Central Region Climate & Drought Outlook

March 16, 2023

Zachary Hoylman

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Research Asst. Professor (U of MT)

Montana Climate Office | USDA | Regional Climate Centers | NOAA

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**
  - April 20, 2023 - 1pm CT/12pm MT, Dennis Todey
- **Access to Future Climate Webinars and Information**
  - https://www.drought.gov/events
- **Recordings of Past Webinars**
  - https://mrcc.purdue.edu/multimedia/webinars.jsp
  - https://hprcc.unl.edu/webinars.php

SUMMARY AND OUTLINE

- **Recent Conditions**
  - 1-3 month & month-to-date precipitation / temperature
  - Snow anomalies
  - Soil Moisture
  - Streamflow (current and forecast)
  - Reservoirs
  - Drought
- **Impacts**
  - Heavy, Wet Snow in WI / MI
  - Extreme Weather in KY / IN
- **Outlooks**
  - 8 day - 3 month precipitation and temperature
  - ENSO Forecast
  - Drought and Fire

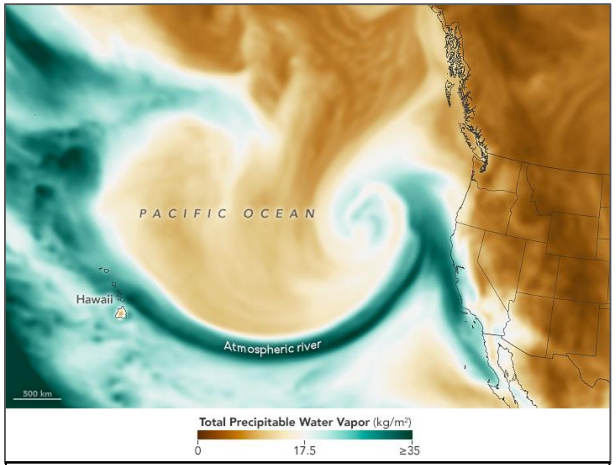

Image from NOAA-20 — VIIRS

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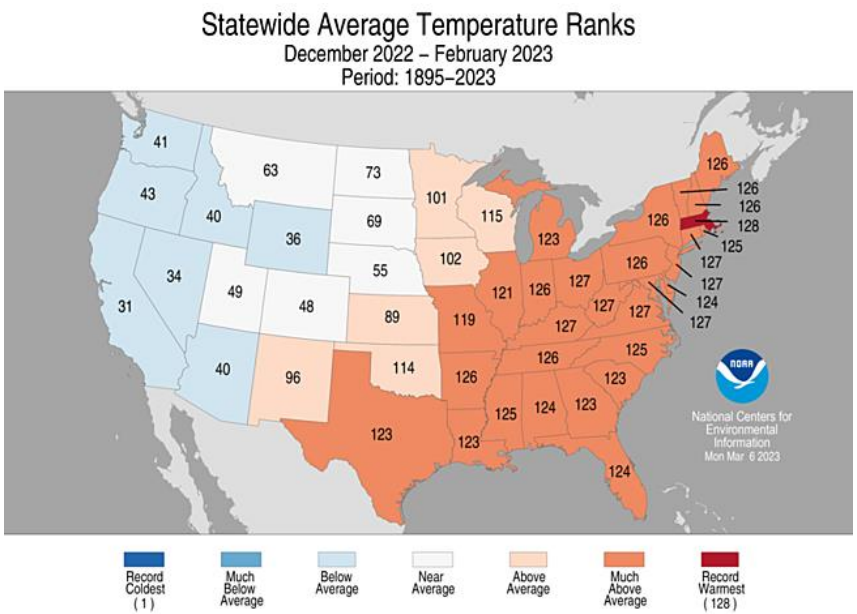
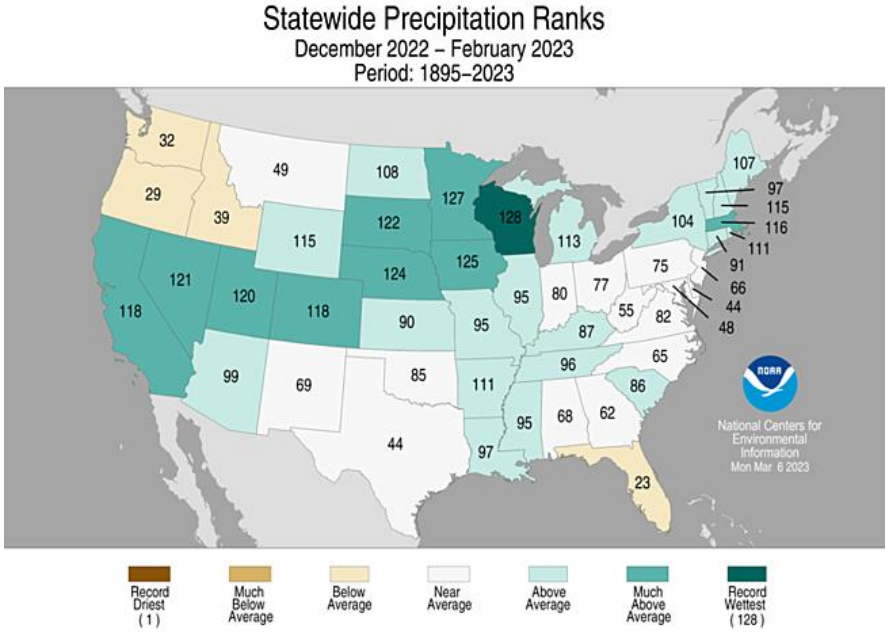
Recent Conditions

3 MONTH TEMPERATURE AND PRECIPITATION



16th Warmest Dec - Feb for CONUS
above average

20th Wettest Dec - Feb for CONUS
above average
(Wettest Winter on record for WI!)



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

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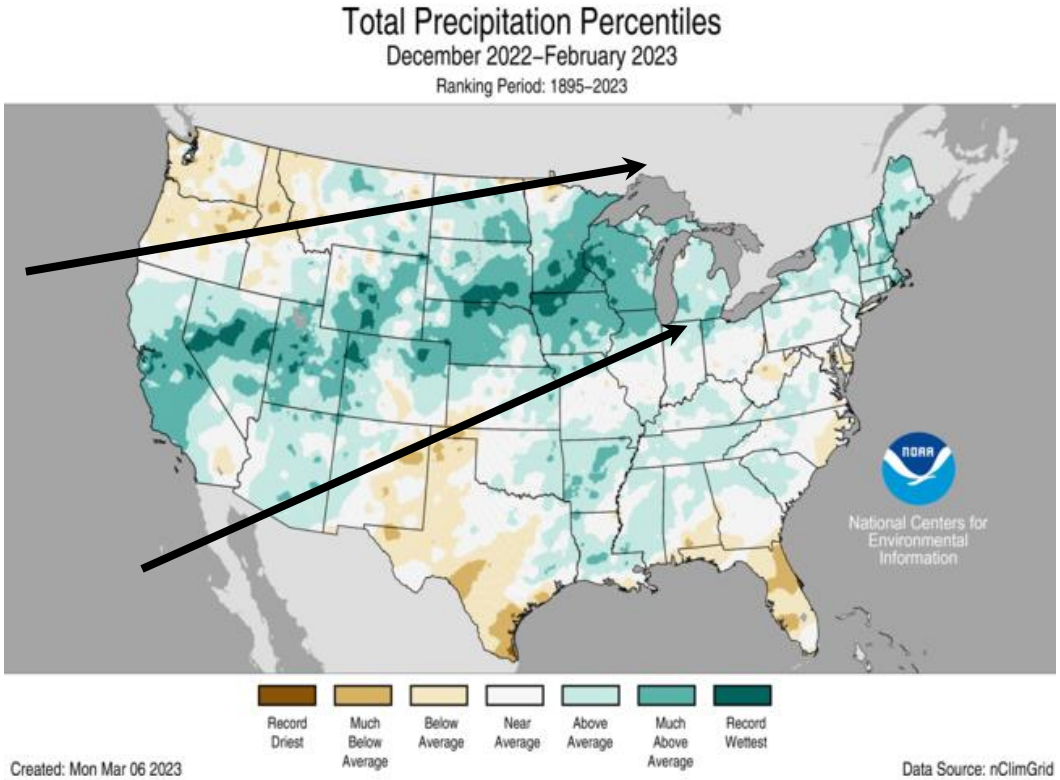
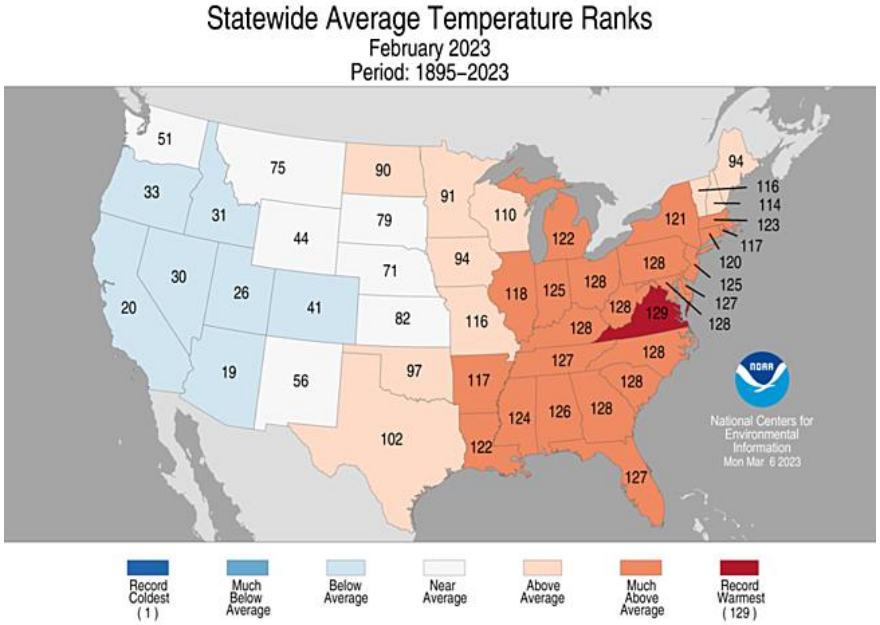
3 MONTH PRECIPITATION PERCENTILE

A component of this seasons wet winter can be attributed to a series of “Atmospheric Rivers”



