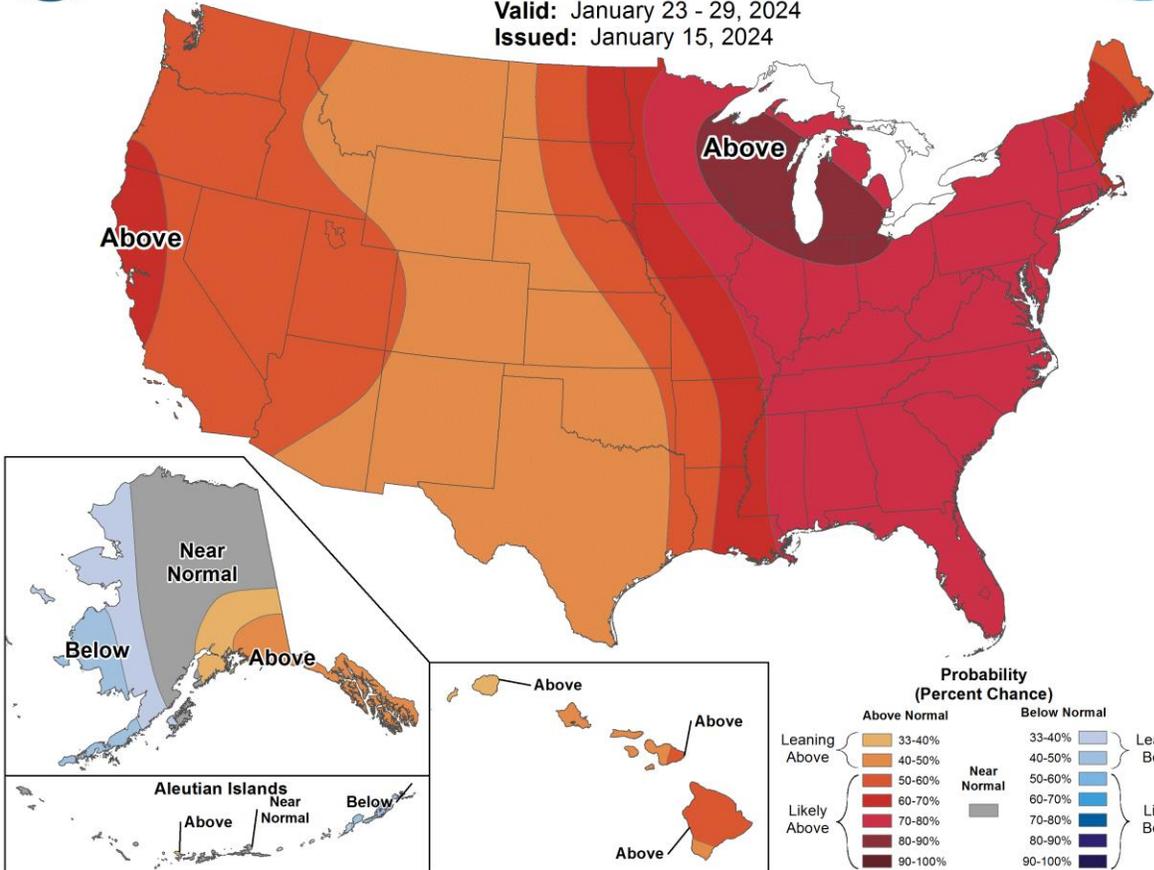
www.cpc.ncep.noaa.gov

NOAA's 8-14 Day Outlook



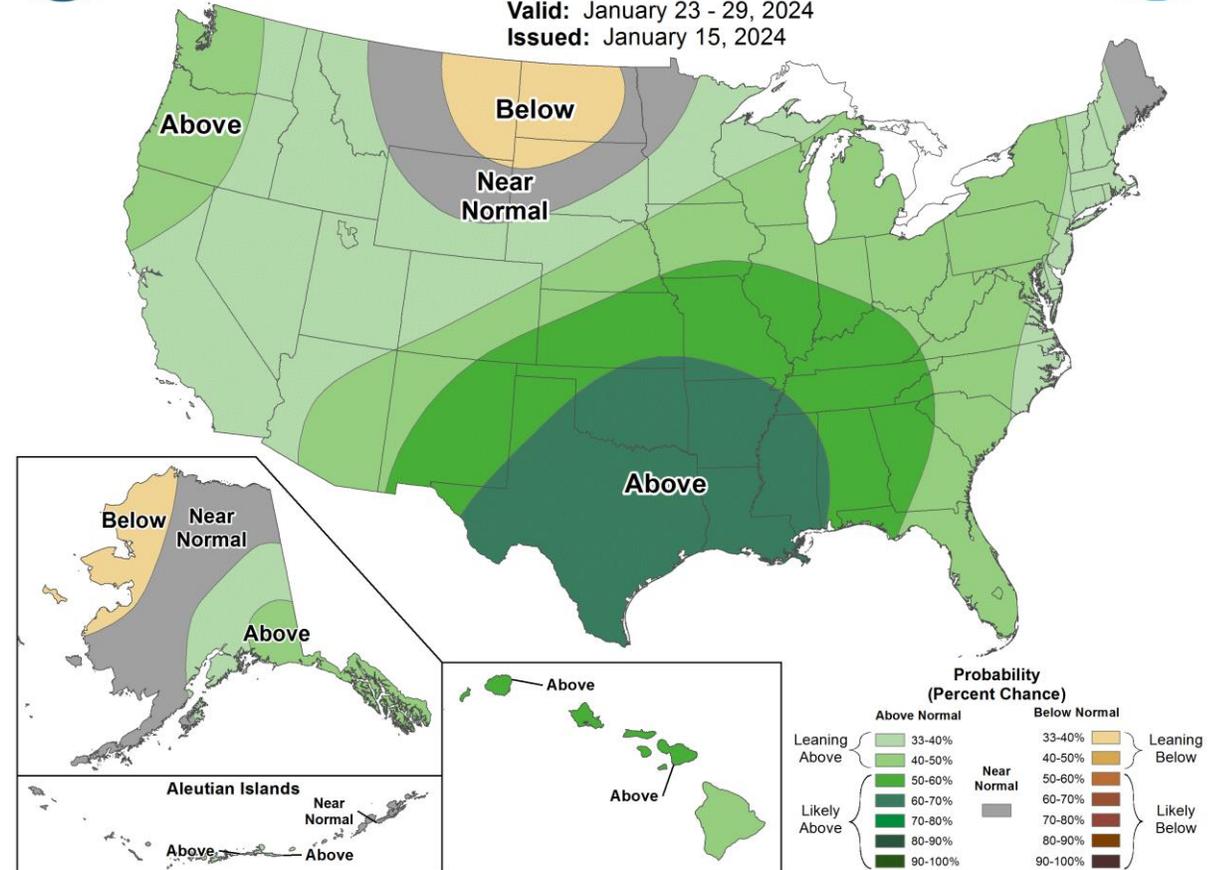
8-14 Day Temperature Outlook

Valid: January 23 - 29, 2024
Issued: January 15, 2024



