



Drought, Weather, Trends and Outlooks in West Texas

Joel Lisonbee, PhD

WTACI Annual Meeting
12 September 2023

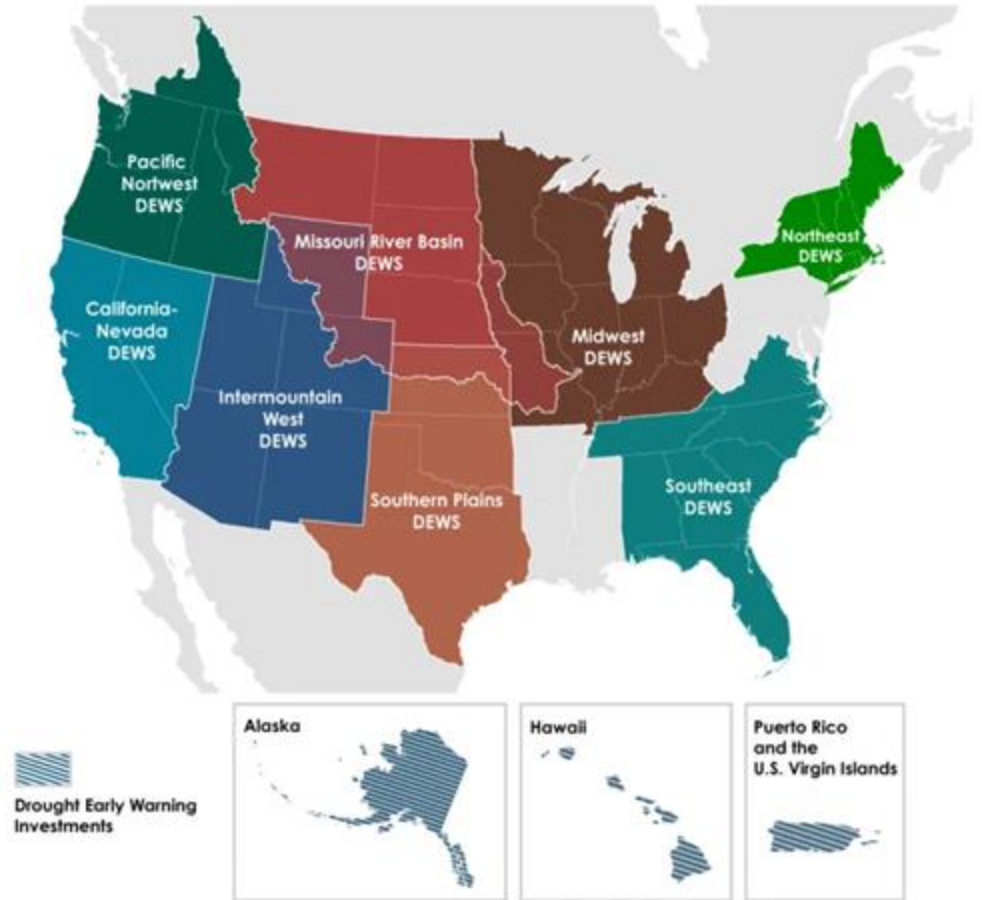
National Integrated Drought Information System (NIDIS)

- First authorized by Congress in 2006; reauthorized in 2014 and 2018.
-  sits within  's Climate Program Office
- Interagency mandate to develop and provide a **national drought early warning information system**
- Host www.drought.gov
- Enable the Nation to move **from a reactive to a more proactive** approach to managing drought risks and impacts
- Authorizes NIDIS to **engage in partnerships** with federal, state, tribal, and local partners, as well as the private sector, academic institutions, and citizen scientists

REGIONS

Drought Early Warning Systems

A Drought Early Warning System (DEWS) utilizes new and existing networks of federal, tribal, state, local and academic partners to make climate and drought science accessible and useful for decision makers.



2021–2025

Southern Plains

Drought Early Warning System
(DEWS) Strategic Action Plan



Document prepared by the National Integrated Drought Information System
(NIDIS) in partnership with key stakeholders in the region (Appendix I).

THREE KEY PRIORITIES FOR 2021–2025

The following three key priorities were developed by NIDIS in consultation with regional partners. The three key priorities for the Southern Plains regions for the next five years are:

- 1** Build resilience and mitigate economic, human health, ecological, and other costs of drought
- 2** Deliver earlier warning of drought (onset and demise) than is currently available
- 3** Improve or build a comprehensive understanding of drought impacts



Scan the QR code to go
directly to the plan



https://www.drought.gov/sites/default/files/2021-10/2021-2025_SPP_StrategicPlan.pdf

Over the last 5
years drought in
the US has cost
about
\$4.1 Billion
each year...

about half of that
was in the Southern
Plains.



What is Drought?



Meteorological



Agricultural



Hydrological



Socio-economic



Ecological

Meteorological Drought

A period of abnormally dry weather sufficiently long to cause a serious hydrological imbalance.



Agricultural Drought

Agricultural drought refers to conditions that result in adverse plant responses, which can range from reduced crop and forage yields to total crop or forage failure.



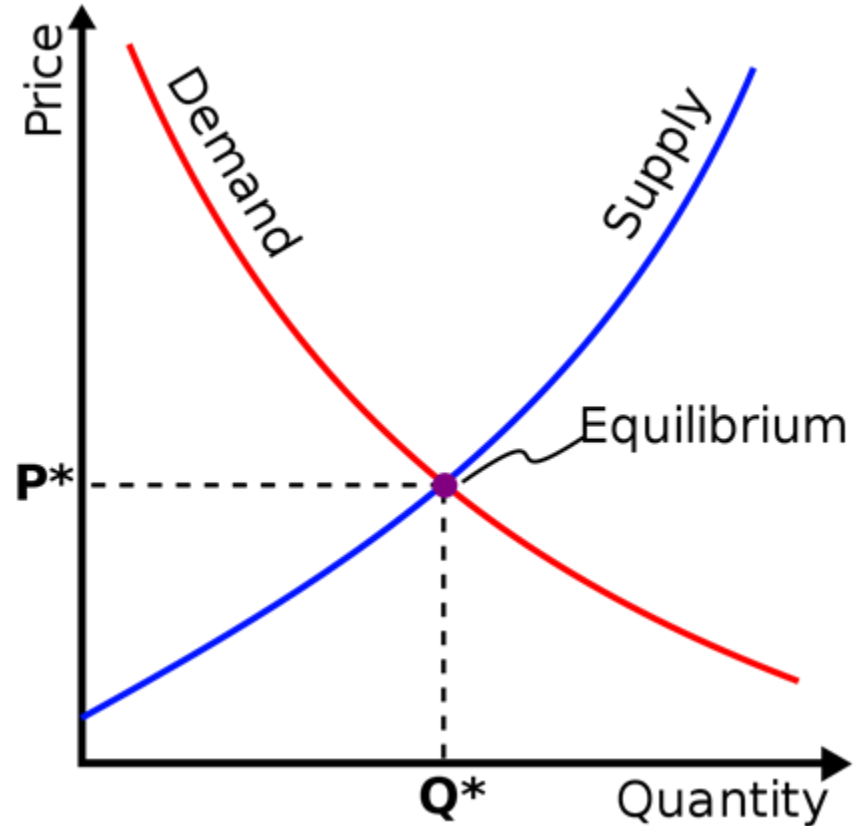
Hydrological Drought

Hydrological drought is associated with the effects of periods of precipitation (including snowfall) shortfalls on surface or subsurface water supply (i.e., streamflow, reservoir and lake levels, groundwater).



Socio-economic Drought

In the simplest terms, socio-economic drought is anytime water supply does not meet water demand.



Ecological Drought

A prolonged and widespread deficit in naturally available water supplies—including changes in natural and managed hydrology—that create multiple stresses across ecosystems.



Photo from
<https://www.azwildlifehero.com/>

Flash Drought

Flash drought is a subset of other drought types that is defined by the rapid onset or intensification of drought conditions culminating in impacts to one or more sectors (agricultural, hydrological, etc.).





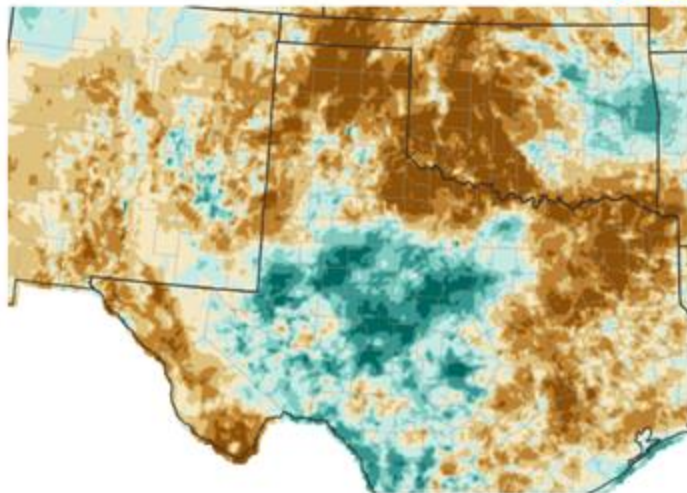
Current Drought Conditions for West Texas



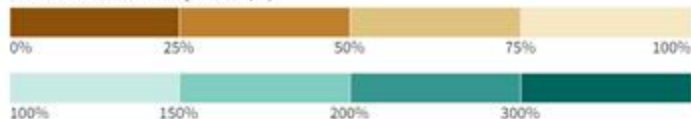
Current Drought Conditions: West Texas

Precipitation

30-Day Percent of Normal Precipitation



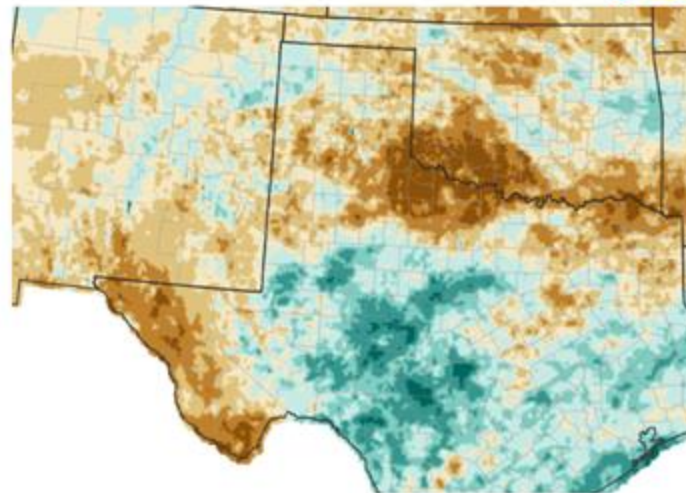
Percent of Normal Precipitation (%)



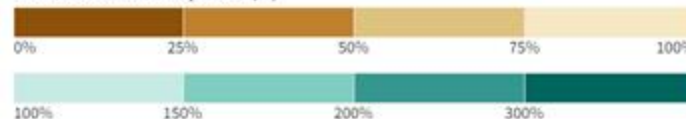
Source(s): UC Merced
Data Valid: 09/09/24

Drought.gov

60-Day Percent of Normal Precipitation



Percent of Normal Precipitation (%)



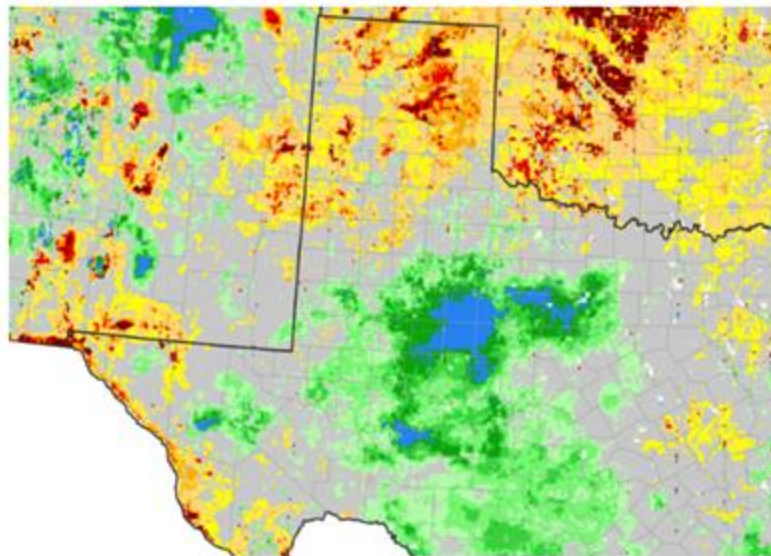
Source(s): UC Merced
Data Valid: 09/09/24

