

North Central U.S. Climate & Drought Outlook *October 2024*

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Indiana State Climate Office

Photo Credit: Rodney Bade, South Dakota



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Further Information & Partners



- **Today's and Past Recorded Webinars:**
 - MRCC - <https://mrcc.purdue.edu/webinars>
 - HPRCC - <https://hprcc.unl.edu/webinars.php>
- **Next Webinar:**
 - Thursday, November 21, 2024 (1 PM CT) – Kenny Blumenfeld, Minnesota State Climate Office
- **Agency URLs**
 - National Centers for Environmental Information: <https://www.ncei.noaa.gov/>
 - National Drought Mitigation Center: <https://drought.unl.edu/>
 - National Integrated Drought Information System (NIDIS): <https://www.drought.gov/>
 - NOAA's Climate Prediction Center: <https://www.cpc.ncep.noaa.gov/>
 - Regional Climate Centers
 - High Plains Regional Climate Center: <https://hprcc.unl.edu/>
 - Midwestern Regional Climate Center: <https://mrcc.purdue.edu>
 - State Climatologists: <https://stateclimate.org/>
 - USDA Midwest Climate Hub: <https://www.climatehubs.usda.gov/hubs/midwest>

Photo Credit: Jeff Burbrink, Purdue Extension



Outline

- **Temperatures**
- **Precipitation & Lack of Clouds**
- **Helene Impacts**
- **Storm Reports**
- **Drought Concerns & Impacts**
- **Hydrological Conditions**
- **Outlook**



Photo Credit: Ketzell Levens, NWS Duluth. The Encampment River is experiencing low water flow due to ongoing drought conditions affecting Minnesota's North Shore.

Temperatures

September 2024 Final Data Disclaimer: *Data are considered preliminary until the final data are released by the National Centers for Environmental Information (NCEI). Located in Asheville, NC, NCEI was significantly impacted by the remnants of Hurricane Helene, and data services have not yet been restored.*

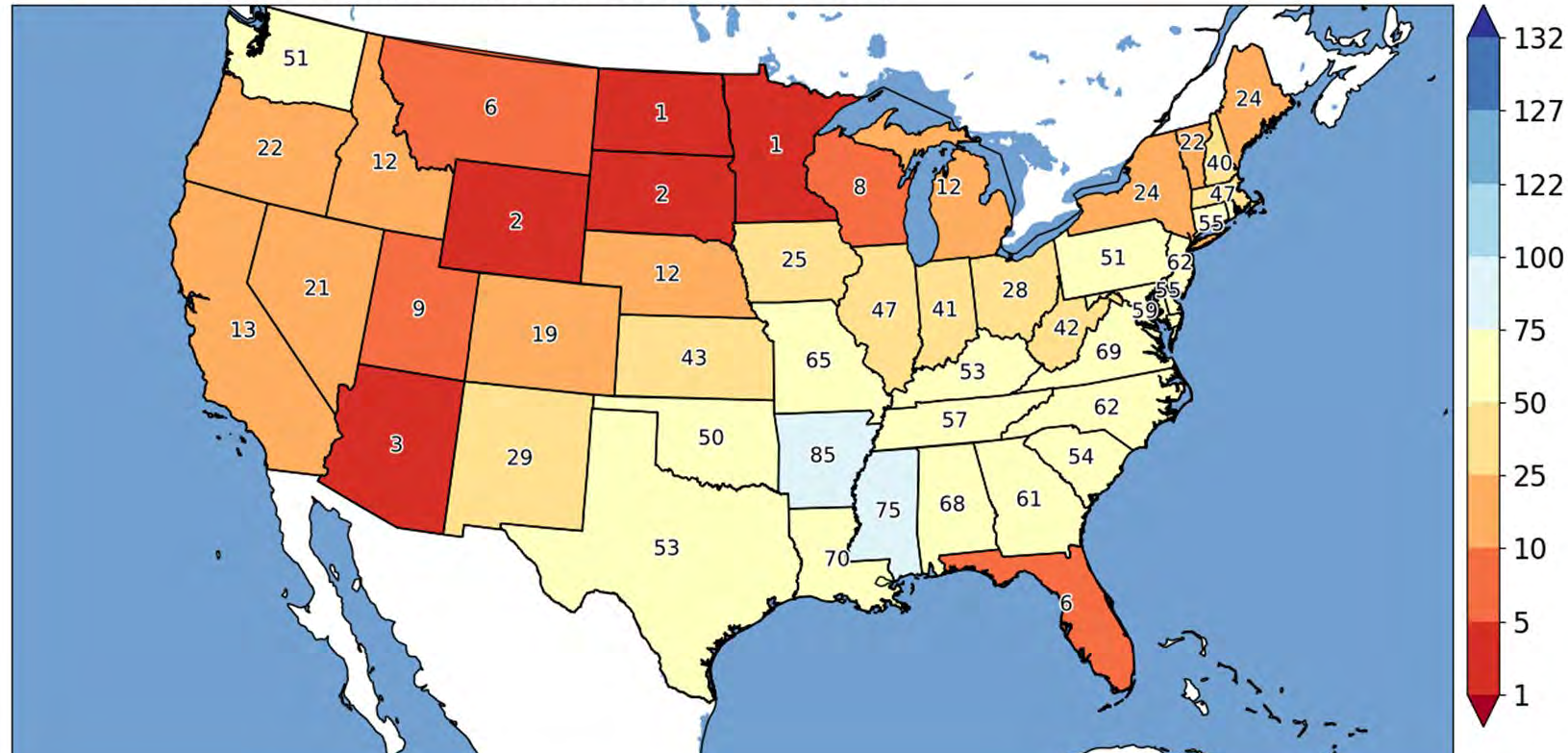
September Preliminary Temperatures



Obtained from [Iowa Environmental Mesonet](#).



31 Aug 2024 ~7 AM till 30 Sep 2024 ~7 AM Average Temperature Ranks by State
Based on IEM Estimates, 1 is hottest out of 132 total years (1893-2024)



Preliminary Avg Temperatures

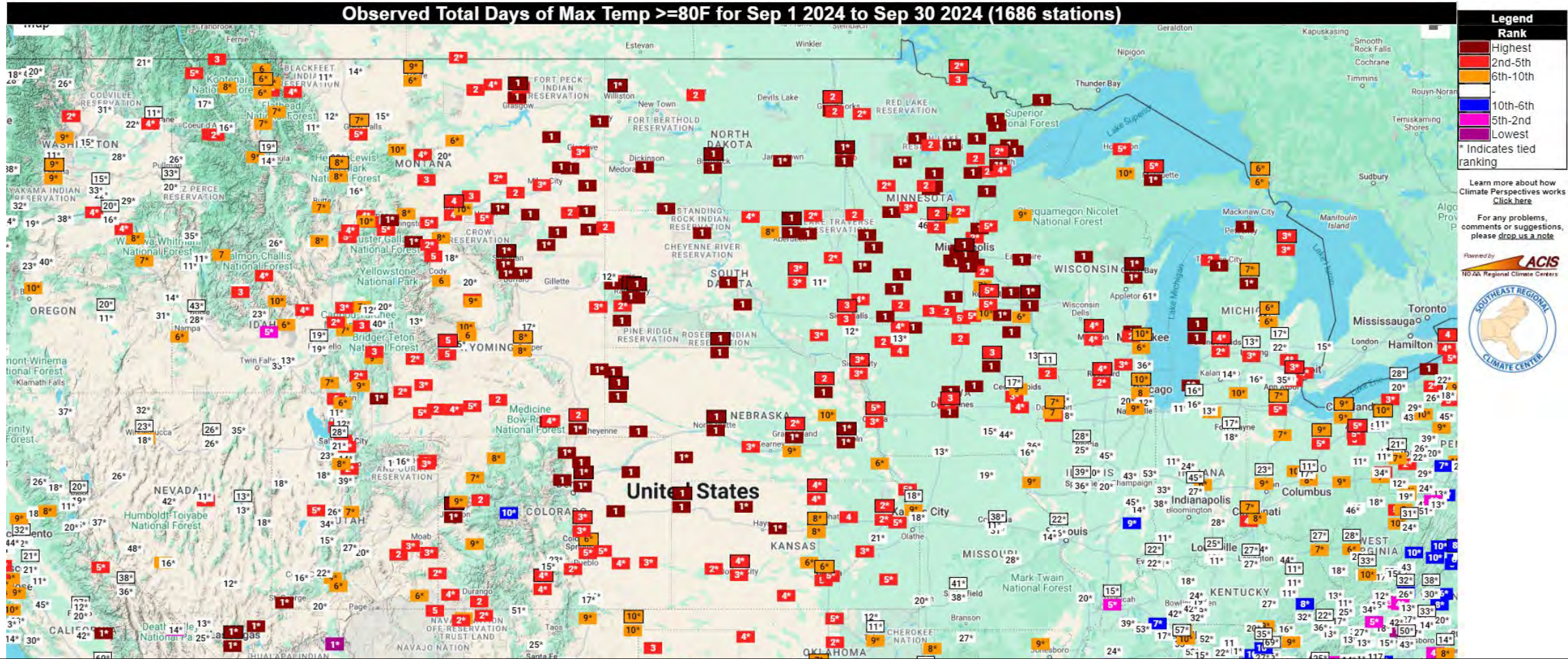
- Most states experienced Top 50 warmest Septembers on record. ND and MN recorded warmest September on record, with departures over 5F above normal.
- 53 weather stations with 90+ years of data set new warmest September records, mainly in CO, NE, MI, MN, ND, SD, WI, & WY.

Sept. Max Temperature Threshold Records



Obtained from Southern Regional Climate Center's *Climate Perspectives*

Observed Total Days of Max Temp $\geq 80^{\circ}\text{F}$ for Sep 1 2024 to Sep 30 2024 (1686 stations)



Number of Days with Temperature greater than or equal to 80F

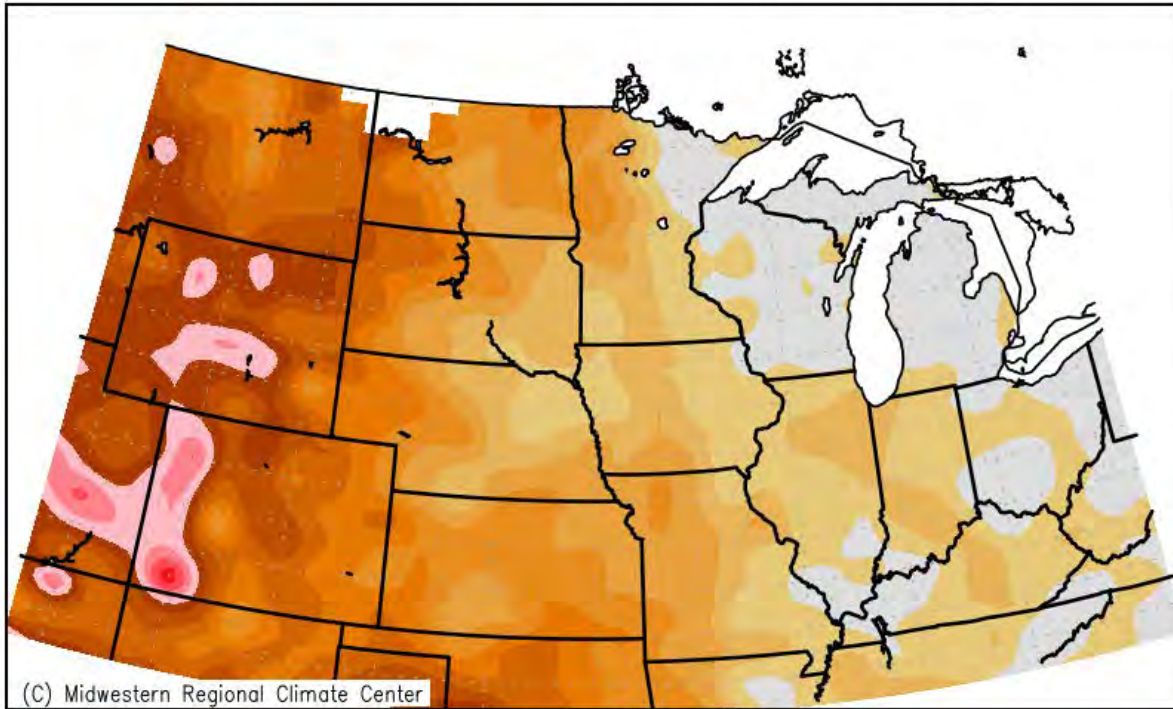
- Dozens of stations recorded more than 20 days with maximum temperatures reaching or exceeding 80F, most of which in the northern extent of the region. This was a record for many stations!

October Temperatures



Obtained from [Midwestern Regional Climate Center's cli-MATE](#)

Average Temperature (°F): Departure from Mean
October 1, 2024 to October 16, 2024

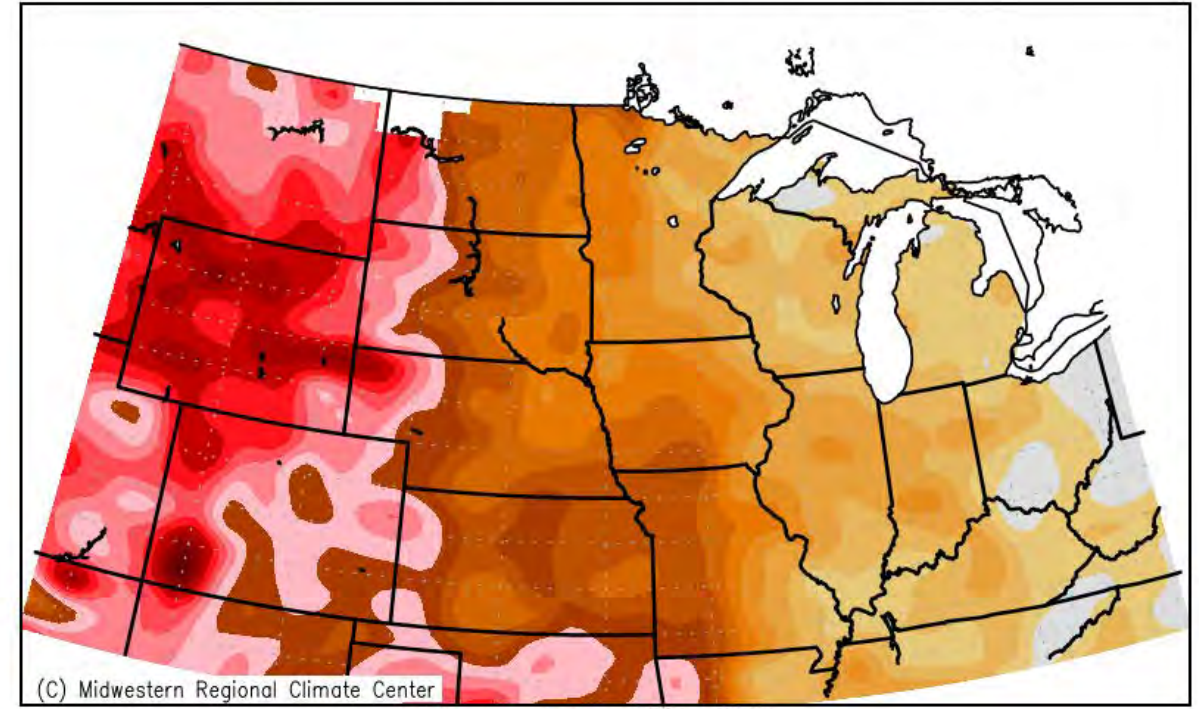


Mean period is 1991–2020.

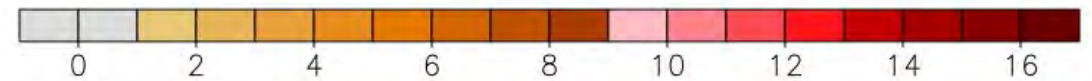


Midwestern Regional Climate Center
cli-MATE: MRCC Application Tools Environment
Generated at: 10/17/2024 9:02:38 AM EDT

Average Maximum Temp. (°F): Departure from Mean
October 1, 2024 to October 16, 2024



Mean period is 1991–2020.