8-14 Day Precipitation Outlook

Valid: January 23 - 29, 2024
Issued: January 15, 2024



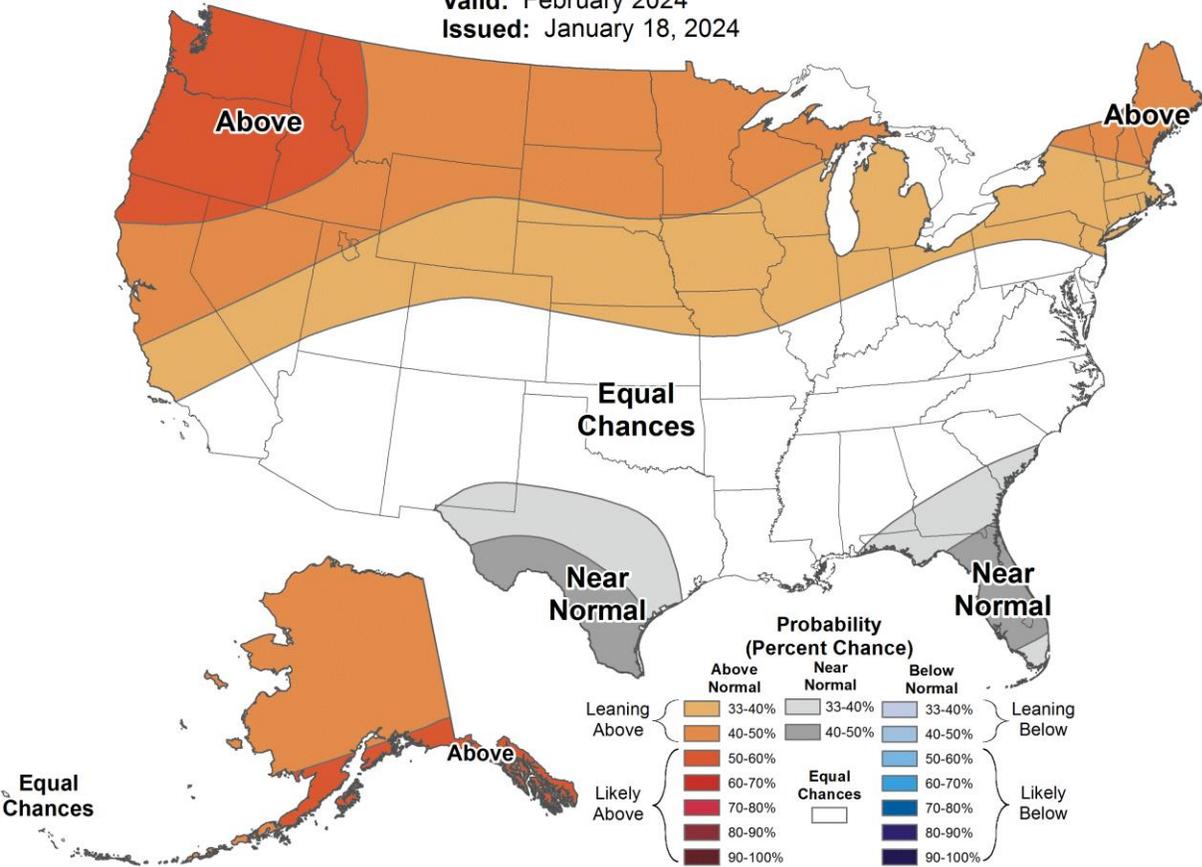
February Outlook



Monthly Temperature Outlook