Drought.gov

Current Drought Conditions: West Texas

Soil Moisture

0-100 cm Soil Moisture Percentile



0-100 cm Soil Moisture Percentile



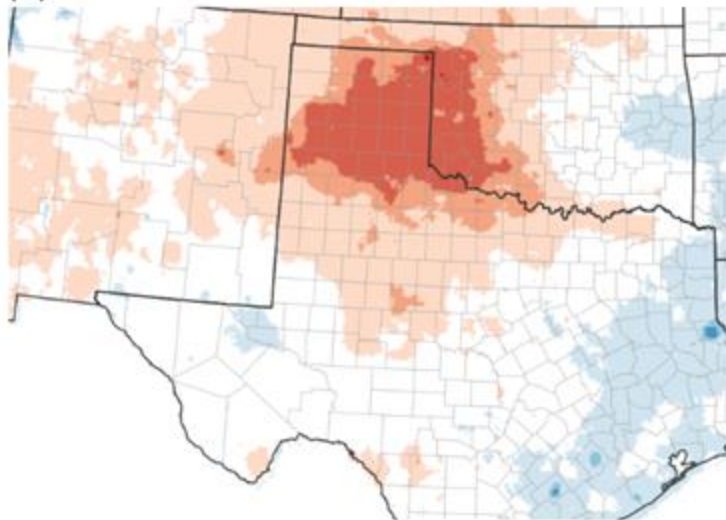
Source(s): NASA
Data Valid: 09/10/24

Drought.gov

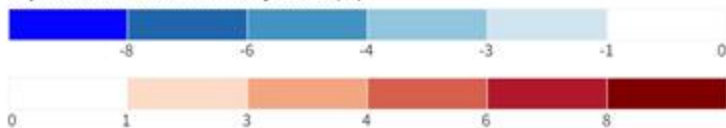
Current Drought Conditions: West Texas

4-week Temperature and Evaporative Demand

30-Day Departure from Normal Maximum Temperature (°F)



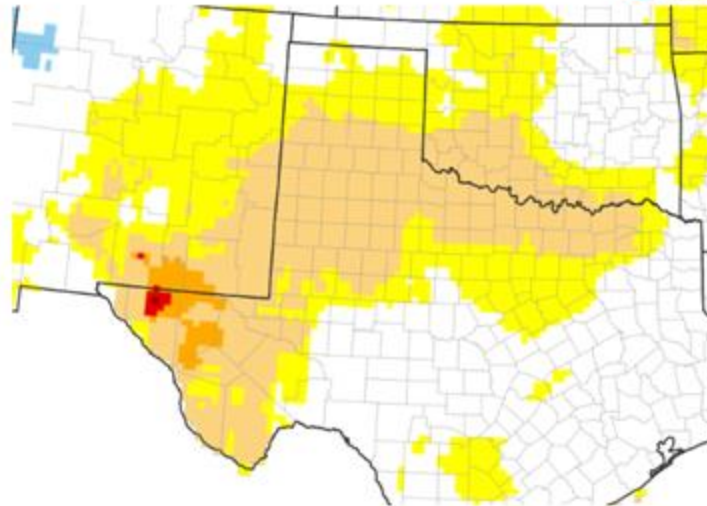
Departure from Normal Max Temperature (°F)



Source(s): UC Merced
Data Valid: 09/09/24

Drought.gov

Evaporative Demand Drought Index (EDDI): 4 Week



Drought Conditions



Wet Conditions



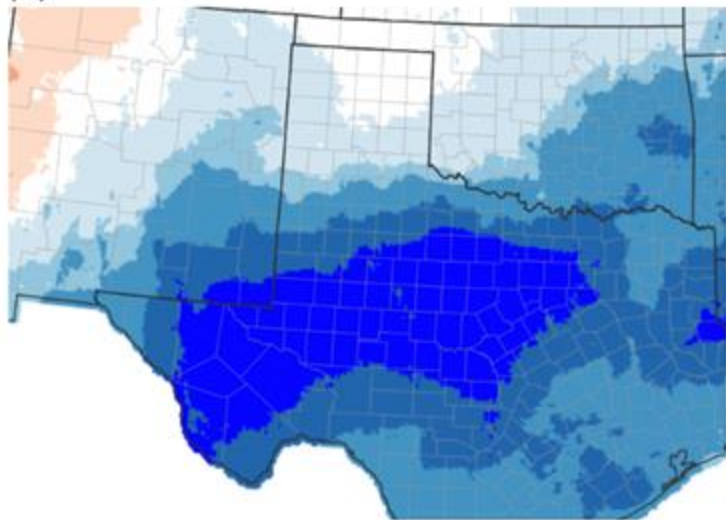
Source(s): NOAA Physical Sciences Laboratory
Data Valid: 09/06/24

Drought.gov

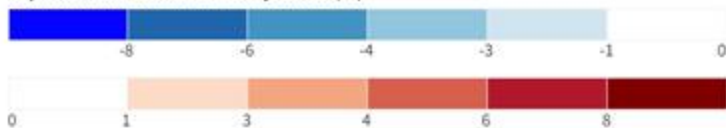
Current Drought Conditions: West Texas

1-week Temperature and Evaporative Demand

7-Day Departure from Normal Maximum Temperature (°F)



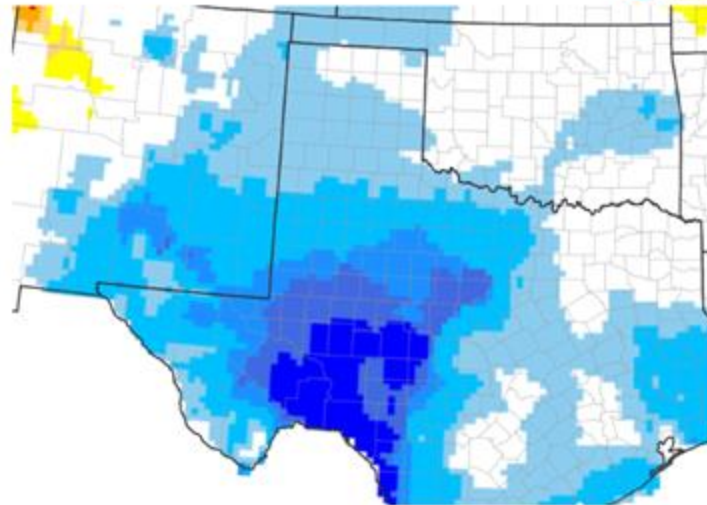
Departure from Normal Max Temperature (°F)



Source(s): UC Merced
Data Valid: 09/09/24

Drought.gov

Evaporative Demand Drought Index (EDDI): 1 Week



Drought Conditions



Wet Conditions



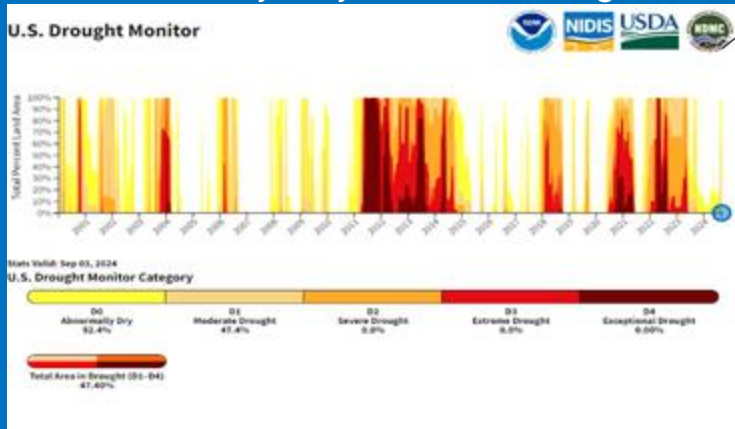
Source(s): NOAA Physical Sciences Laboratory
Data Valid: 09/06/24

Drought.gov

Current Drought Conditions

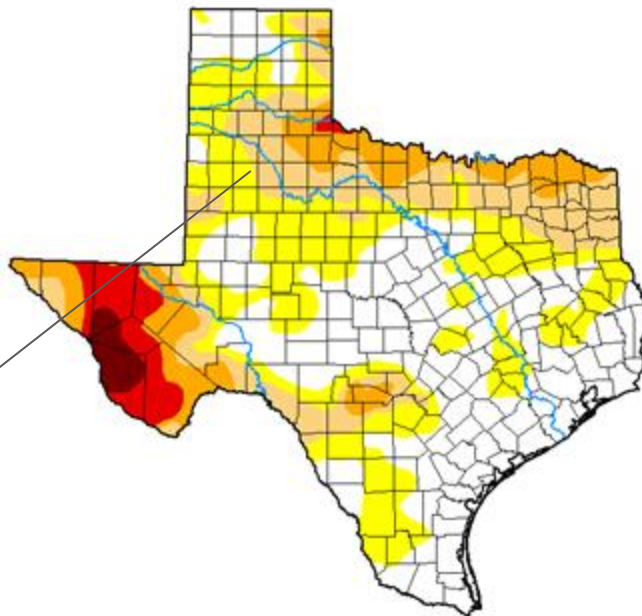
Texas

Currently only 32.2% in drought



U.S. Drought Monitor Texas

September 10, 2024
(Released Thursday, Sep. 12, 2024)
Valid 8 a.m. EDT



Intensity:



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:

Lindsay Johnson
National Drought Mitigation Center



droughtmonitor.unl.edu

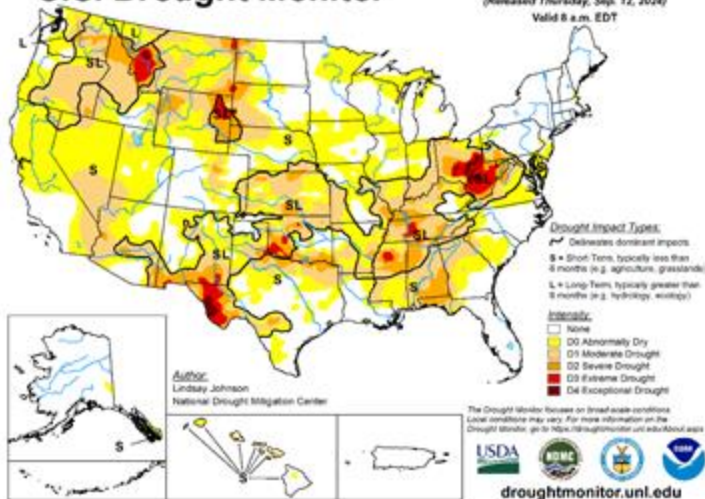
What is the US Drought Monitor

U.S. Drought Monitor

September 10, 2024

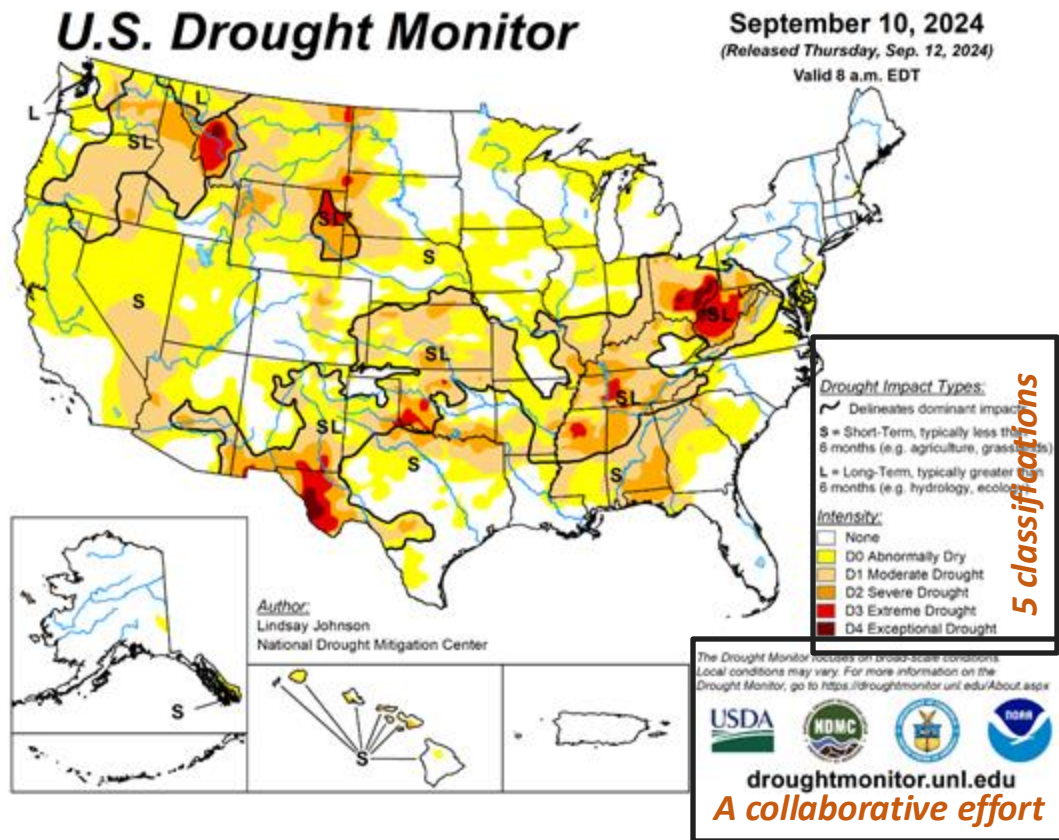
(Released Thursday, Sep. 12, 2024)

Valid 8 a.m. EDT



The U.S. Drought Monitor

- The U.S. Drought Monitor is a map released every Thursday, showing parts of the U.S. that are in drought.
- Used in several USDA programs
- Used by the IRS for tax deferrals
- Other programs have started utilizing the USDM in official capacities

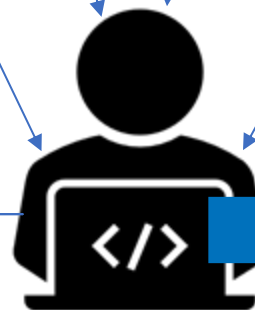


Instead of using a single indicator/index, a Hybrid “Convergence of Evidence” Approach is used

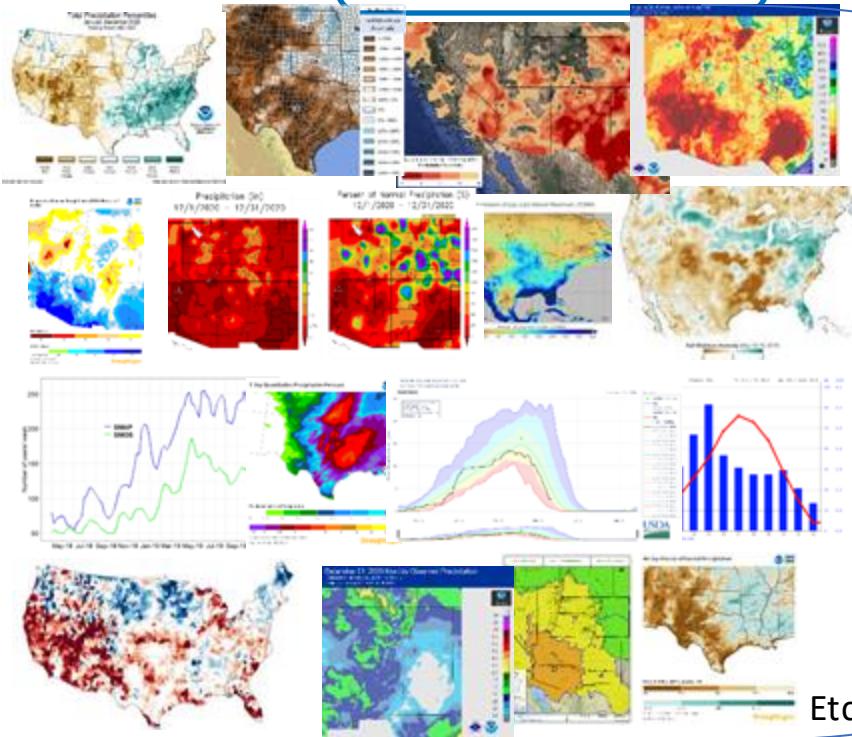
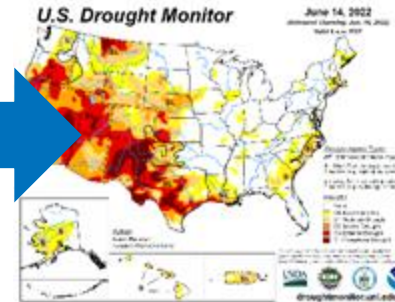
Objective Physical indicators & indices



Subjective local expertise and impacts

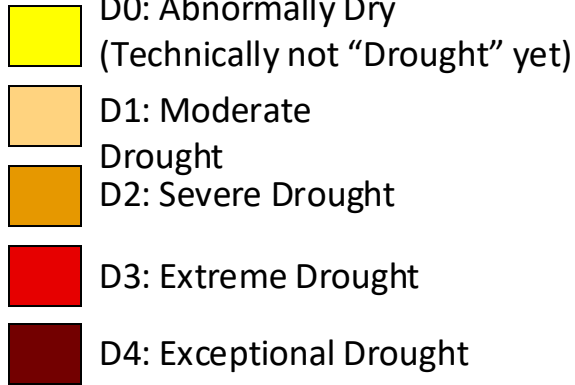


U.S. Drought Monitor Author



Etc.

Drought Categories and Percentiles



(**21st-30th** percentile)

(**11th-20th** percentile)

(**6th-10th** percentile)

(**3rd-5th** percentile)

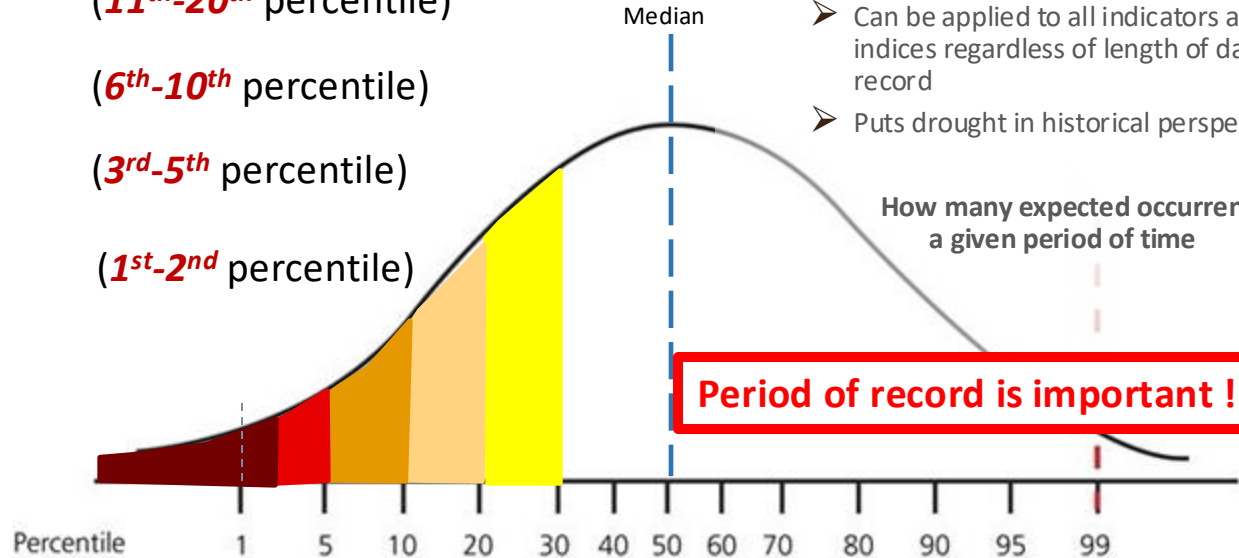
(**1st-2nd** percentile)

Advantages of percentiles:

- Can be applied to any parameter used in the drought analysis
- Can be applied to all indicators and indices regardless of length of data record
- Puts drought in historical perspective:

How many expected occurrences in a given period of time

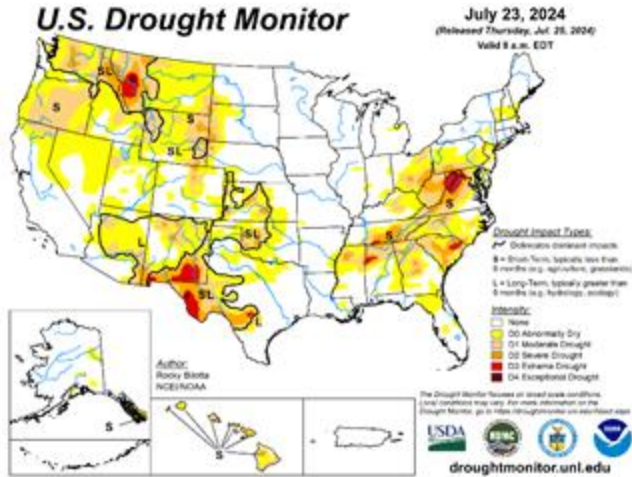
Period of record is important !



Drought indicator, e.g. precipitation or soil moisture

Percentiles and
the U.S. Drought
Monitor

U.S. Drought Monitor Objectives: What it is and what it is not (from Brian Fuchs)



- Assessment of **current** conditions and **current** impacts
- The U.S. Drought Monitor is **NOT** a model
 - The map is made manually each week based off the previous week's map
- The U.S. Drought Monitor is **NOT** interpreting only precipitation
- The U.S. Drought Monitor is **NOT** a forecast or drought declaration
 - Can be used by decision makers in this way though
- The U.S. Drought Monitor does **NOT** take into account any relief programs when the map is produced.
- Identifying **impacts**
 - “S” short-term impacts, “L” long-term impacts or “SL” for a combination of both
 - “S” -6-month time scales or less, “L” -greater than 6-month time scales
- Incorporate **local expert** input (USDM listserver)
 - Accomplished via email and **impact reports**
 - Validation of Objective Indicators
- Authors try to be as **objective** as possible (using the percentiles methodology) and the **“Convergence of evidence”** approach
- The physical data, drought indices/ indicators **must** support the depiction on the map
- **Impact data validates physical data but impacts alone will not drive changes on the map.**

Get Involved

Submit regular CMOR drought reports: <https://go.unl.edu/CMOR>

Become a CoCoRaHS observer:
www.CoCoRaHS.org

Get to know your State
Climate office:

<https://climatexas.tamu.edu/>

Send drought observations to them via
email or social media



Community Collaborative Rain Hail and Snow
Network

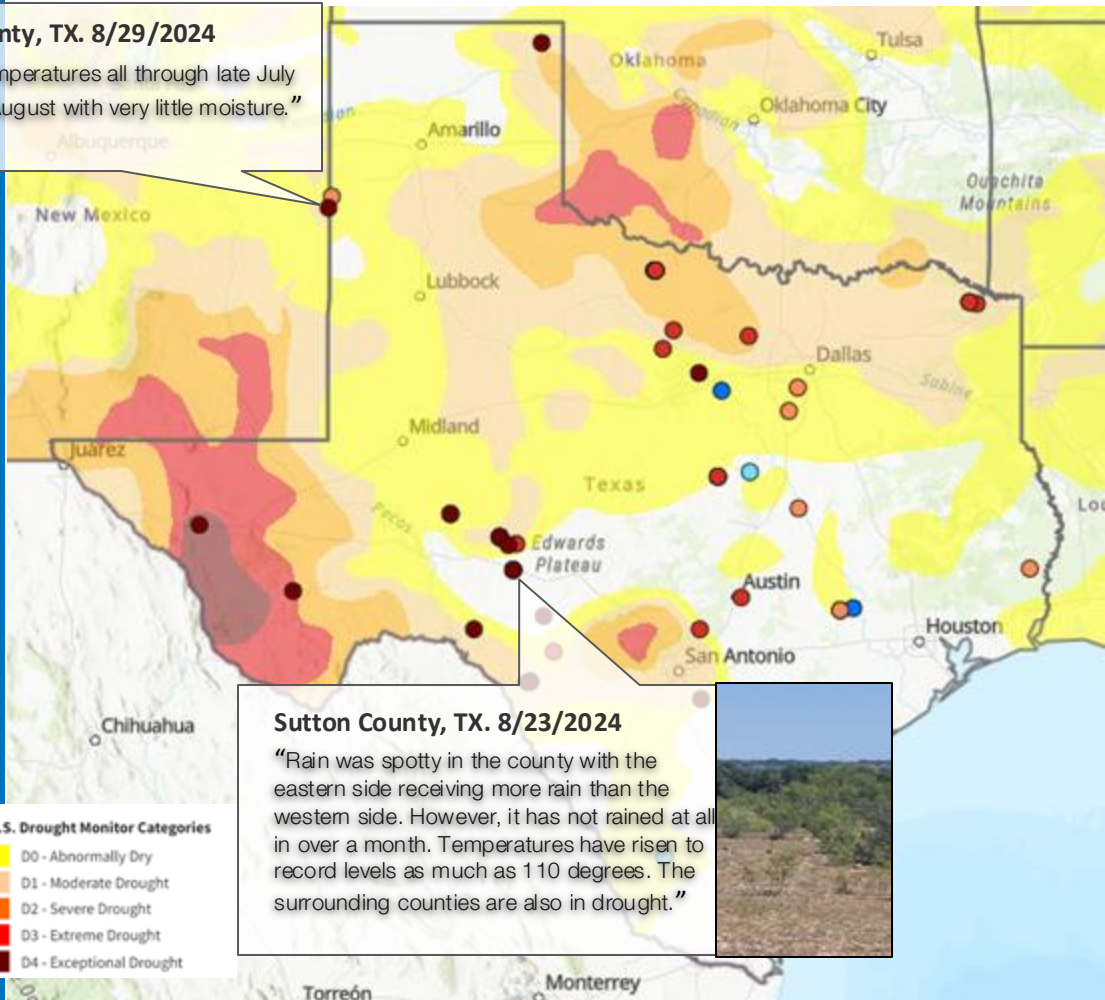
cocorahs.org

<https://go.unl.edu/CMOR>

Conditions Monitoring Observer Reports

Data is great, but storytelling is powerful.

palmer County, TX. 8/29/2024
"Very high temperatures all through late July and most of August with very little moisture."



Sutton County, TX. 8/23/2024
"Rain was spotty in the county with the eastern side receiving more rain than the western side. However, it has not rained at all in over a month. Temperatures have risen to record levels as much as 110 degrees. The surrounding counties are also in drought."



Report
drought



View drought
reports

Colorado
Cooperative Rain
Hail and Snow
(CoCoRaHS)
Network

www.cocorahs.org

<https://dex.cocorahs.org/stations/CO-BO-571/>





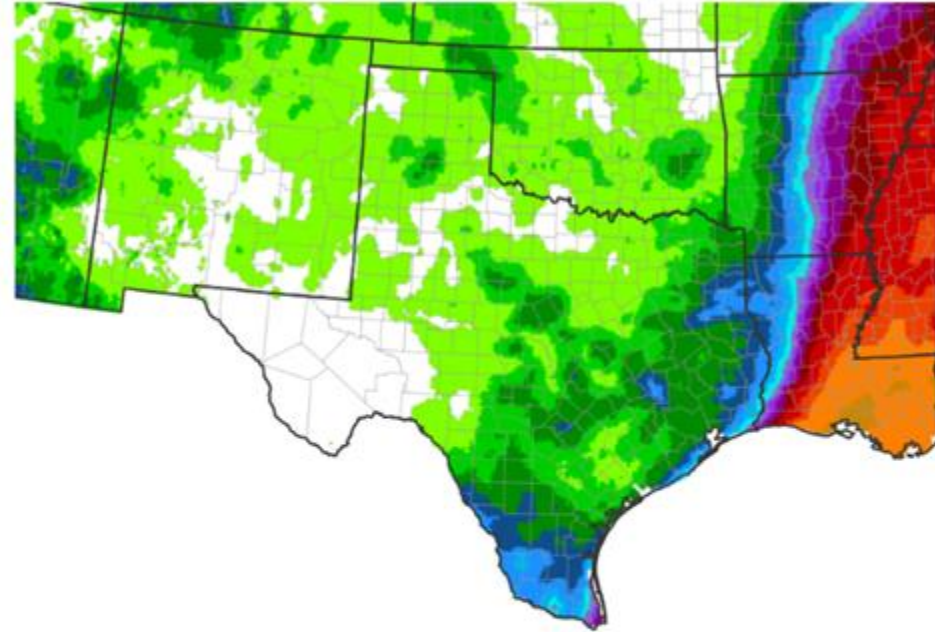
Forecasts and outlooks



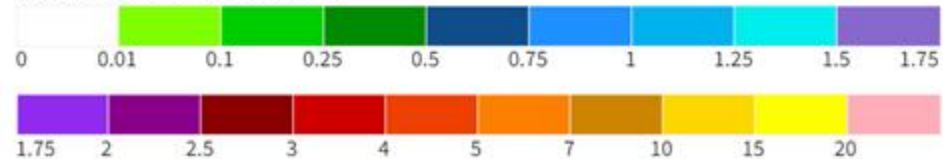
Forecasts

Precipitation for the next 7 days

7-Day Quantitative Precipitation Forecast for September 10-17, 2024



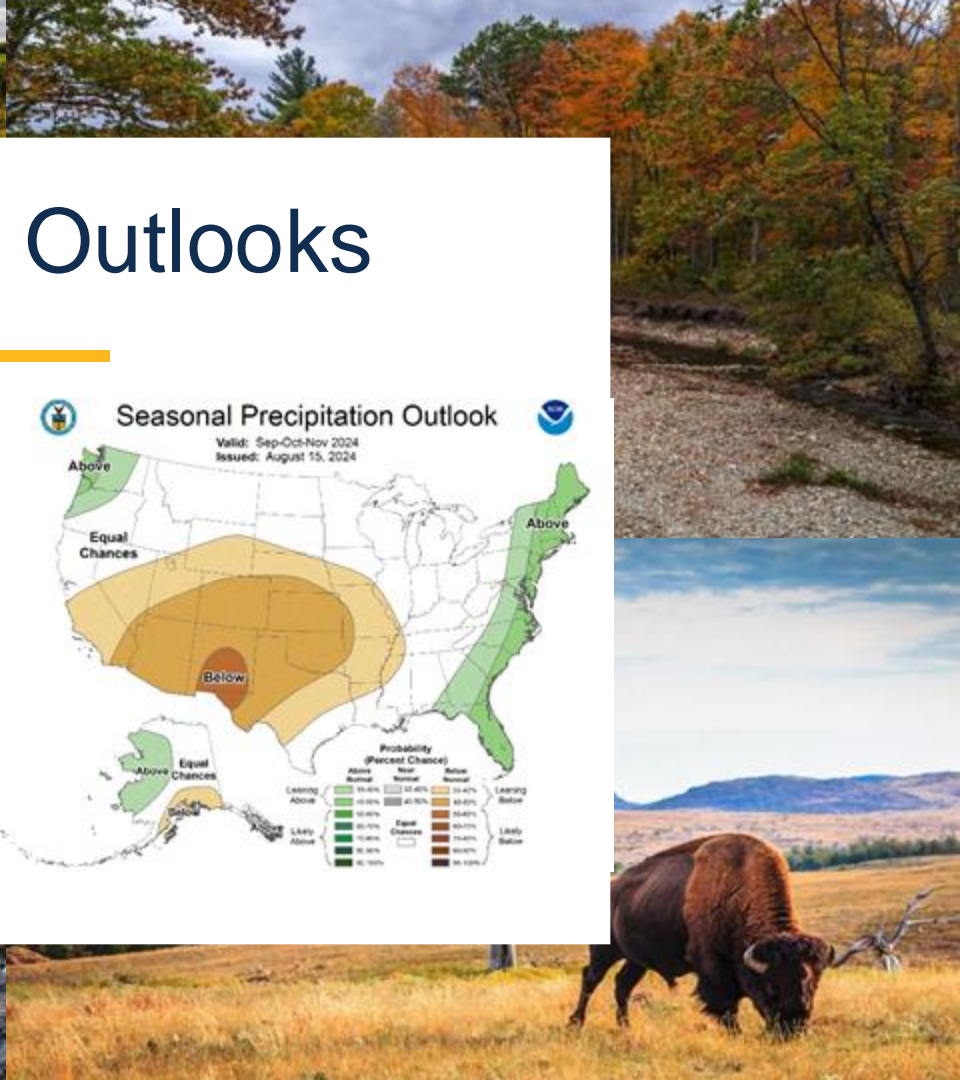
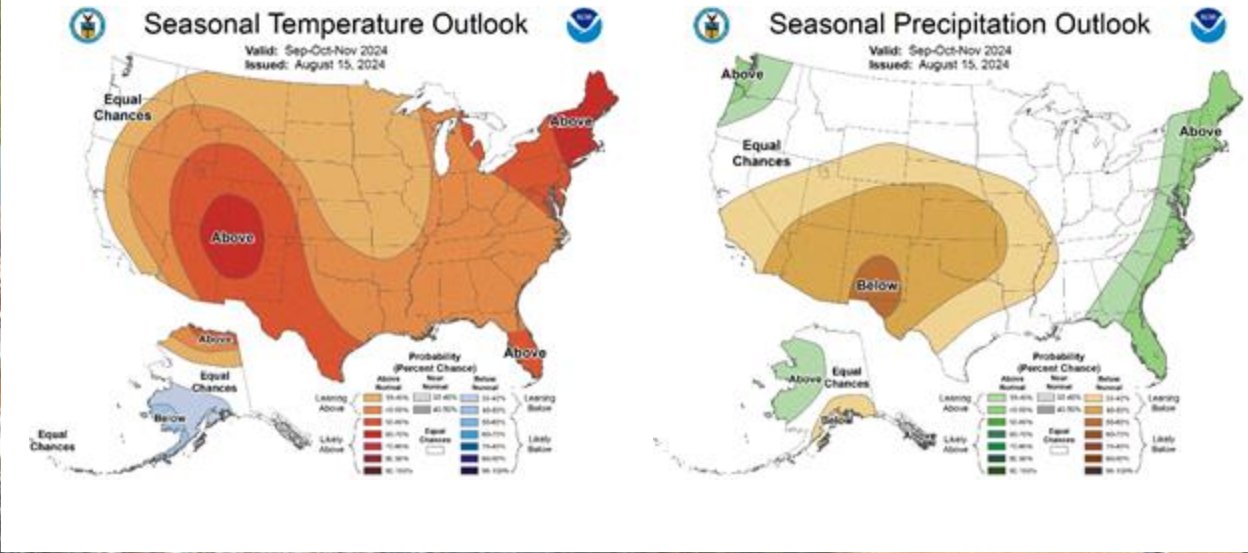
Predicted Inches of Precipitation