Midwestern Regional Climate Center
cli-MATE: MRCC Application Tools Environment
Generated at: 10/17/2024 9:03:20 AM EDT

Precipitation & Lack of Clouds

September 2024 Final Data Disclaimer: *Data are considered preliminary until the final data are released by the National Centers for Environmental Information (NCEI). Located in Asheville, NC, NCEI was significantly impacted by the remnants of Hurricane Helene, and data services have not yet been restored.*

September Preliminary Precipitation



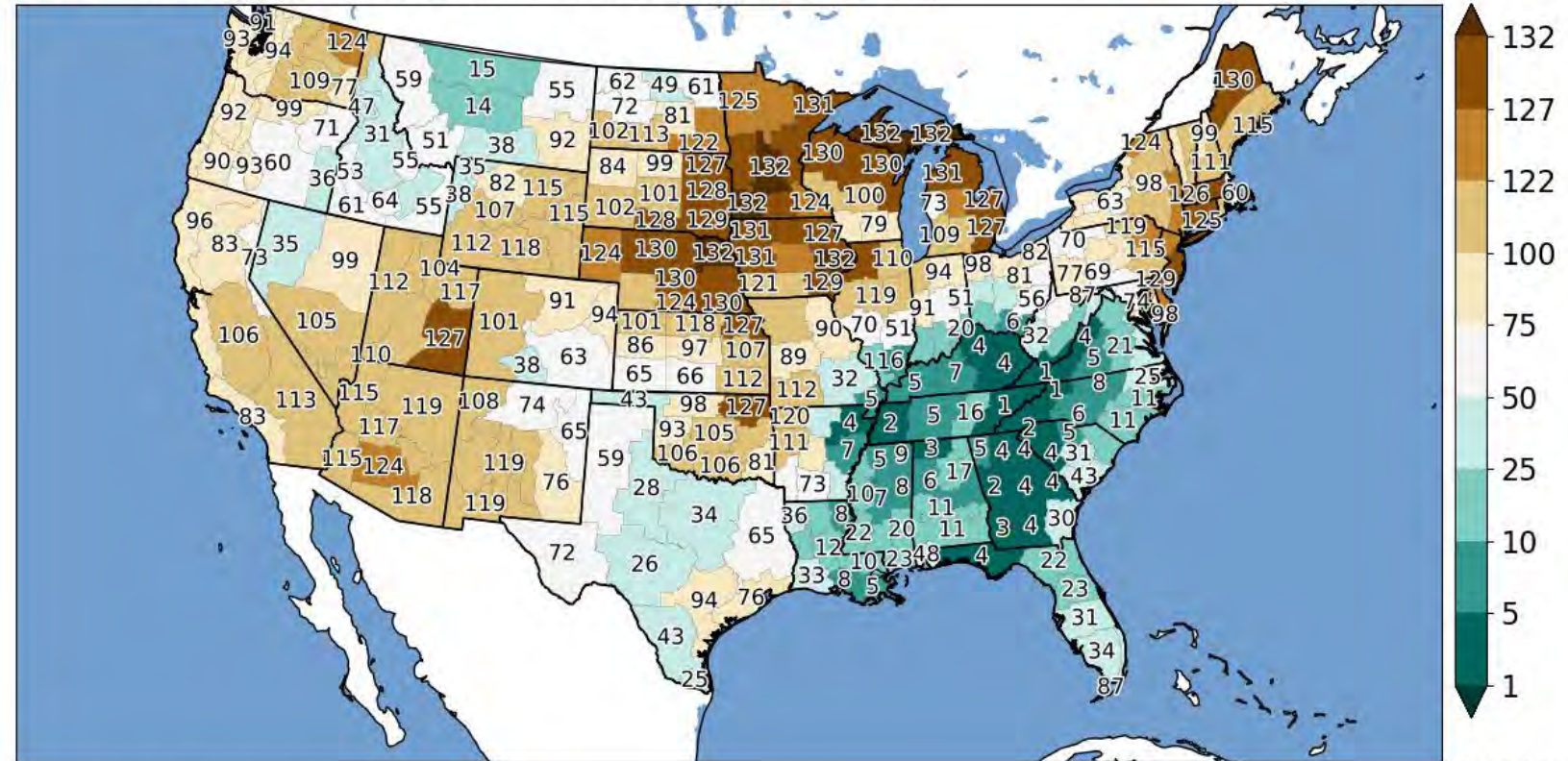
Preliminary Precipitation Ranks

- Many states recorded top 5 or 10 driest Septembers on record, with departures reaching more than 2 inches below normal. NE driest ever recorded. 52 stations with 90+ years of records observed their driest September on record.
- KY recorded third wettest September on record, largely due to Helene (more on this later).
- Longest dry streaks (<0.01 inches), exceeding 15 days, occurred in NE, IA, IL, and IN.
- Notably, Redwood Falls and Canby, MN, went the entire month with less than 0.01 inches of measured precipitation.

Obtained from [Iowa Environmental Mesonet](#).



31 Aug 2024 ~7 AM till 30 Sep 2024 ~7 AM Total Precipitation Ranks by Climate District
Based on IEM Estimates, 1 is wettest out of 132 total years (1893-2024)



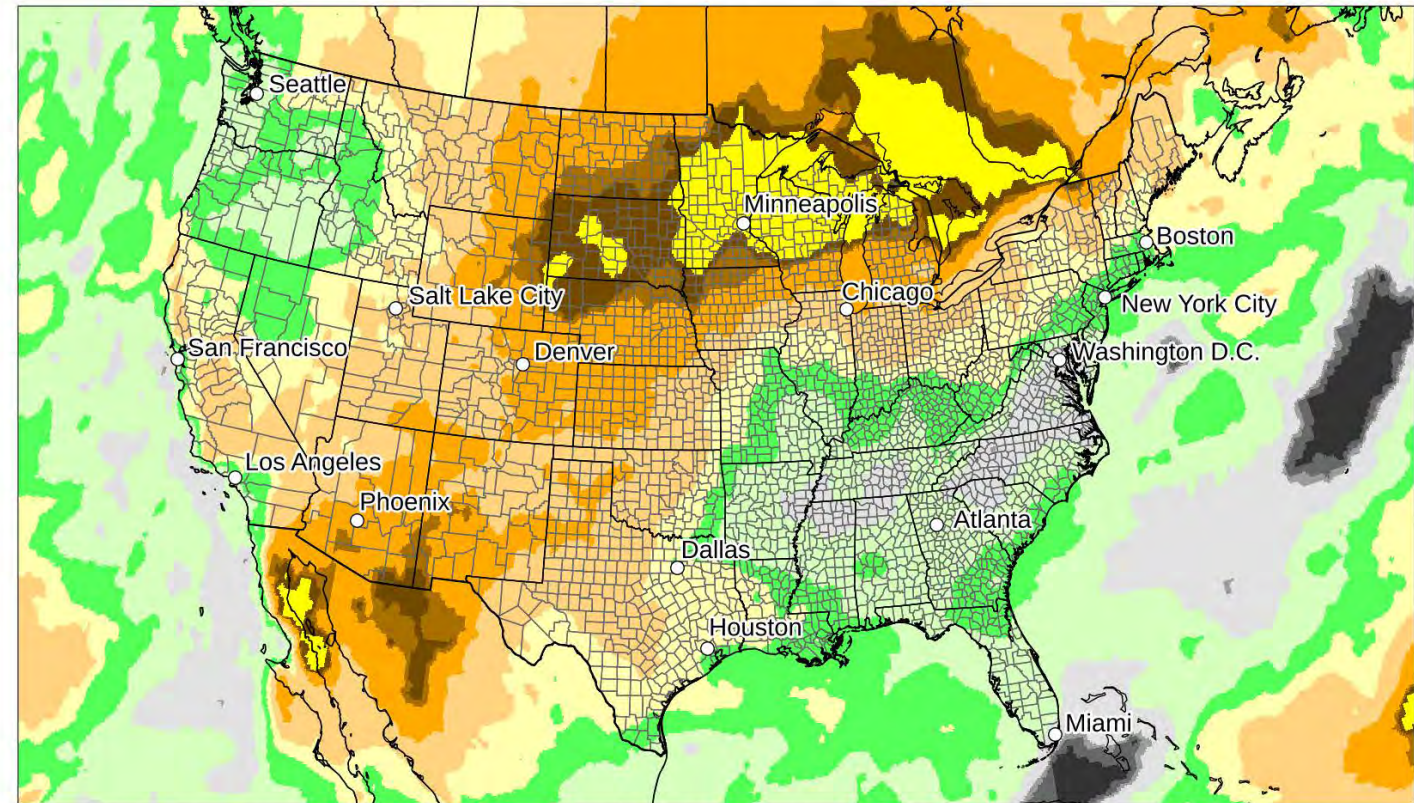
Generated at 10 Oct 2024 7:01 AM CDT in 42.05s

data units ::
IEM Autoplot App #24

September Clouds

- The map displays cloudiness rankings across the contiguous United States for September 2024, based on ERA5 Reanalysis data.
 - **Caveat:** Lack of cloudiness and sunshine are not fully interchangeable.
- 11th least cloudy for the lower 48 states.
- Least cloudy for a number of states, largely MN and WI.

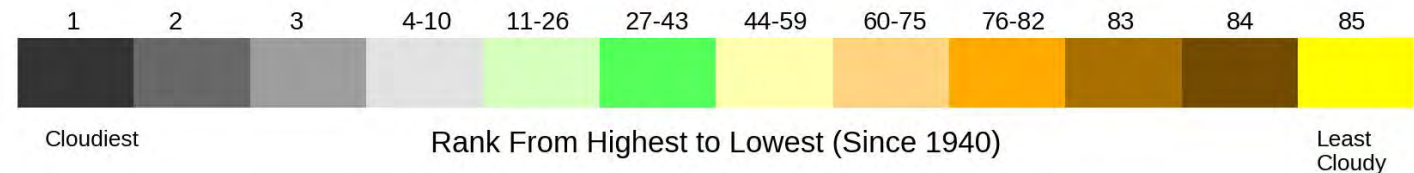
Clouds Ranking for Sep 2024



Source: ERA5 Reanalysis

Lower 48 Rank for Sep 2024 is: 75 out of 85

Map by: Brian Brettschneider



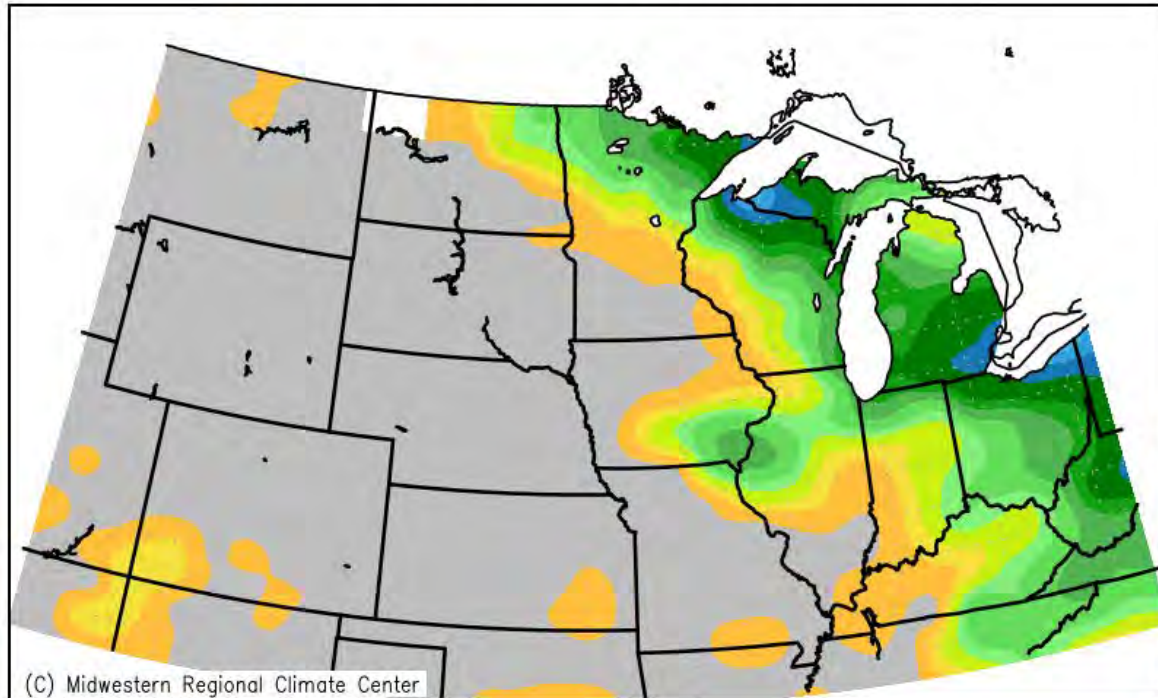
Graphic Credit: Brian Brettschneider, NOAA

October Precipitation

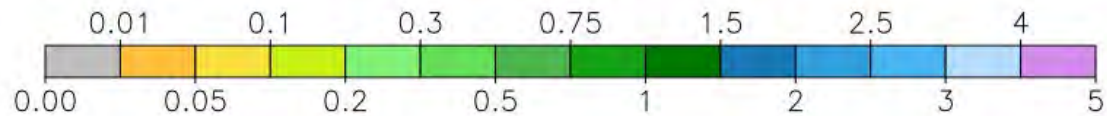


Obtained from [Midwestern Regional Climate Center's cli-MATE](#)

Accumulated Precipitation (in)
October 1, 2024 to October 16, 2024

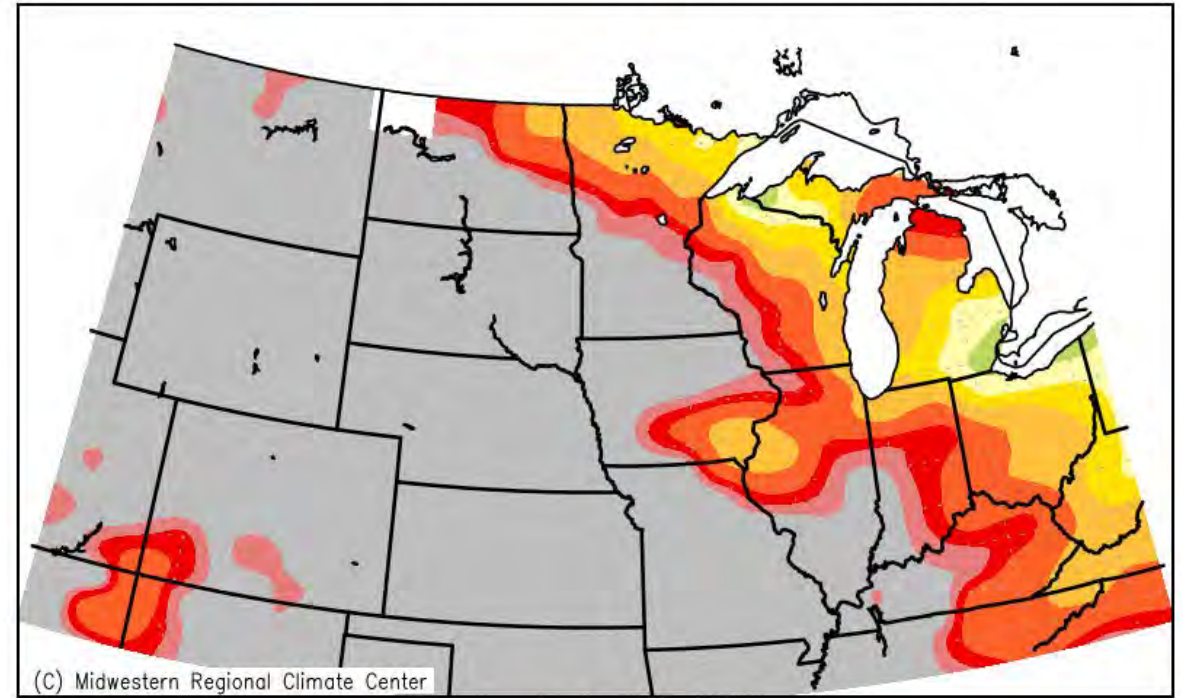


(C) Midwestern Regional Climate Center



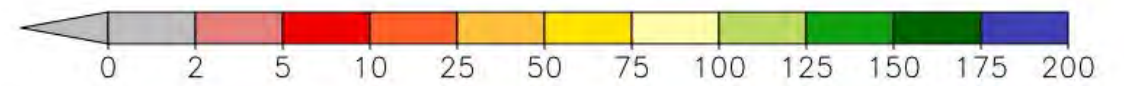
Midwestern Regional Climate Center
cli-MATE: MRCC Application Tools Environment
Generated at: 10/17/2024 9:05:23 AM EDT

Accumulated Precipitation: Percent of Mean
October 1, 2024 to October 16, 2024



(C) Midwestern Regional Climate Center

Mean period is 1991-2020.