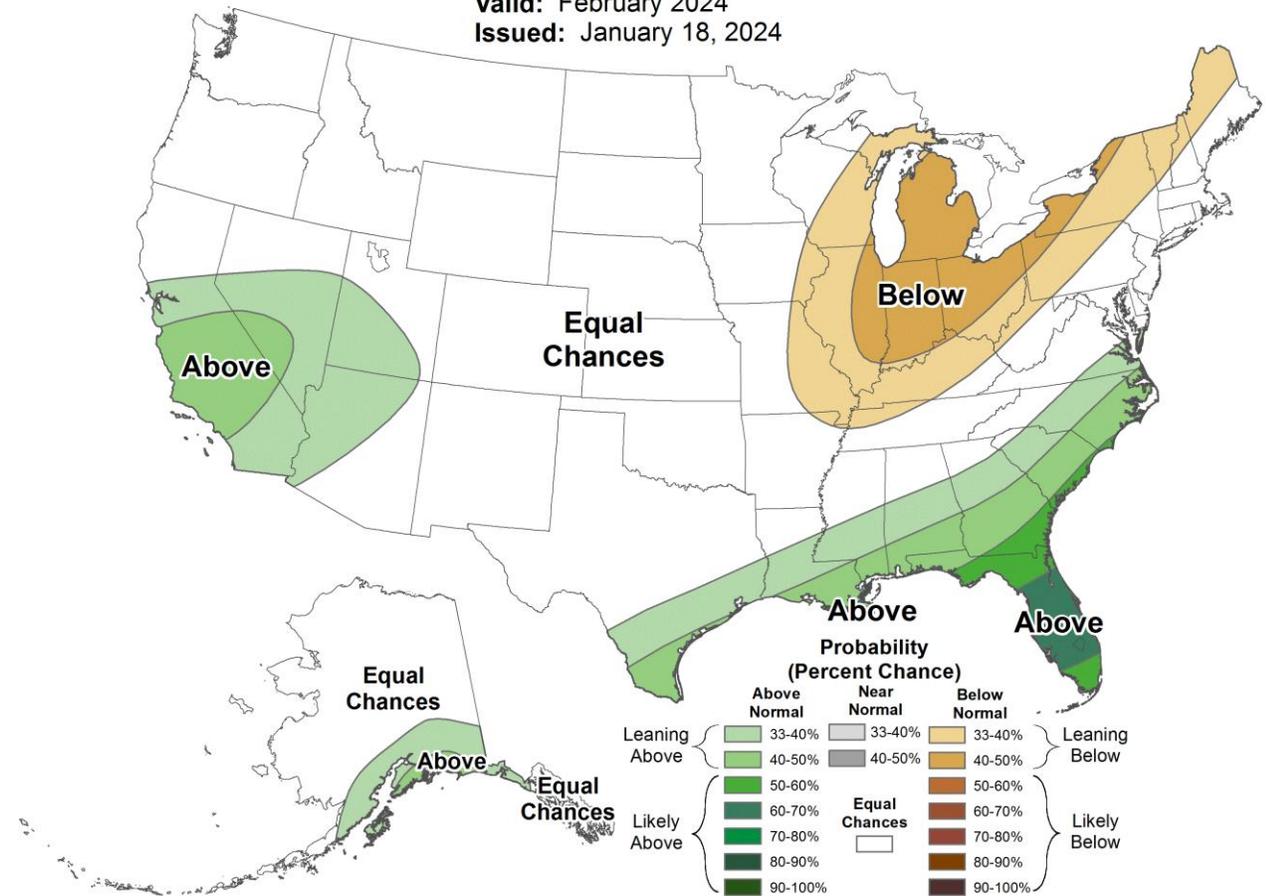
Valid: February 2024
Issued: January 18, 2024



Monthly Precipitation Outlook



Valid: February 2024
Issued: January 18, 2024



Official NOAA CPC ENSO Probabilities (issued Jan. 2024)