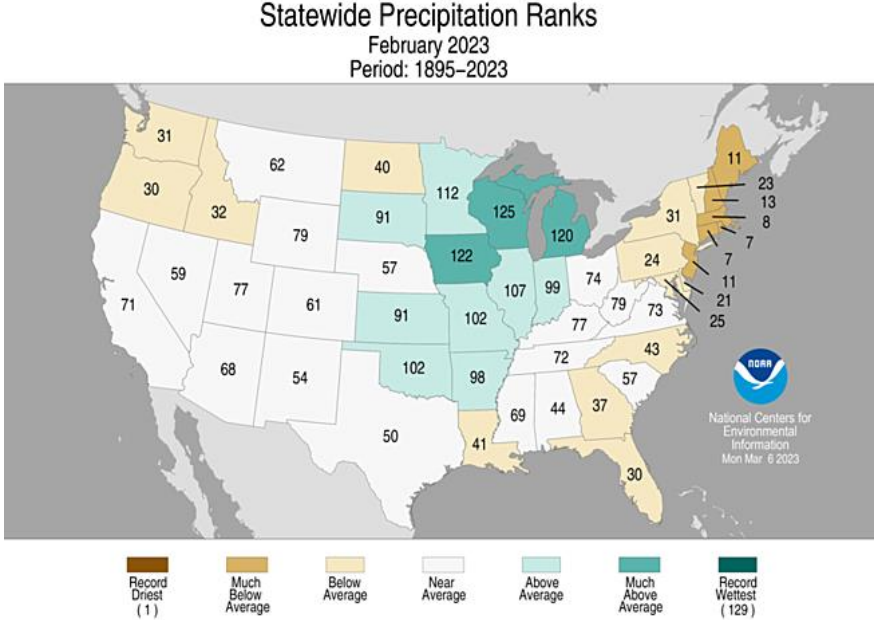
https://www.ncei.noaa.gov/access/monitoring/us-maps/

1 MONTH TEMPERATURE AND PRECIPITATION



26th Warmest February for CONUS
above average

Relatively Average February Precipitation
(50th of 128 Years)



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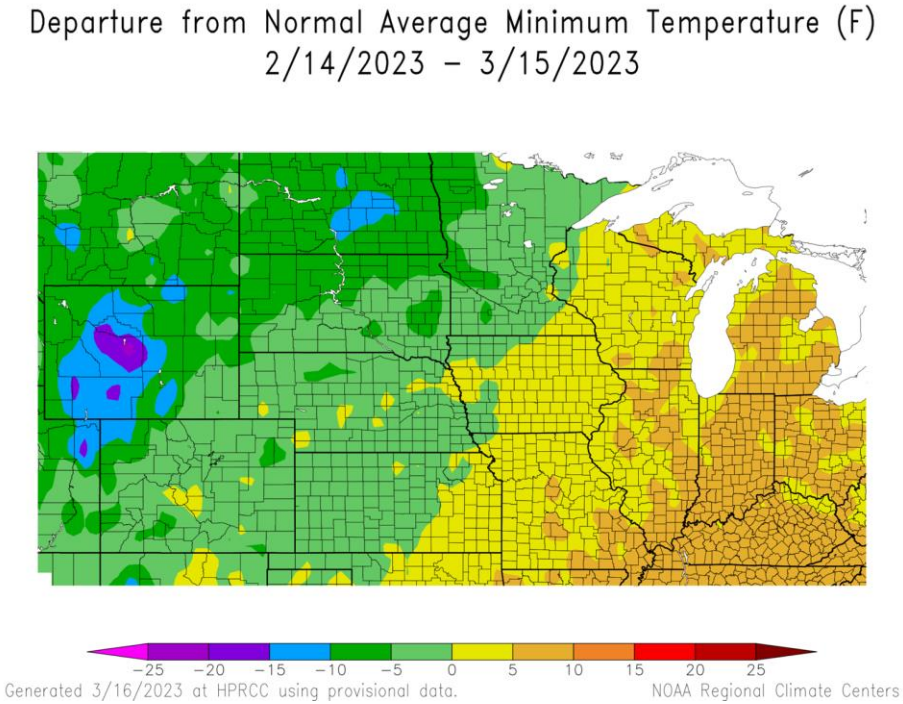
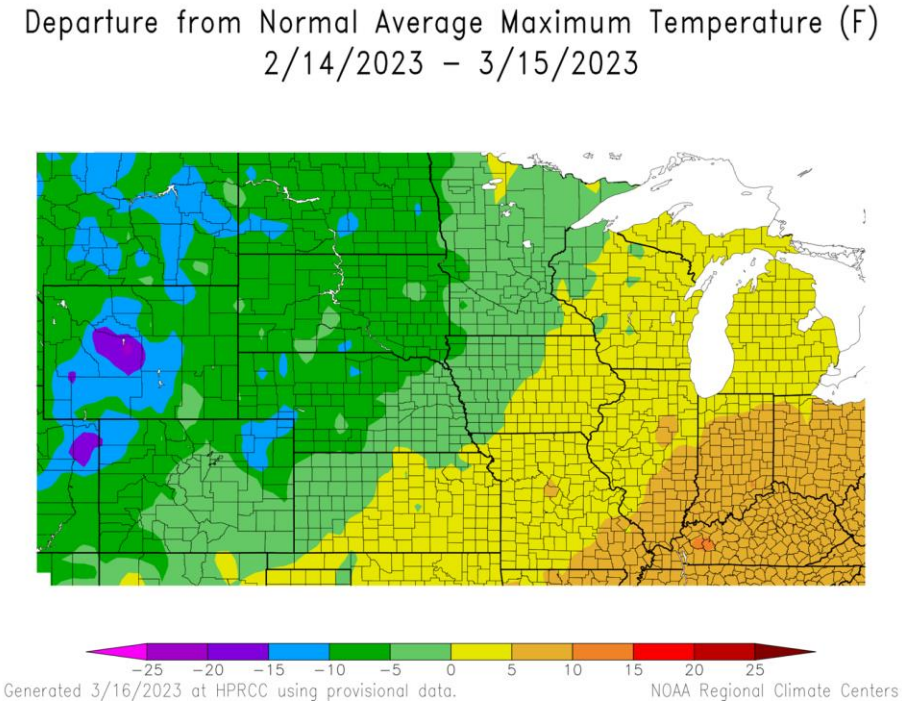
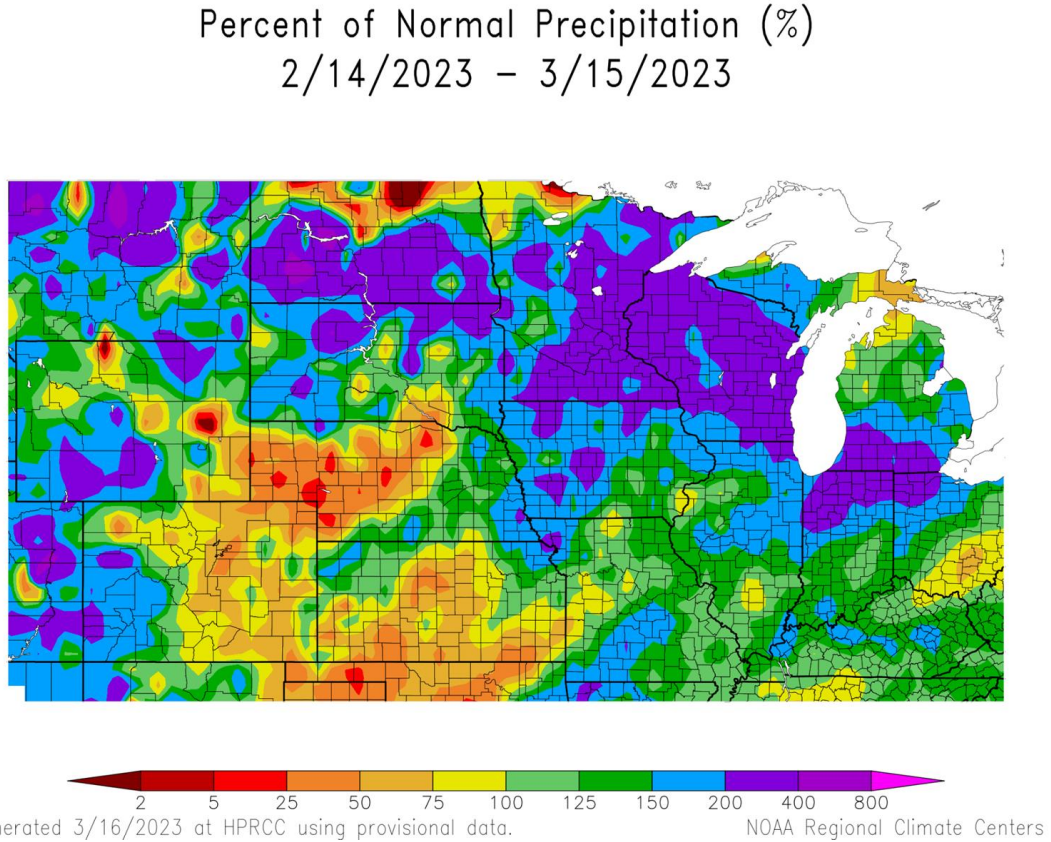
Last 30 Days: Temperature departure from mean





https://hprcc.unl.edu/

Last 30 Days: Precipitation Percent of Mean



https://hprcc.unl.edu/

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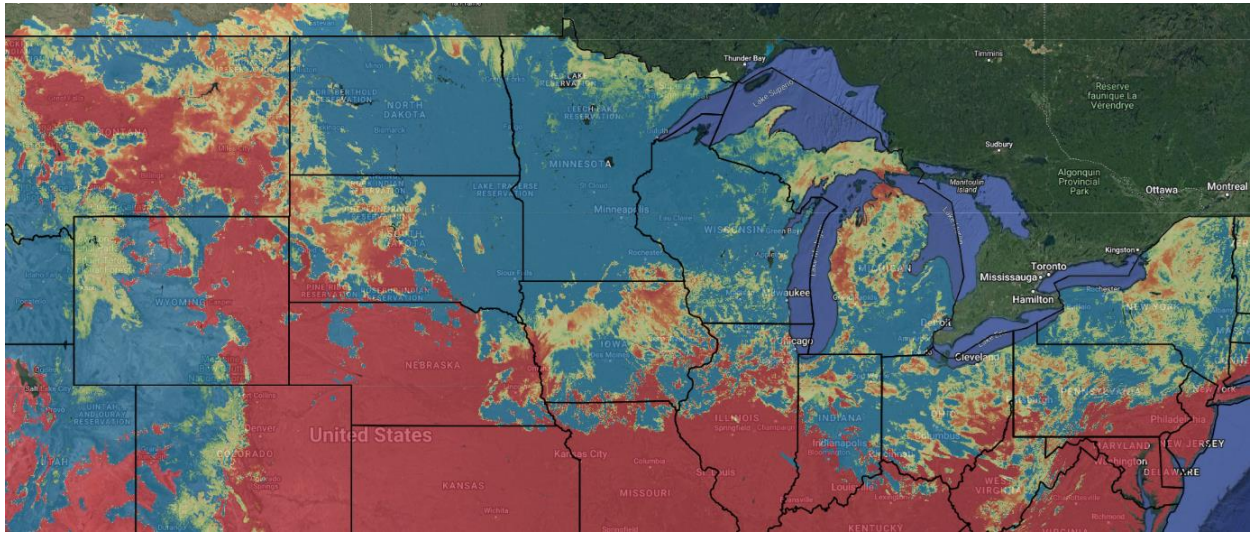
SEASONAL SNOW WATER EQUIVALENT (Percent of Normal SWE)