Midwestern Regional Climate Center
cli-MATE: MRCC Application Tools Environment
Generated at: 10/17/2024 9:05:53 AM EDT

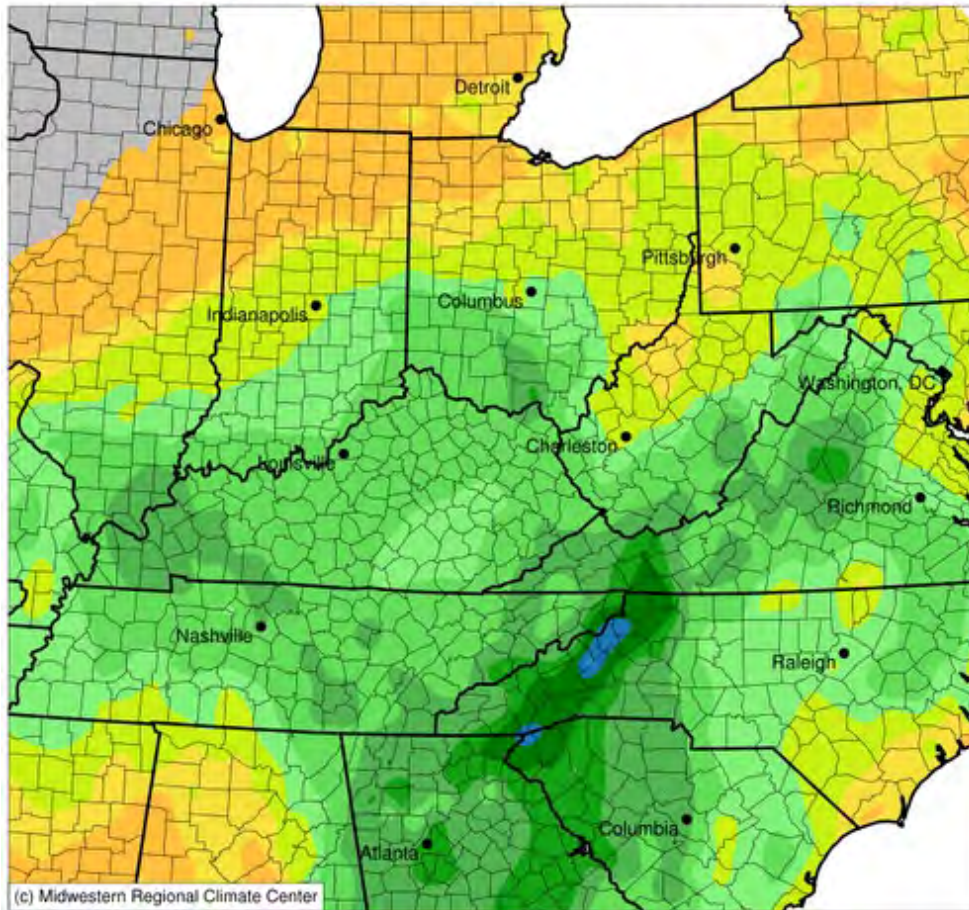


Helene Impacts

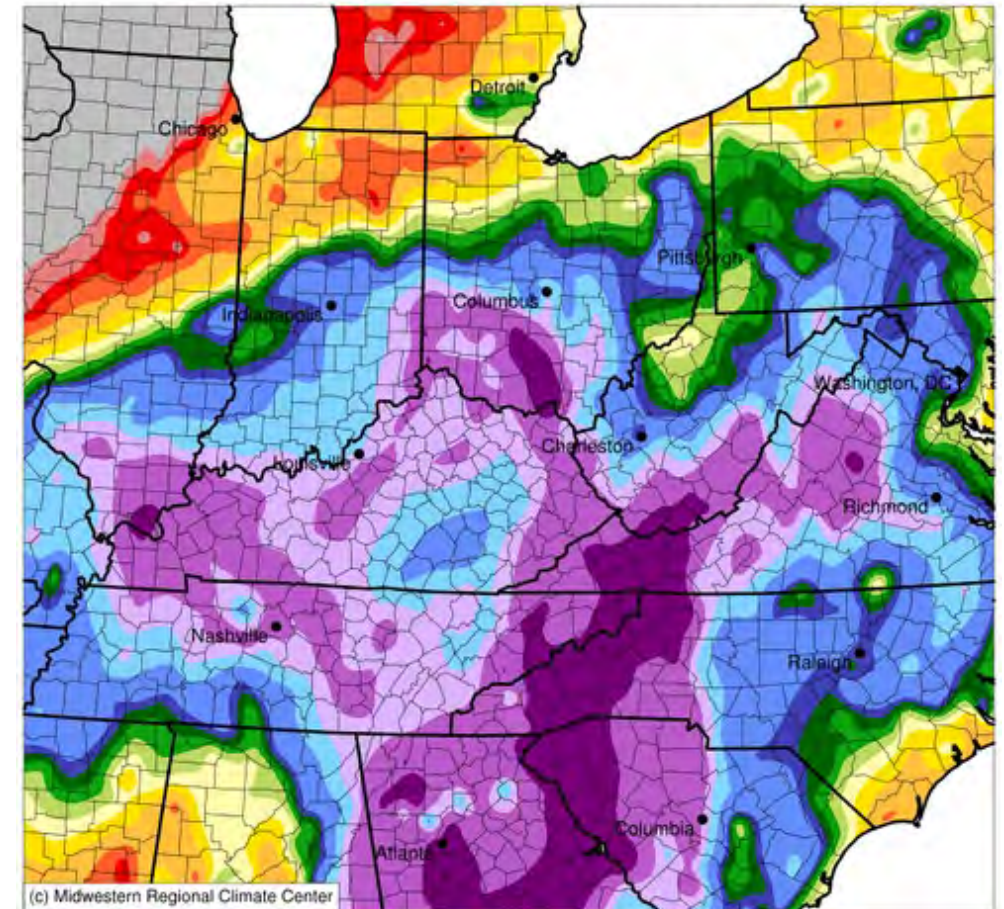
Helene Precipitation

Obtained from [Midwestern Regional Climate Center's cli-MATE](#)

Accumulated Precipitation (in)
September 26, 2024 to October 02, 2024



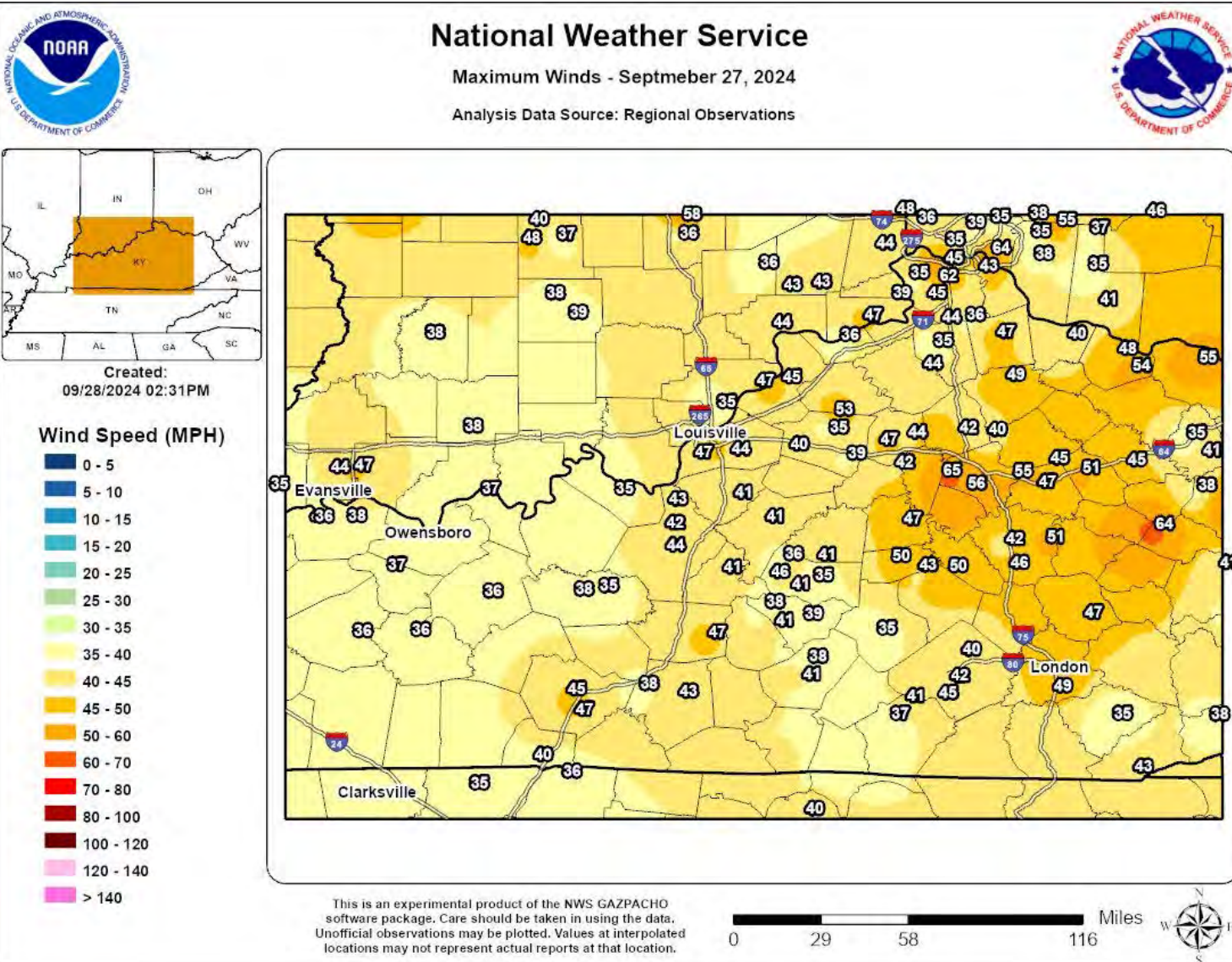
Accumulated Precipitation (in): Percent of 1991-2020 Normals
September 26, 2024 to October 02, 2024



0.01 0.5 1 2 3 5 7.5 10 15 20 25 30 40

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

Helene Max Wind Gusts



- Max wind gusts in excess of 50 mph in KY.
- Indianapolis IN recorded a 68 mph wind gust.
- Gusts up to 70 mph in OH.
- Downed trees cause power outages across IL, IN, KY, and OH.
- Downed agricultural crops.
- Green up of lawns and pastures.
- One storm doesn't change equation for very long. Most precipitation ran off into the Ohio River system and already in the ocean.



Photo Source: Aaron Wilson, Ohio



Storm Reports

September Storm Reports



On September 19, a cold front brought severe weather to Minnesota. An EF-1 tornado with winds of 105 MPH touched down in St. Louis County. Many trees were uprooted along its path.

Photo Source: [NWS Duluth](#)



Warner, SD gustnado from September 23, 2024.

Photo Credit: *Diane Mann-Klager, Bureau of Indian Affairs*

Tornadoes touched down in southern Indiana, northern Indiana, and northern Ohio on September 24. This damage is from an EF-0 tornado in Clark County, Indiana in the southern part of the state. In northern Indiana, an EF-1 tornado tipped over a buggy, causing two injuries.

Photo Source: [NWS Louisville, KY](#)





Drought Concerns & Impacts

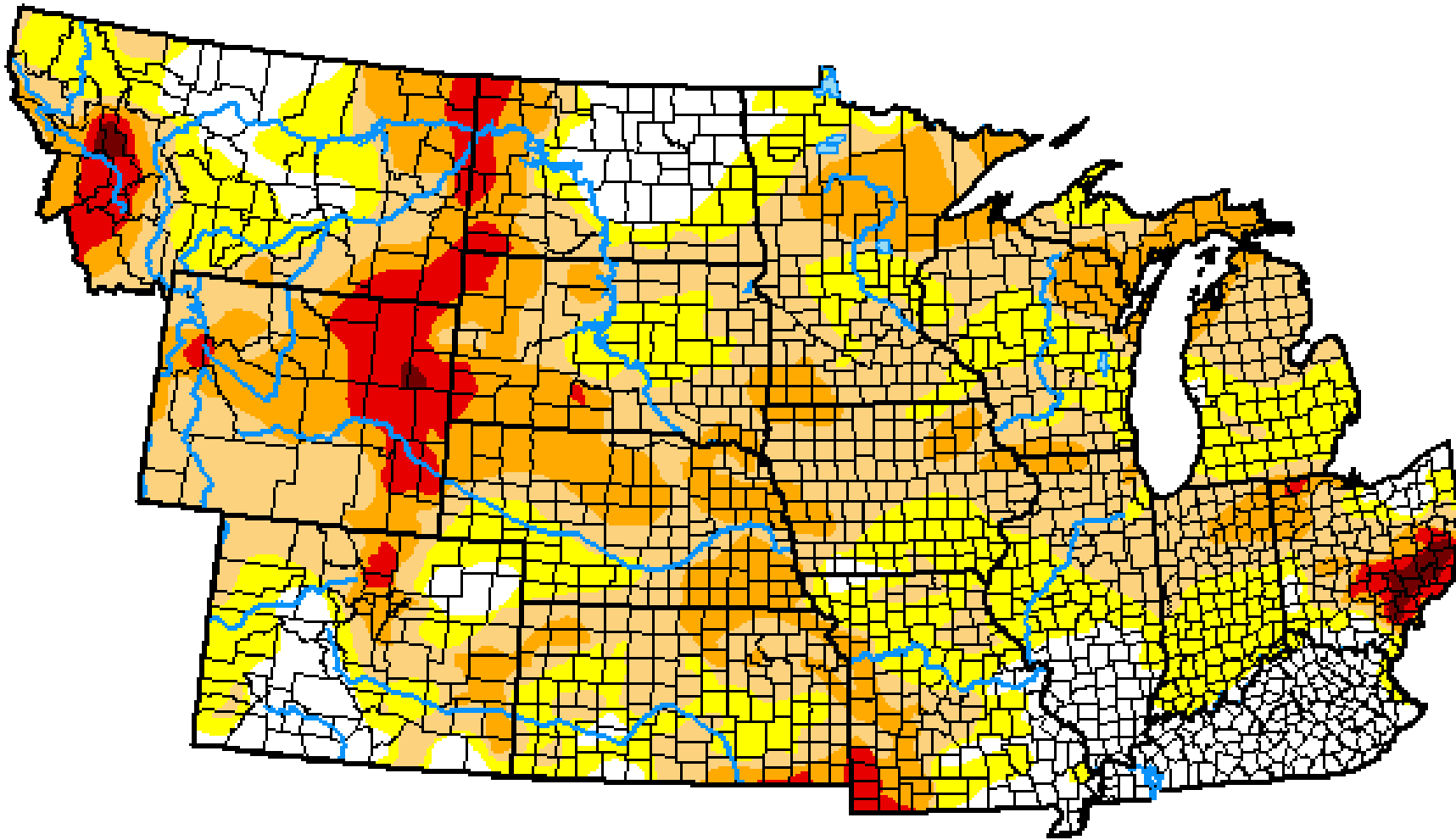
Drought – US Drought Monitor



Obtained from [US Drought Monitor](#)

U.S. Drought Monitor NWS Central

October 15, 2024
(Released Thursday, Oct. 17, 2024)
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

| | None | D0-D4 | D1-D4 | D2-D4 | D3-D4 | D4 |
|------------------------------------------------------------|-------|-------|-------|-------|-------|------|
| Current | 14.88 | 85.12 | 59.86 | 25.92 | 5.83 | 0.47 |
| Last Week <small>10-08-2024</small> | 16.21 | 83.79 | 50.71 | 18.56 | 4.84 | 0.47 |
| 3 Months Ago <small>07-16-2024</small> | 63.50 | 36.50 | 14.17 | 3.12 | 0.35 | 0.00 |
| Start of Calendar Year <small>01-02-2024</small> | 39.12 | 60.88 | 34.11 | 13.18 | 2.68 | 0.01 |
| Start of Water Year <small>10-01-2024</small> | 20.79 | 79.21 | 36.88 | 12.04 | 3.20 | 0.40 |
| One Year Ago <small>10-17-2023</small> | 41.08 | 58.92 | 36.87 | 17.06 | 4.30 | 0.43 |