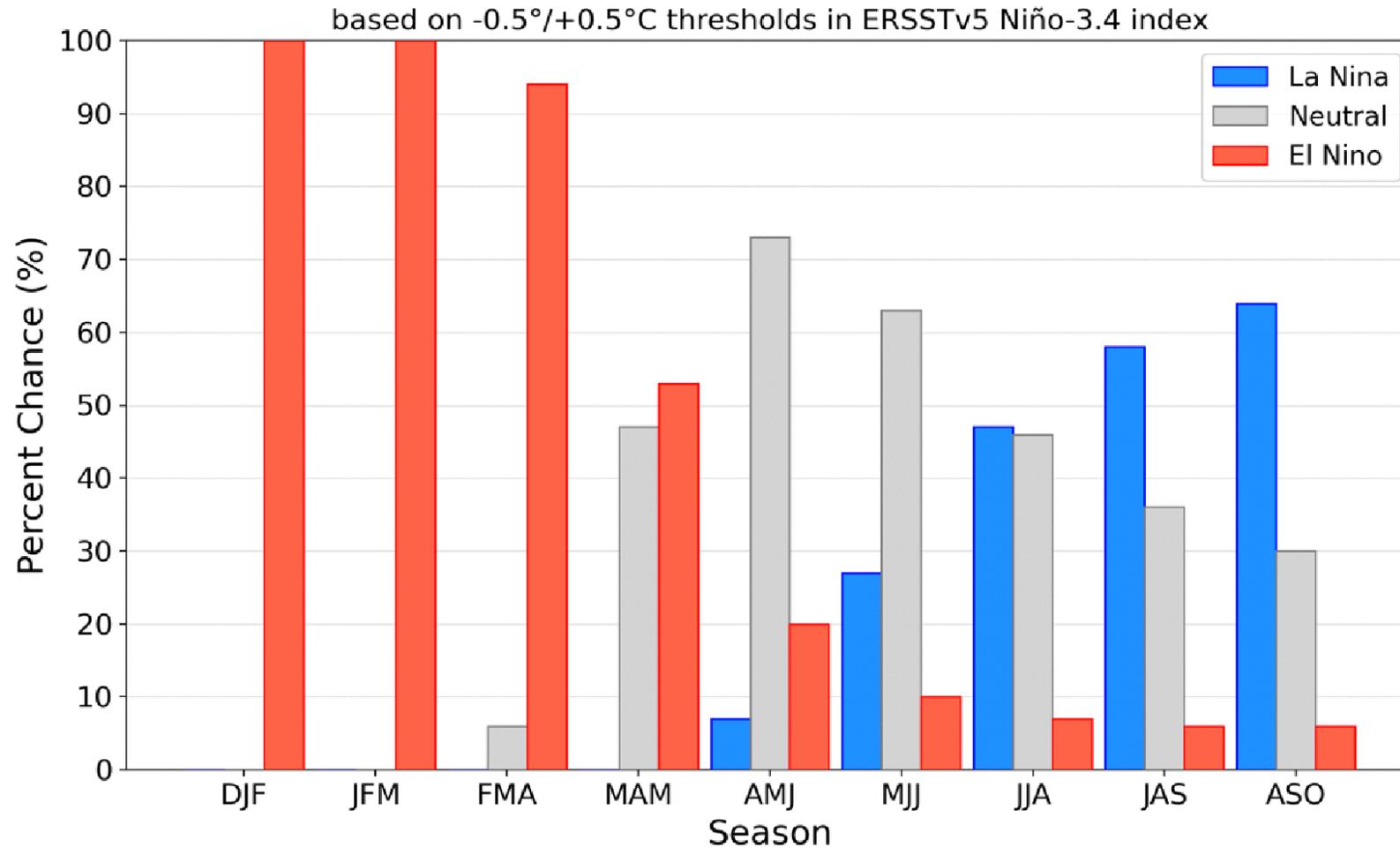


Figure 7. Official ENSO probabilities for the Niño 3.4 sea surface temperature index (5°N - 5°S , 120°W - 170°W). Figure updated 11 January 2024.

