

North Central U.S. Climate & Drought Outlook

June 20, 2024

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OSU Extension & Byrd Center



Photo credit: Robyn Anderson -
<https://www.flickr.com/photos/robynanderson/4817432751/in/photostream/>



Providing climate services to the North Central US

Collaboration Activity Among:

- NOAA NCEI/NWS/OAR/NIDIS
- USDA Climate Hubs
- State Climatologists/American Association of State Climatologists
- Midwest and High Plains Regional Climate Centers
- National Drought Mitigation Center

Next Regular Climate/Drought Outlook Webinar

- *July 18, 2024 (1 PM CDT) – Laura Edwards (South Dakota State Climatologist)*

Past Drought & Climate Webinars and Information

- https://www.youtube.com/playlist?list=PLmhxKH4OH8KK_Dc759hS1EUkf8fggvZ4R
- <https://mrcc.purdue.edu/webinars>
- <http://www.hprcc.unl.edu/webinars.php>

Open for questions at the end (Enter them along the way)



Last year we had smoke. This year, the severe weather onslaught continues.

Lake Koshkonong tornado on May 26, 2024. Photo credit to Chris Vagasky, courtesy of the Wisconsin State Climate Office

- **Recent Conditions**
 - Temperature and precipitation rankings
 - 30-day temperature and precipitation
 - Hydrology (soils, rivers, lakes)
 - Drought
- **Growing Season Progress**
- **Impacts and Notable Events**
- **Outlooks**
 - ENSO Neutral to La Niña
 - Short-term
 - Summer/Early Fall

RECENT CONDITIONS

Winter wheat ahead of schedule across southern Ohio



May Temperature Recap

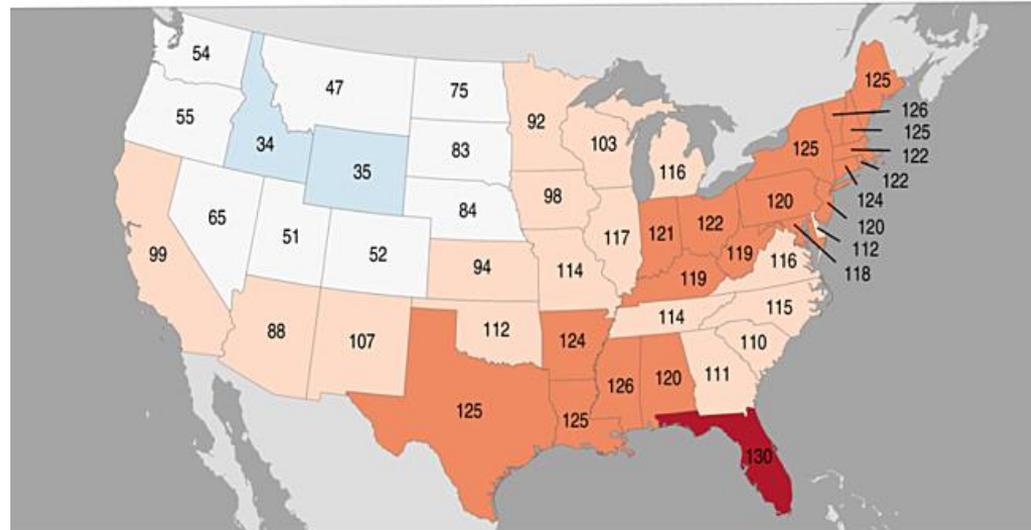
- Very warm in the east (top 10 for Ohio and Indiana)
- Above average from Kansas and Missouri into the Great Lakes
- Near to Cooler than Average conditions across western states

Statewide Average Temperature Ranks

May 2024

Ranking Period: 1895-2024

NOAA's National Centers for Environmental Information



Created: Thu Jun 6 2024
Source: nClimGrid - Monthly





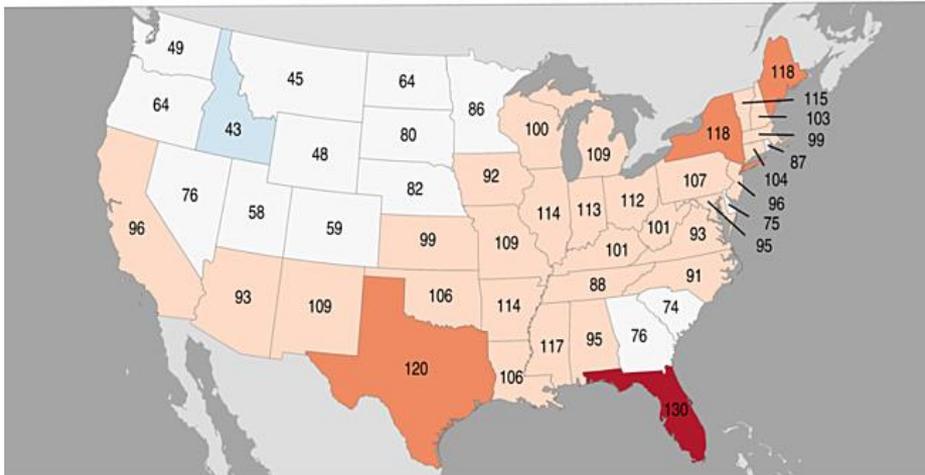
May Temperature Recap

Statewide Maximum Temperature Ranks

May 2024

Ranking Period: 1895-2024

NOAA's National Centers for Environmental Information

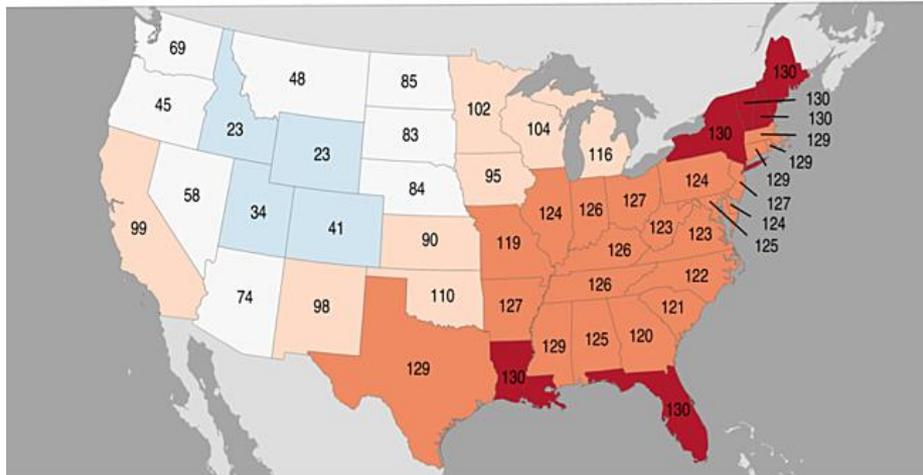


Statewide Minimum Temperature Ranks

May 2024

Ranking Period: 1895-2024

NOAA's National Centers for Environmental Information





March - May Temperature Recap

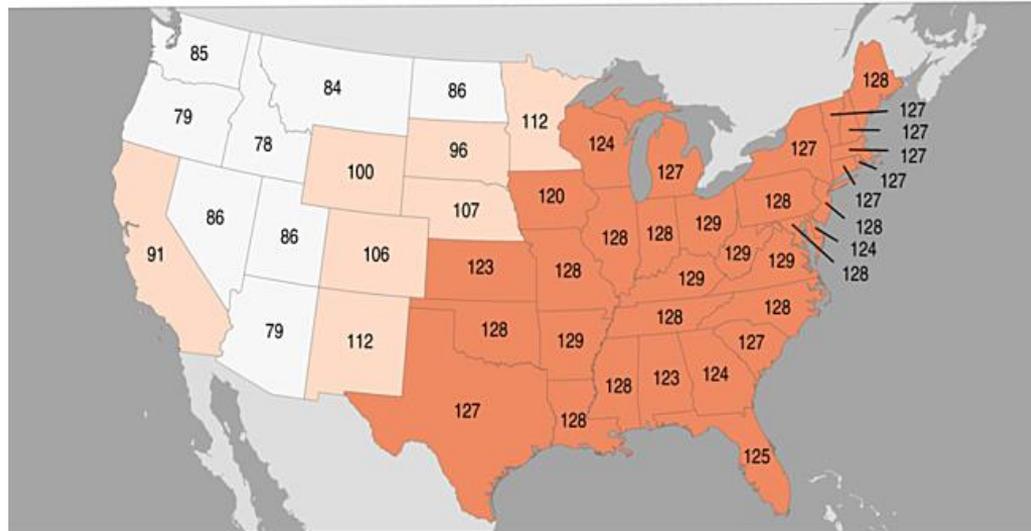
- Above to much above average across most of the region
- 2nd warmest spring on record for Ohio and Kentucky; 3rd warmest for Indiana, Illinois, and Missouri
- Near average across North Dakota and Montana

Statewide Average Temperature Ranks

March - May 2024

Ranking Period: 1895-2024

NOAA's National Centers for Environmental Information



Created: Thu Jun 6 2024
Source: nClimGrid - Monthly





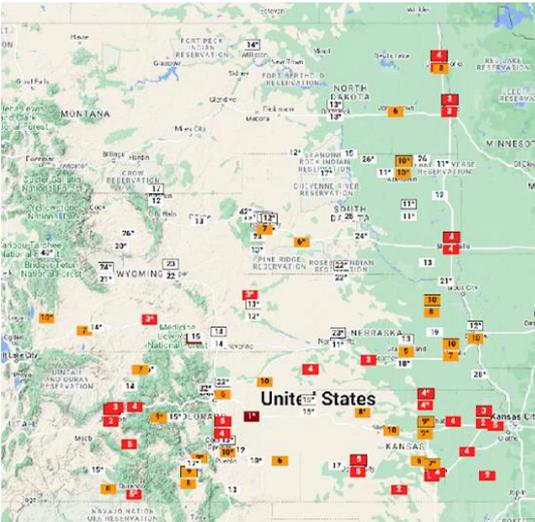
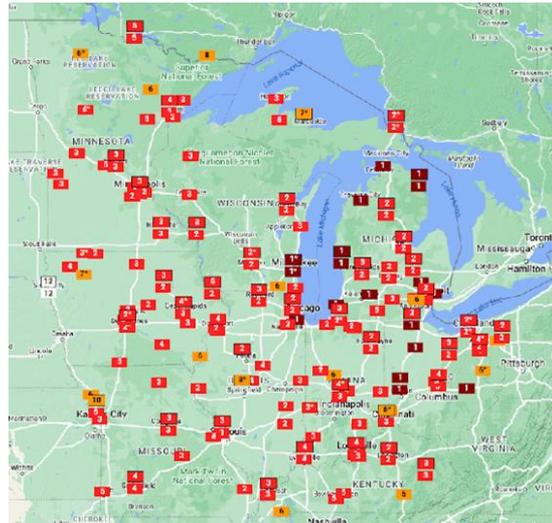
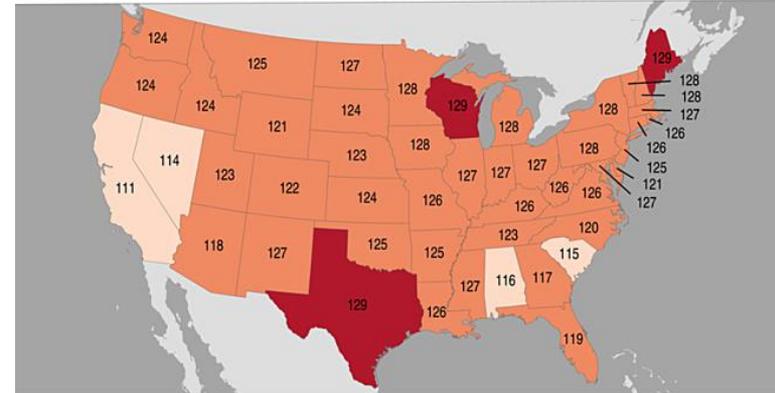
Year to Date/June 2023- May 2024

Statewide Average Temperature Ranks

June 2023 – May 2024

Ranking Period: 1895–2024

NOAA's National Centers for Environmental Information





May Precipitation Recap

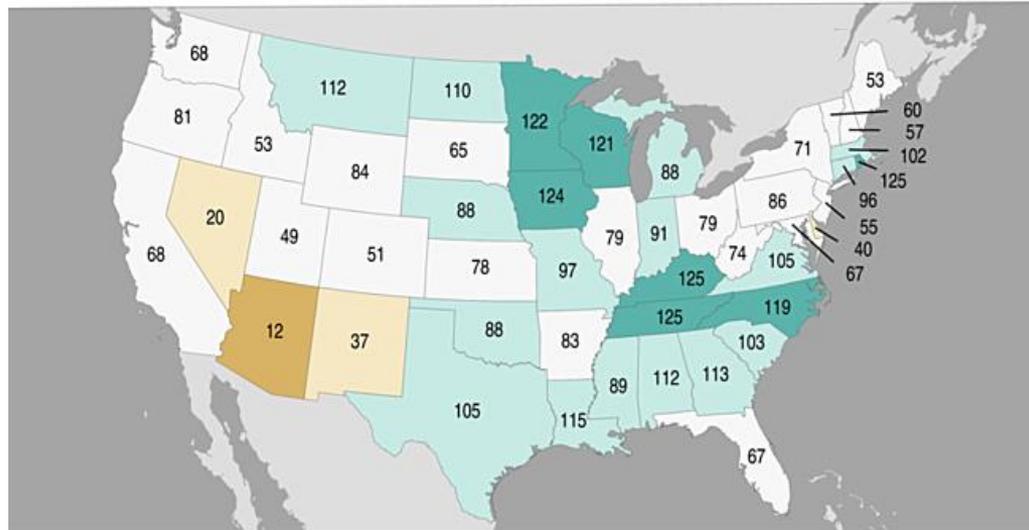
- Near to above average precipitation for the entire region
- Top 10 wettest May for a few states (MN, WI, IA, KY)