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:

Brian Fuchs
National Drought Mitigation Center



droughtmonitor.unl.edu

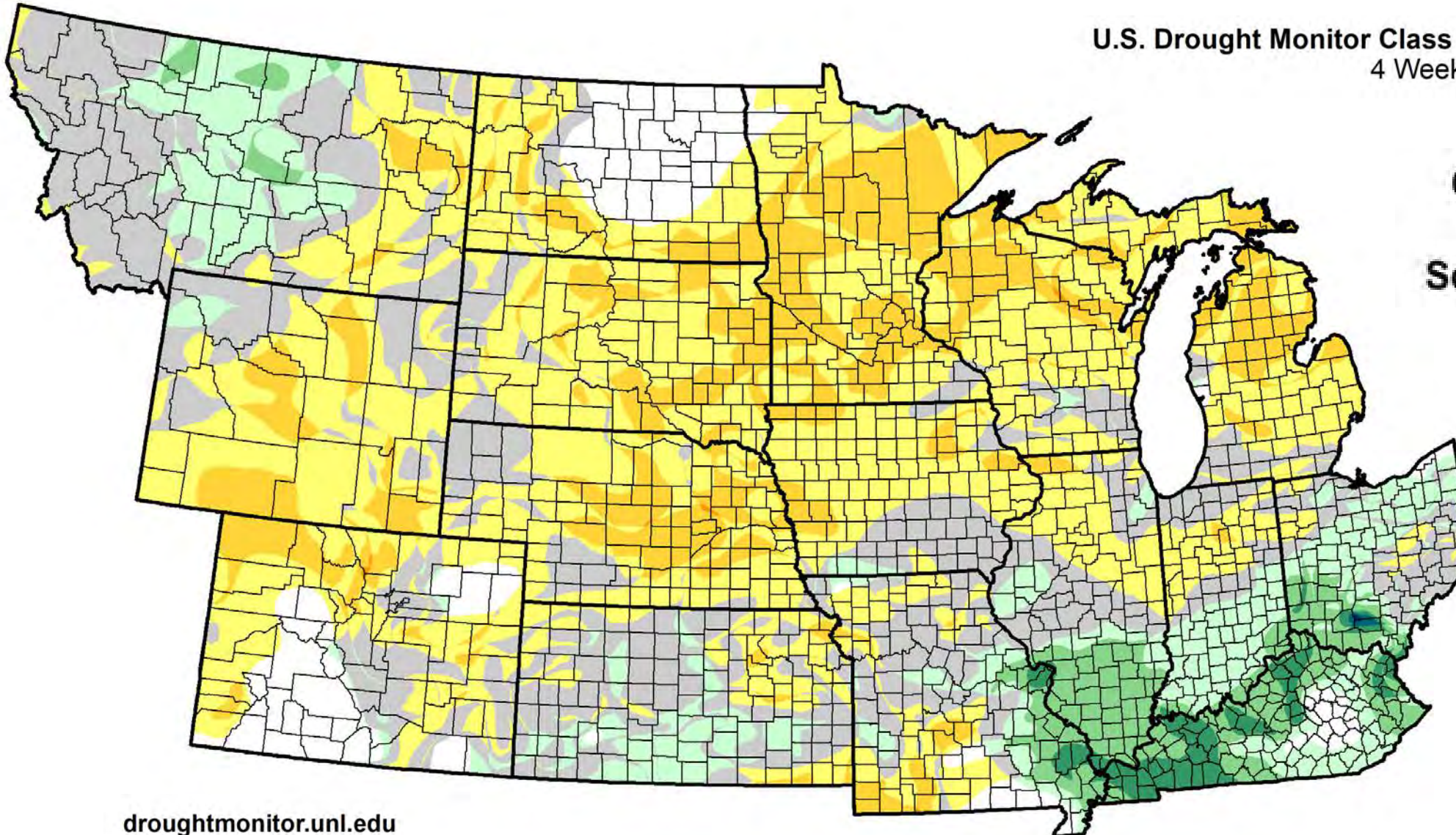
Drought – US Drought Monitor



Obtained from [US Drought Monitor](#)

U.S. Drought Monitor Class Change - NWS Central
4 Week

October 15, 2024
compared to
September 17, 2024



| | |
|--|---------------------|
| | 5 Class Degradation |
| | 4 Class Degradation |
| | 3 Class Degradation |
| | 2 Class Degradation |
| | 1 Class Degradation |
| | No Change |
| | 1 Class Improvement |
| | 2 Class Improvement |
| | 3 Class Improvement |
| | 4 Class Improvement |
| | 5 Class Improvement |

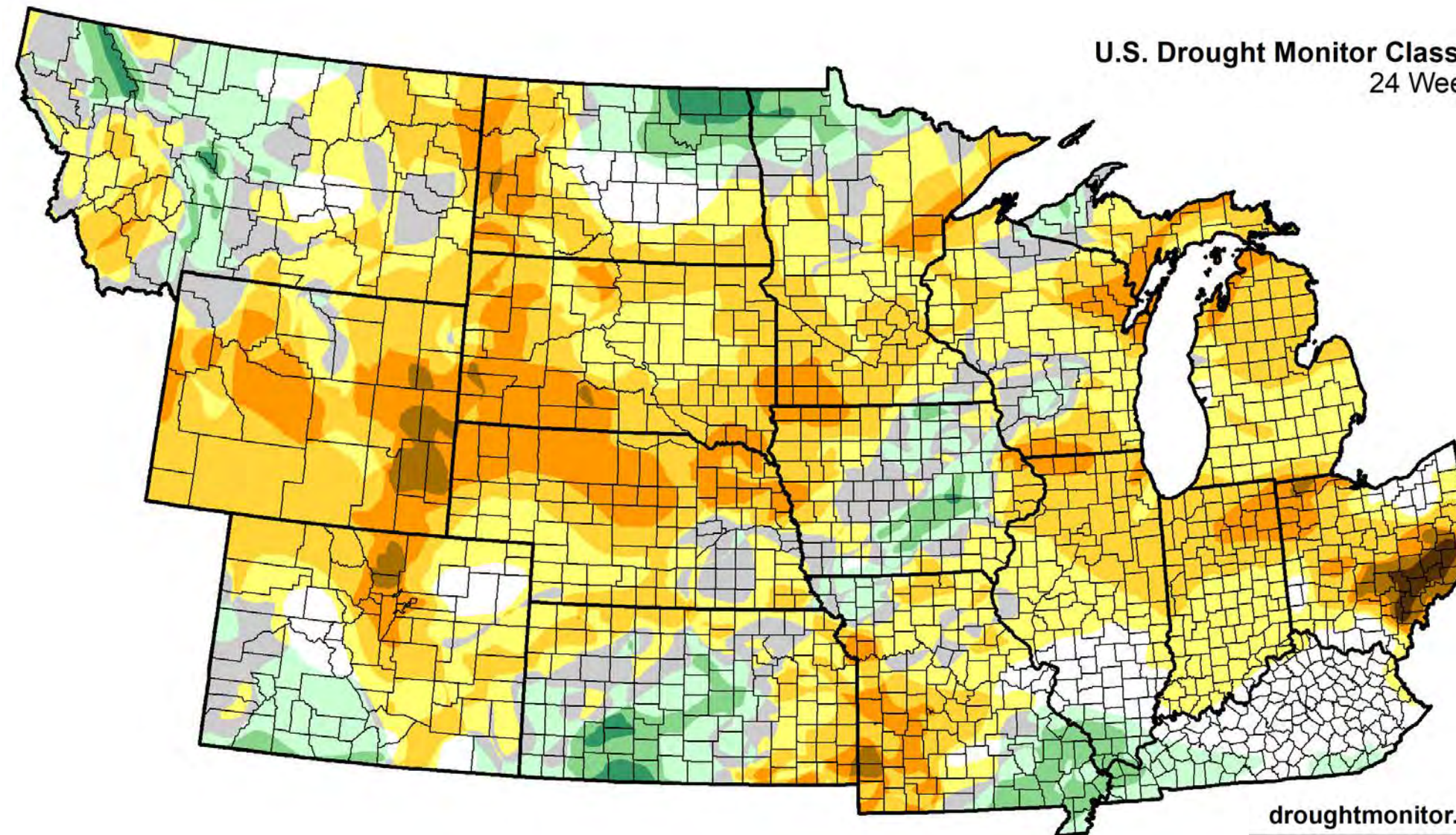
Drought – US Drought Monitor



Obtained from [US Drought Monitor](#)

U.S. Drought Monitor Class Change - NWS Central
24 Week

October 15, 2024
compared to
April 30, 2024



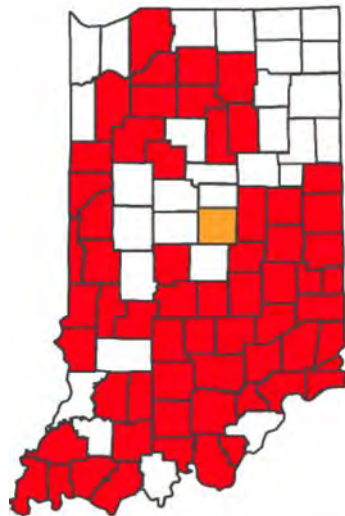
- 5 Class Degradation
- 4 Class Degradation
- 3 Class Degradation
- 2 Class Degradation
- 1 Class Degradation
- No Change
- 1 Class Improvement
- 2 Class Improvement
- 3 Class Improvement
- 4 Class Improvement
- 5 Class Improvement

droughtmonitor.unl.edu

Drought – Impacts

- Burn Bans by mid-September or earlier
 - OH more than 25 counties
 - IN more than 60 counties
 - Several in other states across the region
- Not the pawpaws!
 - Earlier-than-normal harvests in OH
 - Smaller, bitter tasting fruit
- Pumpkins are okay!

September 19 IN Burn Ban Map



Obtained from [IDHS](#)



Valerie Libbey holds a normal-sized pawpaw, left, next to a drought-affected pawpaw from her farm, Wednesday, Sept. 18, 2024, in Washington Court House, Ohio. ([AP Photo/Joshua A. Bickel](#))

Drought – Impacts

- Early fall foliage
- Field Fires across several states
- Smaller soybeans, lower moisture 9-11%
- Dropping water levels in ponds, streams (more on this later)
- USDA Farm Service Agency Declares federal emergency in Ohio and Kentucky Counties



Remnants of corn charred by field fire in Kankakee County last week (source: Daily Journal, Kankakee)



Photo Credit: Ketzell Levens, NWS Duluth. Crow Creek no water flowing due to ongoing drought conditions affecting Minnesota's North Shore.



Photo Credit: Austin Pearson, IN-SCO. Dry harvest conditions in IN, bean dust pictured. Low soybean moisture.

Drought – Impacts

Fires

- North Dakota - 57 to 75 mph wind gusts, downed power lines, and ongoing dry conditions
 - Major Fires:
 - **Bear Den Fire**
 - Burned ~25,000 acres near Mandaree
 - 85% contained as of 10/14
 - **Elkhorn Fire**
 - Burned ~10,000 acres south of Watford City
 - 75% contained as of 10/14
 - Two deaths and more than 100 people forced to evacuate
 - ND Governor declared a statewide fire emergency



*A wildfire burn near Arnegard, ND on Saturday October 5.
Photo Source: [Arnegard Fire Protection District via AP](#)*

Fires

- Wyoming
 - Major Fires
 - **Elk Fire**
 - Burned ~89,000 acres in Bighorn National Forest
 - Largest in the forest's 100-year history
 - ~27% contained as of 10/14
 - **Pack Trail Fire**
 - Burned ~77,600 acres in Bridger-Teton National Forest
 - ~62% contained as of 10/14
 - Over 1,000 firefighters deployed to fight these fires
 - Many evacuations ordered
 - Governor has issued an emergency transport order to protect livestock



Pack Trail Fire in northwest Wyoming.

Photo Source: [WyoFile](#), [InciWeb](#)