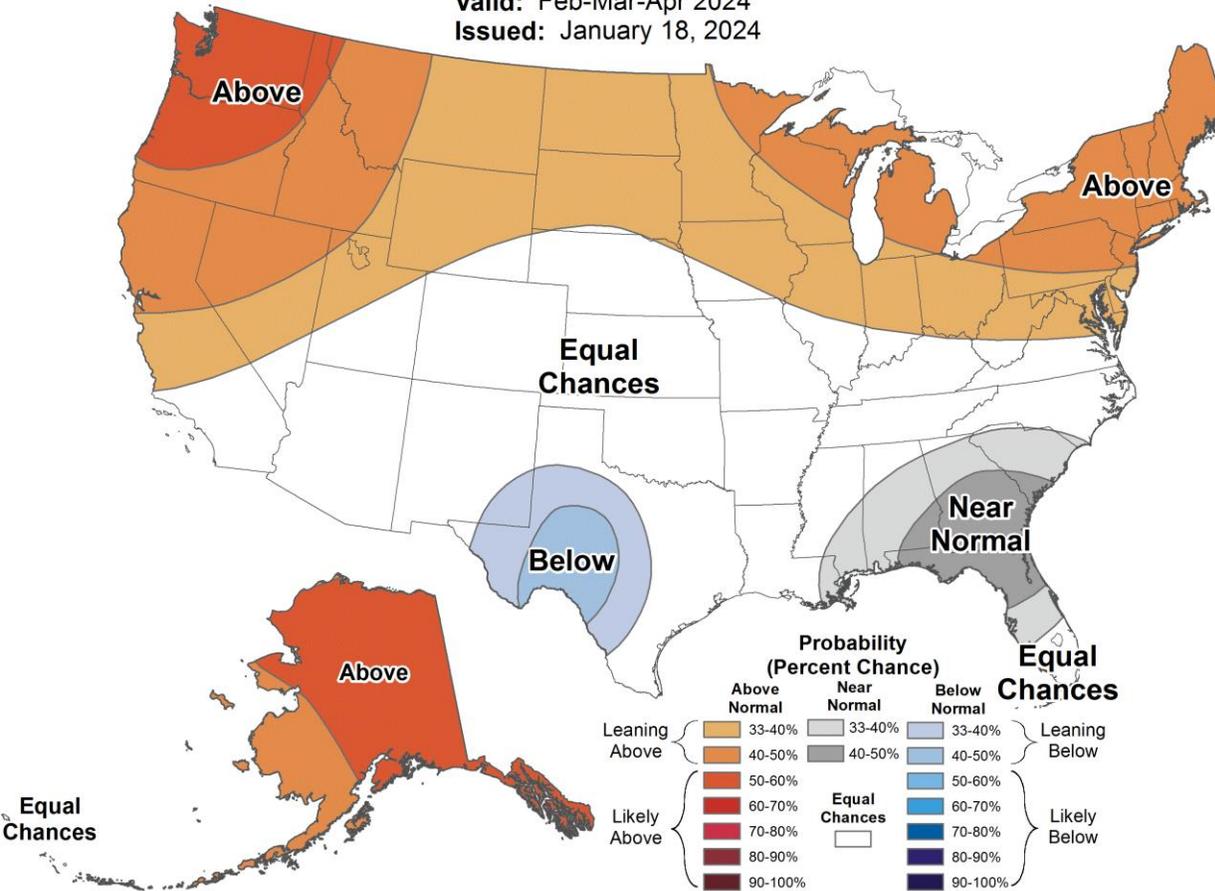
February – April Outlook



Seasonal Temperature Outlook