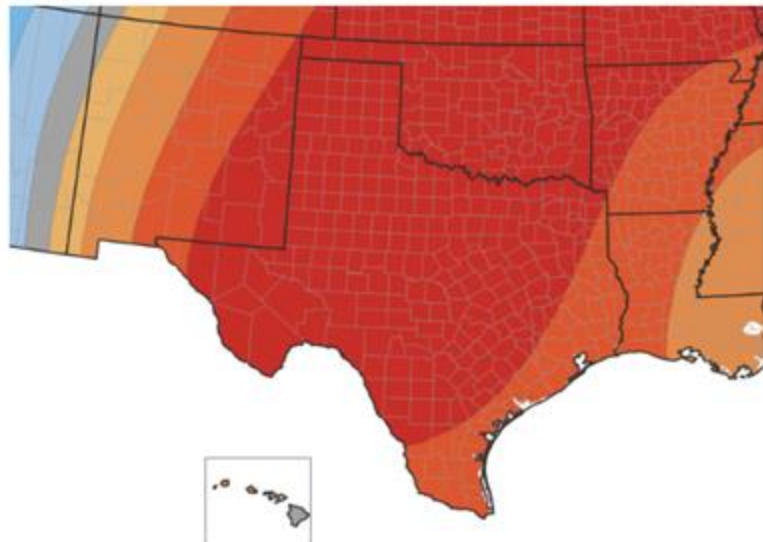
Source(s): National Weather Service Weather Prediction Center
Last Updated: 09/10/24

Drought.gov

Seasonal Outlooks



8-14 Day Temperature Outlook for September 18-24, 2024



Probability of Below-Normal Temperatures



Probability of Above-Normal Temperatures

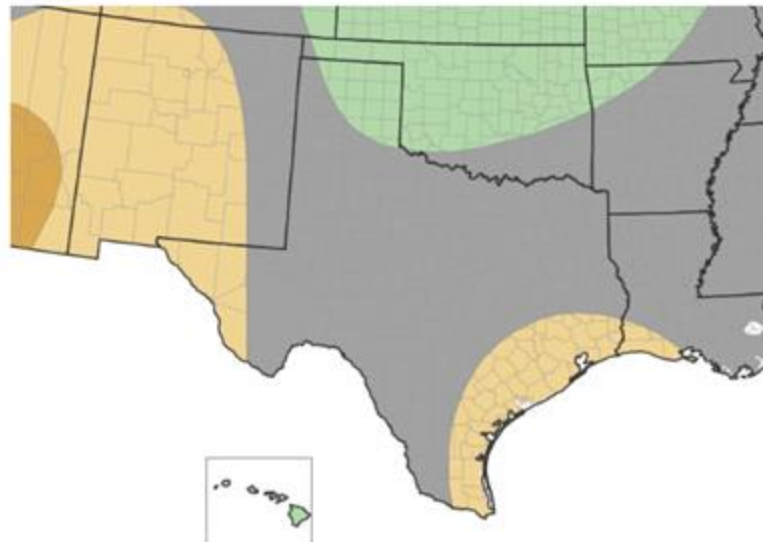


■ Near-Normal Conditions

Source(s): Climate Prediction Center
Last Updated: 09/10/24

Drought.gov

8-14 Day Precipitation Outlook for September 18-24, 2024



Probability of Below-Normal Precipitation



Probability of Above-Normal Precipitation



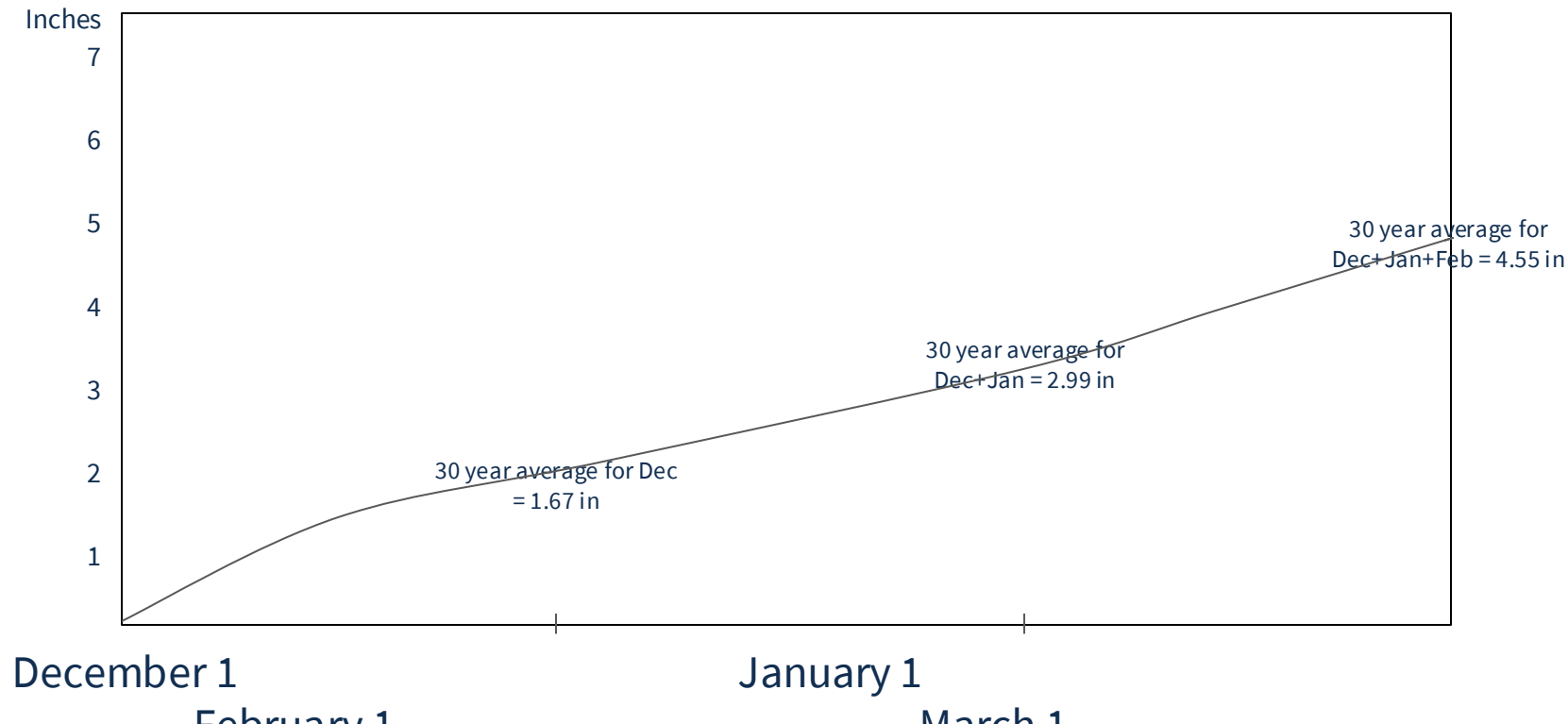
■ Near-Normal Conditions

Source(s): Climate Prediction Center
Last Updated: 09/10/24

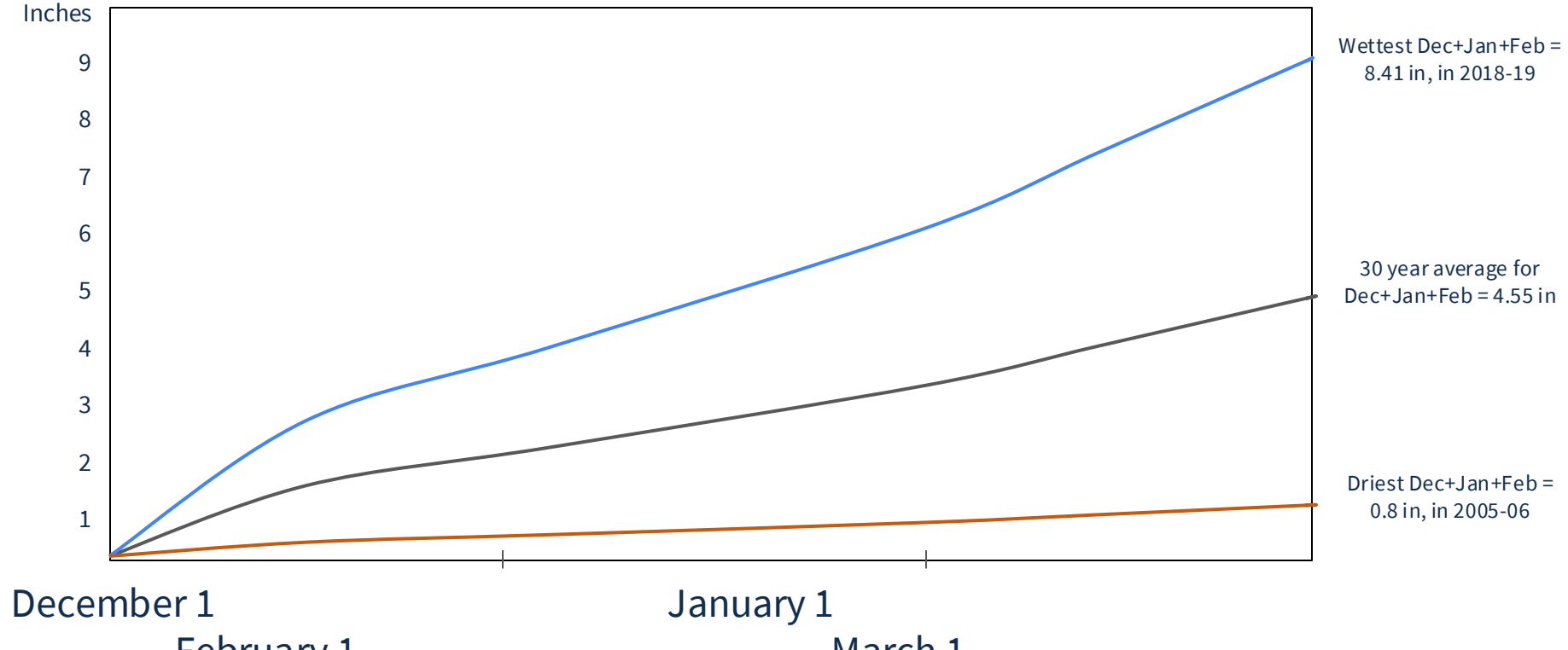
Drought.gov

Understanding Ensemble-based, probabilistic forecasts

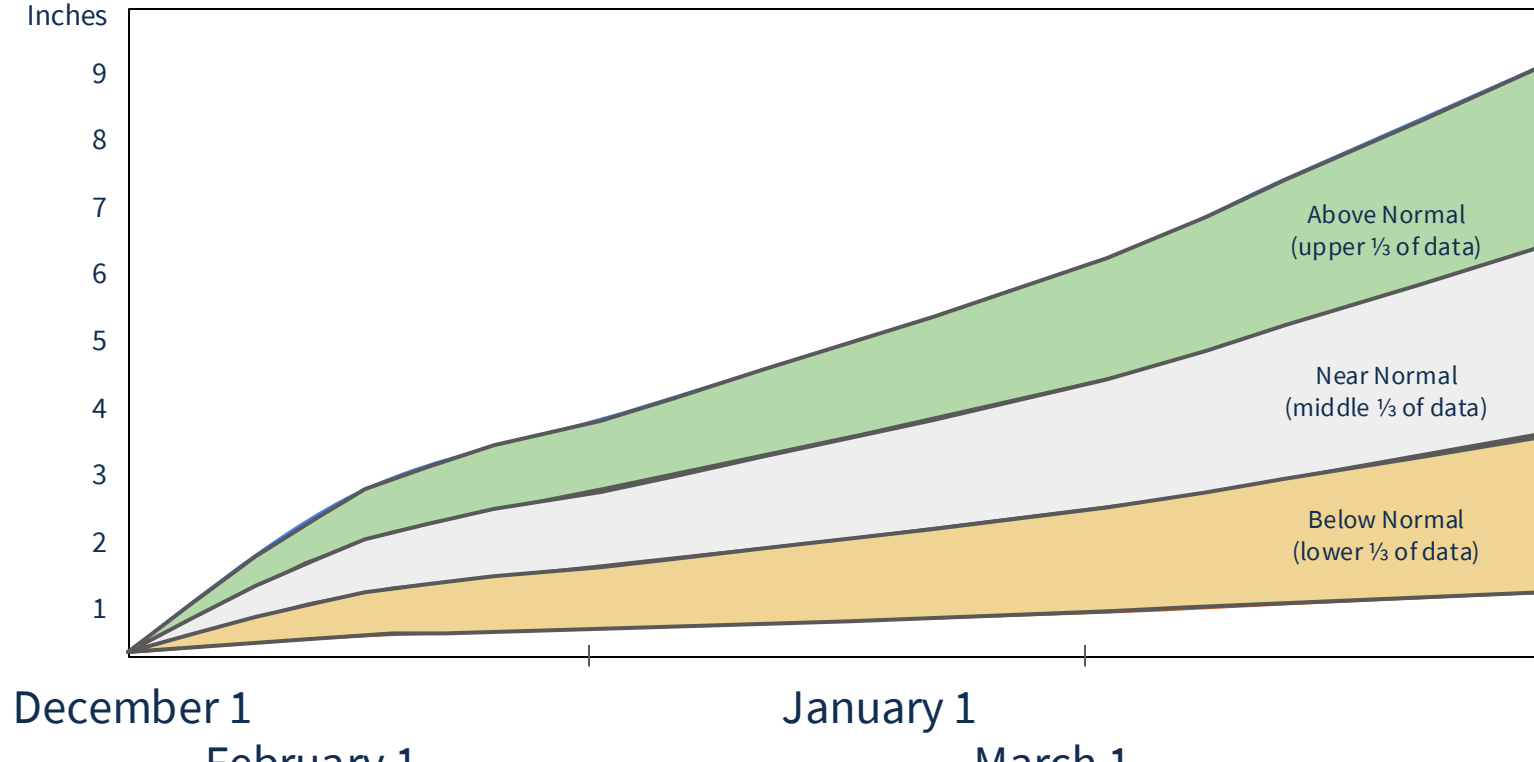
What's a percent chance? How is it calculated and what does it mean?