SWE Percent Of Average (SNODAS) : Generally Well Above Average!
note period of record is 2004 - present

https://app.climateengine.com/climateEngine

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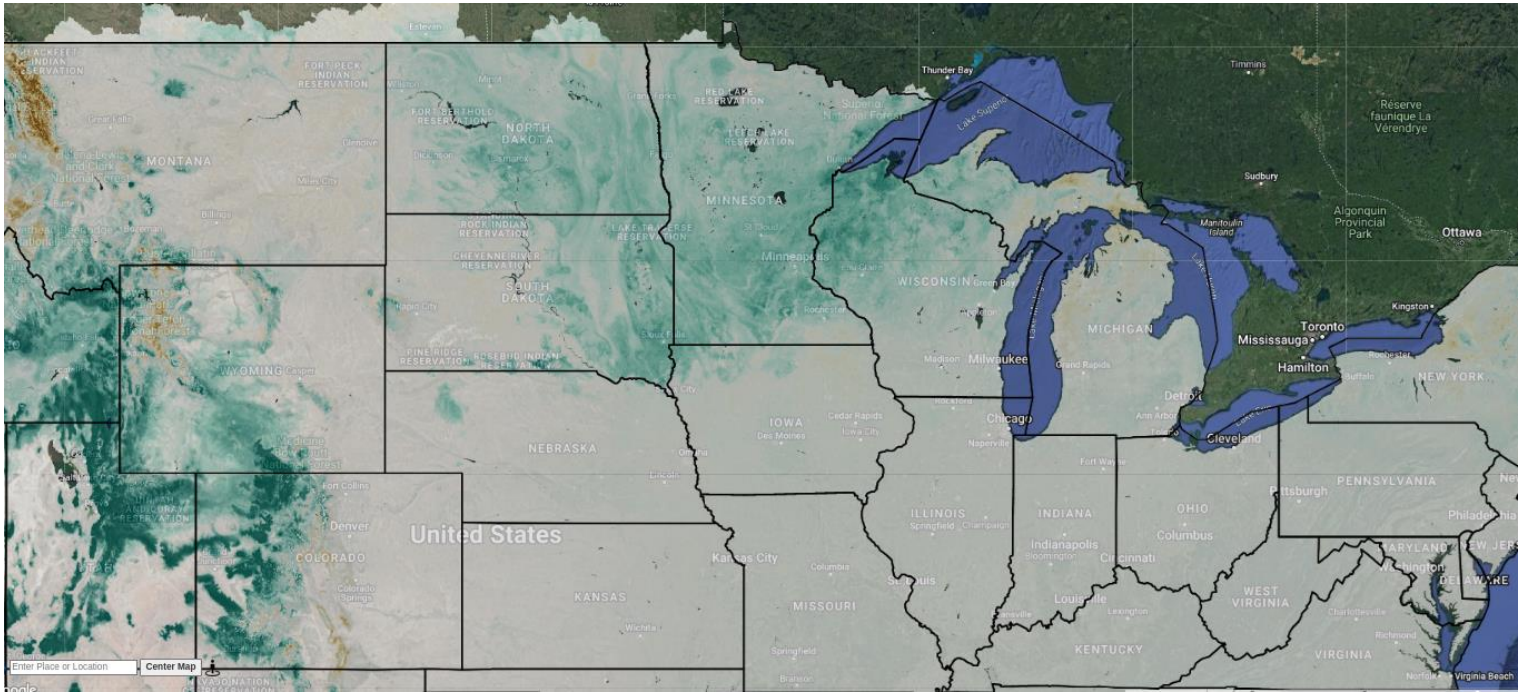
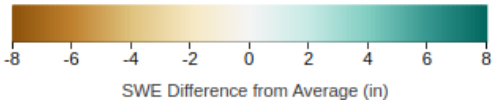
SEASONAL SNOW WATER EQUIVALENT (Difference from Average)



SWE Difference from Average (SNODAS) : Generally Well Above Average!

note period of record is 2004 - present

https://app.climateengine.com/climateEngine



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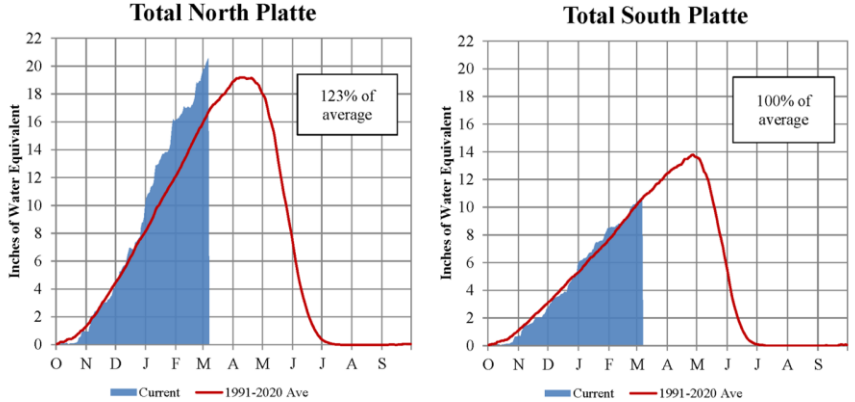
SEASONAL SNOW WATER EQUIVALENT (SWE Accumulation)

PLATTE RIVER BASIN

Platte River Basin - Mountain Snowpack Water Content
Water Year 2022-2023
March 07, 2023



The North and South Platte River Basin mountain snowpacks normally peak near April 10 and the end of April, respectively. As of March 7, 2023, the mountain snowpack SWE in the "Total North Platte" reach is 20.6", 123% of the (1991-2020) average. The mountain snowpack SWE in the "Total South Platte" reach is 10.7", 100% of the (1991-2020) average.

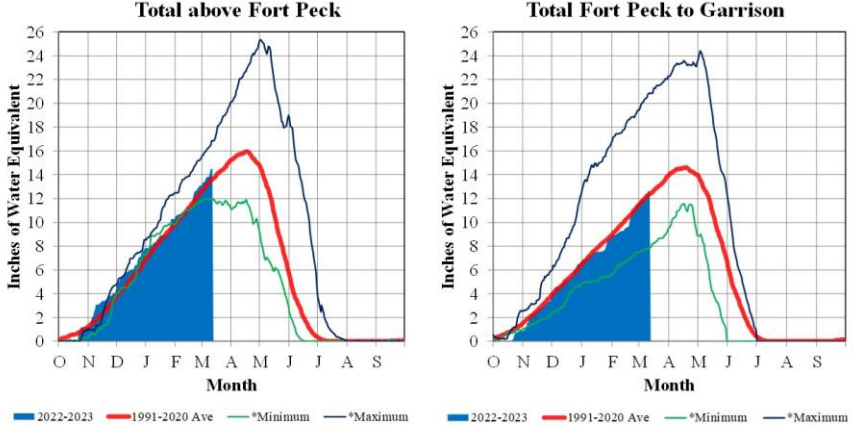
Source: USDA, Natural Resource Conservation Service

Provisional Data. Subject to Revision

https://www.nwd-mr.usace.army.mil/rcc/

MISSOURI RIVER BASIN

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



On March 12, 2023 the mountain Snow Water Equivalent (SWE) in the "Total above Fort Peck" reach is 14.5" and 107% of the (1991-2020) average. The mountain SWE in the "Fort Peck to Garrison" reach is 12.6" 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.

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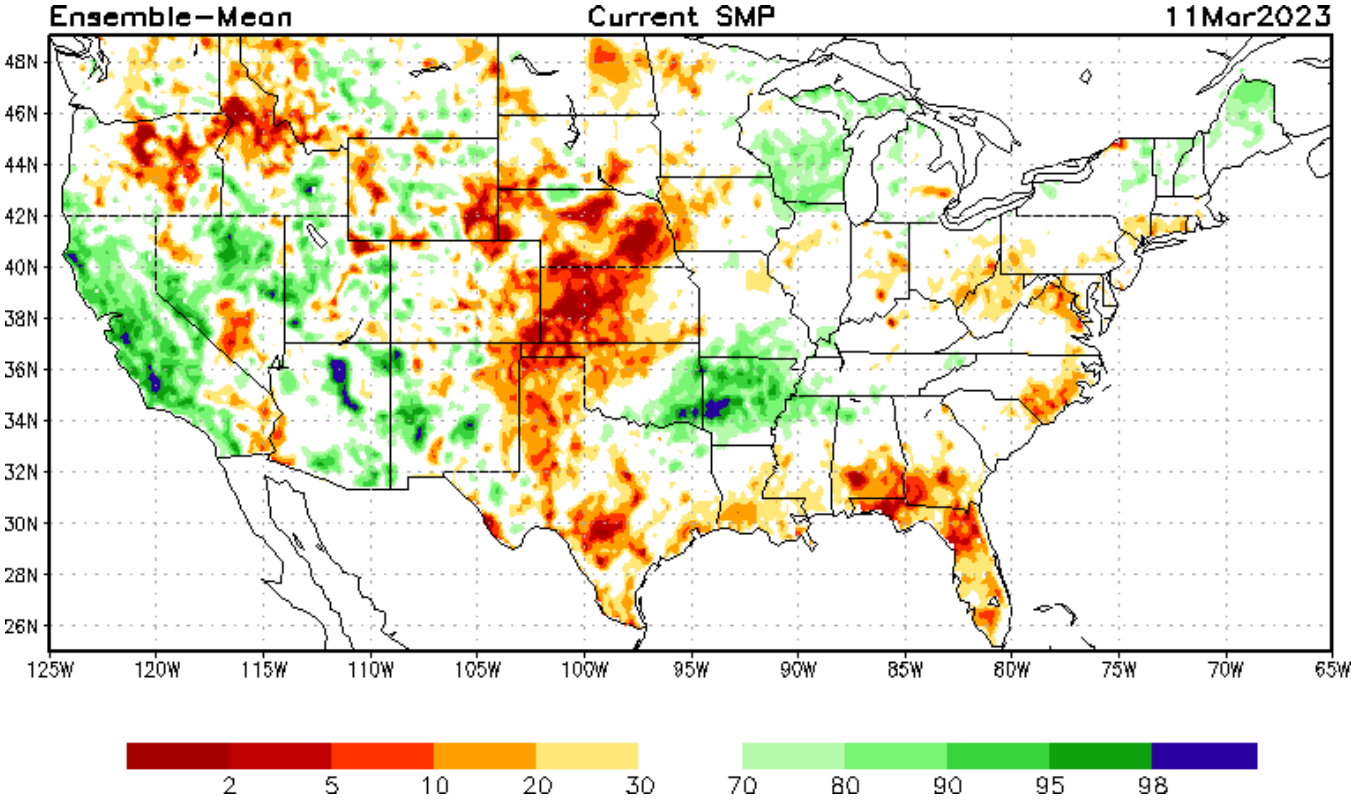
SOIL MOISTURE PERCENTILES