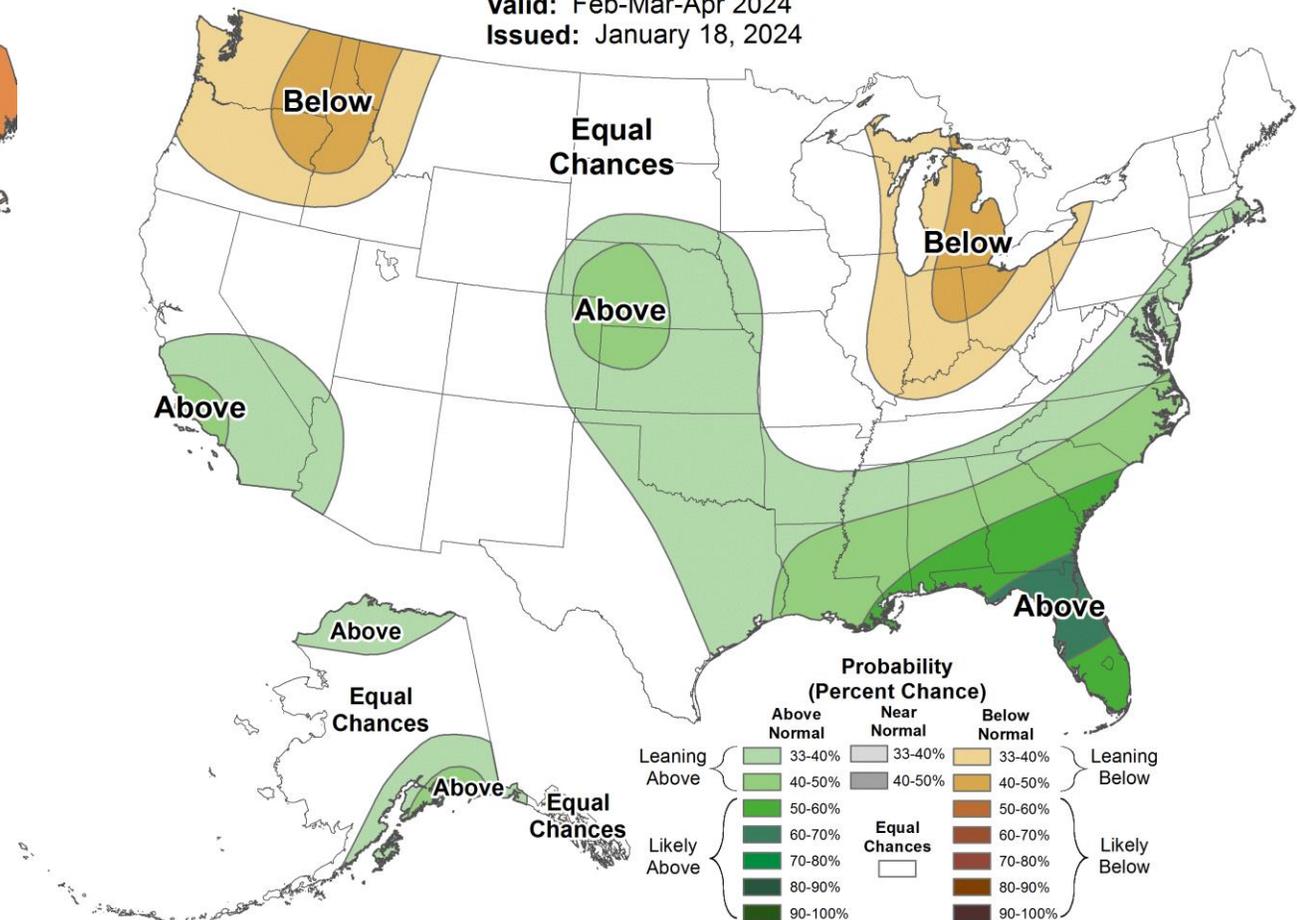
Valid: Feb-Mar-Apr 2024
 Issued: January 18, 2024