Statewide Precipitation Ranks

May 2024

Ranking Period: 1895-2024

NOAA's National Centers for Environmental Information





March - May Precipitation Recap

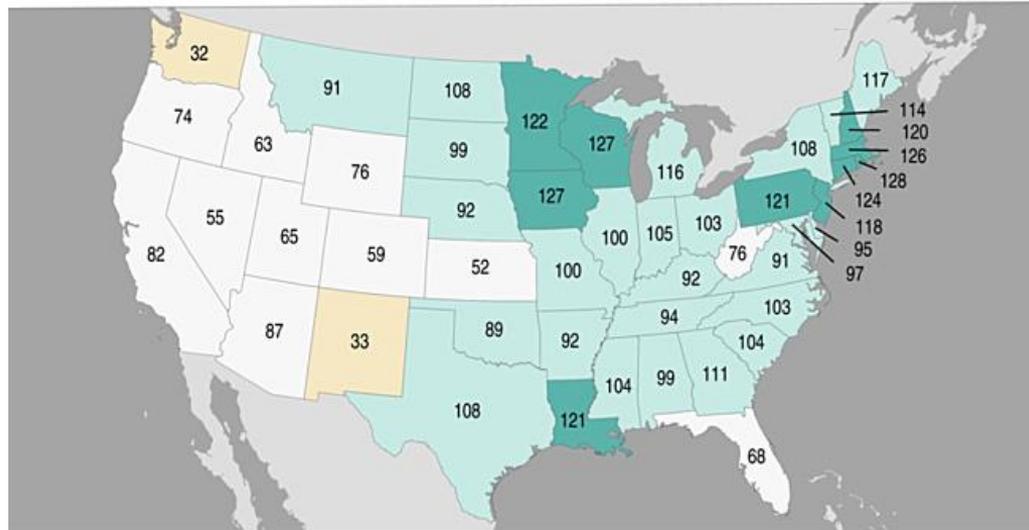
- Above to Much Above Average across most of the region
- 4th wettest spring for Wisconsin and Iowa; Top 10 for Minnesota as well
- Closer to average across Kansas, Colorado, and Wyoming

Statewide Precipitation Ranks

March - May 2024

Ranking Period: 1895-2024

NOAA's National Centers for Environmental Information



Created: Thu Jun 6 2024
Source: nClimGrid - Monthly

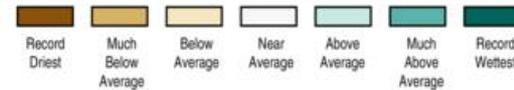
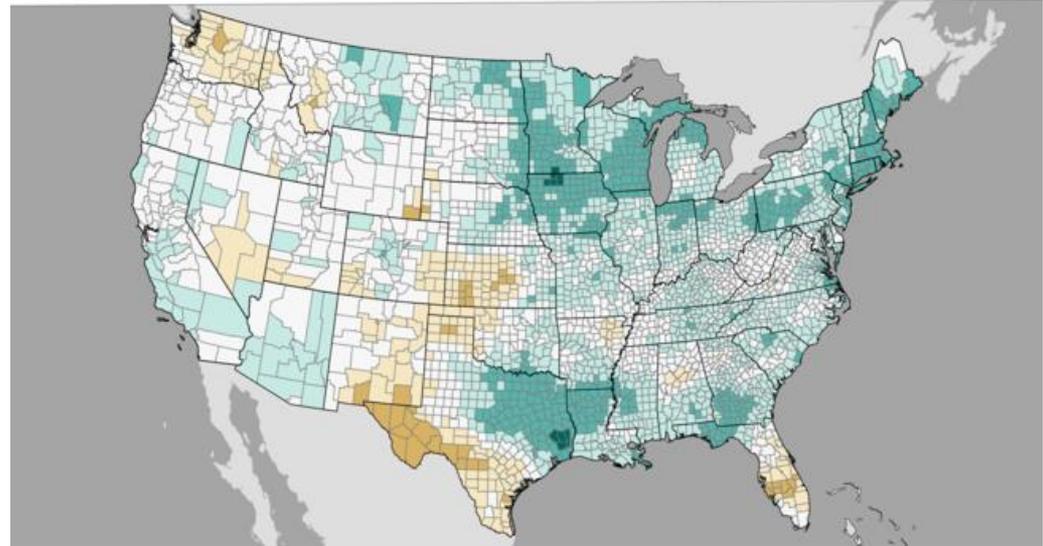




March - May County Precipitation

- Record wettest for counties across north-central Iowa and south-central Minnesota
- Very dry across portions of central and southwest Kansas, western Nebraska, and southeast Wyoming

County Precipitation Ranks
 March-May 2024
 Ranking Period: 1895-2024
 NOAA's National Centers for Environmental Information

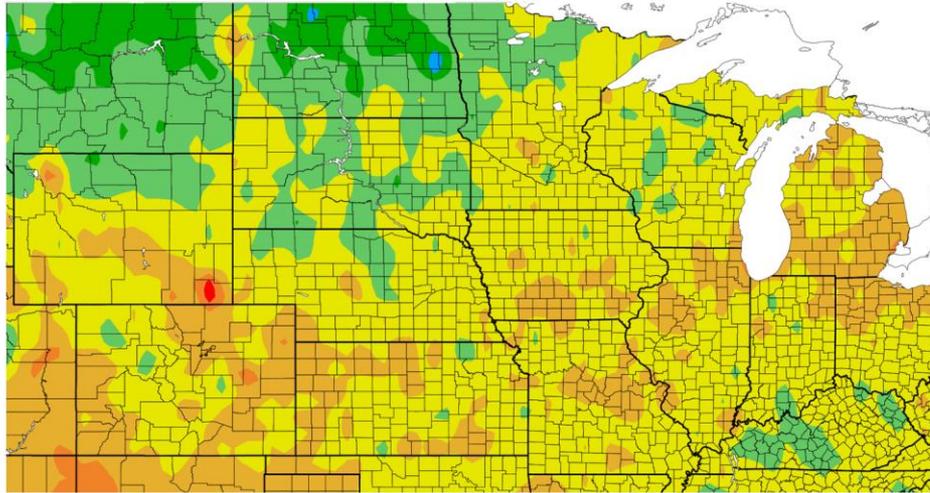


Created: Thu Jun 06 2024
 Source: nClimGrid-Monthly

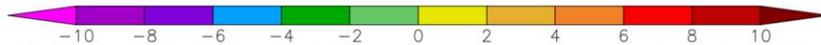




Departure from Normal Temperature (F)
5/21/2024 – 6/19/2024



- Warmer than average across much of the North Central Region
- Cooler than average from Montana across most of North Dakota and northwest Minnesota



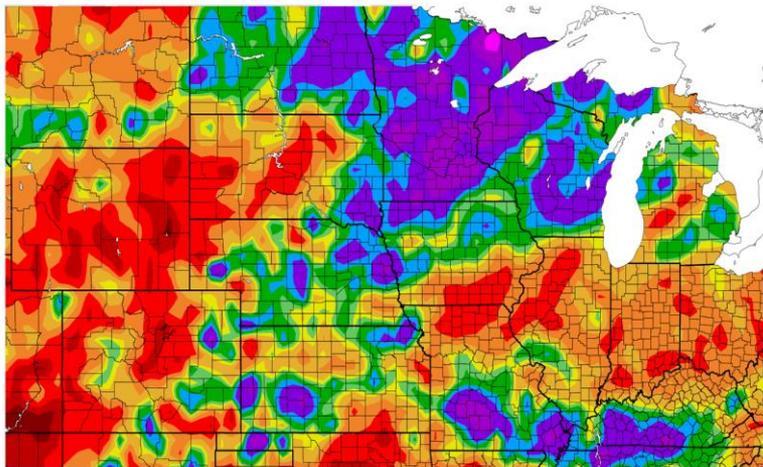
Generated 6/20/2024 at HPRCC using provisional data.

NOAA Regional Climate Centers

Source: <https://hprcc.unl.edu/maps.php?map=ACISClimateMaps>

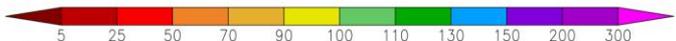
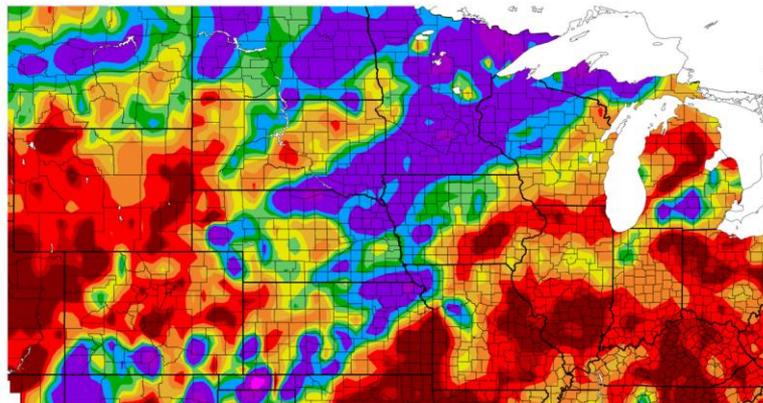


Percent of Normal Precipitation (%)
5/21/2024 – 6/19/2024



- Very heavy rainfall across the Upper Midwest (8-12"; 150-300%)
- Bulk of this falling in the last week
- Wet conditions across parts of NE, KE, S. MO, and KY
- Dry across the western states and from N. MO/S. IA east through OH

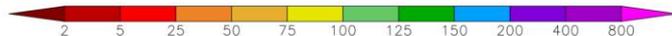
Percent of Normal Precipitation (%)
6/13/2024 – 6/19/2024



Generated 6/20/2024 at HPRCC using provisional data. NOAA Regional Climate Centers

Last 30 days of precipitation

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

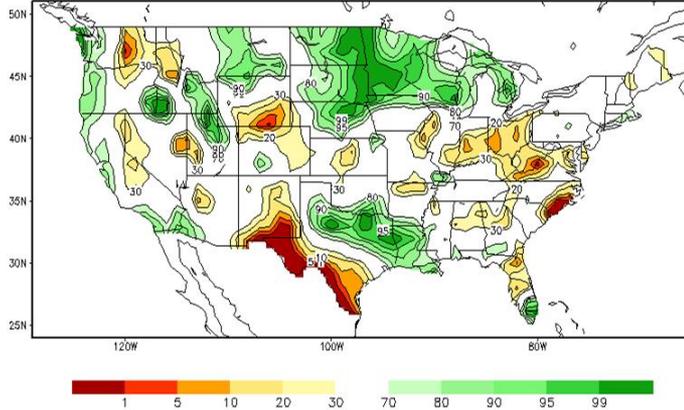


Generated 6/20/2024 at HPRCC using provisional data. NOAA Regional Climate Centers

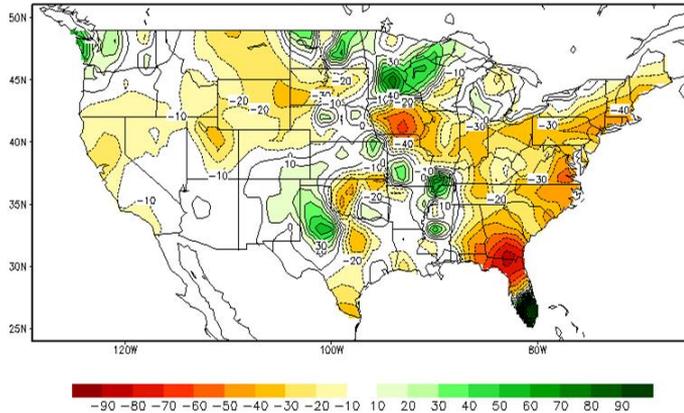
Last 7 days of precipitation



Calculated Soil Moisture Ranking Percentile
JUN 18, 2024

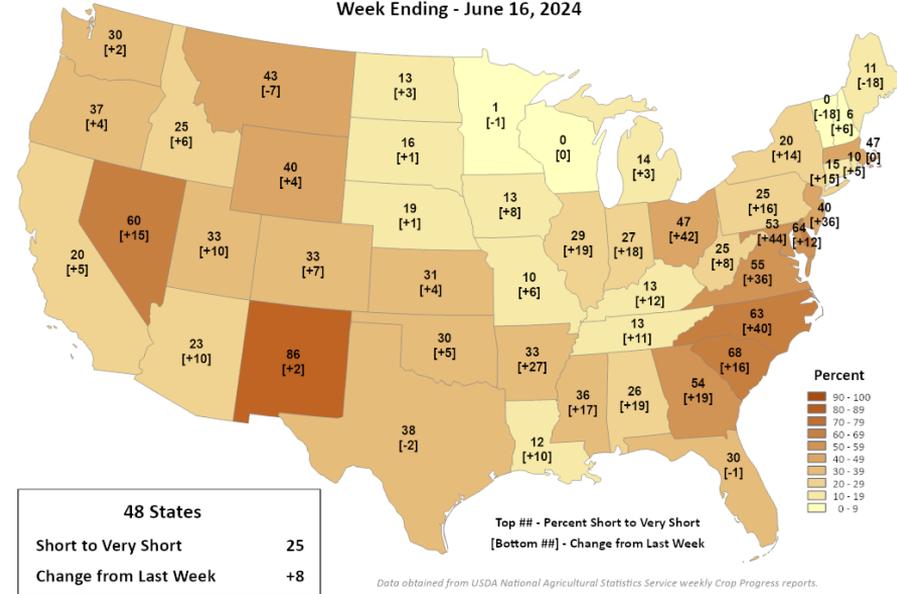


Calculated Soil Moisture Anomaly Change
JUN 18, 2024 from MAY 31



This product was prepared by the
USDA Office of the Chief Economist (OCE)
World Agricultural Outlook Board (WAOB)