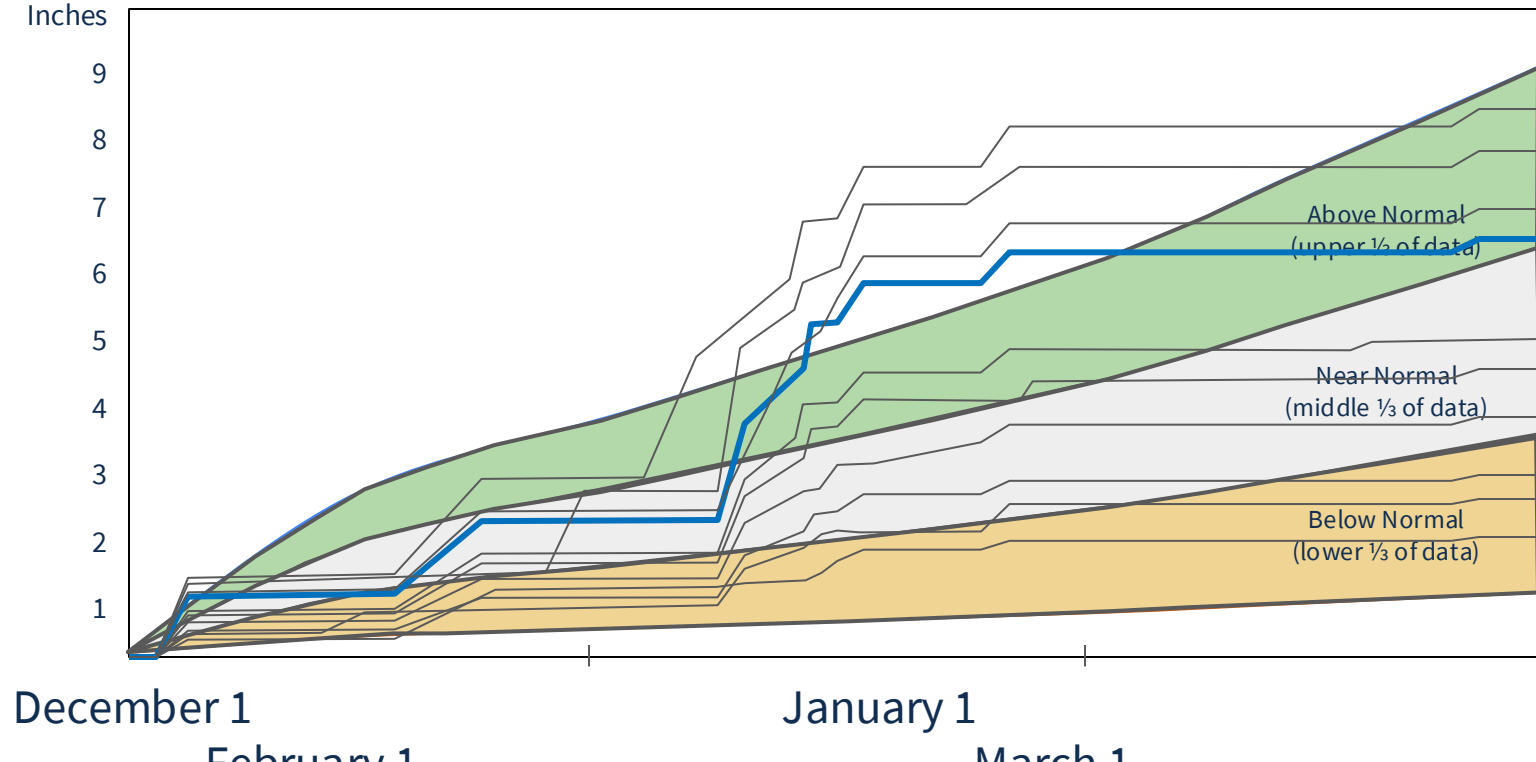
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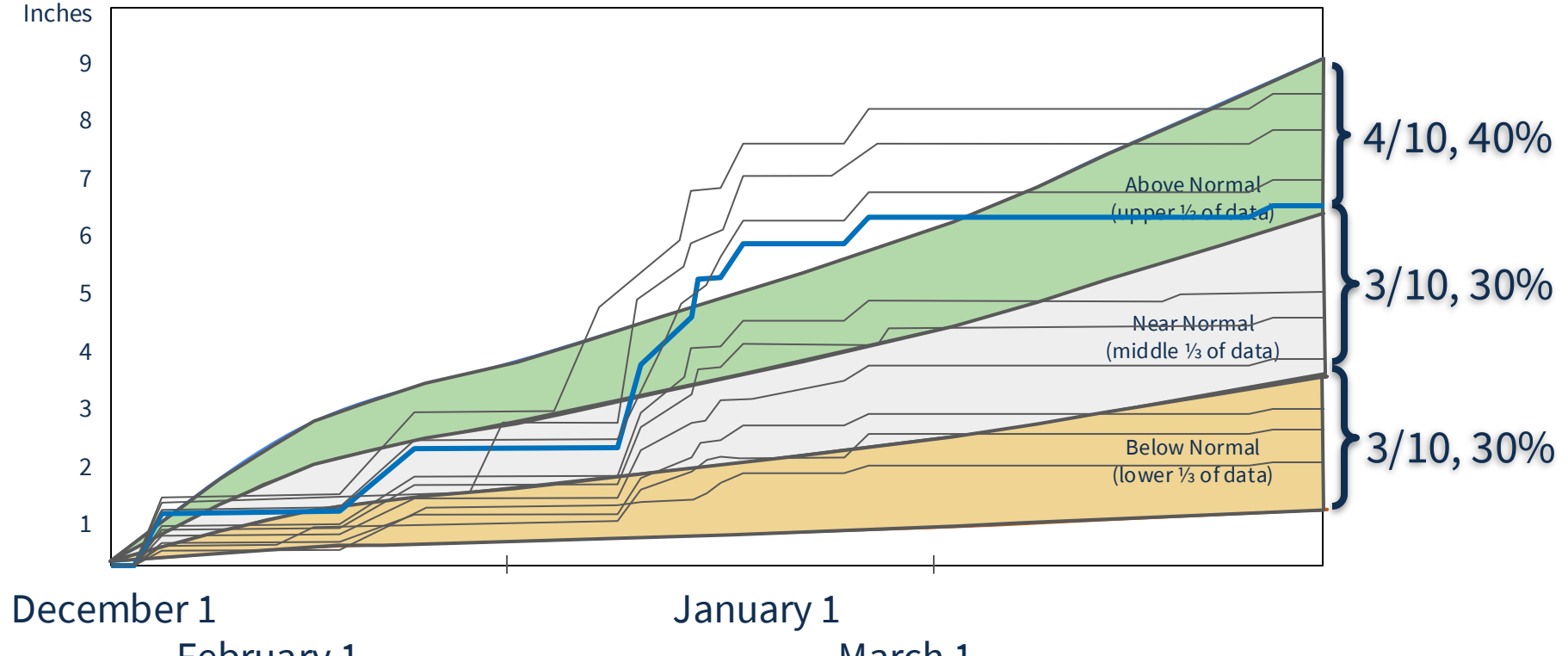
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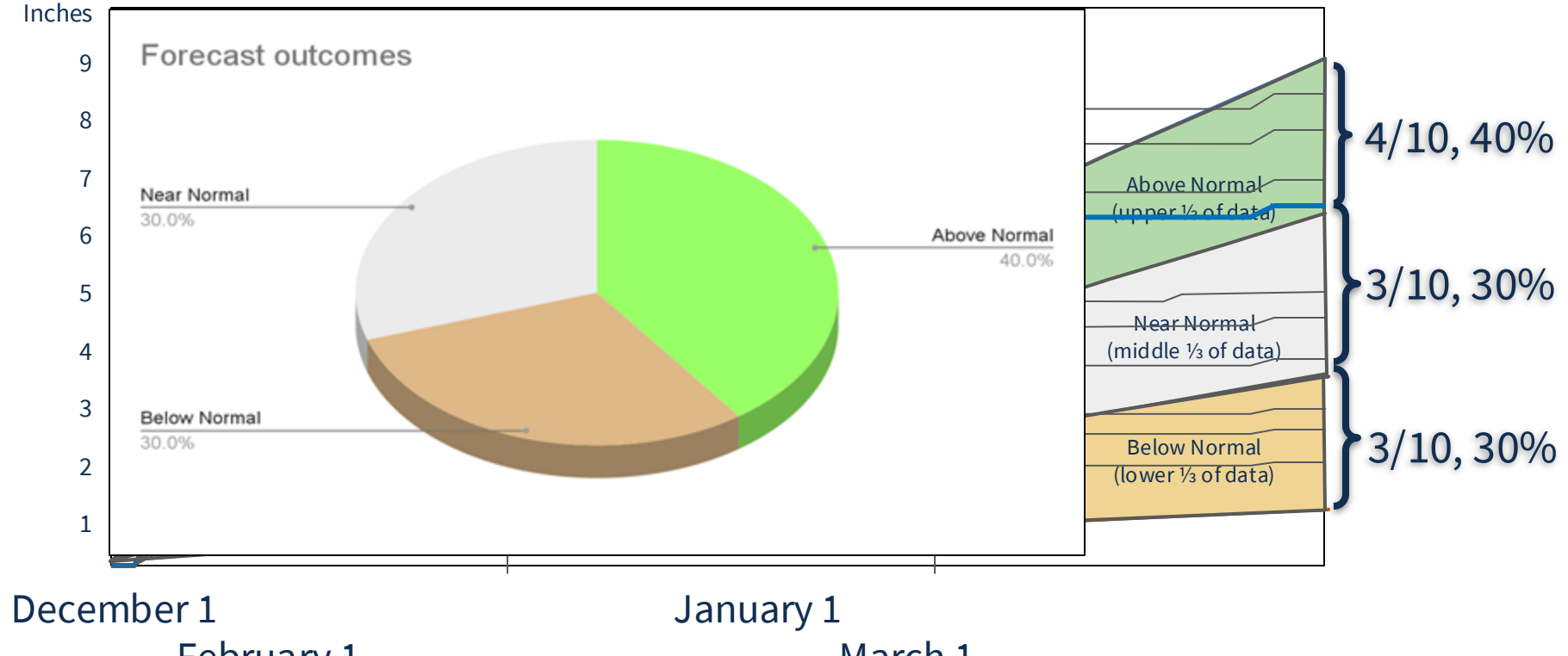
What's a percent chance? How is it calculated and what does it mean?