Seasonal Precipitation Outlook



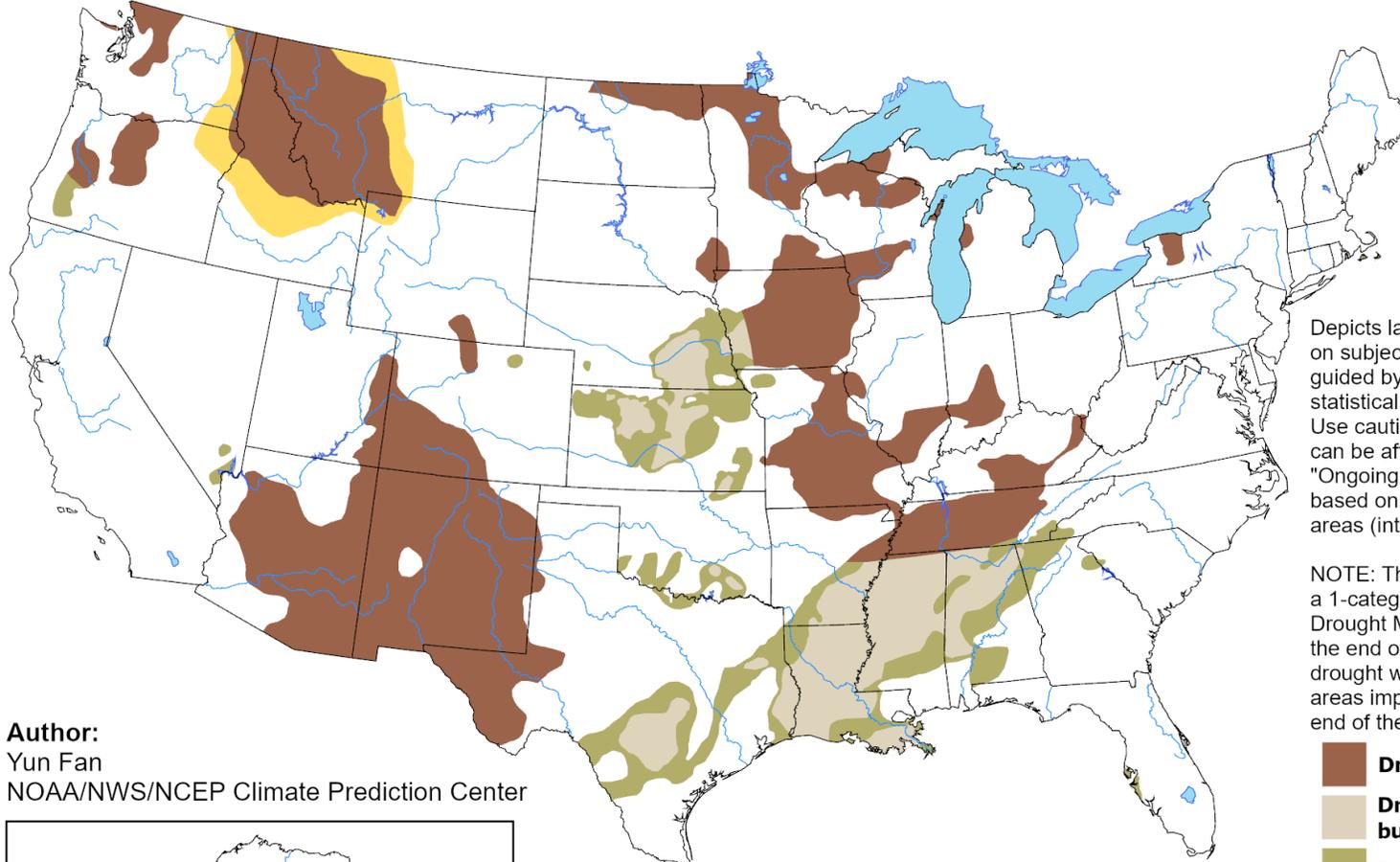
Valid: Feb-Mar-Apr 2024
 Issued: January 18, 2024