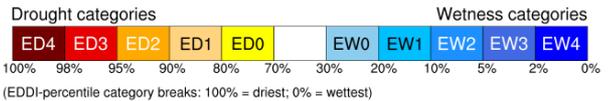
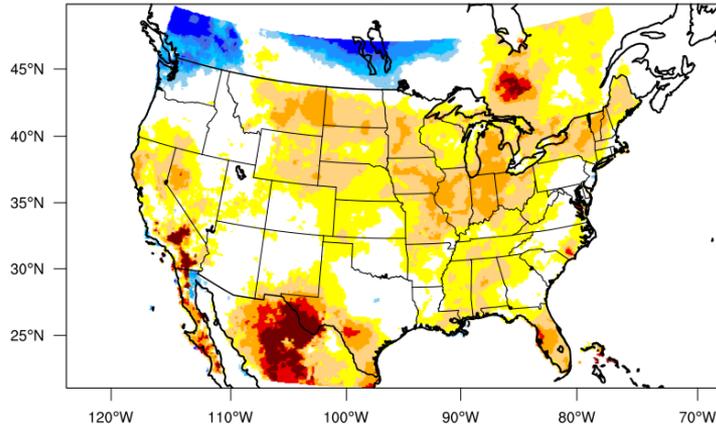
Topsoil Moisture Percent Short to Very Short Week Ending - June 16, 2024





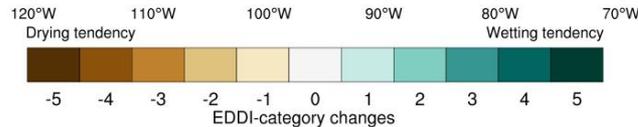
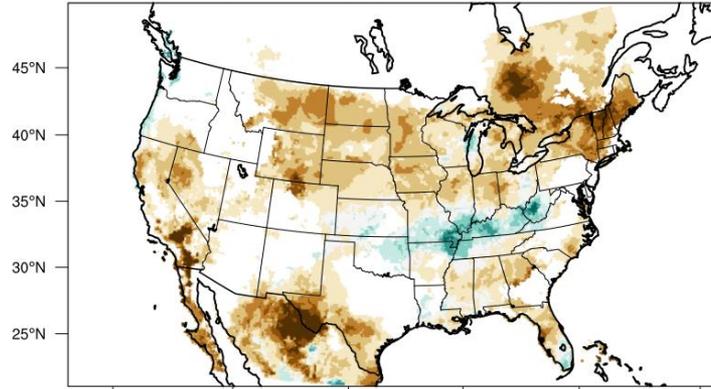
Think: “Thirst of the atmosphere” or precursor for water stress

1-month EDDI categories for June 14, 2024



Generated by NOAA/ESRL/Physical Sciences Laboratory

1-month EDDI: Changes during the 30 days ending on June 14, 2024



Only regions that start or end above the 70th percentile (i.e., ED0-ED4) are shown.

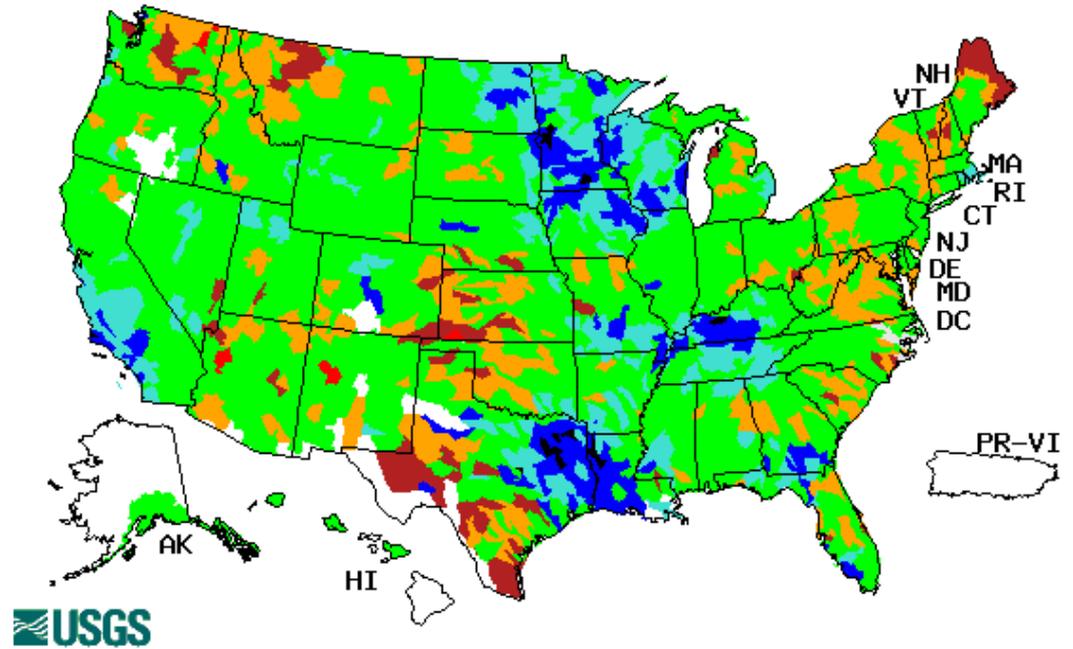
Generated by NOAA/ESRL/Physical Sciences Laboratory

- Fairly persistent demand from the atmosphere
- Increasing demand across much of the North Central Region (less so across the south)
- Very high observed evaporation rates in some parts of the region (e.g., Illinois-Ohio)

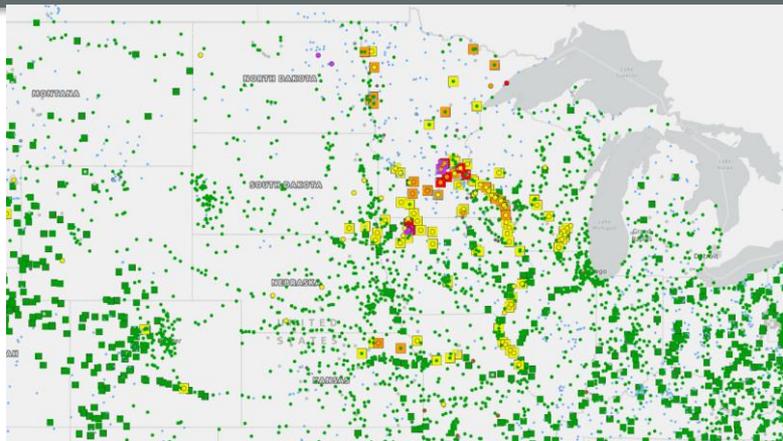


- Normal to much above normal/high levels across the bulk of the region, especially in the northern Midwest states (Iowa, Minnesota, Wisconsin) and southern Midwest (Missouri, W. Kentucky)
- More isolated areas of below normal levels across South Dakota, Northern Missouri, Indiana, and Ohio.
- More widespread below to much below normal levels across Nebraska, Kansas, Southeast Colorado, Northern Montana

Wednesday, June 19, 2024



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



OBSERVATIONS & FORECASTS		
LONG RANGE FLOOD OUTLOOK		
CATEGORIES		
	FORECAST	
Major Flood	1	3
Moderate Flood	5	8
Minor Flood	22	30
Action	90	81
No Flood	4738	1120
Flood Category Not Defined	1908	0
No Forecast Available	0	0
Low Water Threshold	23	0
Data Not Current	363	0
Out of Service	120	0

Limit by boundary
 Only display Partner FIM Gauges

Mississippi:

- Upper Basin contributing a lot of water
- Strong flows south of St. Louis
- No current navigation concerns

Missouri:

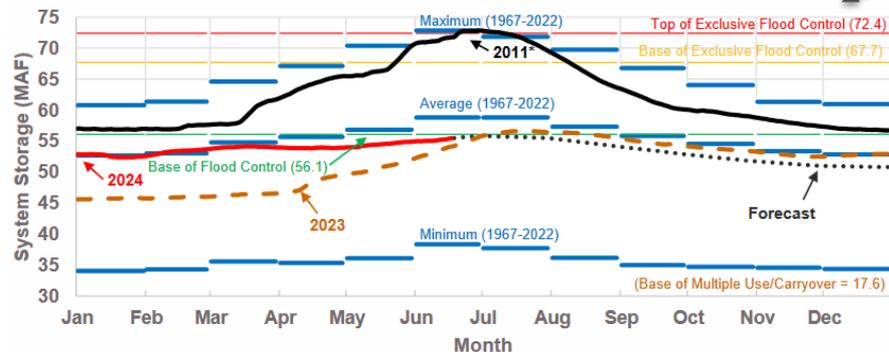
- On June 16, the reach above Fort Peck had 1% of the peak remaining, and the reach between Fort Peck and Garrison had 1% of the peak remaining
- Lack of snowpack due to El Niño will mean some reservoirs will not fill completely this season

Ohio River:

- Drying out rapidly
- Normally delivers 60-65% of the lower Mississippi water
- Will need to be monitored this summer

<https://water.noaa.gov>

System Storage Comparison

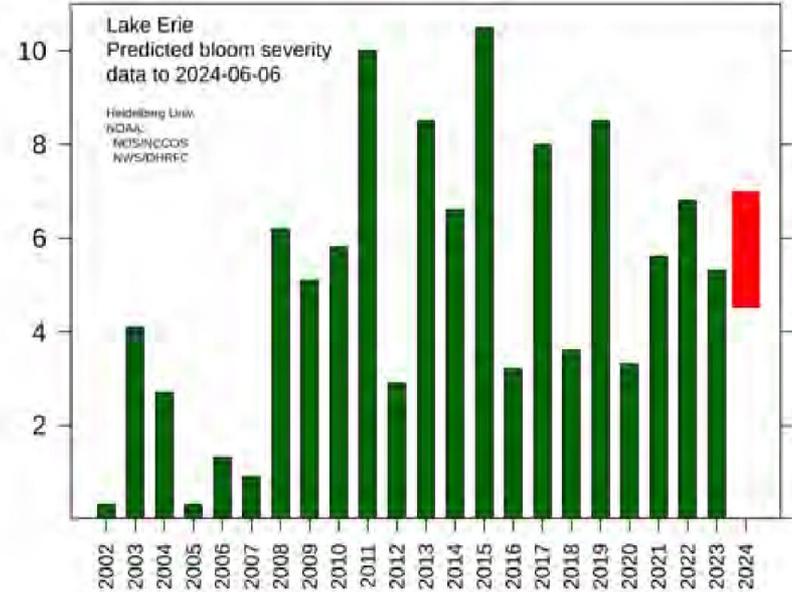
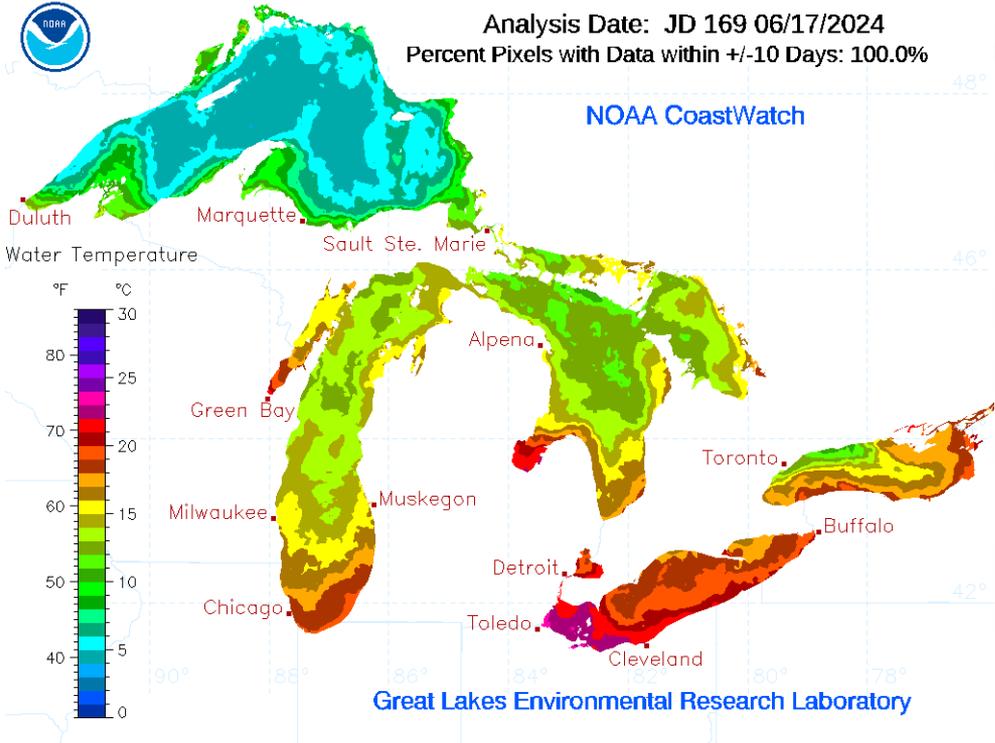