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

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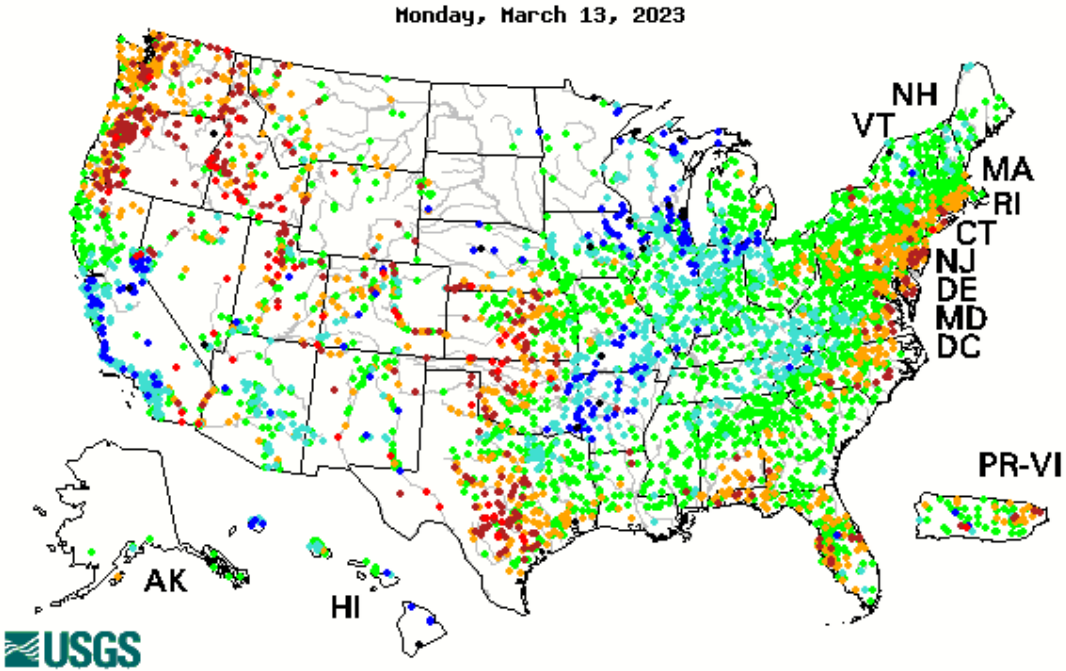
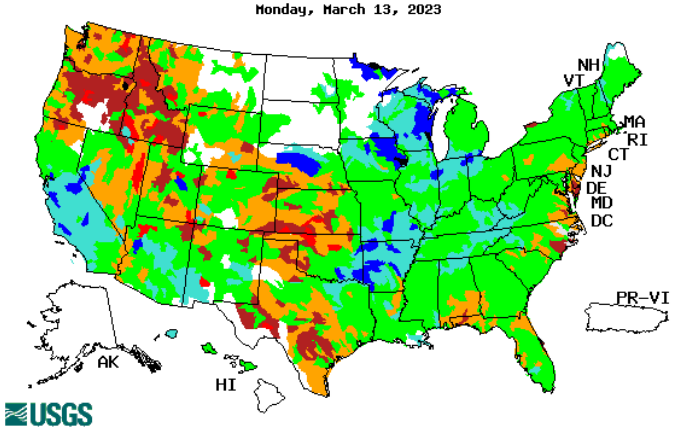
STREAMFLOW PERCENTILES (28 Day Average)

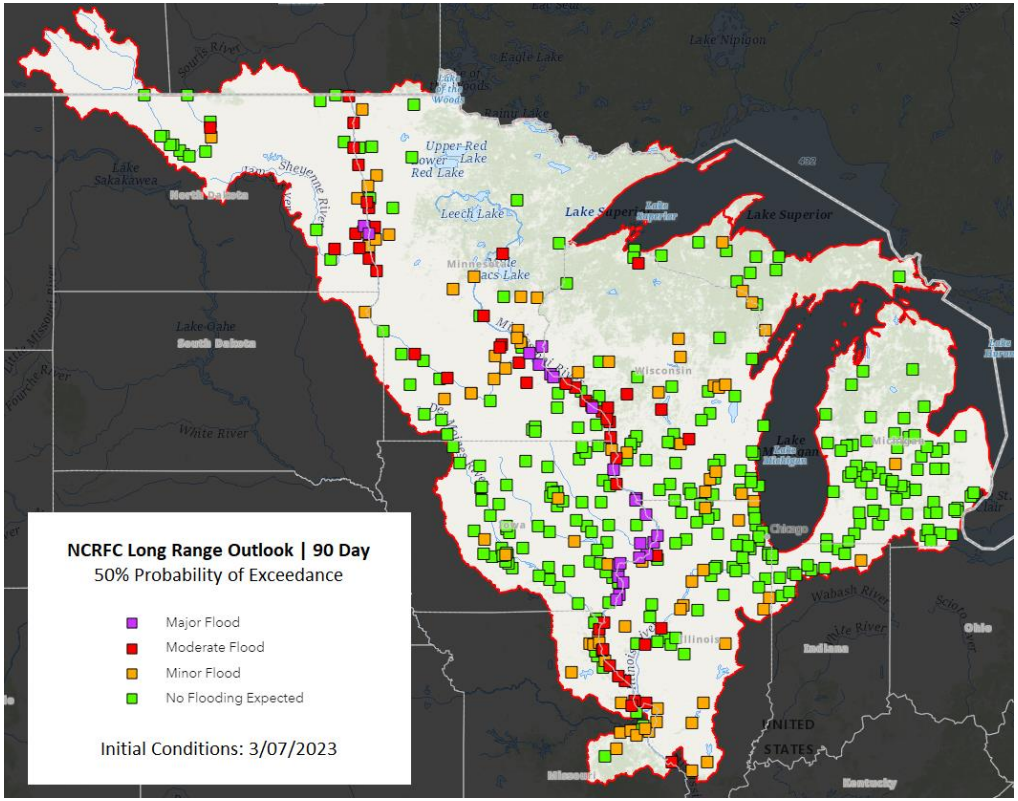




Explanation - Percentile classes							
Low	<10	10-24	25-75	76-90	>90	High	No Data
	Much below normal	Below normal	Normal	Above normal	Much above normal		

https://waterwatch.usgs.gov/

STREAMFLOW FORECAST (UPPER MISSISSIPPI)



National Weather Service North Central River Forecast Center

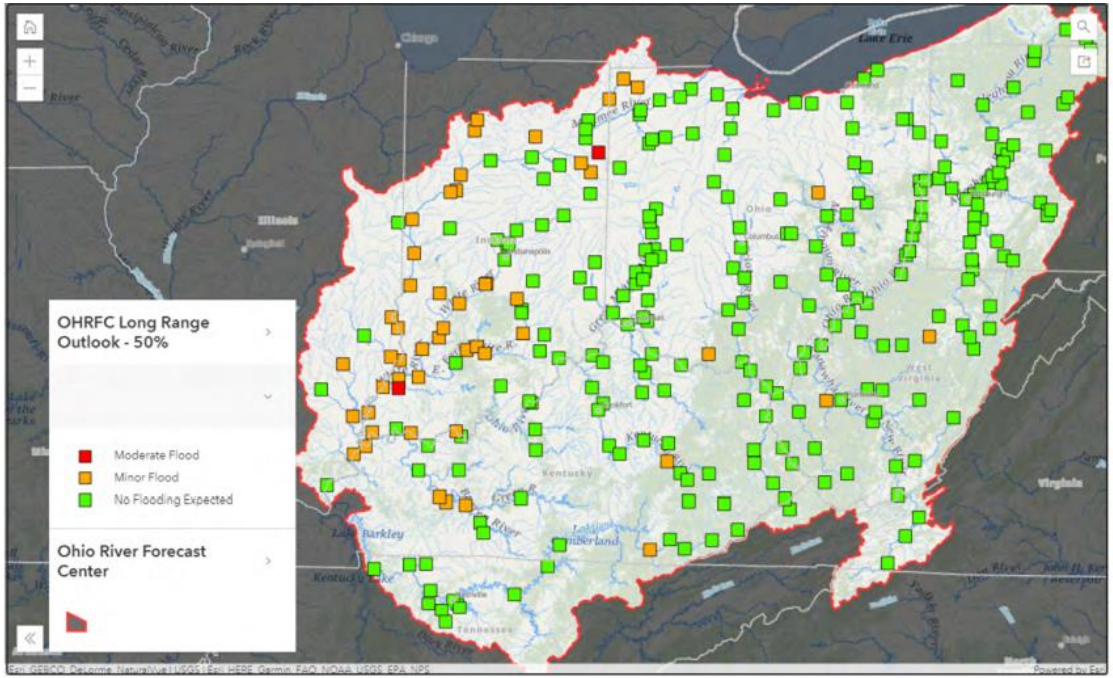
- Flood Risk along the mainstem Mississippi River from the **Twin Cities area, downstream through about Keokuk, IA** is **well above normal**

- **"If the melt is delayed and significant rainfall is added,** we could see the **worst flooding in over 20 years"**

- **2023 could rival what was seen in the spring of 2019, and could be the worst since 2001**

Information courtesy of the National Weather Service

STREAMFLOW FORECAST (OHIO RIVER BASIN)