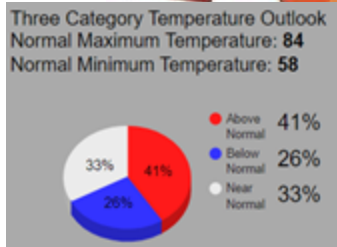
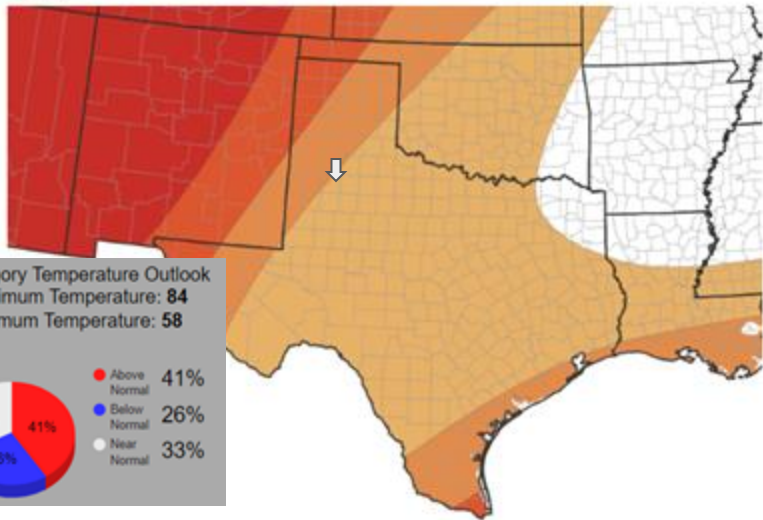
What's a percent chance? How is it calculated and what does it mean?



What's a percent chance? How is it calculated and what does it mean?



Monthly Temperature Outlook for September 1-30, 2024



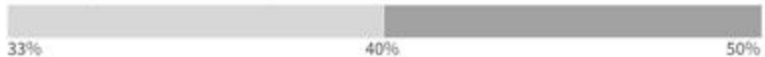
Probability of Below-Normal Temperatures



Probability of Above-Normal Temperatures



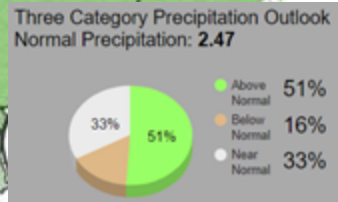
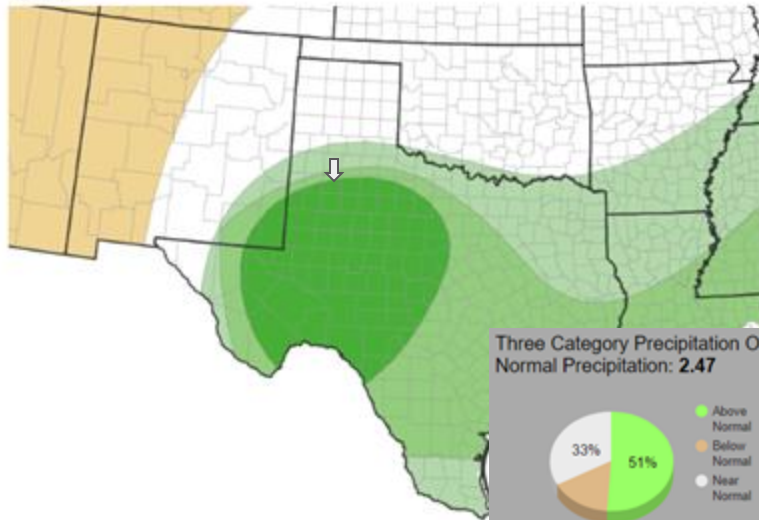
Probability of Near-Normal Temperatures



Source(s): Climate Prediction Center
 Last Updated: 08/31/24

Drought.gov

Monthly Precipitation Outlook for September 1-30, 2024



Probability of Below-Normal Precipitation



Probability of Above-Normal Precipitation



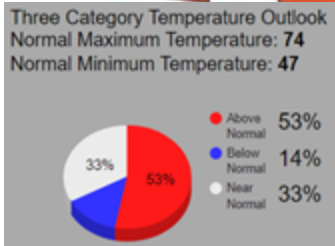
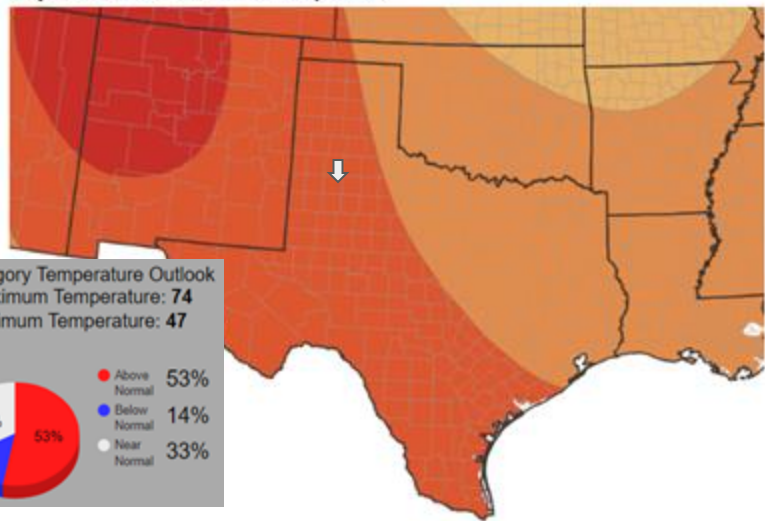
Probability of Near-Normal Precipitation



Source(s): Climate Prediction Center
 Last Updated: 08/31/24

Drought.gov

Seasonal (3-Month) Temperature Outlook for September 1–November 30, 2024



Probability of Below-Normal Temperatures



Probability of Above-Normal Temperatures



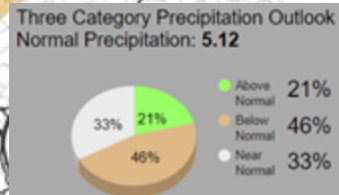
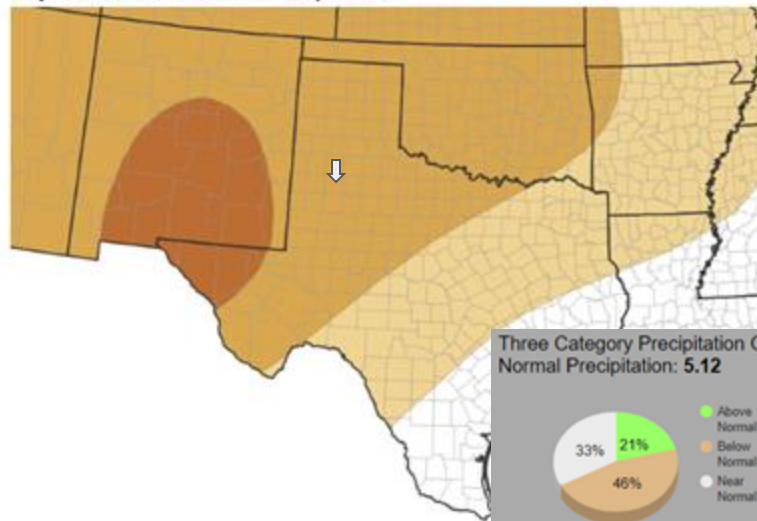
Probability of Near-Normal Temperatures



Source(s): Climate Prediction Center
Last Updated: 08/15/24

Drought.gov

Seasonal (3-Month) Precipitation Outlook for September 1–November 30, 2024



Probability of Below-Normal Precipitation



Probability of Above-Normal Precipitation



Probability of Near-Normal Precipitation



Source(s): Climate Prediction Center
Last Updated: 08/15/24

Drought.gov

Winter 2024-2025: Maybe a La Niña...maybe

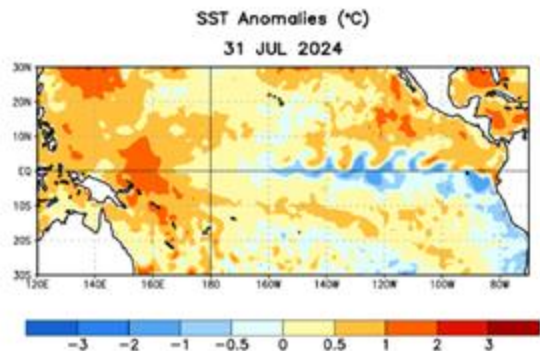
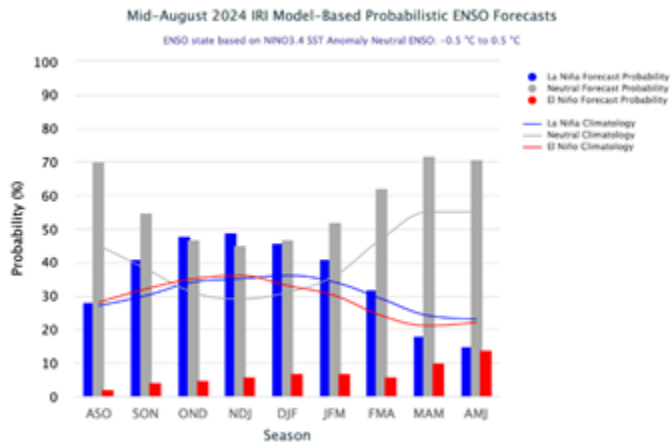
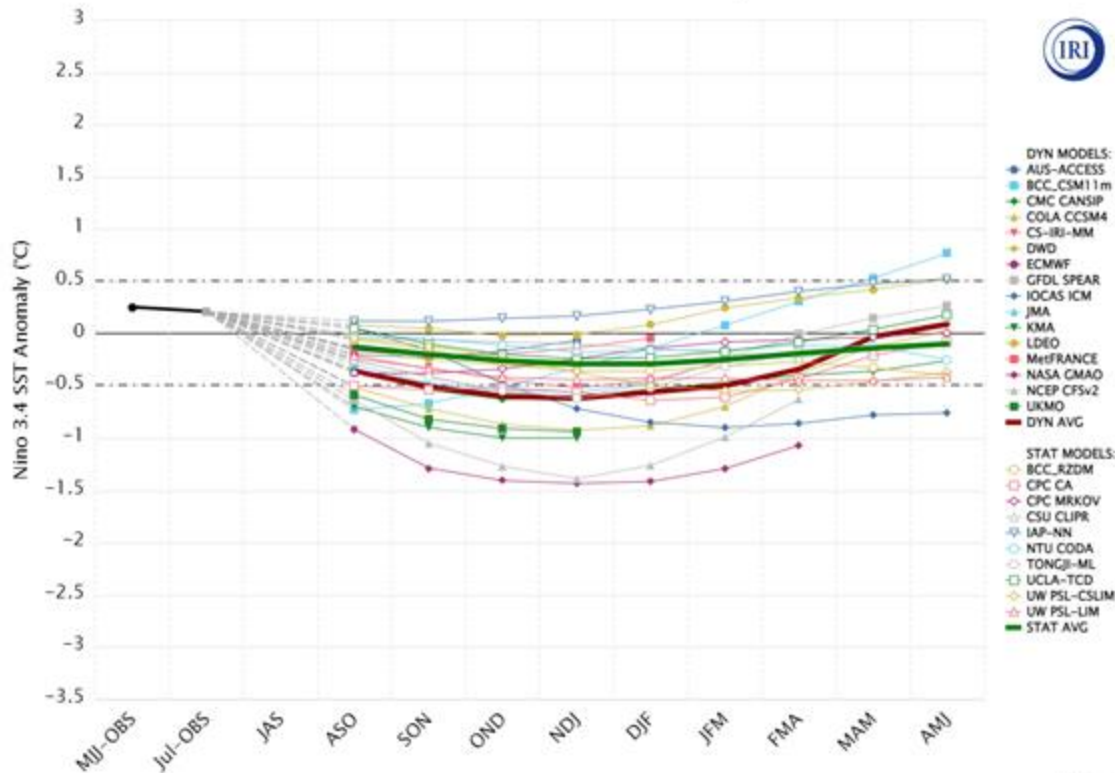


Figure 1. Average sea surface temperature (SST) anomalies (°C) for the week centered on 31 July 2024. Anomalies are computed with respect to the 1991-2020 base period weekly means.