*In January 2011, the Base of Flood Control was 56.8 MAF, and the Top of Exclusive Flood Control was 73.1 MAF



GREAT LAKES SURFACE ENVIRONMENTAL ANALYSIS (GLSEA)

Analysis Date: JD 169 06/17/2024
Percent Pixels with Data within +/-10 Days: 100.0%

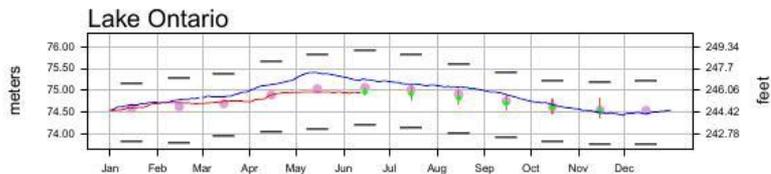
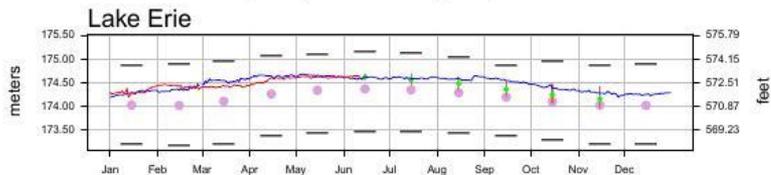
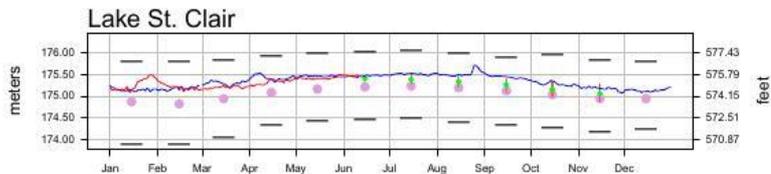
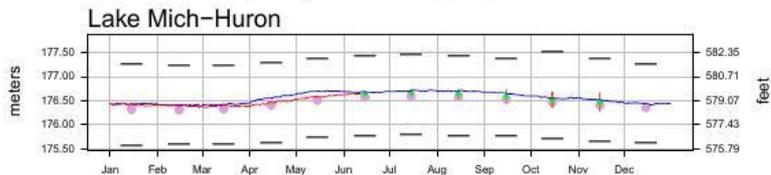
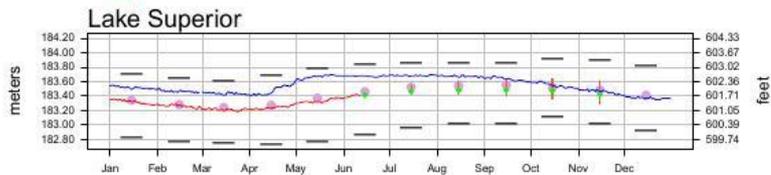


- Lake Erie: Moderate to larger-than-moderate summer bloom
- NOAA predicts above average summer dead zone in the Gulf of Mexico



Daily Great Lakes Water Levels

— 2024
— 2023
↓ Coordinated Forecast
● LTA Monthly Mean
— Record High/Low Monthly Mean



Lakewide average levels are based on a network of water level gages located around the lakes.

LTA and record levels are computed from a period of record of 1918 to 2023

Elevations are referenced to the International Great Lakes Datum (1985).

Updated 2024-06-14

- All lakes are rising or steady over the recent period which typical for spring
- At or below levels from 2023
- At or above June average level for Lakes Michigan-Huron and Erie

<https://www.lre.usace.army.mil/Missions/Great-Lakes-Information/Great-Lakes-Information-2/Water-Level-Data/>

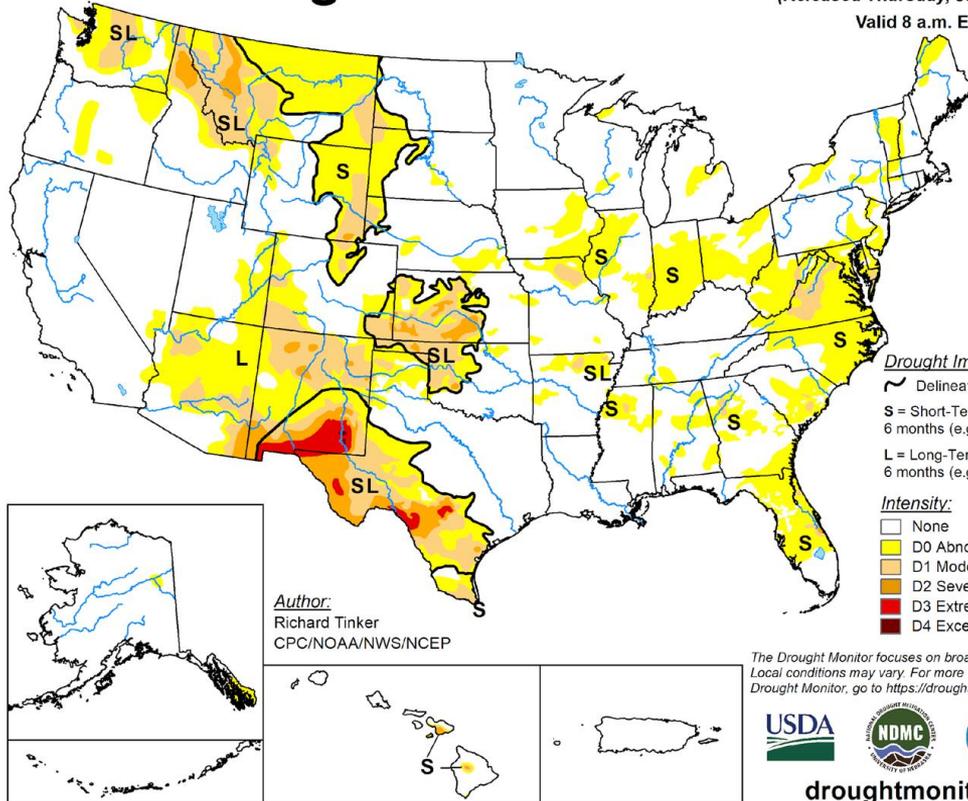


U.S. Drought Monitor

June 18, 2024

(Released Thursday, Jun. 20, 2024)

Valid 8 a.m. EDT



Drought Impact Types:

- ~ Delineates dominant impacts
- S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
- L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

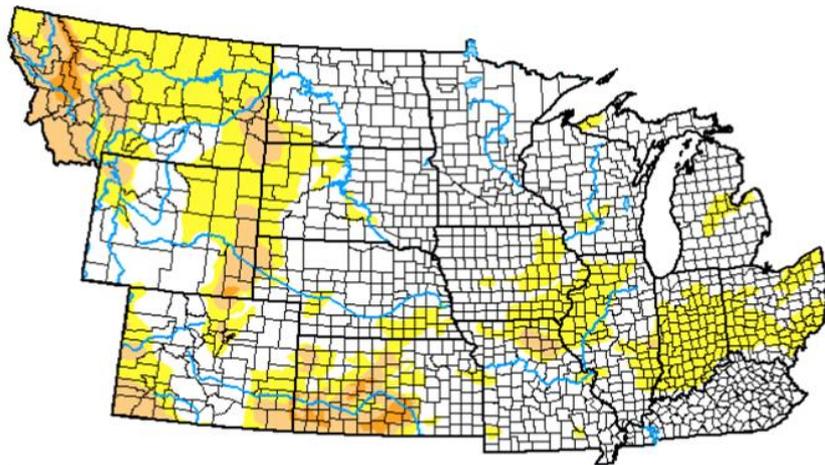
Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

Author:
Richard Tinker
CPC/NOAA/NWS/NCEP

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>





June 18, 2024

(Released Thursday, Jun. 20, 2024)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	63.33	36.67	10.20	1.28	0.00	0.00
Last Week 06-11-2024	71.98	28.02	9.22	1.26	0.00	0.00
3 Months Ago 03-19-2024	34.40	65.60	31.32	8.97	1.11	0.00
Start of Calendar Year 01-02-2024	39.12	60.88	34.11	13.18	2.68	0.01
Start of Water Year 09-26-2023	39.86	60.14	40.32	19.88	6.29	0.49
One Year Ago 06-20-2023	30.29	69.71	42.21	16.52	5.62	1.35

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>

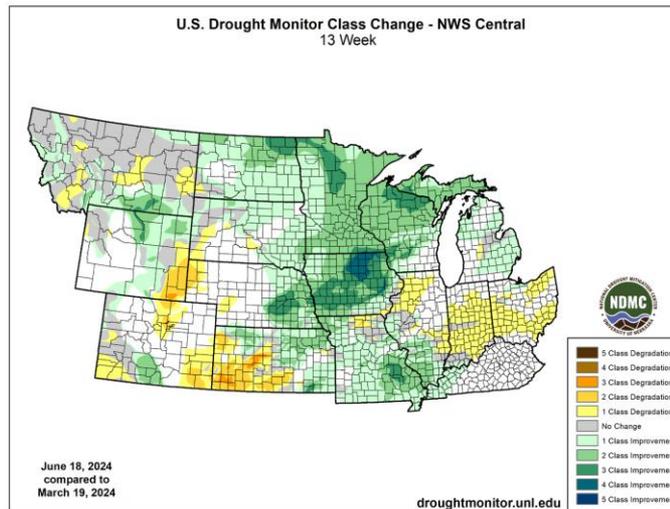
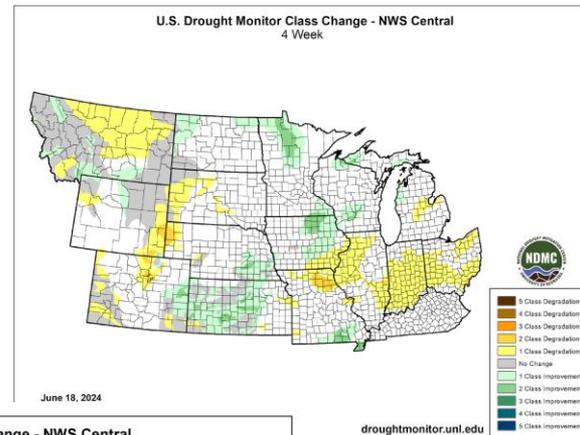
Author:

Richard Tinker
CPC/NOAA/NWS/NCEP



droughtmonitor.unl.edu

U.S. Drought Monitor NWS Central



AGRICULTURAL IMPACTS



Big differences in earlier vs later planted corn in Illinois: Photo credit, Trent Ford - IL SC



USDA NASS Crop Progress: Corn

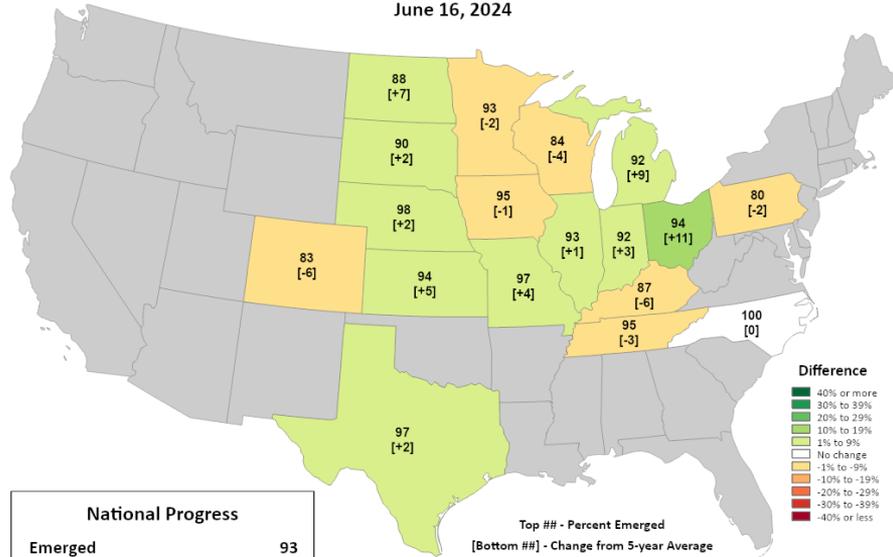


This product was prepared by the USDA Office of the Chief Economist (OCE) World Agricultural Outlook Board (WAOB)

Corn Progress

Percent Emerged

June 16, 2024



National Progress	
Emerged	93
Change from 5-year Average	+1

Data obtained from USDA National Agricultural Statistics Service weekly Crop Progress reports.