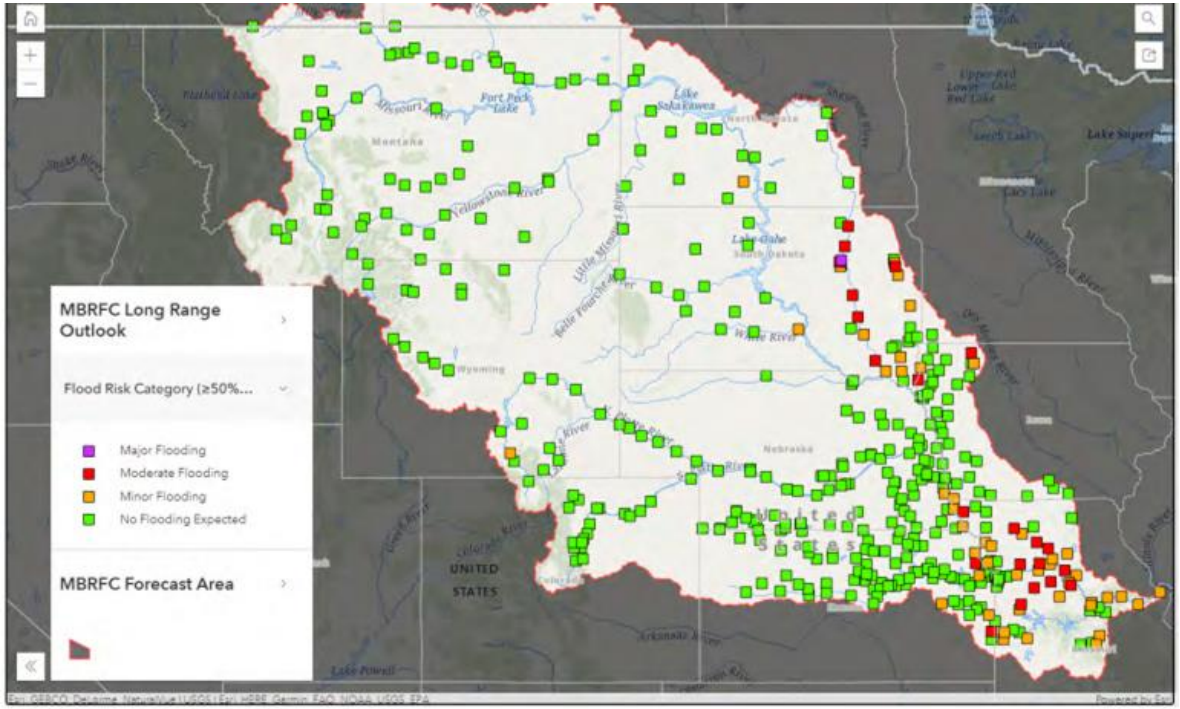


- Flood Risk is **near normal** this spring for the Ohio and Cumberland Valley regions
- **Minor flooding** is **expected** in the Ohio Valley (which is relatively normal)
- Snow and Ice are not expected to be factors in this springs flood risk

Information courtesy of the National Weather Service

National Weather Service North Central River Forecast Center

STREAMFLOW FORECAST (Missouri)



- Flood risk **varies significantly** across the Missouri River basin
- Significant snowpack in the plains with average to above average conditions in the mountains - melt will be an important factor
- The **Mainstem of the Missouri** is likely to experience **episodic floods** from **Nebraska City** downstream to the mouth

Information courtesy of the National Weather Service

National Weather Service North Central River Forecast Center

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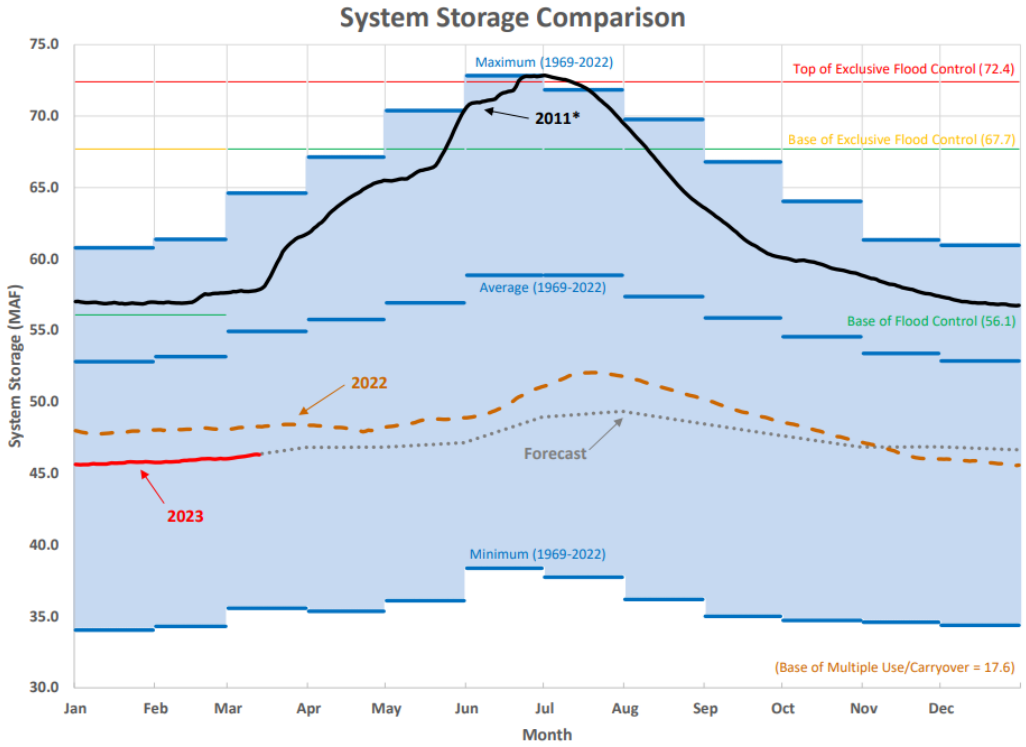
MISSOURI RIVER RESERVOIR STORAGE

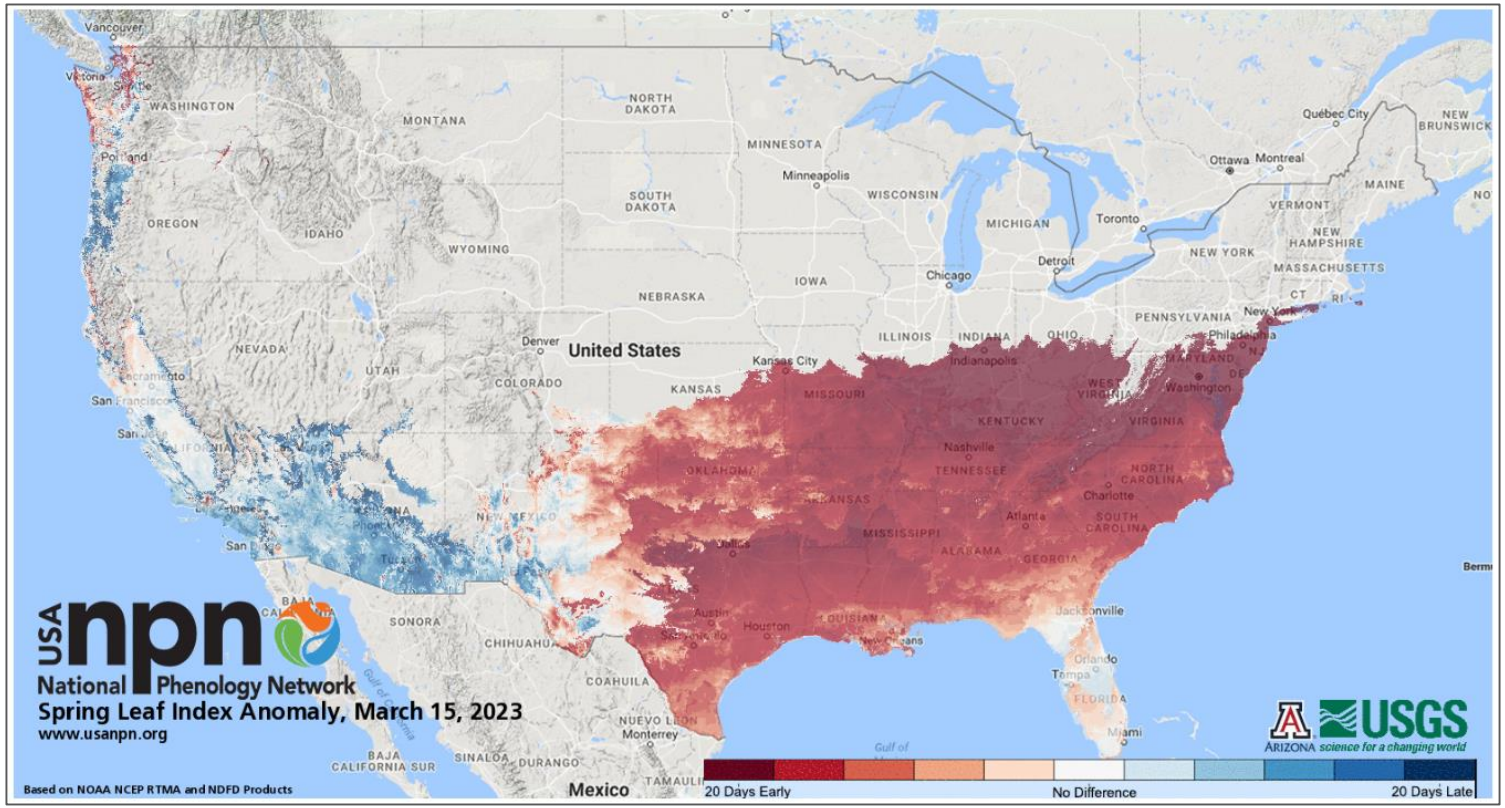


The 2023 calendar year runoff forecast above Sioux City is 21.5 million acre feet, 84% of average

"Despite some improvement in basin conditions, we expect 2023 runoff to remain below average" - John Remus, chief of the U.S. Army Corps of Engineers'

https://www.nwd-mr.usace.army.mil/rcc/reports/pdfs/weeklyupdate.pdf

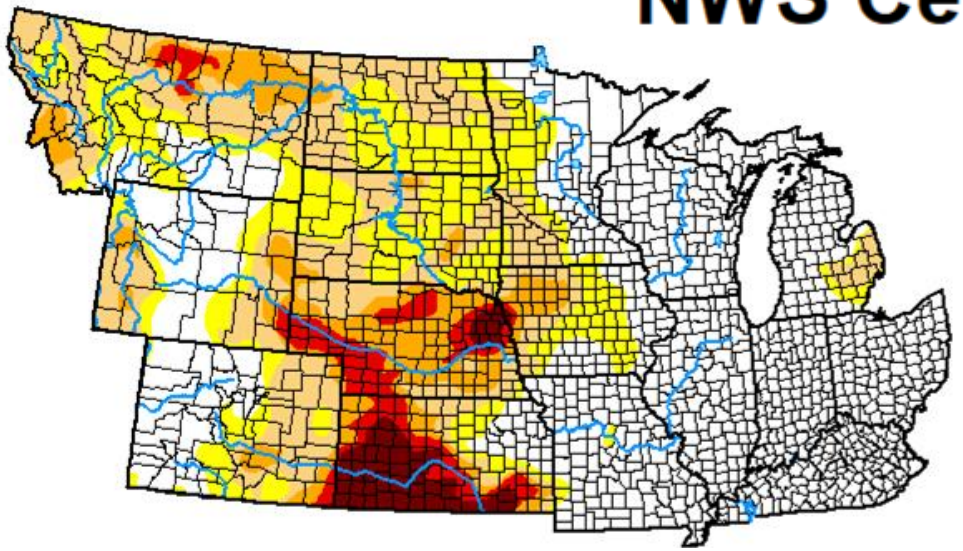
SPRING PHENOLOGY

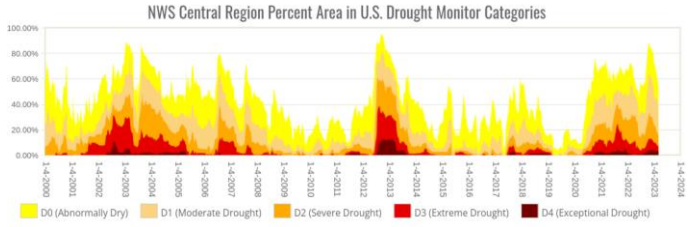


https://www.usanpn.org/news/spring

U.S. DROUGHT MONITOR

U.S. Drought Monitor
NWS Central





March 14, 2023
(Released Thursday, Mar. 16, 2023)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	47.01	52.99	34.76	15.28	6.76	2.97
Last Week 03-07-2023	45.47	54.53	37.68	15.51	6.76	2.87
3 Months Ago 12-13-2022	17.91	82.09	57.82	29.23	12.22	3.87
Start of Calendar Year 01-03-2023	25.76	74.24	48.98	24.27	9.90	3.48
Start of Water Year 09-27-2022	27.00	73.00	47.70	23.08	8.80	2.73
One Year Ago 03-15-2022	30.31	69.69	53.60	32.19	10.12	0.13