Hydrological Conditions

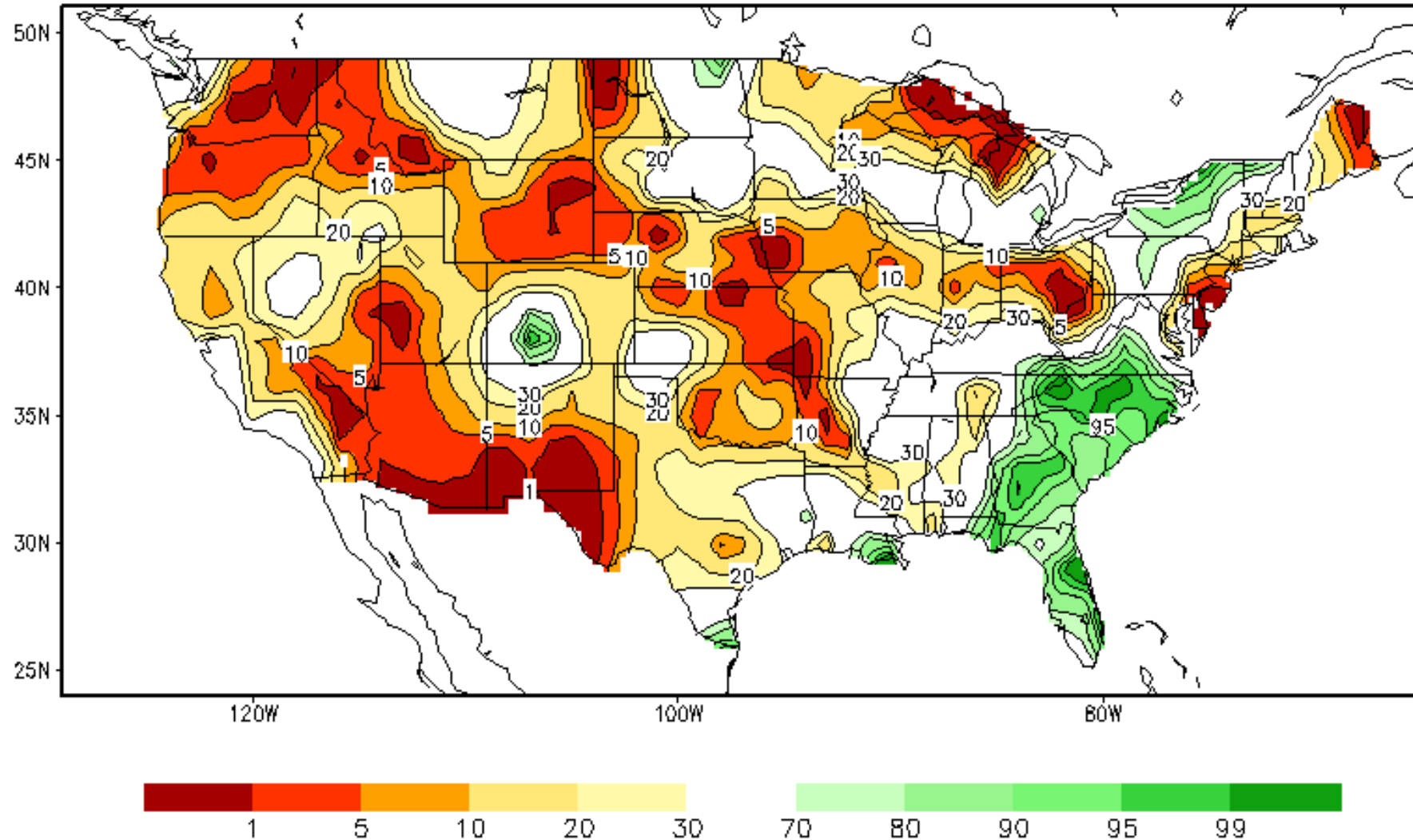


Hydrology - Soil Moisture



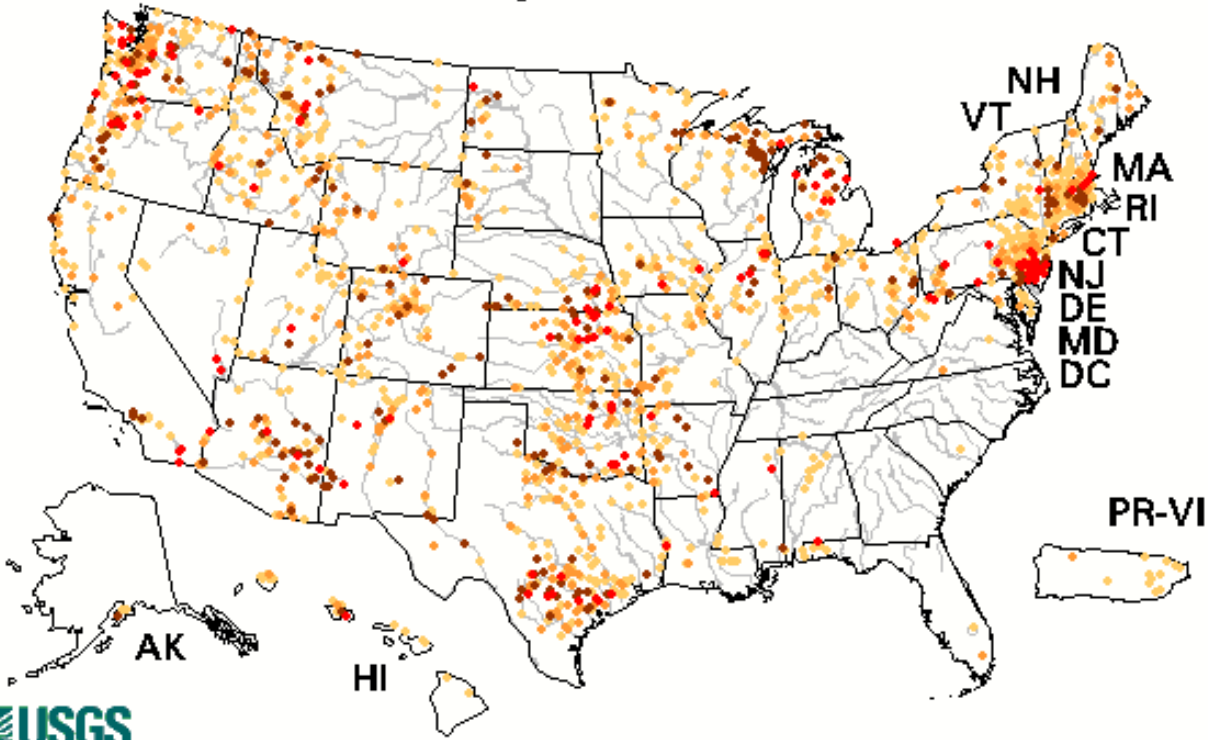
Obtained from [CPC's Soil Moisture Maps](#)





Calculated Soil Moisture Ranking Percentile OCT 16, 2024



Hydrology – Streamflow

Wednesday, October 16, 2024

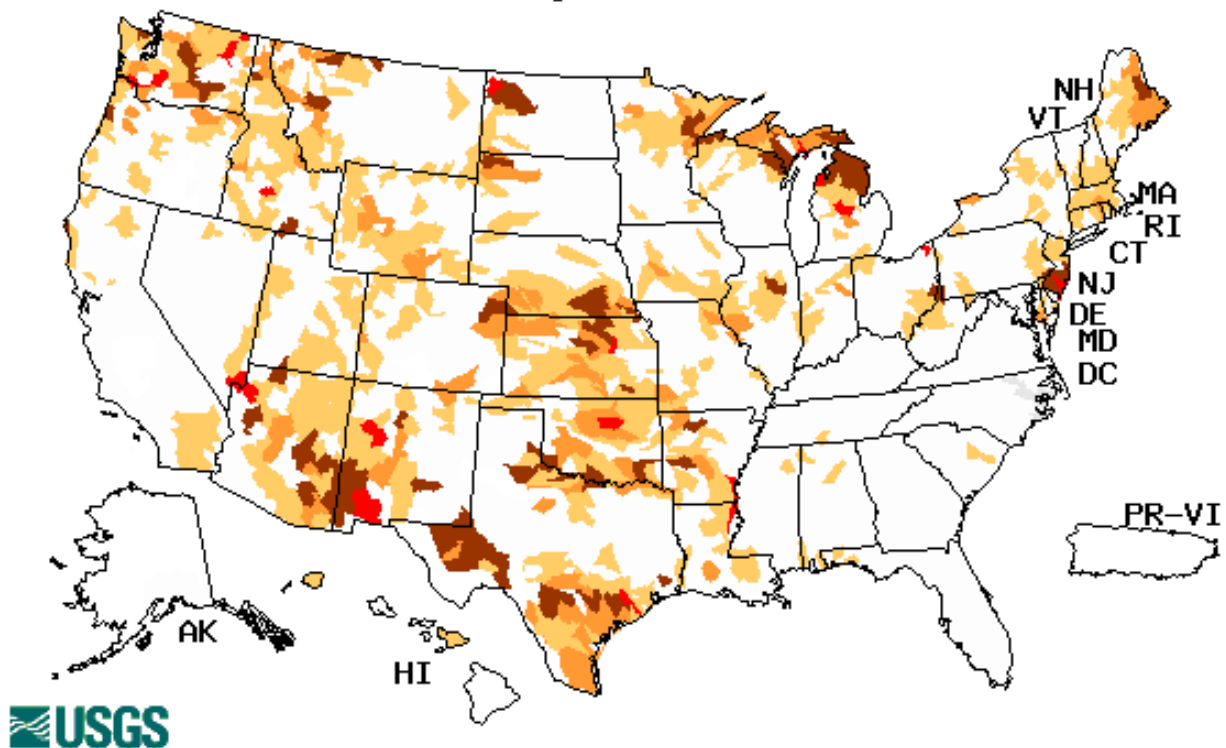






| Explanation - Percentile classes | | | |
|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |  |  |
| Low | ≤5 | 6-9 | 10-24 |
| Extreme hydrologic drought | Severe hydrologic drought | Moderate hydrologic drought | Below normal |

Obtained from

https://waterwatch.usgs.gov/index.php?id=pa28d&sid=w_map/m_pa28d_nwc

Wednesday, October 16, 2024

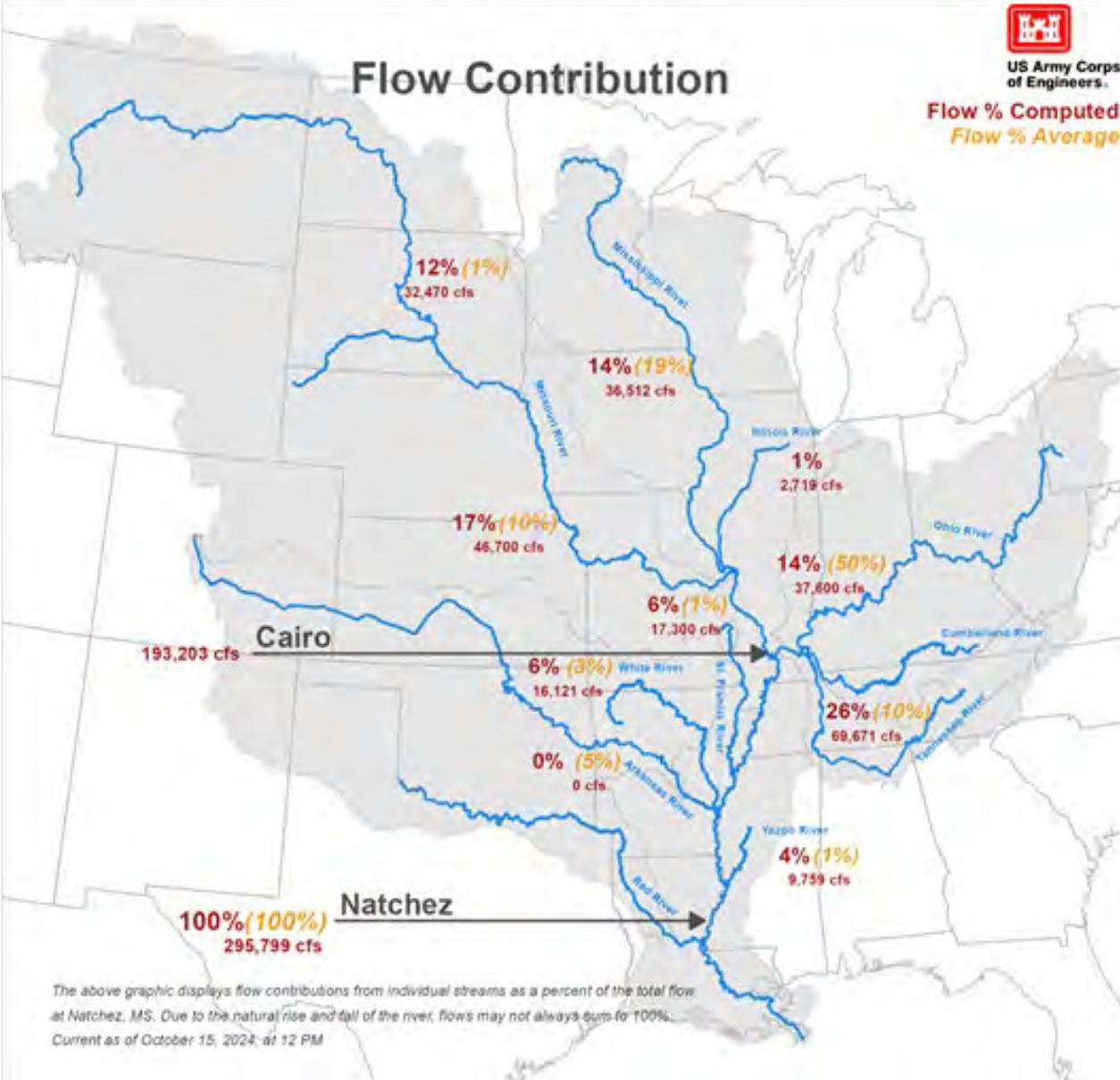


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Obtained from

https://waterwatch.usgs.gov/index.php?id=pa28d_dry&sid=w_map/m_pa28d_dwc

Lower Mississippi Flow Contribution



- Missouri River basin is experiencing significant drought, with 63% of the area affected.
- Helene provided temporary relief in the Ohio River Basin, but those effects are diminishing.
- Missouri and Tennessee Rivers are currently supporting the Lower Mississippi River for now.
- Missouri River is expected to contribute at least 44,000 cfs to the Mississippi at St. Louis, primarily from reservoir releases at Gavins Point Dam at Yankton, SD (releasing about 33,000-34,000 cfs). Flow will decrease in late Nov. as winter release targets are implemented (12,000 cfs).
- Ongoing dredging around St. Louis is allowing safe navigation at lower river stages.
- Navigation on the Illinois River has been halted due to vessel groundings (9 mile stretch).

Hydrology – River Impacts



Obtained from water.noaa.gov



Tower Rock on the Mississippi River



Tower Rock on the Mississippi River between Missouri and Illinois. You can once again walk from the banks to Tower Rock from the Missouri side, due to low MS River levels. This is the third straight year this has happened after not happening for decades.
Photo Credit: ksdk.com

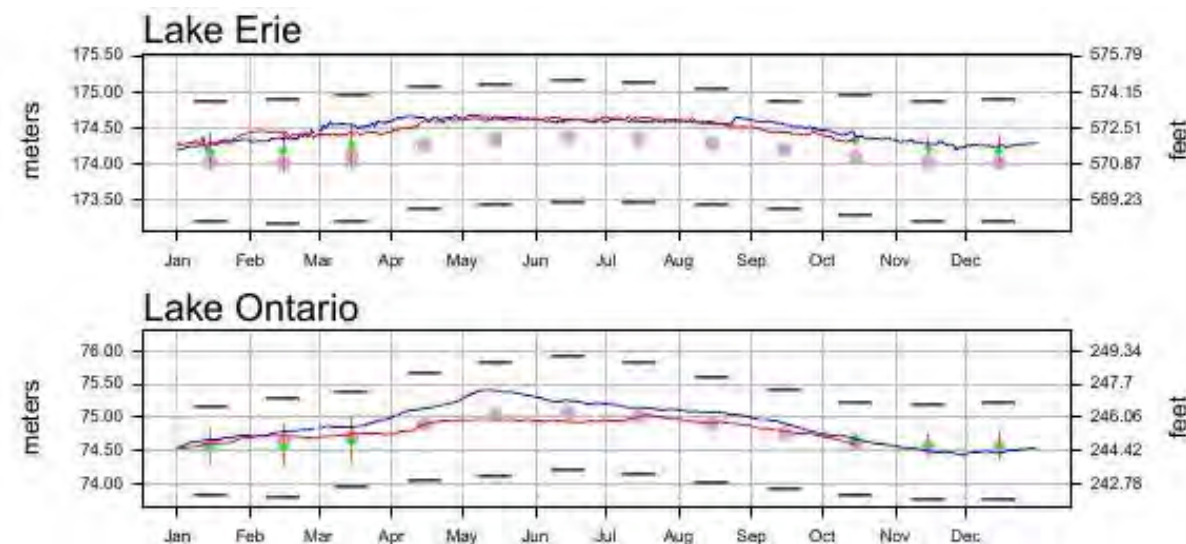
Temperatures

- All Great Lakes 3-5°F warmer than the 1995-2023 average.

| Lake | 2024 Current Avg Surface Water Temp | Average (1995-2023) | Difference |
|---------------|-------------------------------------|---------------------|------------|
| Lake Superior | 53.6 | 49.9 | 3.7 |
| Lake Michigan | 61.4 | 56.5 | 4.9 |
| Lake Huron | 59.3 | 55.3 | 4 |
| Lake Ontario | 62.2 | 57.3 | 4.9 |
| Lake Erie | 64.6 | 61 | 3.6 |

Water Levels

- Lake Superior slightly below the long-term-average (LTA) monthly mean, decline since mid-August.
- Lake Erie slightly above the LTA monthly mean.
- Other lakes are tracking with LTA mean levels.