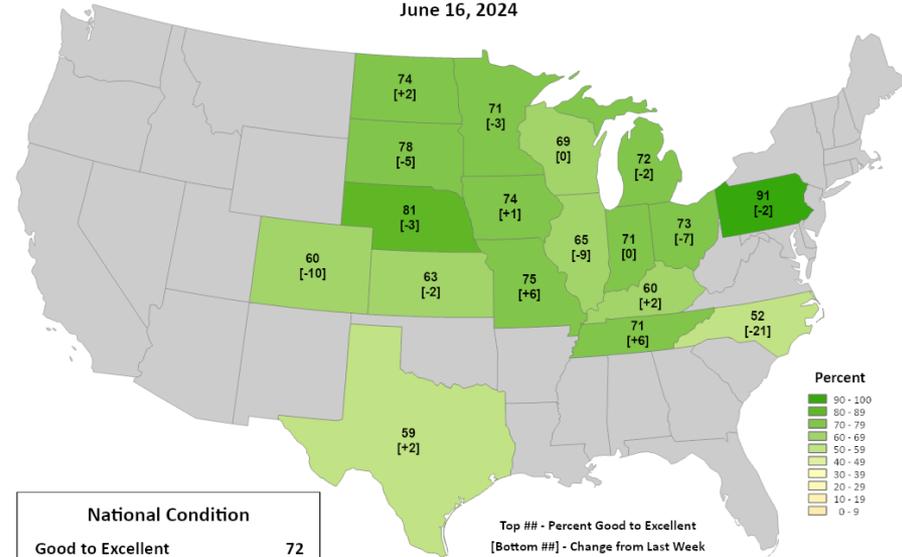


This product was prepared by the USDA Office of the Chief Economist (OCE) World Agricultural Outlook Board (WAOB)

Corn Conditions

Percent Good to Excellent

June 16, 2024



National Condition	
Good to Excellent	72
Change from Last Week	-2

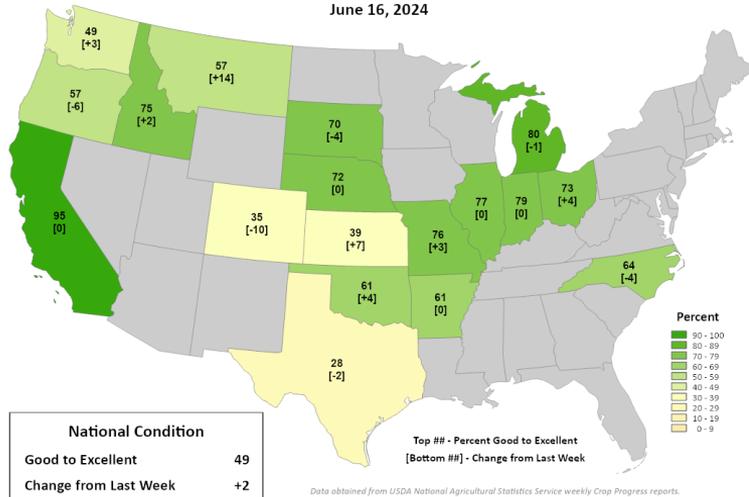
Data obtained from USDA National Agricultural Statistics Service weekly Crop Progress reports.



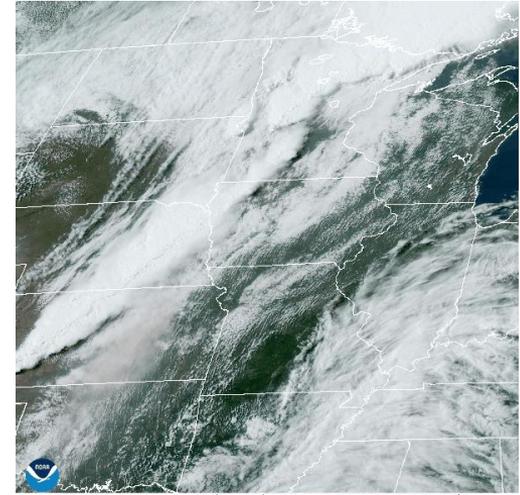
USDA NASS Crop Progress: Winter Wheat



Winter Wheat Conditions Percent Good to Excellent June 16, 2024



“With the drought about March and April and no rain forecasted, it looked like we would not have much,” he told KSN. “When it finally started raining, we had some hope, but the rain came with multiple hail and wind storms that destroyed many wheat fields and blew over several irrigation systems in the area and caved in a bin at the local elevator.”



18 Jun 2024 22:01Z - NOAA/NESDIS/STAR - UMW - GEOCOLOR Composite





USDA NASS Crop Progress: Others

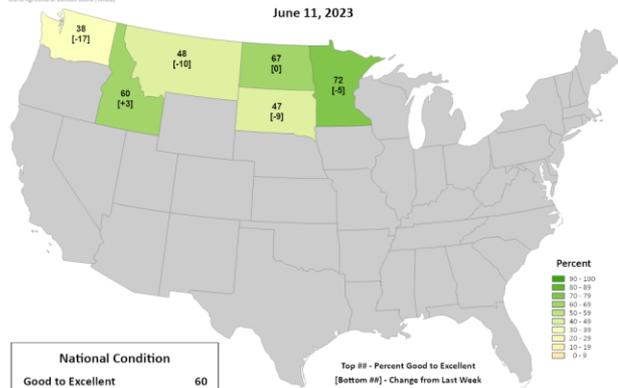


United States Department of Agriculture
This product was prepared by the USDA Office of the Chief Economist (OCE) World Agricultural Outlook Board (WAOB)

Spring Wheat Conditions

Percent Good to Excellent

June 11, 2023



National Condition	
Good to Excellent	60
Change from Last Week	-4

Top ## - Percent Good to Excellent
[Bottom ##] - Change from Last Week
Data obtained from USDA National Agricultural Statistics Service weekly Crop Progress reports.

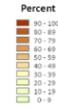
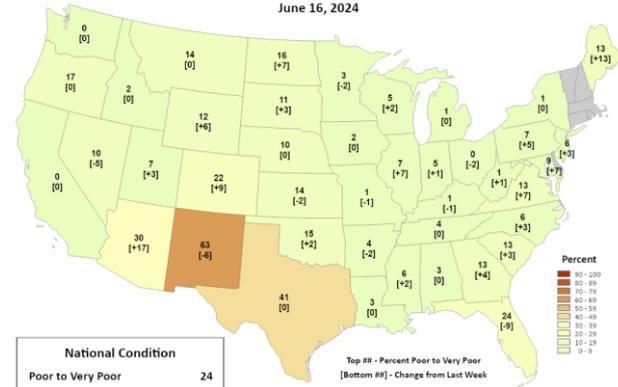


United States Department of Agriculture
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Pasture and Range Conditions

Percent Poor to Very Poor

June 16, 2024



National Condition	
Poor to Very Poor	24
Change from Last Week	+2

Top ## - Percent Poor to Very Poor
[Bottom ##] - Change from Last Week
Data obtained from USDA National Agricultural Statistics Service weekly Crop Progress reports.

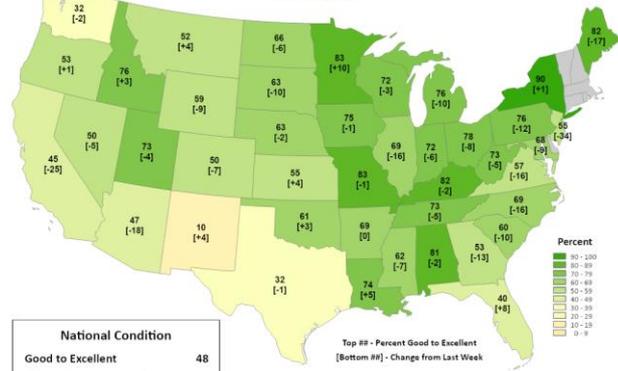


United States Department of Agriculture
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Pasture and Range Conditions

Percent Good to Excellent

June 16, 2024



National Condition	
Good to Excellent	48
Change from Last Week	-3

Top ## - Percent Good to Excellent
[Bottom ##] - Change from Last Week
Data obtained from USDA National Agricultural Statistics Service weekly Crop Progress reports.

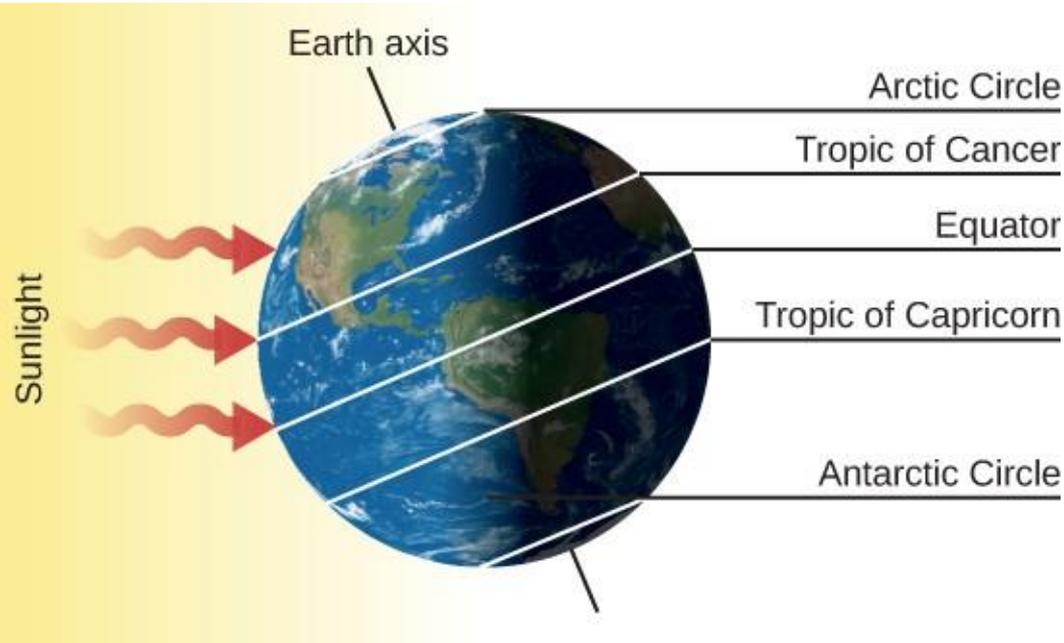
Issues & Notable Events





Happy Solstice

June 20th, 3:50pm Central Daylight Time

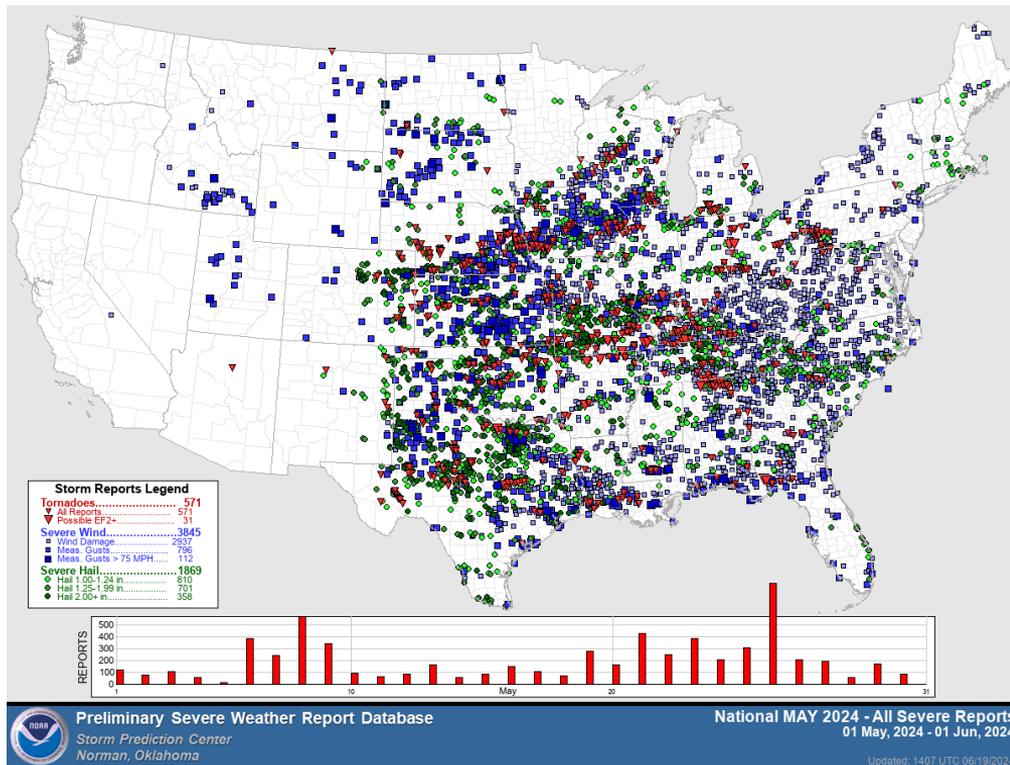


- Earliest since George Washington Presidency
- Leap years will continue to be earlier until 2100
- Sun directly over Tropic of Cancer (latitude 23.5 degrees North)
- Climatological summer (June-August)



Severe Weather

- Over 6200 storm reports for May across the US; ~2400 in May 2023
- Several rounds of all severe types (tornadoes, hail, wind)
- Significant events:
 - May 21st (NE-IA-MN-WI)
 - Memorial Day Weekend (25-27; Central Plains through Kentucky to the East Coast)





May 21: EF4- Greenfield, Iowa

5 fatalities; 35-injured

(AP Photo/Charlie Neibergall)



May 20: NE Colorado

Golf ball and Baseball sized hail

Knee-deep hail piled up

May 26: Dawson Springs, KY

53 tornadoes were reported across the Central Region area

Several Tornado Emergencies were issued across Western Kentucky Sunday.