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 Rippey
U.S. Department of Agriculture

droughtmonitor.unl.edu

https://droughtmonitor.unl.edu/

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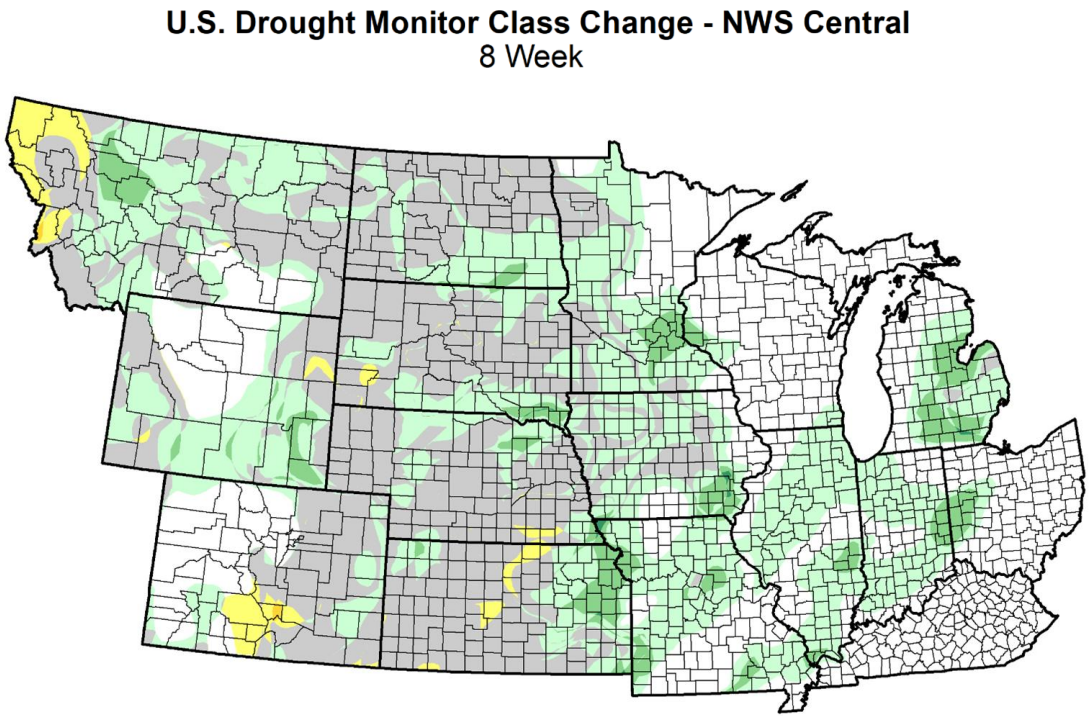
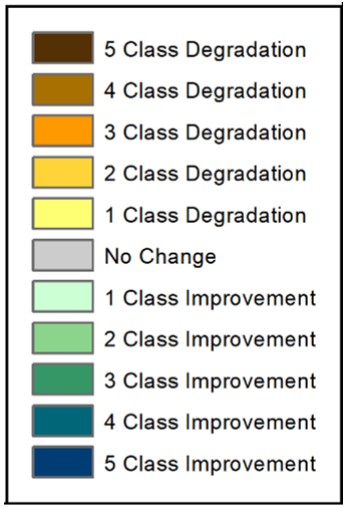
U.S. DROUGHT MONITOR (8 week change)





https://droughtmonitor.unl.edu/

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Impacts

WET/HEAVY SNOW AND RAIN IN WI / MN / MI

*A winter season with extreme **ice and heavy snow** events*

- **Wettest (WI) & 2nd wettest (MN) winter in 128 years**
- **Ice storm** in **southern WI** on **Feb 23** that caused lots of **power outages** from **downed trees**
- **800,000** homes and businesses lost power due to the **Feb 23 ice storm** in MI**, 780 flights** canceled
  - **0.5in of ICE accumulation!**
- Heavy rains on **Feb 27th** caused **flooding** in SE WI
  - **Milwaukee's wettest February day on record**, since 1871
  - **Equivalent to expected precipitation for the entire month of Feb**
- **Roof collapse** in Duluth's Miller Hill Mall Barnes & Noble (March 14th)

Fallen tree limbs due to heavy snow
-Steve Vavrus (Wisconsin-Madison)

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EXTREME WEATHER IN KY / IN

*Kentucky's **Windy, Warm Winter***

- **2023 is the windiest year on record**
  - Recorded **70+ mph** winds
- Feb. average temp. was **48.6F**, which was **+8.2deg above normal**
  - **Second warmest Feb on record** according to NCEI
- Winter (DJF) average temp. was **41.7F**, which was **+5.8 F above normal**
- Warm conditions are causing a **very early spring green-up**

*Indiana's **Heavy Rain***

- **Almost 4in of rain in 2 days caused "debris flows"**
  - Instead of mud and rock, flows consisted of **corn stalks for ¼ mile**

Road closed because road and ditch are now corn stalks for around ¼ mile. Nearest station showed a 3.8" rain event over two days.
-Hans Schmitz (Purdue)

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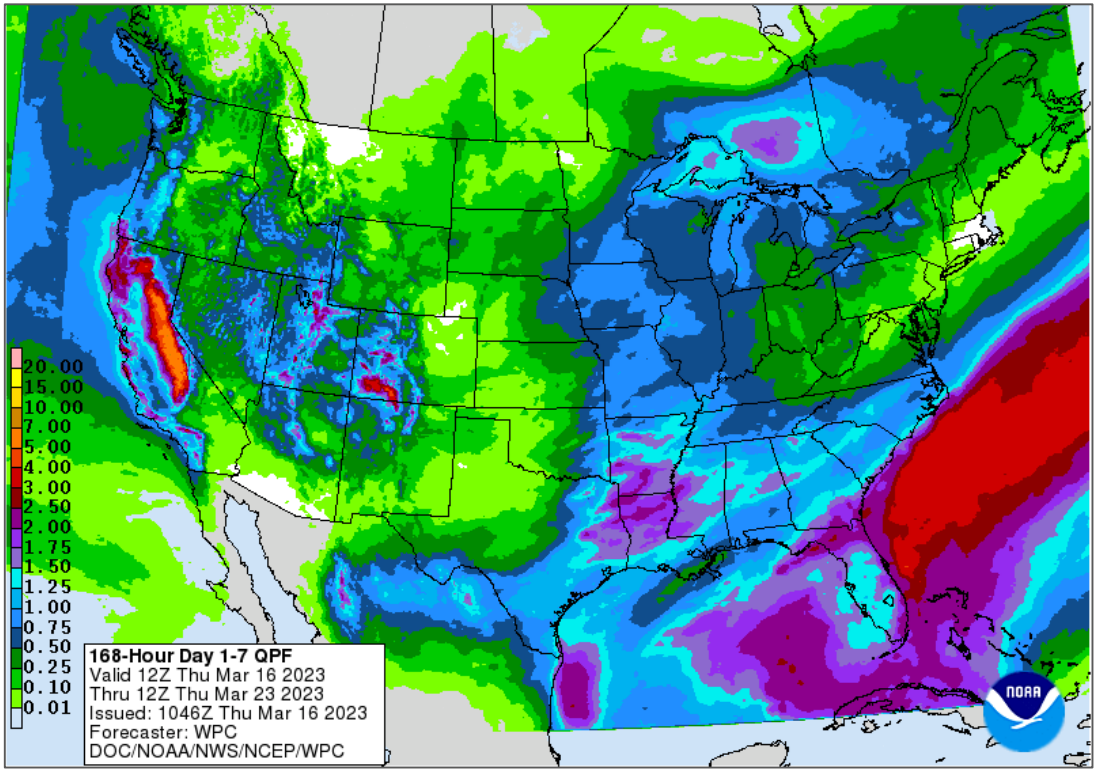
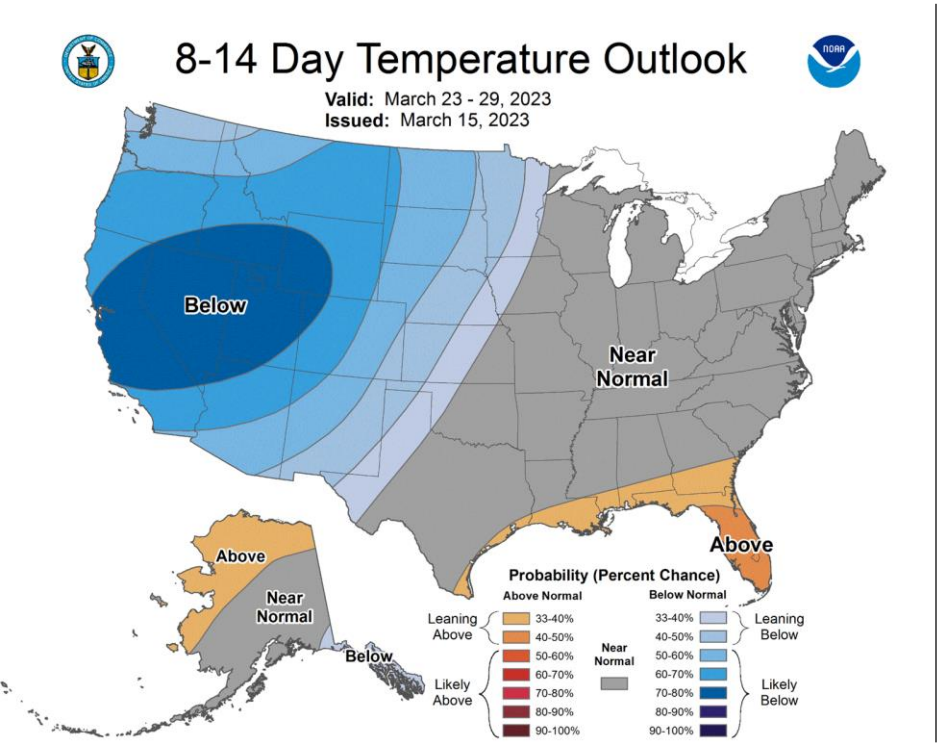
Outlook