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 2024-10-17



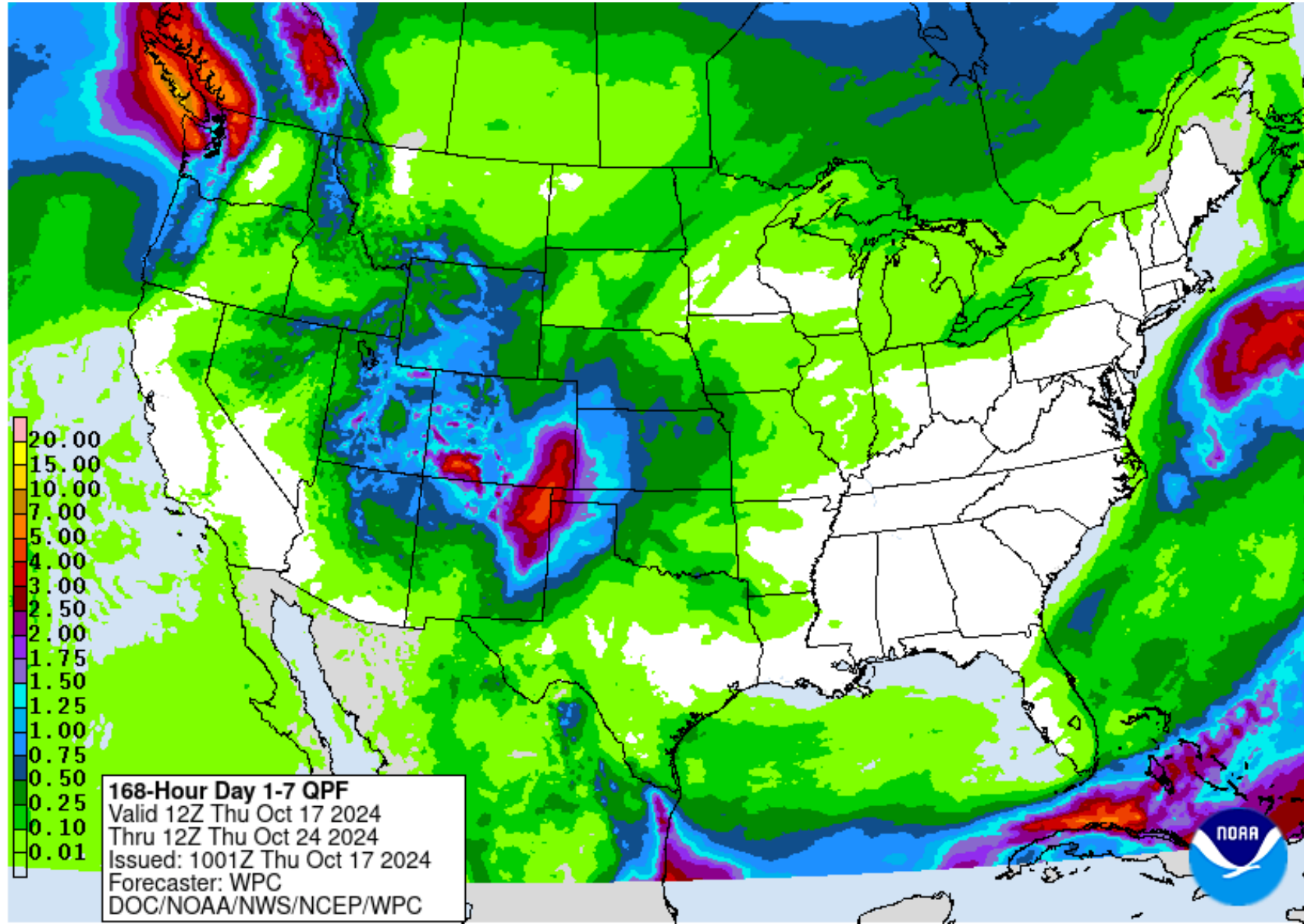
Outlook



7-day Quantitative Precipitation Forecast



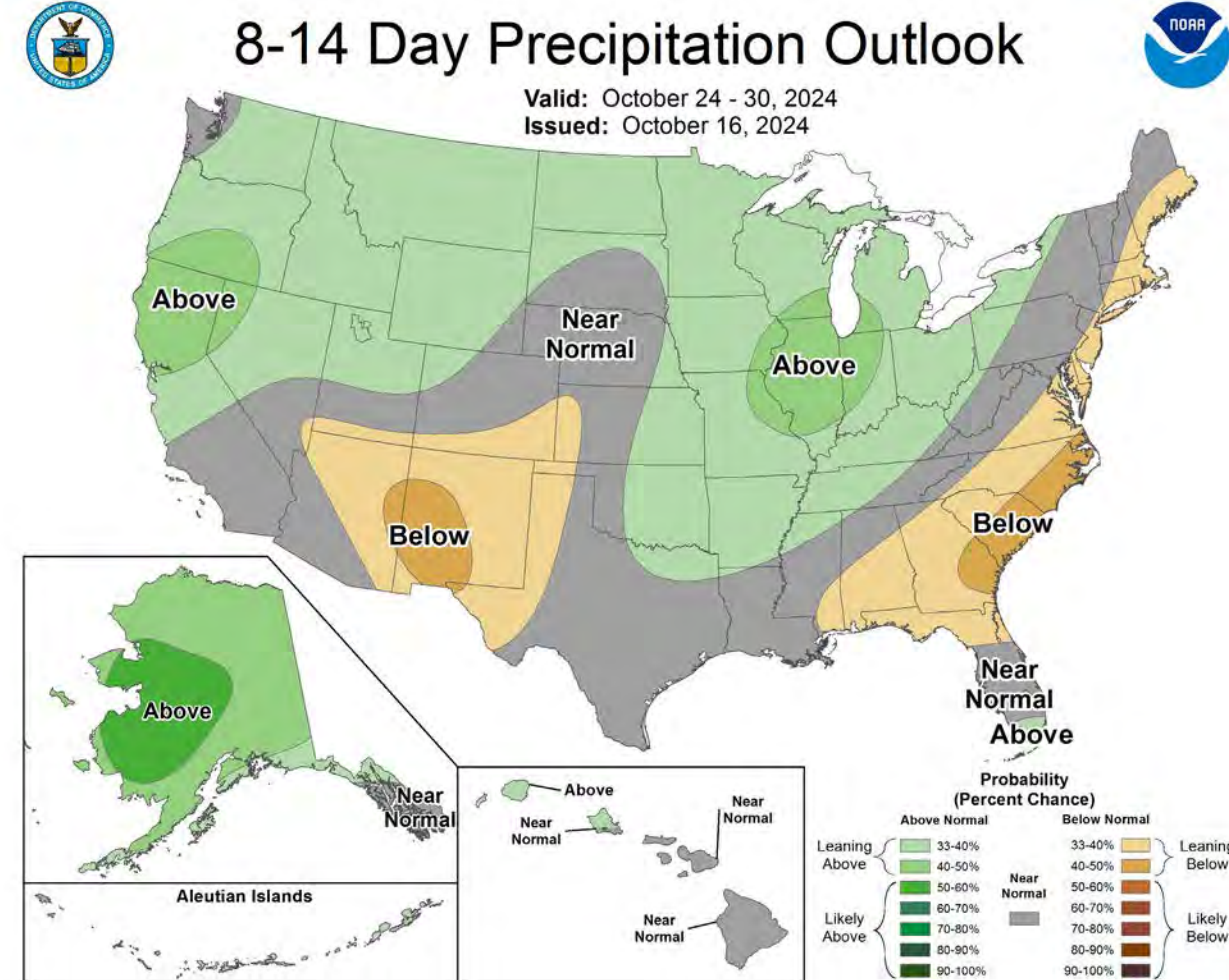
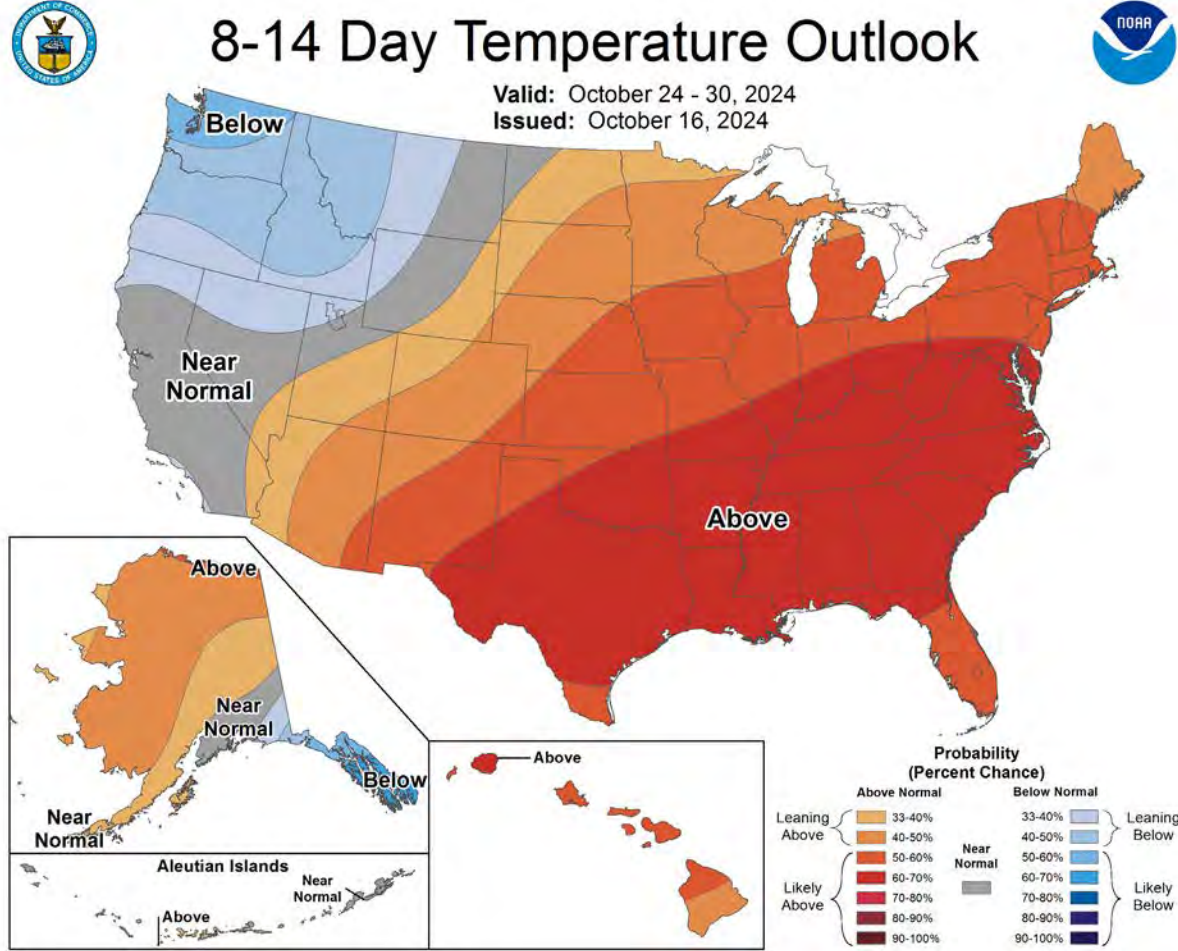
Obtained from <https://www.wpc.ncep.noaa.gov/qpf/day1-7.shtml>



8-14 day Outlook



Obtained from <https://www.cpc.ncep.noaa.gov/>



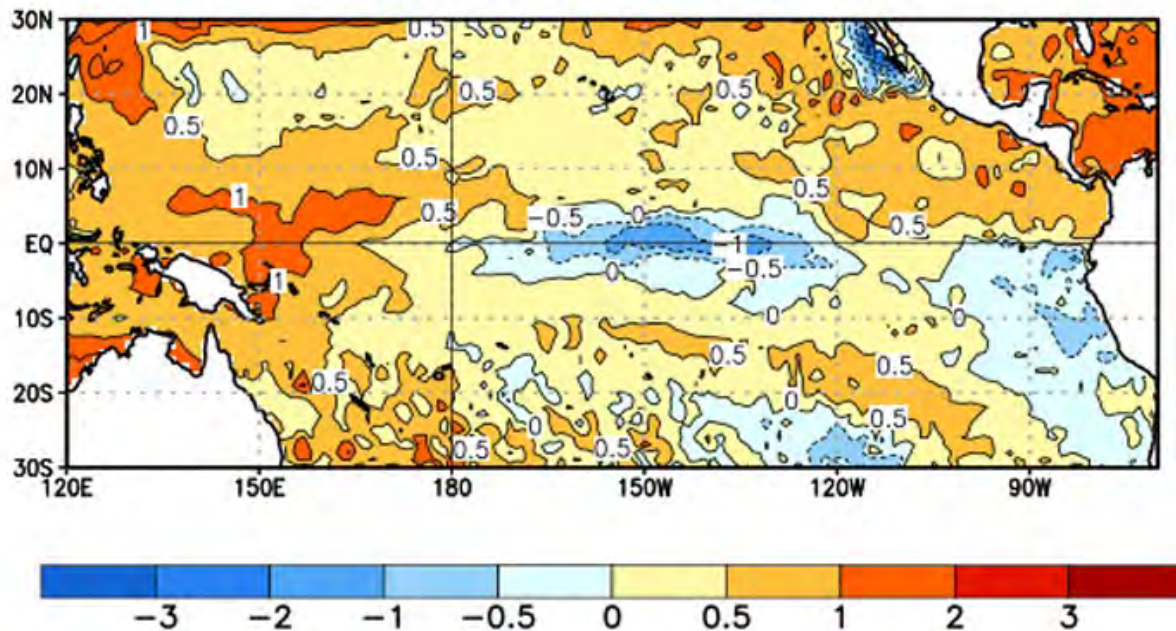
El Niño-Southern Oscillation Outlook



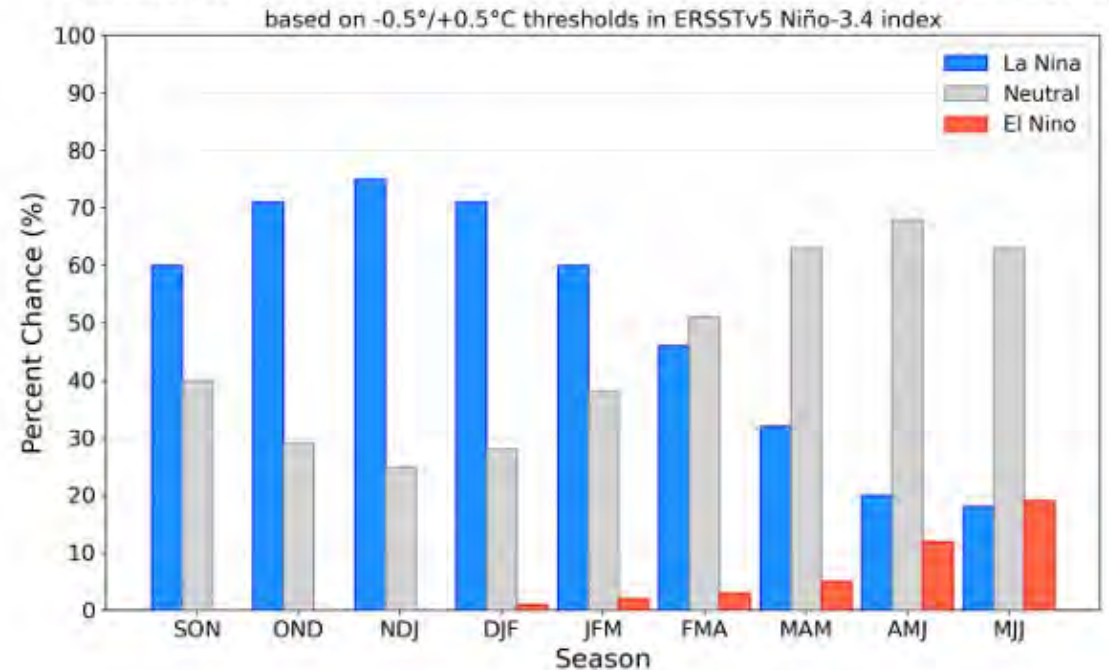
Obtained from https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.shtml

- Currently ENSO-neutral
- La Niña conditions are developing
- La Niña expected to emerge and persist through January-March 2025.