6 fatalities (5 in Kentucky)



The Heat is on!

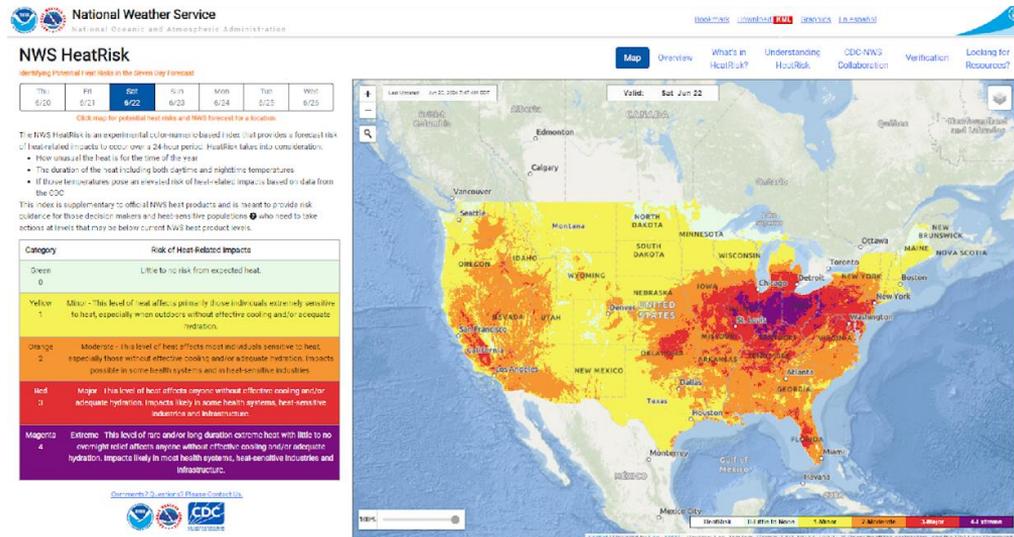
Daily High Temperature Records broken or tied
Week-to-Date: 6/15/2024 - 6/20/2024

- Both High Maximum and Minimum
- ▲ High Maximum
- ▼ High Minimum

High Max: 78
High Min: 241



Minimum 30 years of data
All Reports Are Considered Preliminary



- Limited heat across much of the Midwest
- Heat occurred with very low humidity (sub 20% across the region)



Jen B (@jen_in_Madison)

ILLNOIS

- Second lowest heating degree day units (since October) = low heating demand throughout this past winter
- Chicago nights above 70-degrees Fahrenheit 7 nights in June – Most since 1933

IOWA

- May ranks as the 8th wettest May and 6th wettest Spring in 152 years
- Finally busted the drought two weeks ago after the start of the drought in July 2020 – longest since 1954-1959

KANSAS

- Overall drought improvements across the east
- Over 9" in Manhattan in May; 110 degrees Fahrenheit on June 13 in Haze, KS – earliest on record by 11 days

NORTH DAKOTA

- Fairly wet with a lot of prevent plant talk
- Below average forage and some severe weather

SOUTH DAKOTA

- Dry west, wet east
- Wildfire activity increasing over western SD in a normally wet year due to heavy thatch

WISCONSIN

- Second most tornadoes in WI during May (22 total) since records began
- First tornado ever recorded on Washington Island
- 10th wettest May and 4th wettest spring
- 3 of the 4 wettest springs on record in the past two decades

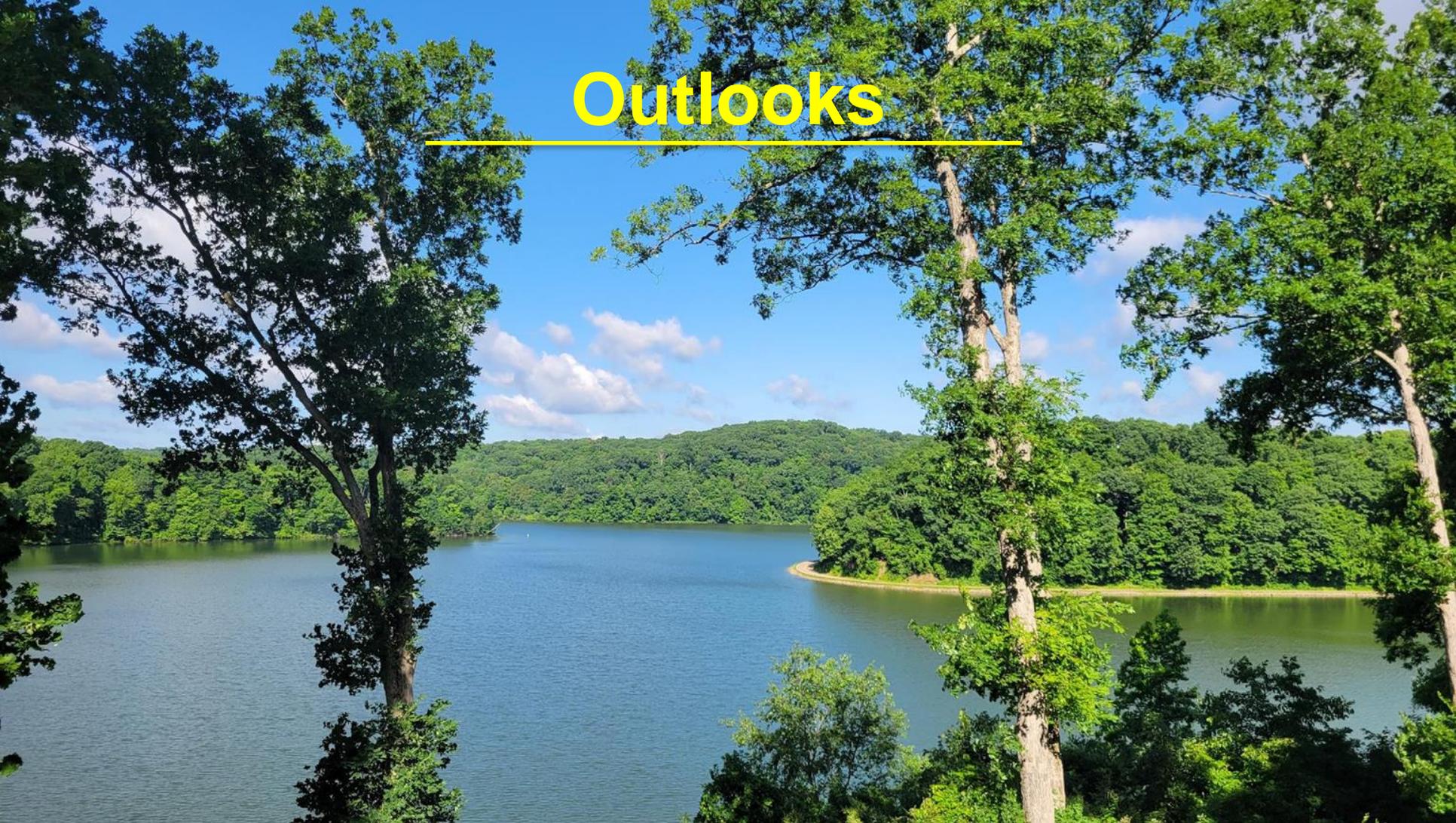


- Failure of Siphons that provide water to the Milk River Irrigation Project that serves 121K acres in North Central Montana
- Biggest infrastructure disaster in 30 years for the area
- Illustrates societal complexities of drought and impacts



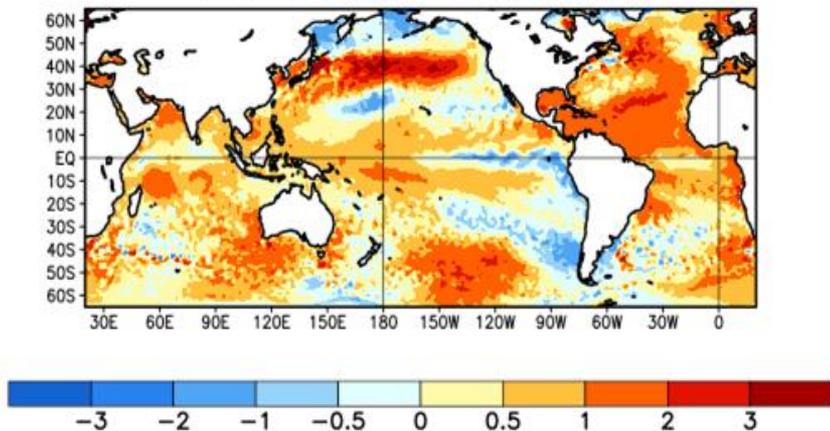
Michael Downey
Drought Program Coordinator
MT DNRC

Outlooks



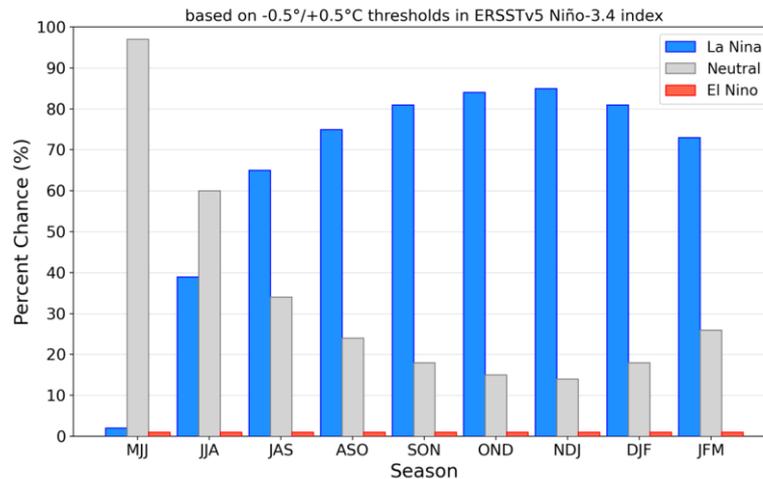


Average SST Anomalies
19 MAY 2024 – 15 JUN 2024



- ENSO-neutral conditions are observed
- Equatorial sea surface temperatures (SSTs) are above average in the west-central Pacific Ocean, near average in the east-central Pacific Ocean, and below-average in the far eastern Pacific Ocean

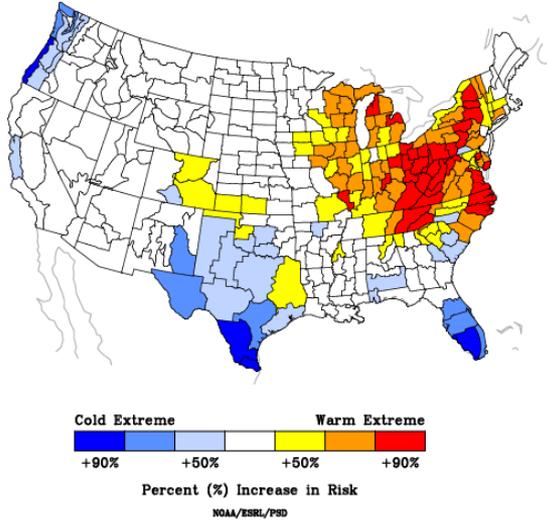
Official NOAA CPC ENSO Probabilities (issued June 2024)



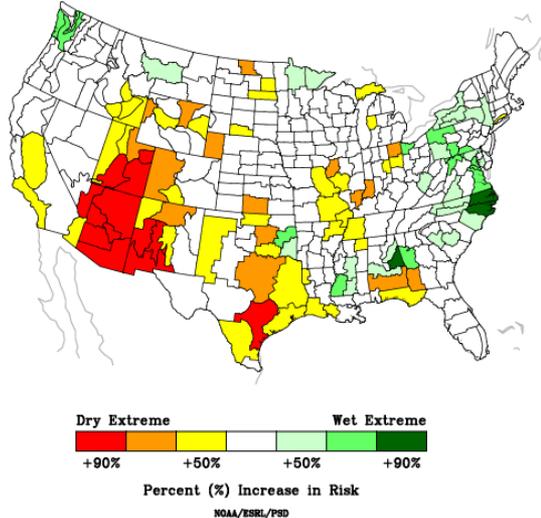
- ENSO-neutral is favored in May-July and June-August 2024.
- La Niña Watch La Niña may develop in July-September (65% chance) and persist through Northern Hemisphere winter 2024-25.