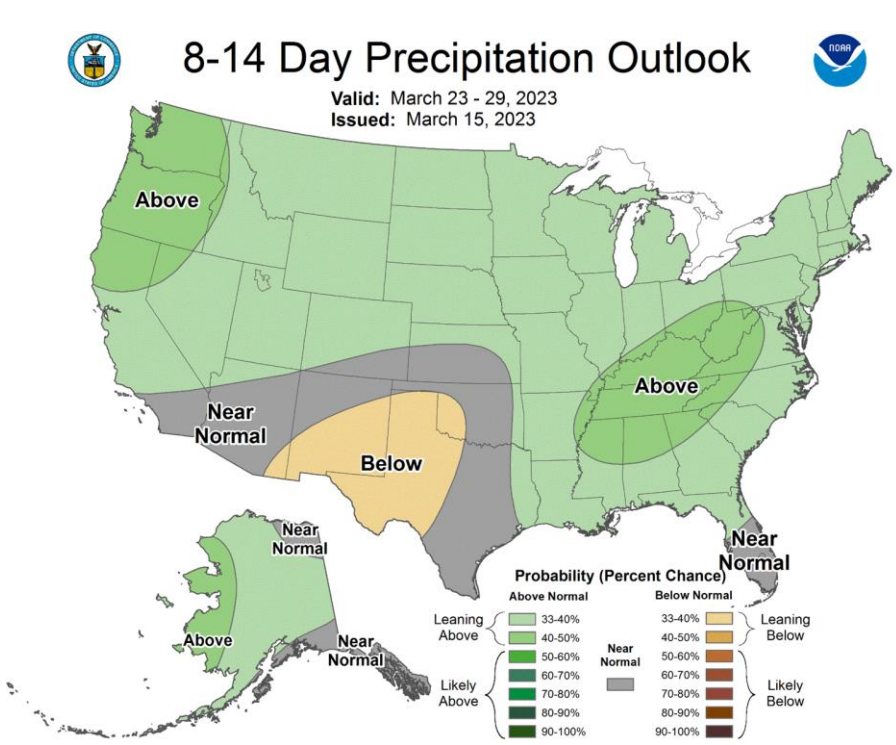
7 DAY PRECIPITATION FORECAST (MARCH 16 - 23)



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

8-14 DAY OUTLOOK





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

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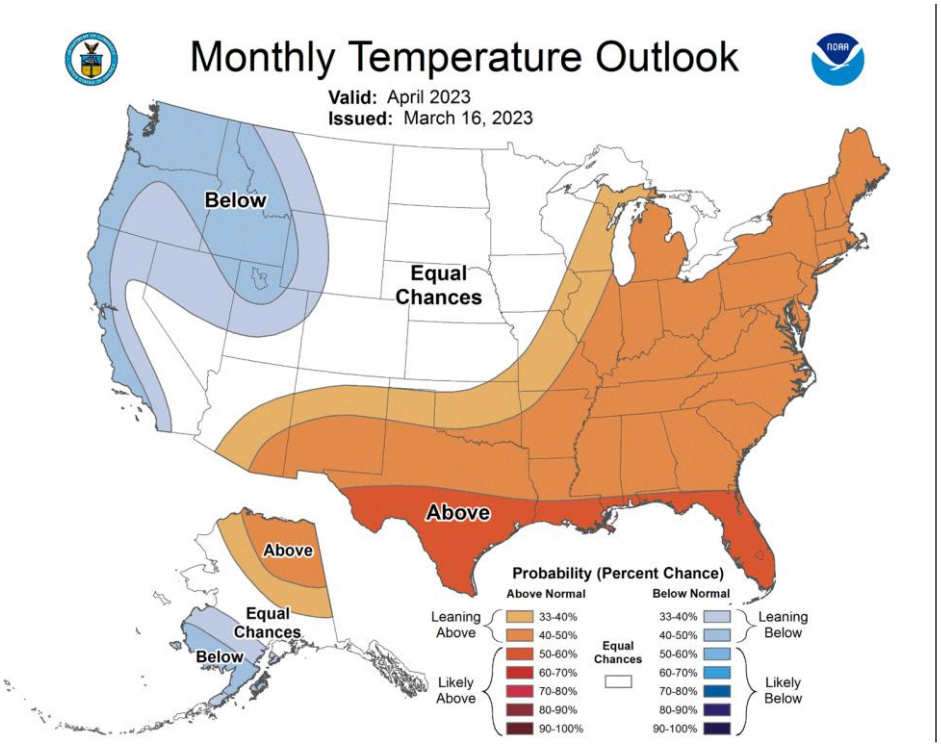
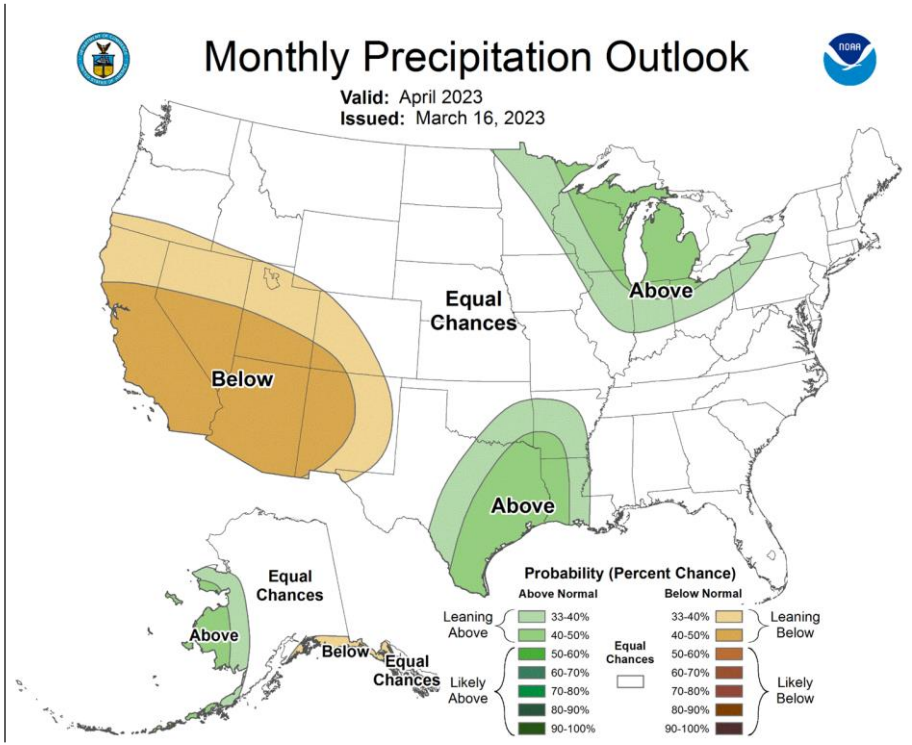
1 MONTH OUTLOOK





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

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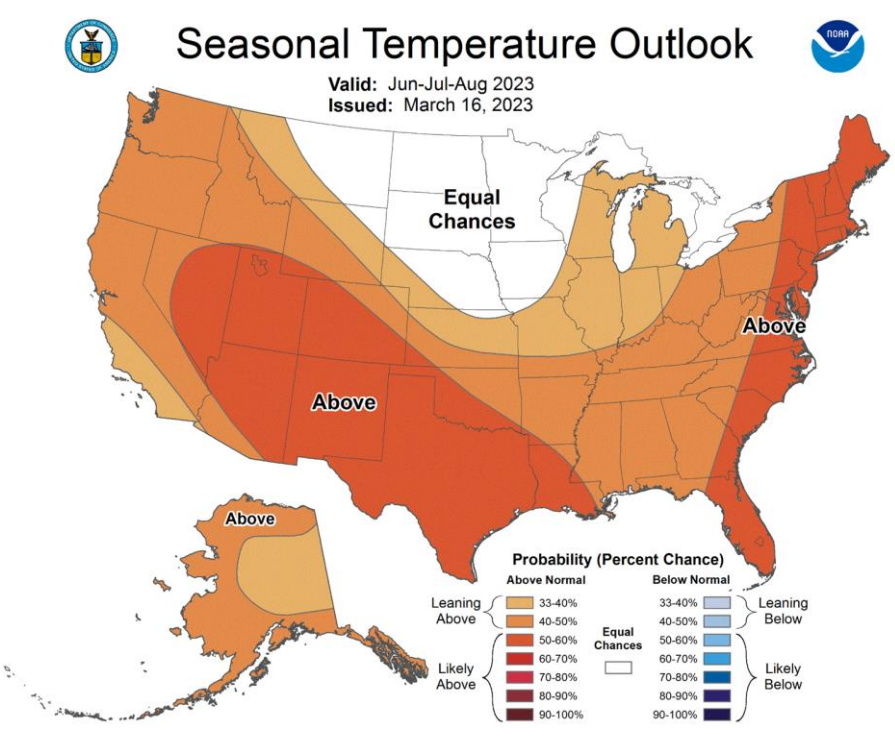
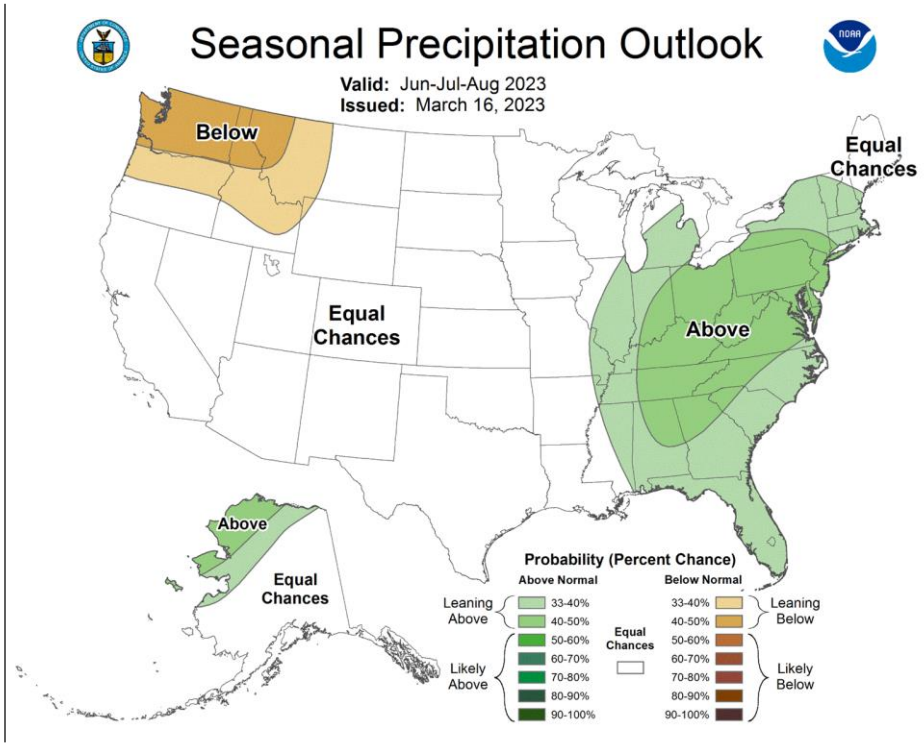
3 MONTH OUTLOOK





https://www.cpc.ncep.noaa.gov/products/predictions/long_range/seasonal.php?lead=3