Average SST Anomalies
15 SEP 2024 – 12 OCT 2024



Official NOAA CPC ENSO Probabilities (issued October 2024)

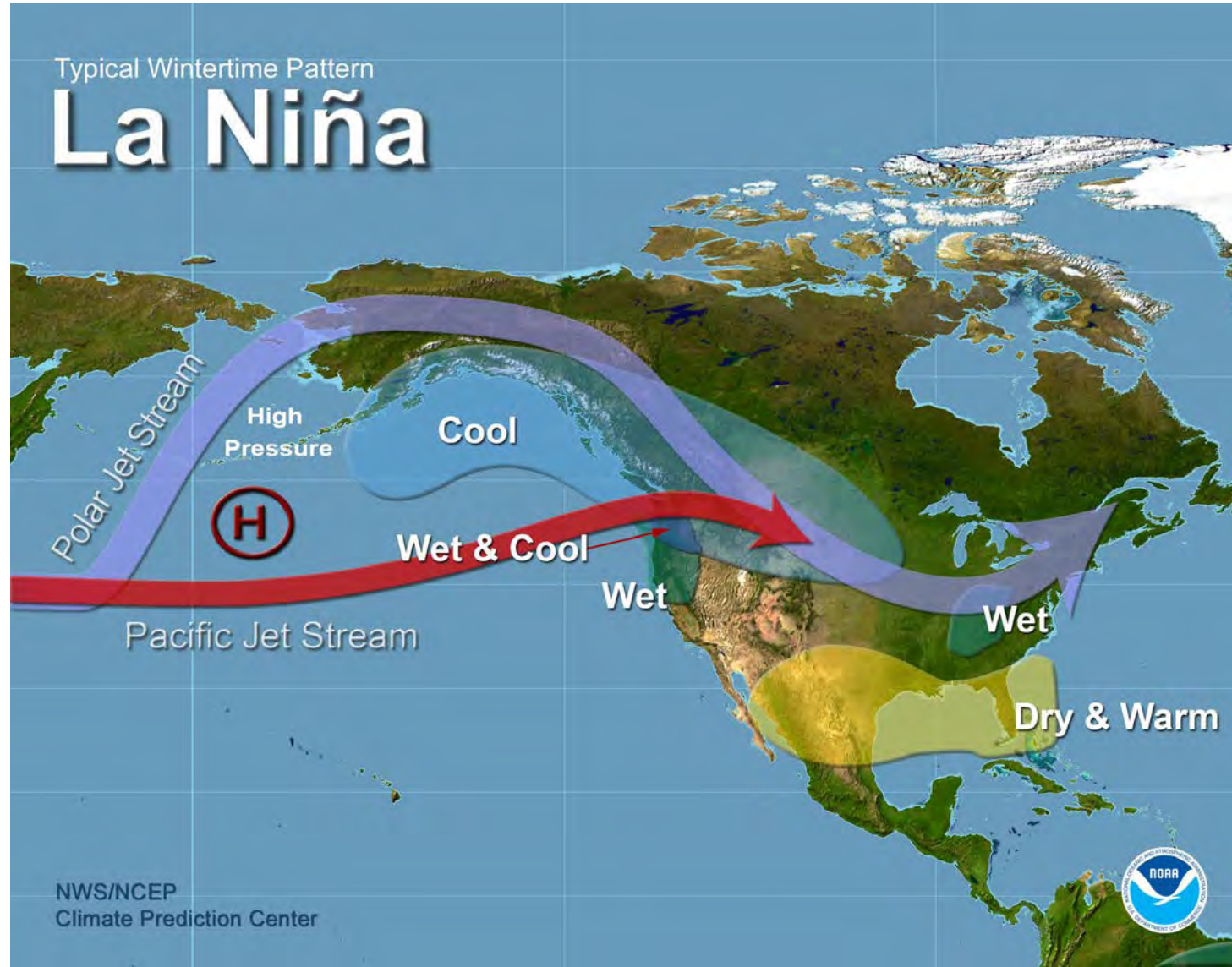


<https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>

El Niño-Southern Oscillation Outlook



https://www.pmel.noaa.gov/el_nino/sites/default/files/thumbnails/image/LaNina-Jet-Wintertime-Pattern.jpg

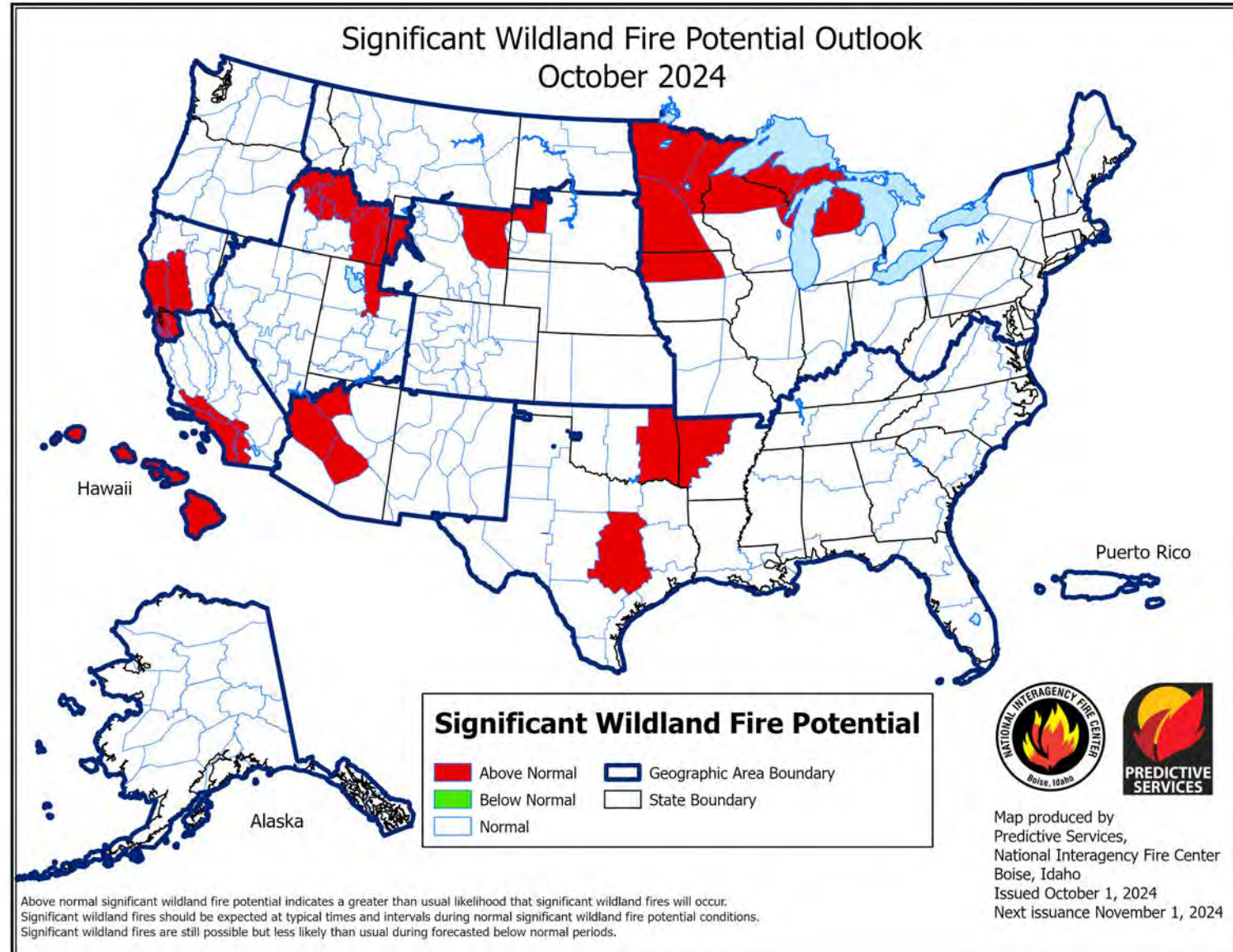




Wildland Fire Potential Outlook



Obtained from https://www.nifc.gov/nicc-files/predictive/outlooks/month1_outlook.png



November Outlook



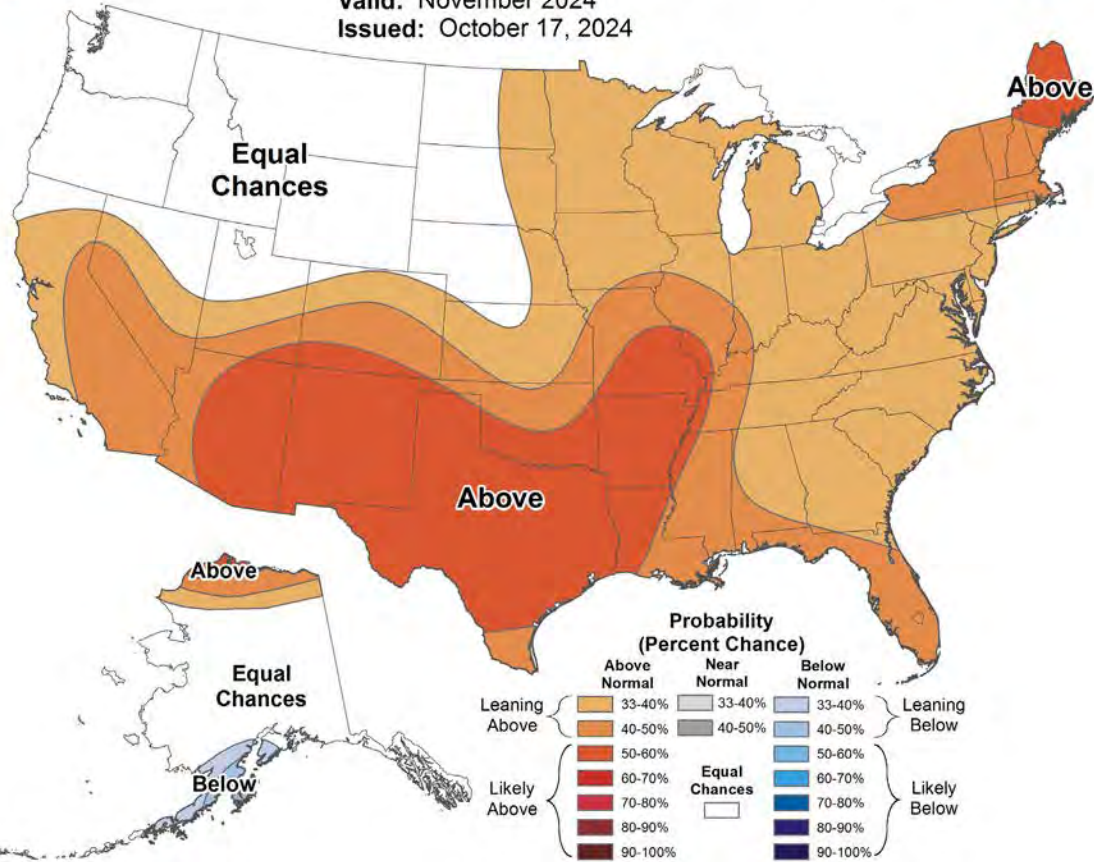
Obtained from <https://www.cpc.ncep.noaa.gov/>



Monthly Temperature Outlook



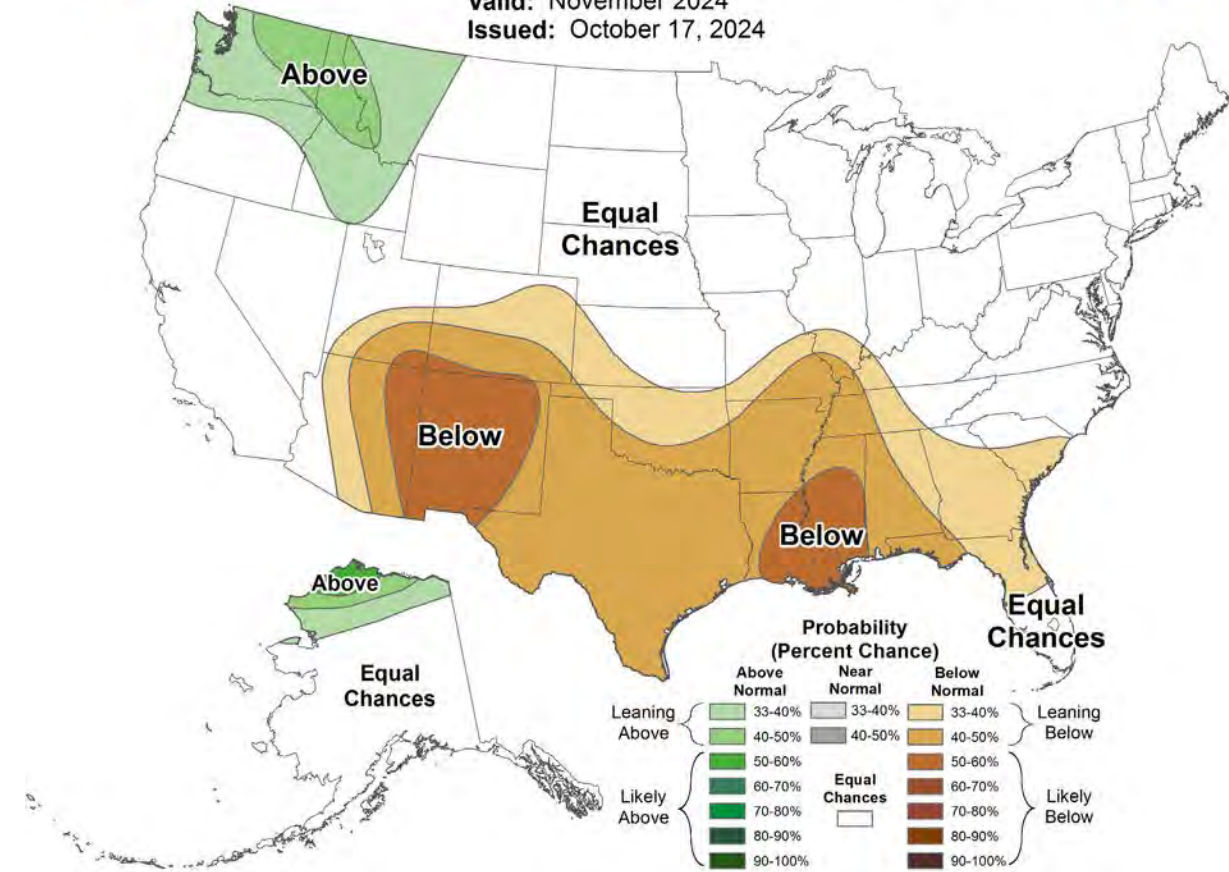
Valid: November 2024
Issued: October 17, 2024



Monthly Precipitation Outlook



Valid: November 2024
Issued: October 17, 2024



November-January Outlook

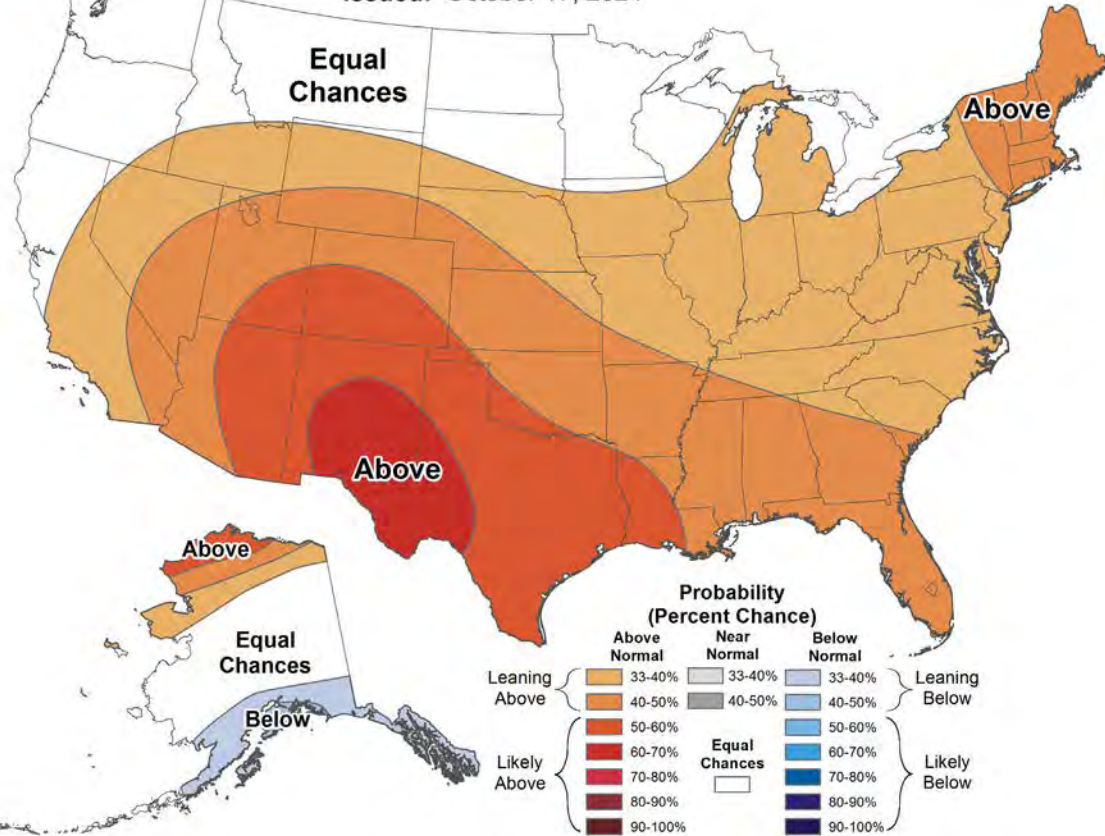
Obtained from https://www.nifc.gov/nicc-files/predictive/outlooks/month1_outlook.png