ASO Temperature During La Nina
Increased Risk of Warm or Cold Extremes



ASO Precipitation During La Nina
Increased Risk of Wet or Dry Extremes

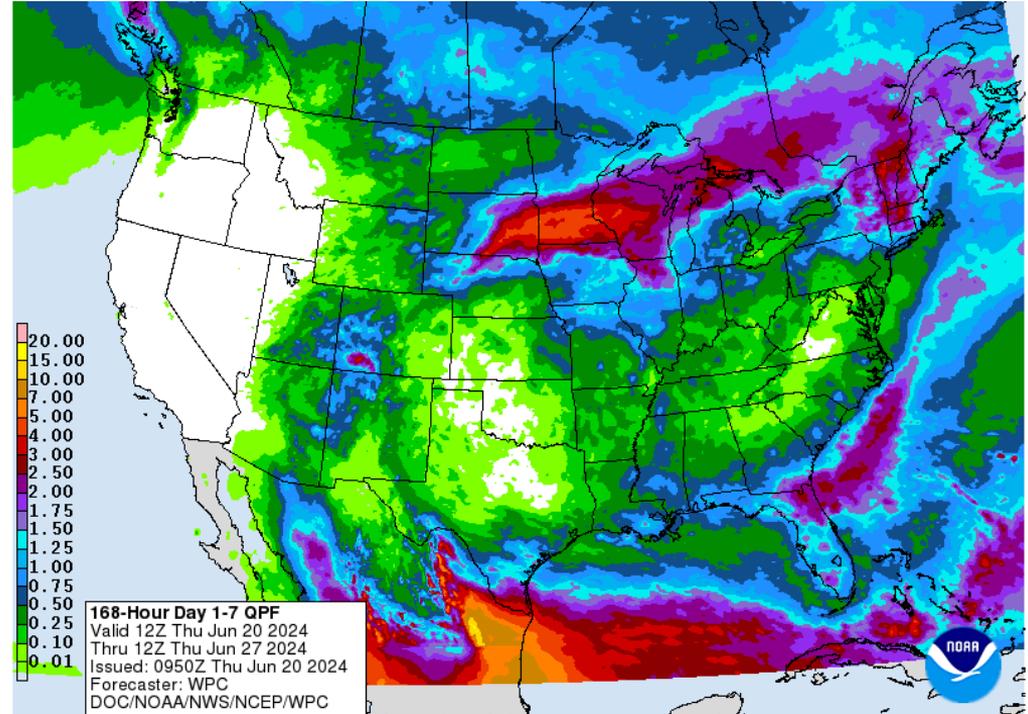


- These plots are composites of years when La Niña has been present in Aug-Oct
- Not Forecasts but rather an average of past behavior and the percent increase in risk
- Overall, favors increased risk for warm extremes in the eastern states and mixed signals (dry/wet) across the entire region



Valid Thu June 20 – Thu Jun 27

- High pressure anchored in the TN Valley over the weekend will strongly influence the weather pattern
- Very active pattern for the Upper Midwest and eastern Dakotas
- Less rainfall expected for much of the southern and eastern states, but activity forecast to increase next week



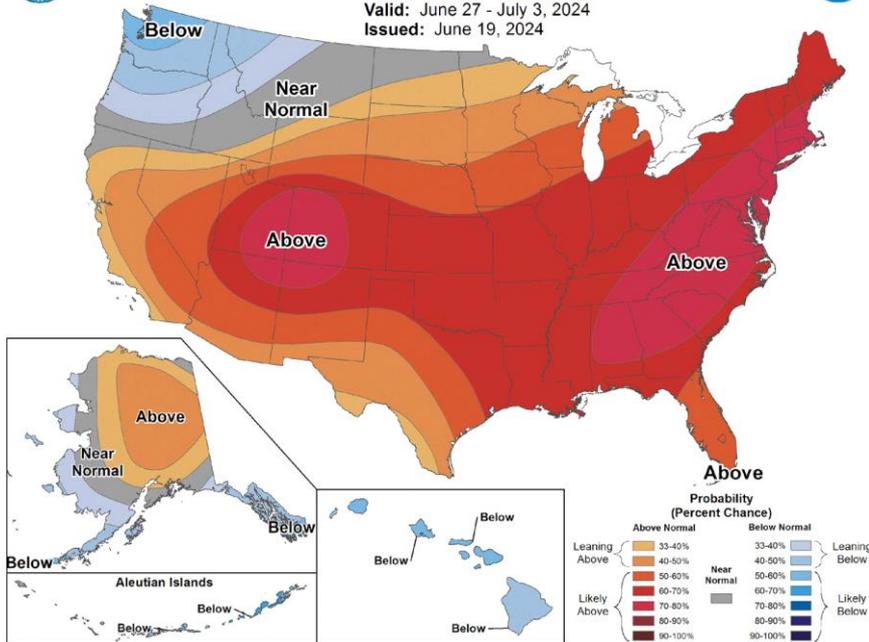


VALID June 27 – July 3



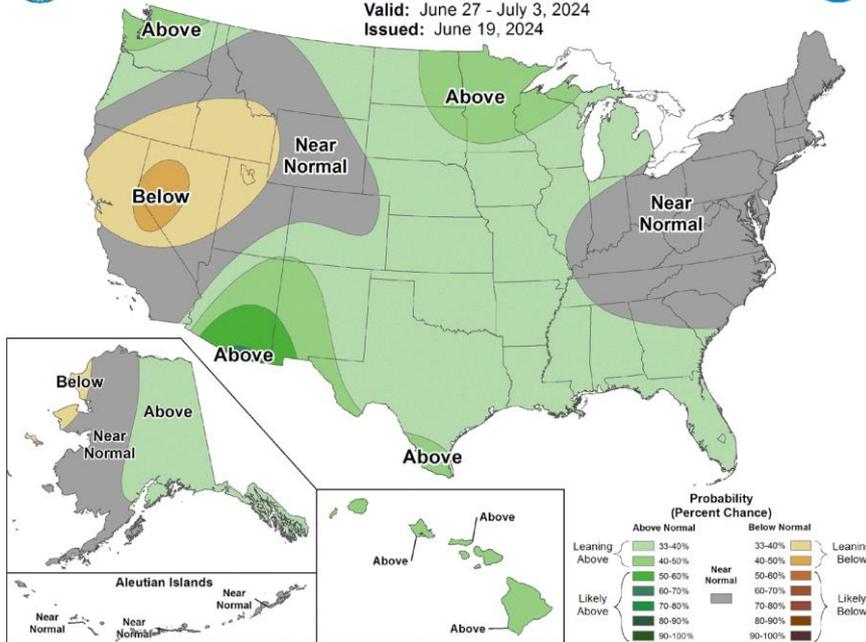
8-14 Day Temperature Outlook

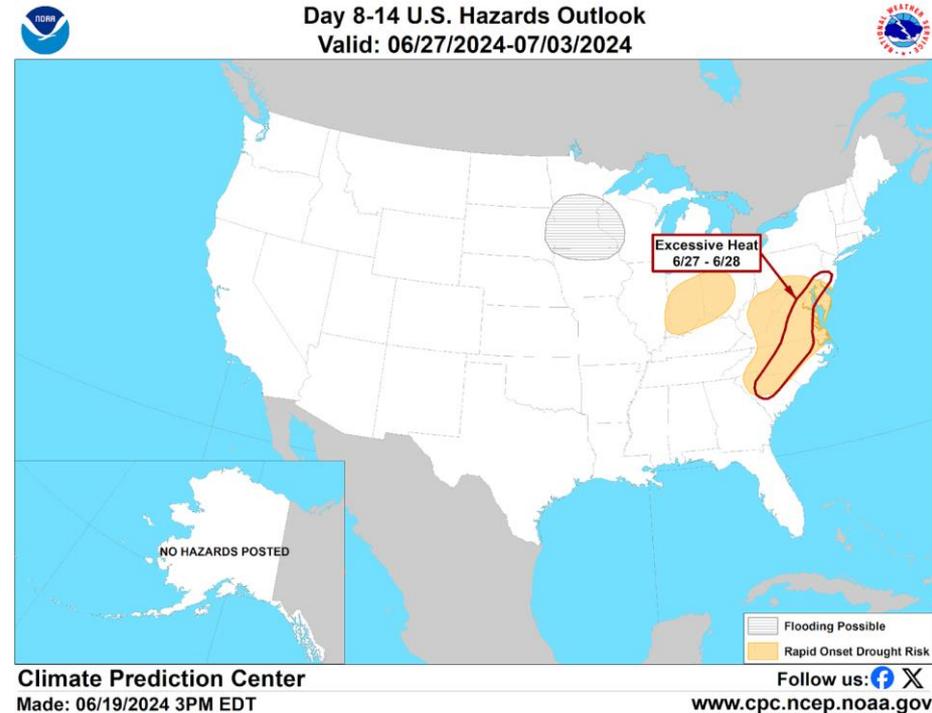
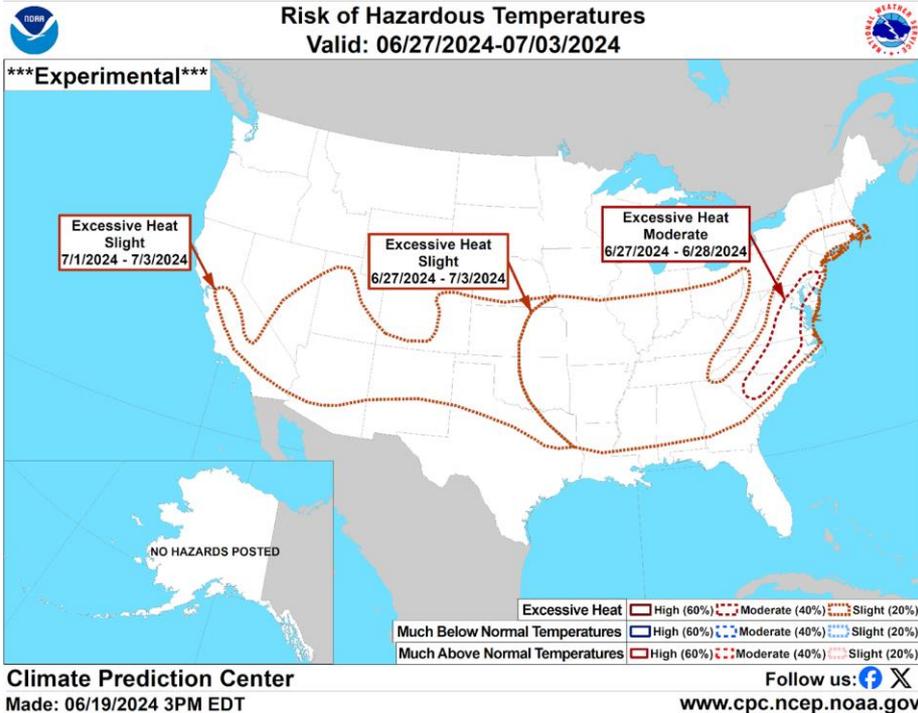
Valid: June 27 - July 3, 2024
Issued: June 19, 2024