U.S. Seasonal Drought Outlook

Drought Tendency During the Valid Period

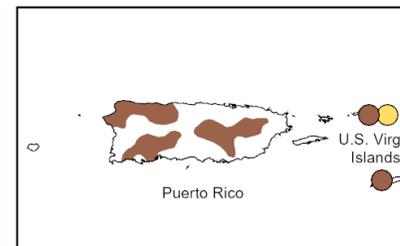
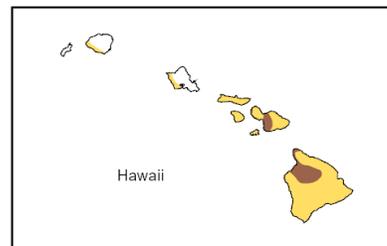
Valid for January 18 - April 30, 2024
Released January 18, 2024



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).

Author:
Yun Fan
NOAA/NWS/NCEP Climate Prediction Center



- Drought persists**
- Drought remains, but improves**
- Drought removal likely**
- Drought development likely**
- No drought**



<https://go.usa.gov/3eZ73>

Key Points

- **Recap:**
 - 2023 was the warmest year on record (globally).
 - Improved conditions across the Plains, drying east across Miss/Ohio Valleys
 - First half of winter very typical El Nino conditions – warm across northern tier and dry conditions across the OH Valley.
- **Outlook:**
 - Short term: A return to El Nino-typical conditions – warm in the north, dry east
 - Seasonal: A transition to neutral conditions as we move towards summer, La Nina in the fall.
- **Big Questions:**
 - Will an El Nino precipitation pattern return, or will spring rains and ground recharge return in time for ag?
 - Timing of El Nino transition?

Thank You!

- **Contact Information**

- Dennis Todey: dennis.todey@usda.gov , 515-294-2013
- Doug Kluck: doug.kluck@noaa.gov , 816-564-2417

- **Websites**

- Weather.gov
- Climate.gov
- Heat.gov
- Drought.gov

- **Today's and Past Recorded Presentations:**

- <https://mrcc.purdue.edu/webinars>
- <https://hprcc.unl.edu/webinars.php>



South Dakota
Photo by Laura Edwards