Seasonal Temperature Outlook



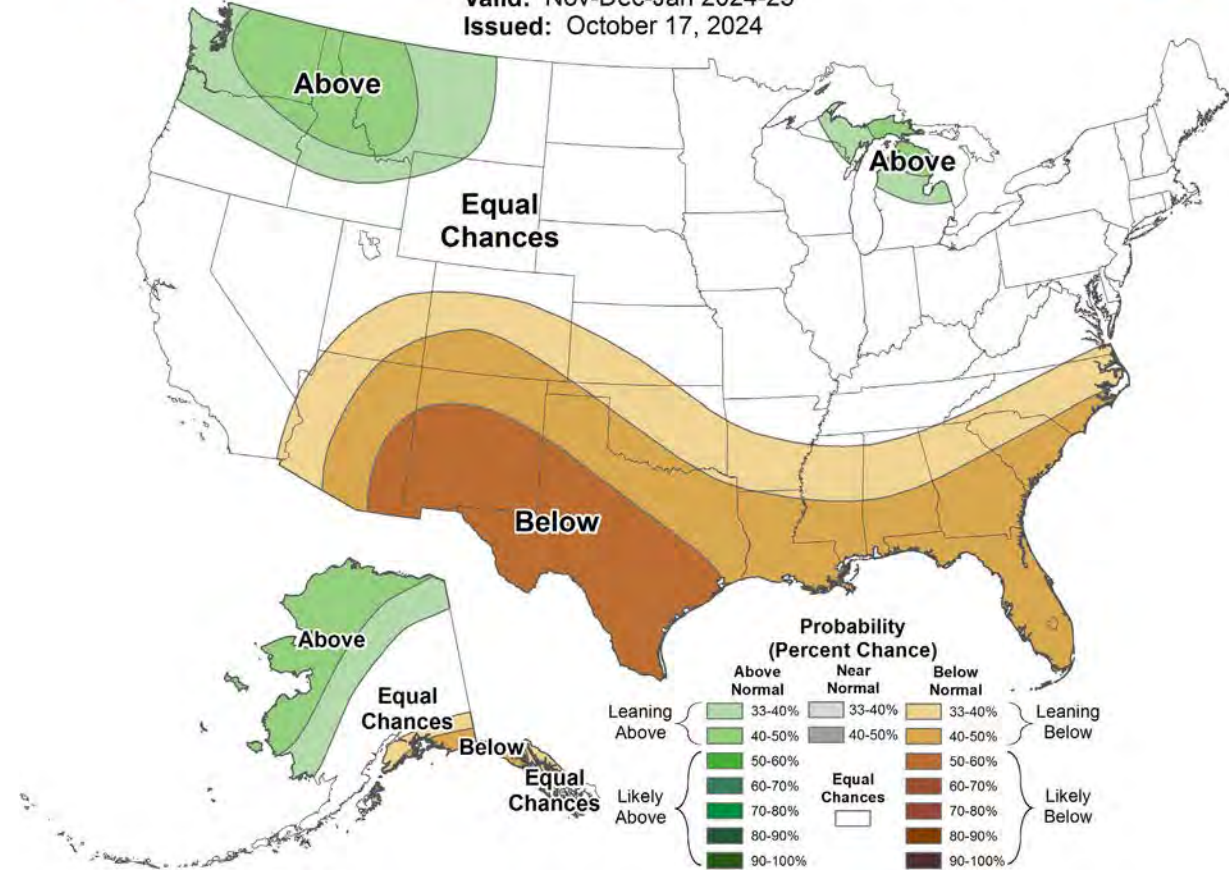
Valid: Nov-Dec-Jan 2024-25
Issued: October 17, 2024



Seasonal Precipitation Outlook



Valid: Nov-Dec-Jan 2024-25
Issued: October 17, 2024



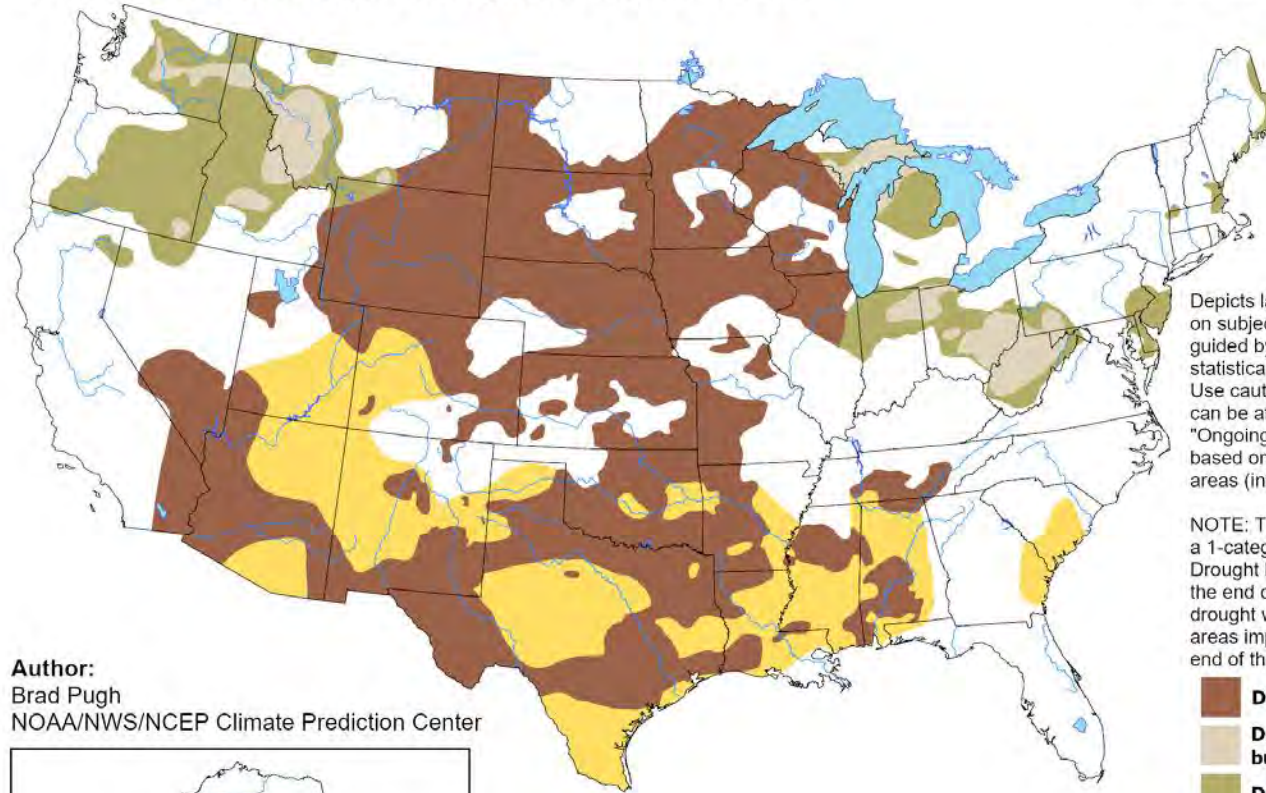
Seasonal Drought Outlook



Obtained from <https://www.cpc.ncep.noaa.gov/>

U.S. Seasonal Drought Outlook Drought Tendency During the Valid Period

Valid for October 17, 2024 - January 31, 2025
Released October 17, 2024

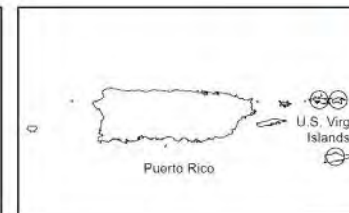
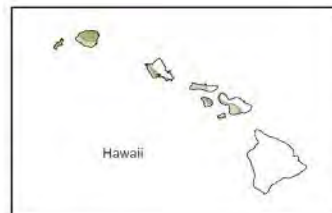


Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to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

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

December-February Outlook



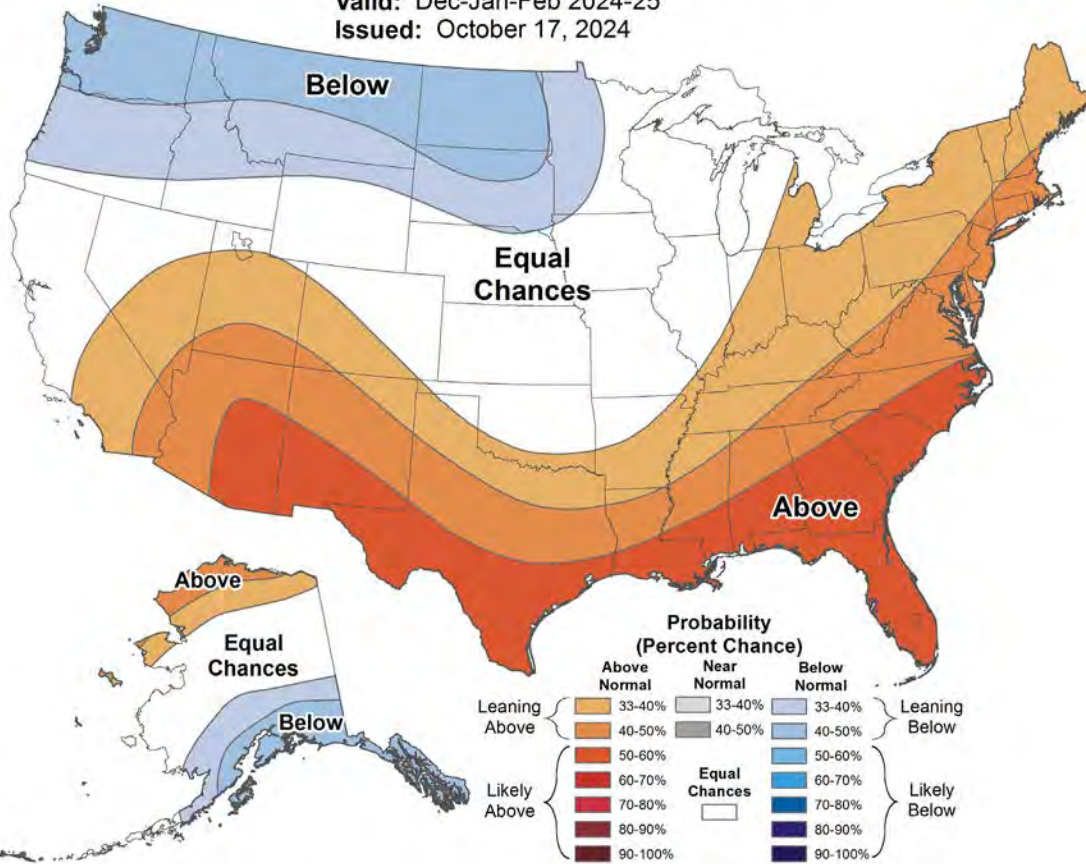
Obtained from <https://www.cpc.ncep.noaa.gov/>



Seasonal Temperature Outlook



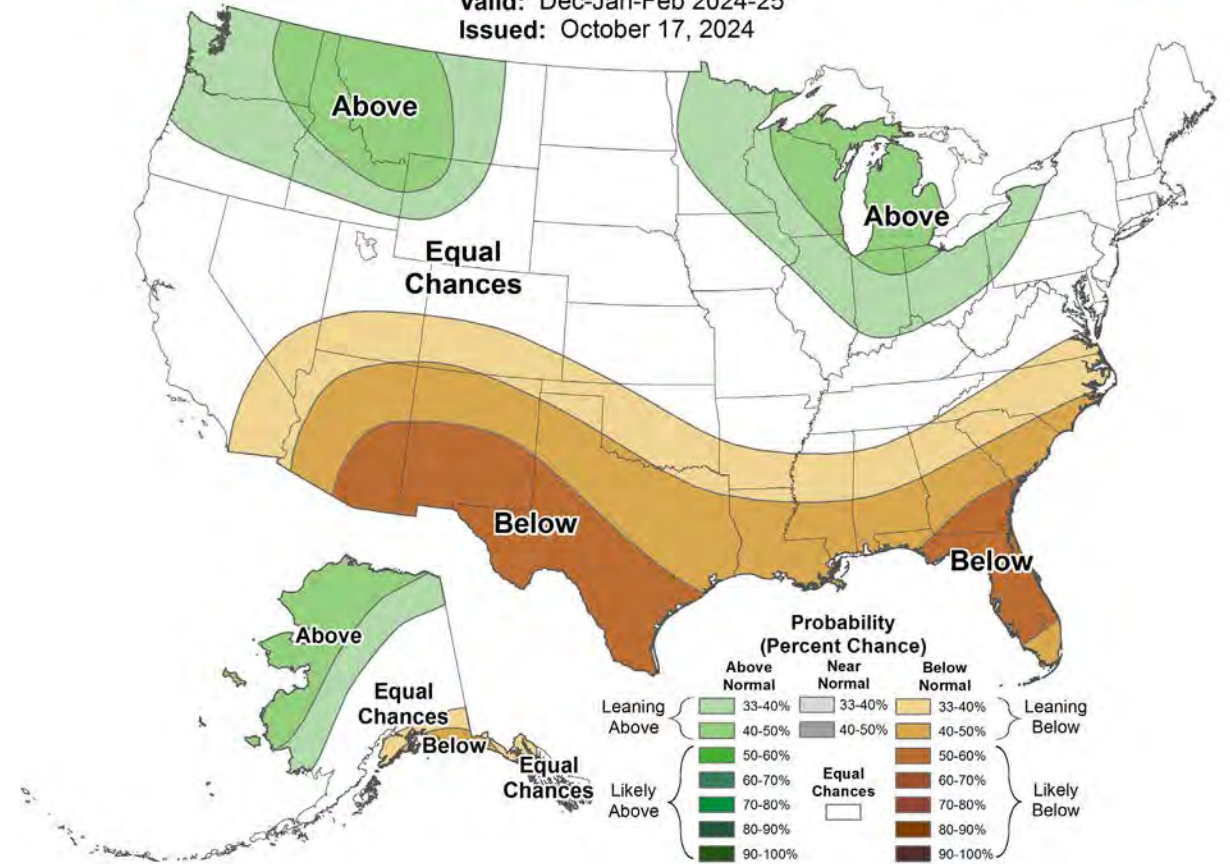
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Seasonal Precipitation Outlook



Valid: Dec-Jan-Feb 2024-25
Issued: October 17, 2024



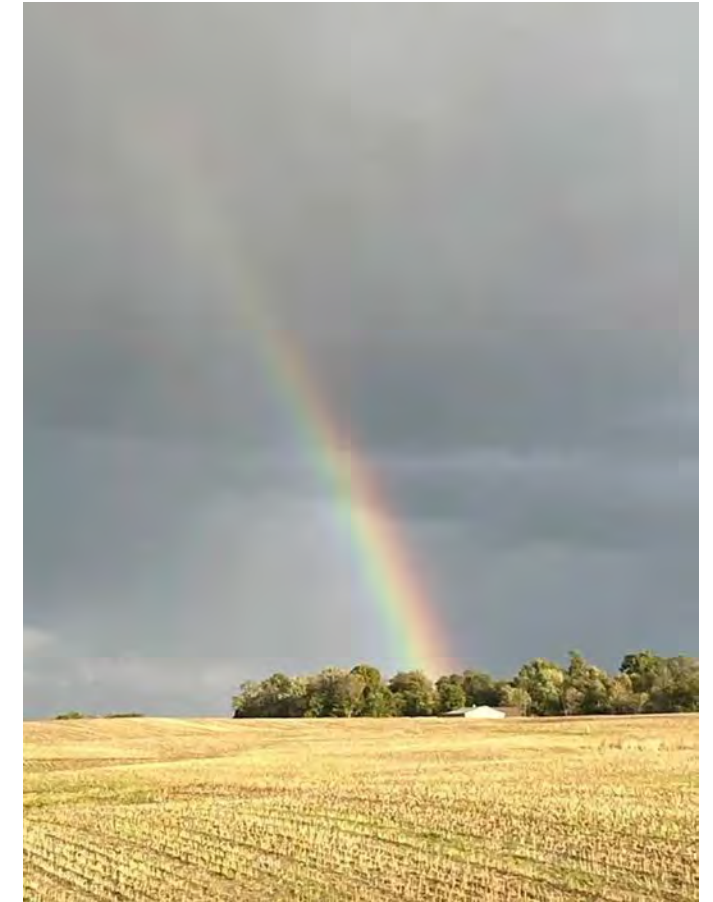
Summary

Current Conditions

- Record-breaking warmth persists into mid-October.
- Drought conditions are intensifying.
- Elevated fire risk.
- Declining water levels.

Outlooks

- Warmer than average temperatures expected to continue.
- Variable precipitation, uncertainty due to forecasted weak La Niña.
- Persistent drought through winter in the Plains with some expected improvement over the Great Lakes region.



Rainbow, Photo Credit: Hans Schmitz, Indiana

Thank You, Questions?



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Atlas Comet on 10/16/24, Photo Credit: Austin Pearson