8-14 Day Precipitation Outlook

Valid: June 27 - July 3, 2024
Issued: June 19, 2024







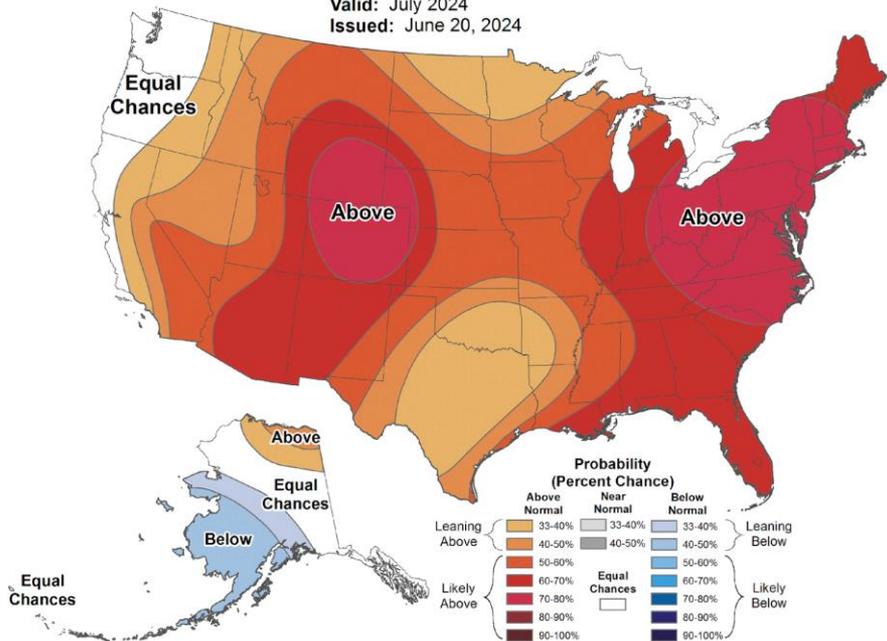
July 2024



Monthly Temperature Outlook



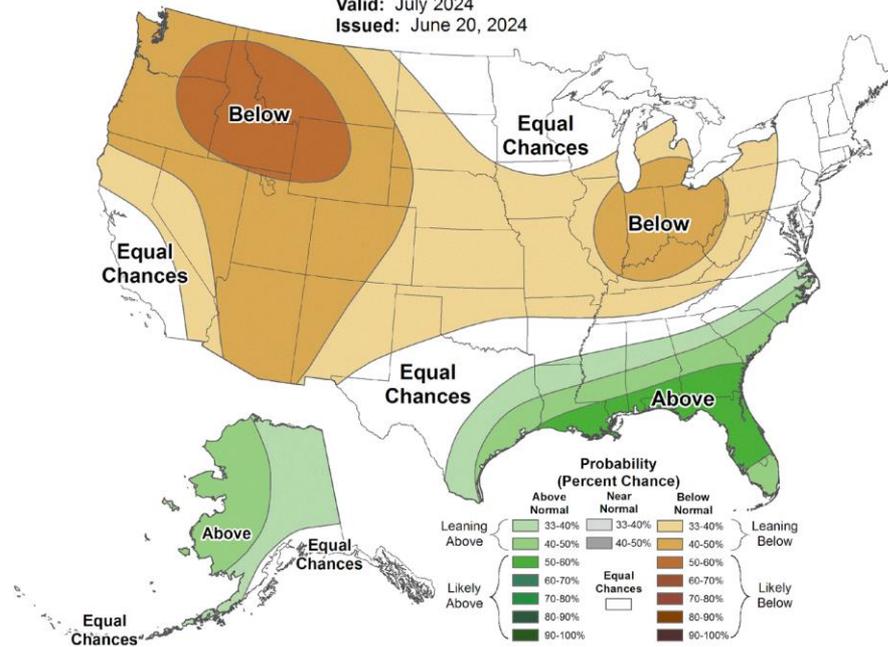
Valid: July 2024
Issued: June 20, 2024



Monthly Precipitation Outlook



Valid: July 2024
Issued: June 20, 2024





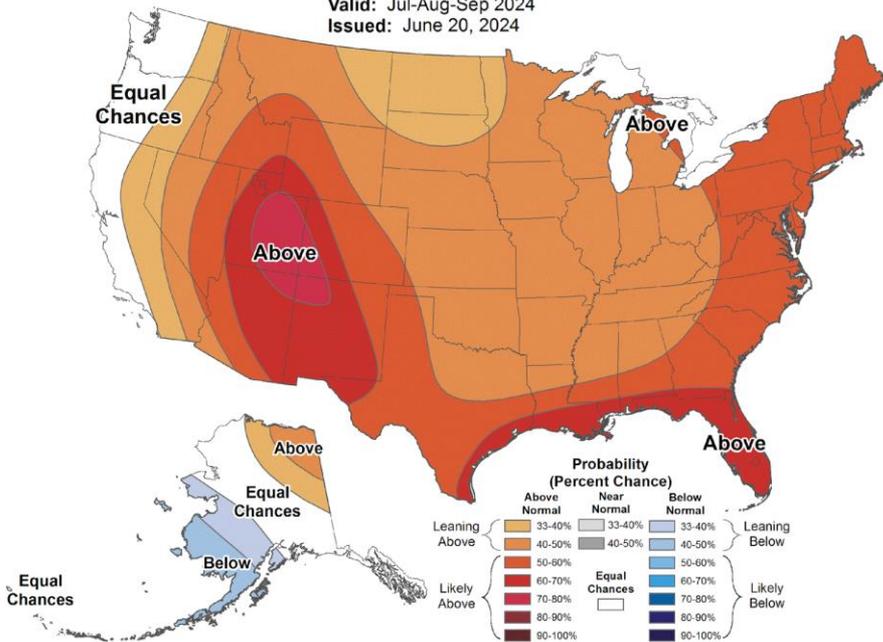
July - September 2024



Seasonal Temperature Outlook



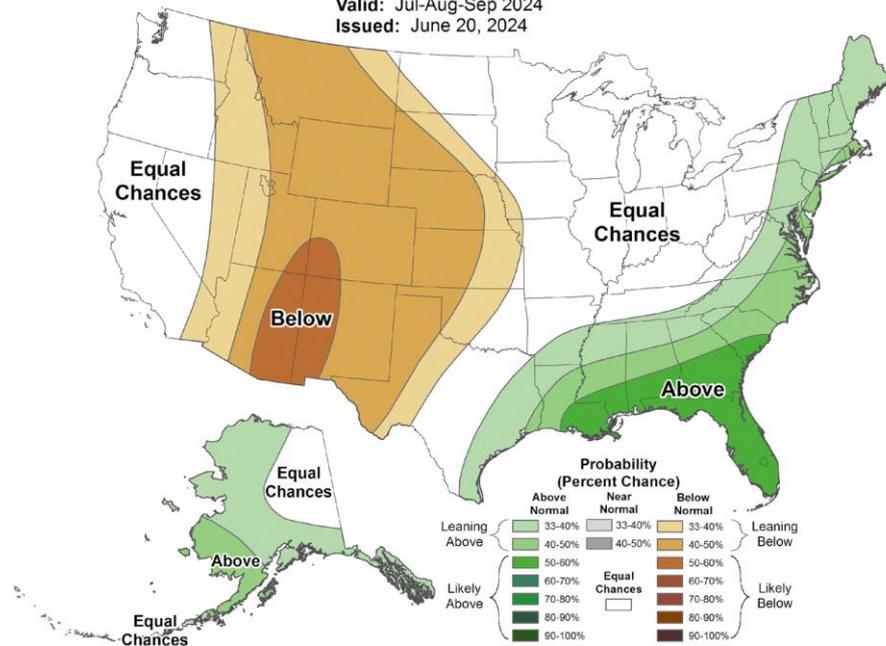
Valid: Jul-Aug-Sep 2024
Issued: June 20, 2024



Seasonal Precipitation Outlook



Valid: Jul-Aug-Sep 2024
Issued: June 20, 2024



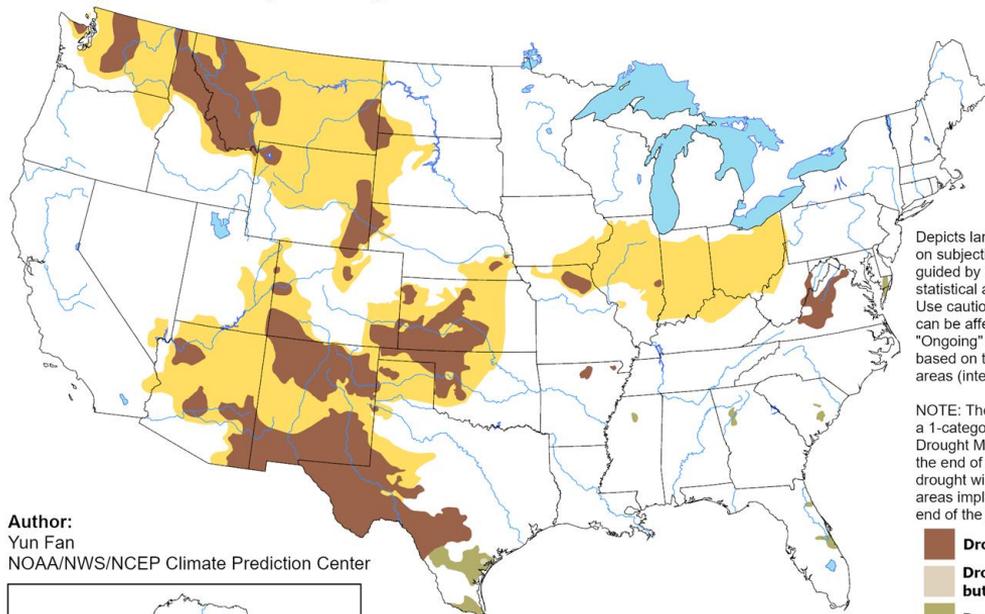


U.S. Seasonal Drought Outlook

Drought Tendency During the Valid Period

Valid for June 20 - September 30, 2024

Released June 20, 2024

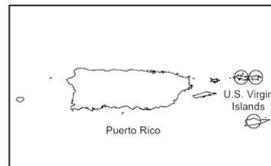
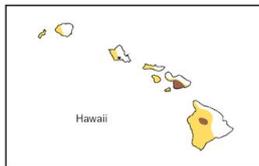


Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to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

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

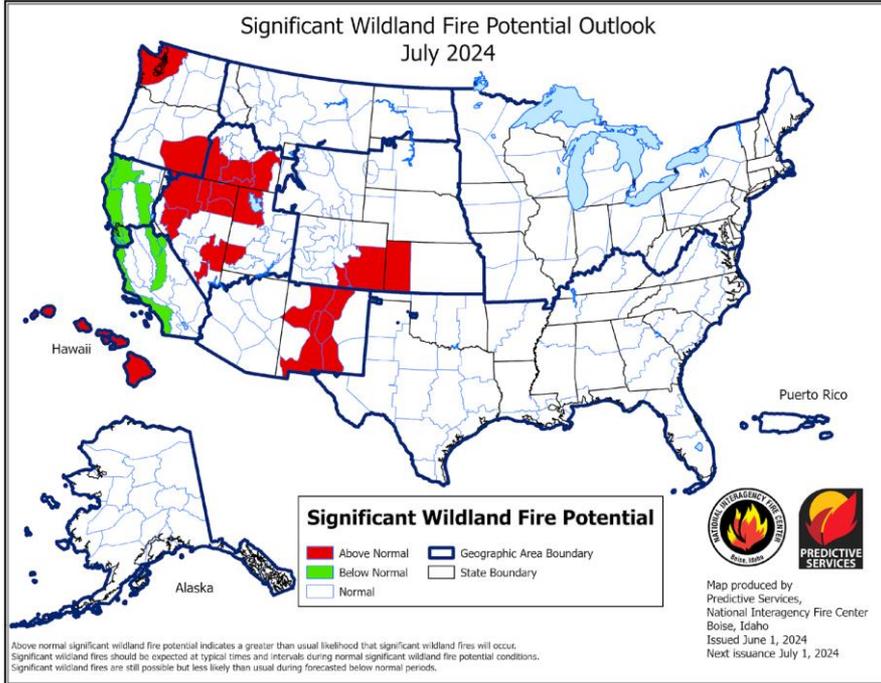
Author:
Yun Fan
NOAA/NWS/NCEP Climate Prediction Center



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

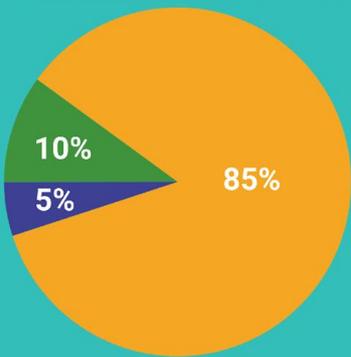


Issued June 1





2024 Atlantic Hurricane Season Outlook



Above normal Near normal Below normal

Season probability

Named storms

17 - 25

Hurricanes

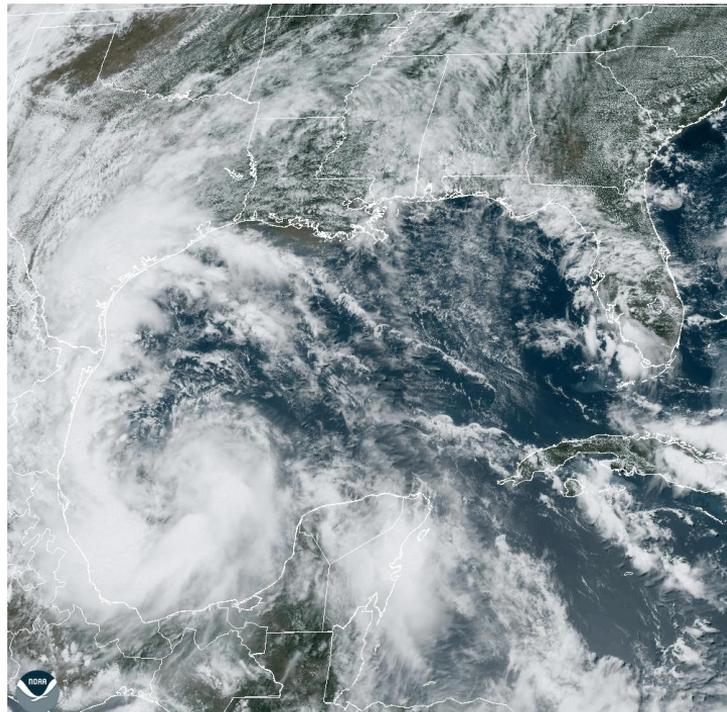
8 - 13

Major hurricanes

4 - 7

Be prepared: Visit hurricanes.gov and follow @NWS and @NHC_Atlantic on X.

May 2024



19 Jun 2024 18:26Z - NOAA/NESDIS/STAR - GOES-East - GEOCOLOR Composite - GM

<https://www.star.nesdis.noaa.gov/GOES/index.php>



- ENSO-neutral conditions with La Niña conditions likely (60-65%) developing during Northern Hemisphere Summer
- July Outlook: Temperature probabilities leaning toward warmer than average across North Central Region; Precipitation leaning below average for Ohio and from Montana/Wyoming east through the Dakotas into Minnesota
- July - September: Generally leaning warmer than average, favor dry Plains and West, equal chances of precipitation Midwest/Great Lakes





Today and Past Recorded Presentations

- https://www.youtube.com/playlist?list=PLmhxKH4OH8KK_Dc759hS1EUkf8fggvZ4R
- <https://mrcc.purdue.edu/webinars>
- <http://www.hprcc.unl.edu/webinars.php>

NOAA's National Climatic Data Center: 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/>

USDA Climate Hubs <https://www.climatehubs.usda.gov/>

State Climatologists: <http://www.stateclimate.org>

Regional climate centers: <http://mrcc.purdue.edu> and <http://www.hprcc.unl.edu>



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crhroc@noaa.gov