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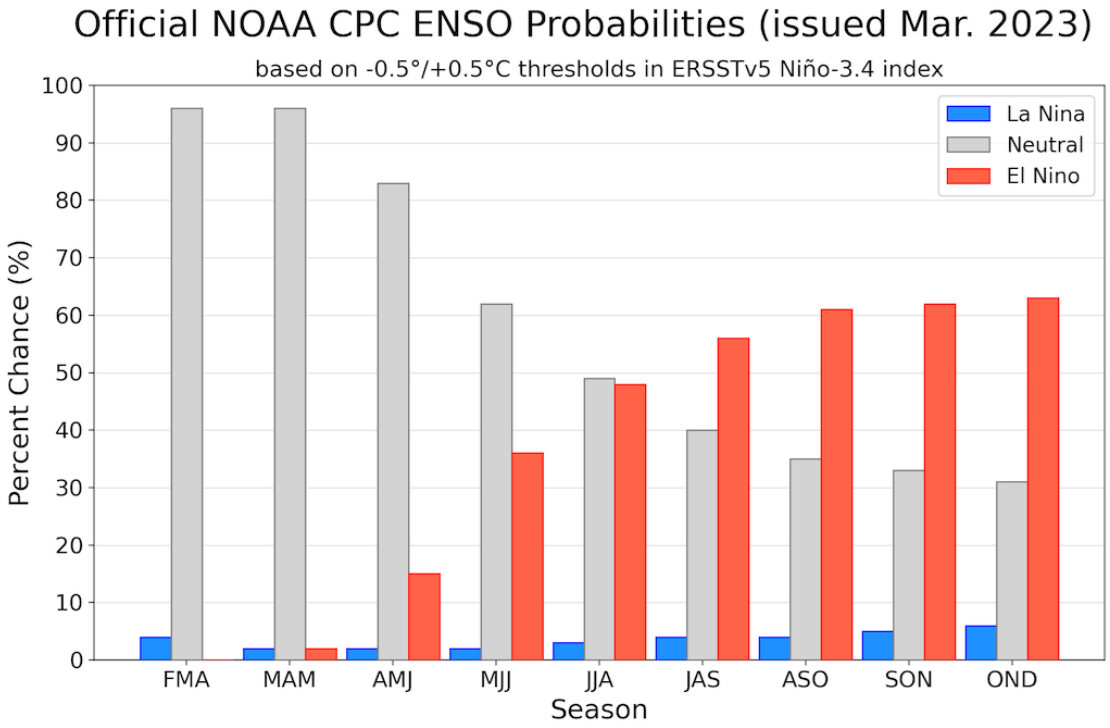
El Niño/La Niña (ENSO) PROBABILITY



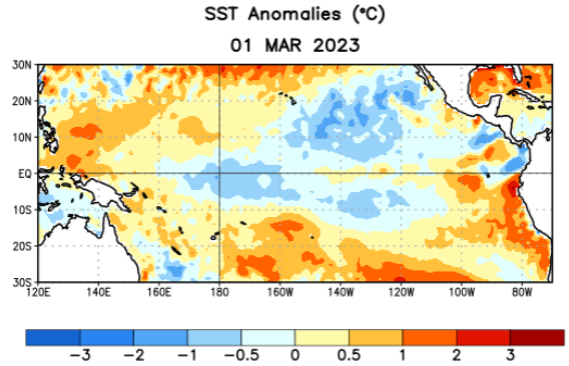
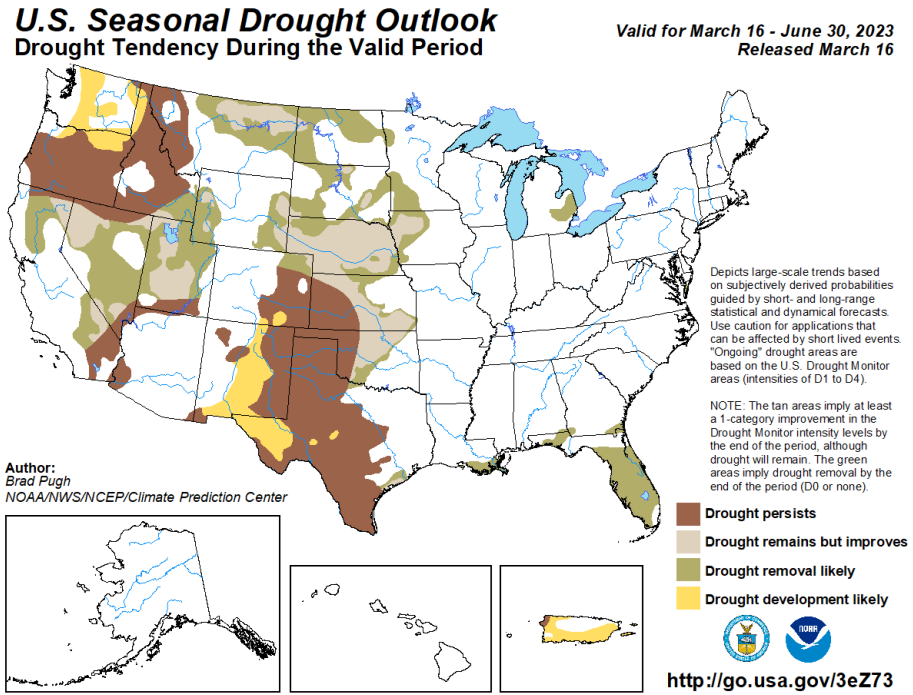
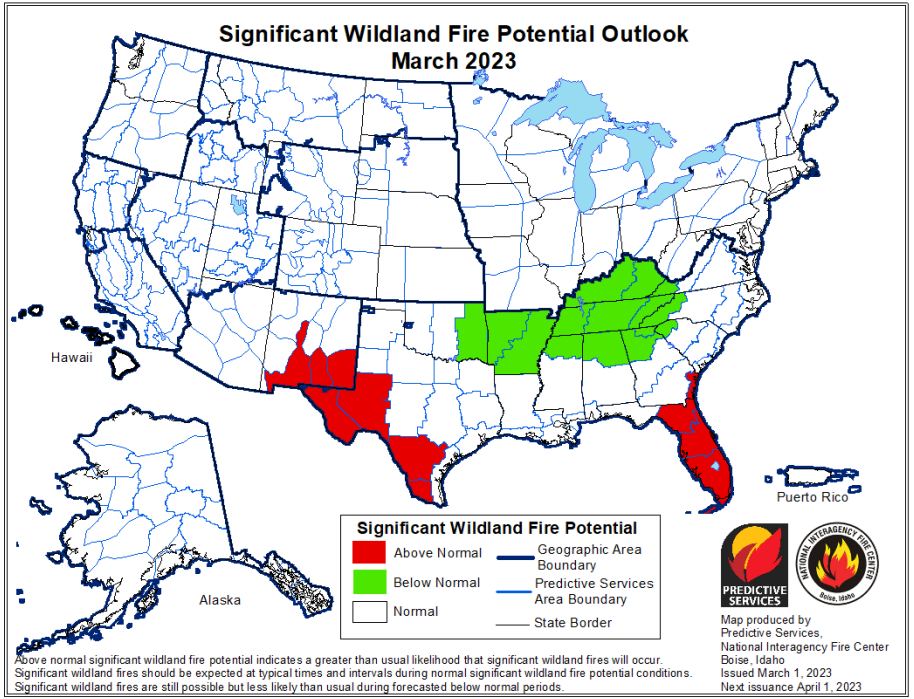


Figure 1. Average sea surface temperature (SST) anomalies (°C) for the week centered on 1 March 2023. Anomalies are computed with respect to the 1991-2020 base period weekly means.

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

OUTLOOK: FIRE & DROUGHT





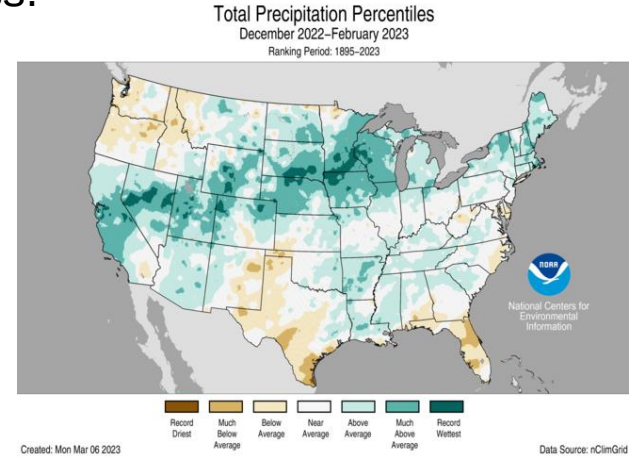
https://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.php

https://www.predictiveservices.nifc.gov/outlooks/month1_outlook.png

Central Region Climate & Drought Outlook
Zachary Hoylman, Montana Climate Office
University of Montana
Missoula, MT - 3/16/2023

SUMMARY

- **Recent Conditions**
  - **Precipitation: WET!** Especially in the western great lake states
  - **Temperature**: It has been a very warm winter for the midwest, relatively normal in the upper Missouri river basin
  - **Snow:** Lots of snow in the upper Miss. / upper Mo.
  - **Streamflow**: Elevated risk of flooding in the upper Miss.
  - **Drought:** Improving in the north, extreme in south
- **Outlooks**
  - **Short term**: Leaning wet and cool
  - **Long term:** Leaning normal/warm and normal/dry
  - **ENSO Forecast:** Transitioning to neutral
  - **Fire:**



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Thank You!

Zachary Hoylman

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