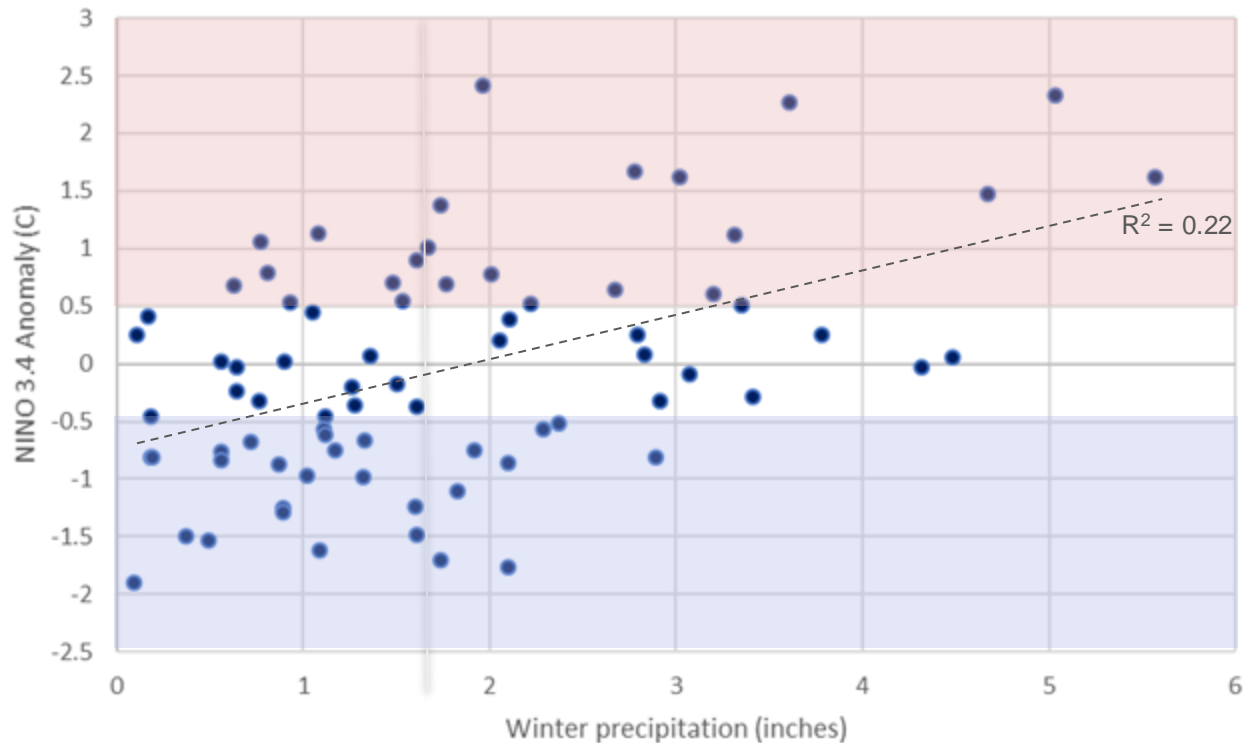


Model Predictions of ENSO from Aug 2024

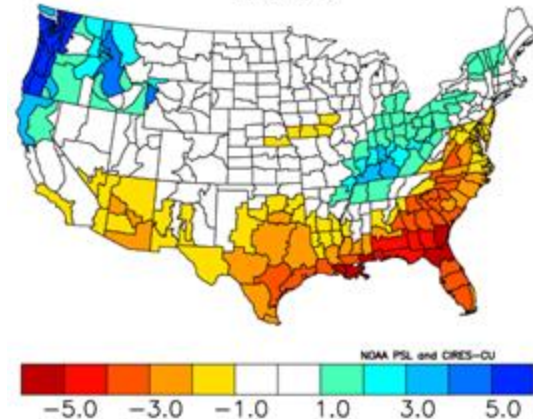


Winter 2024-2025: Maybe a La Niña...maybe

Lubbock Winter Precipitation VS. NINO3.4



NOAA/NCEI Climate Division Composite Precipitation Anomalies (in)
Versus 30 year moving climo
Nov to Mar La Niña 1973-74, 1988-89, 2007-08, 1999-00, 2010-11, 1975-76, 1998-99, 1955-56
1949-50, 1970-71.

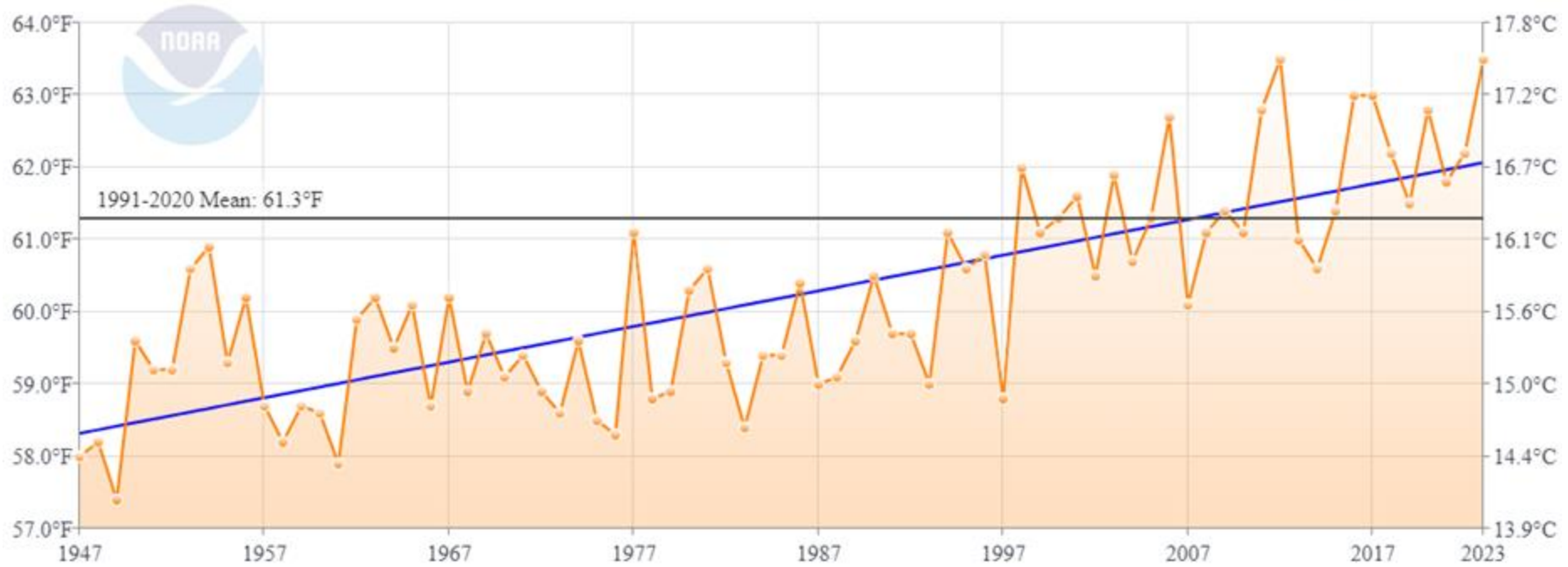


Long-term trends: Temperature

Lubbock, Texas Average Temperature

January-December

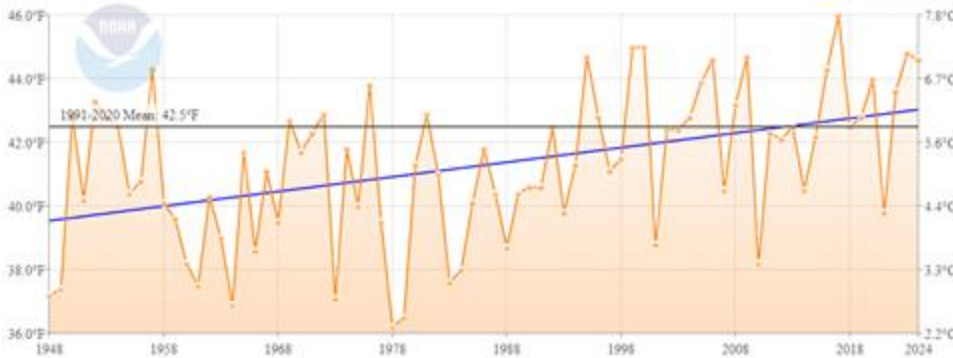
1947-2023 Trend
(+0.5°F/Decade)



Long-term trends: Temperature

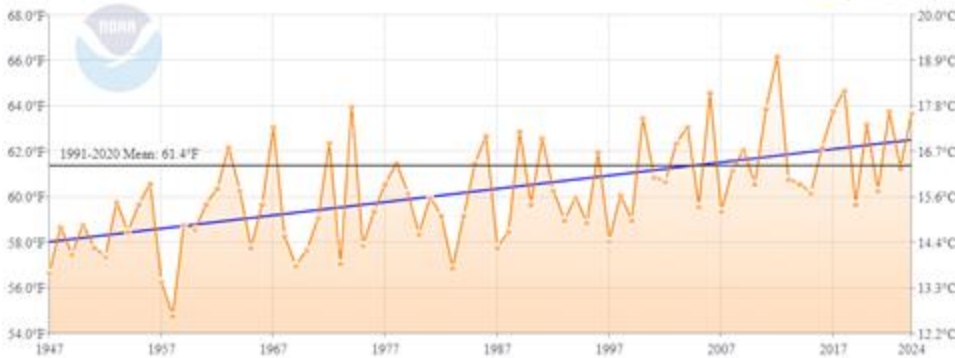
Lubbock, Texas Average Temperature

December-February



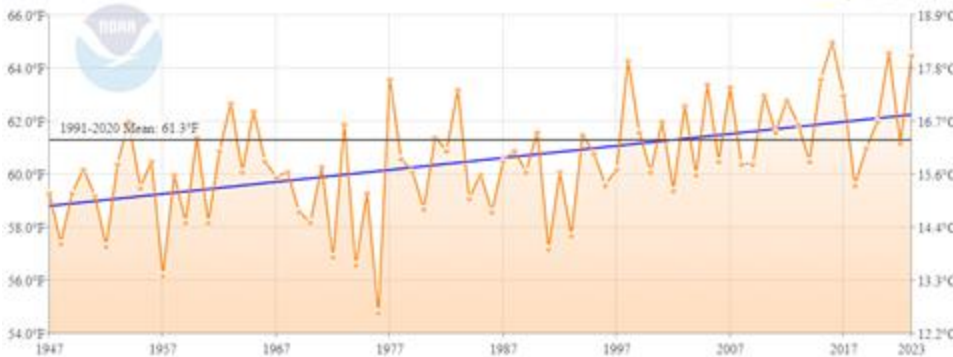
Lubbock, Texas Average Temperature

March-May



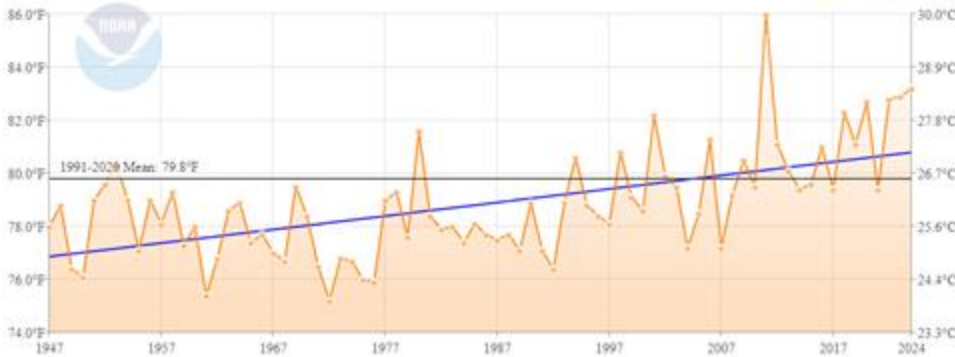
Lubbock, Texas Average Temperature

September-November



Lubbock, Texas Average Temperature

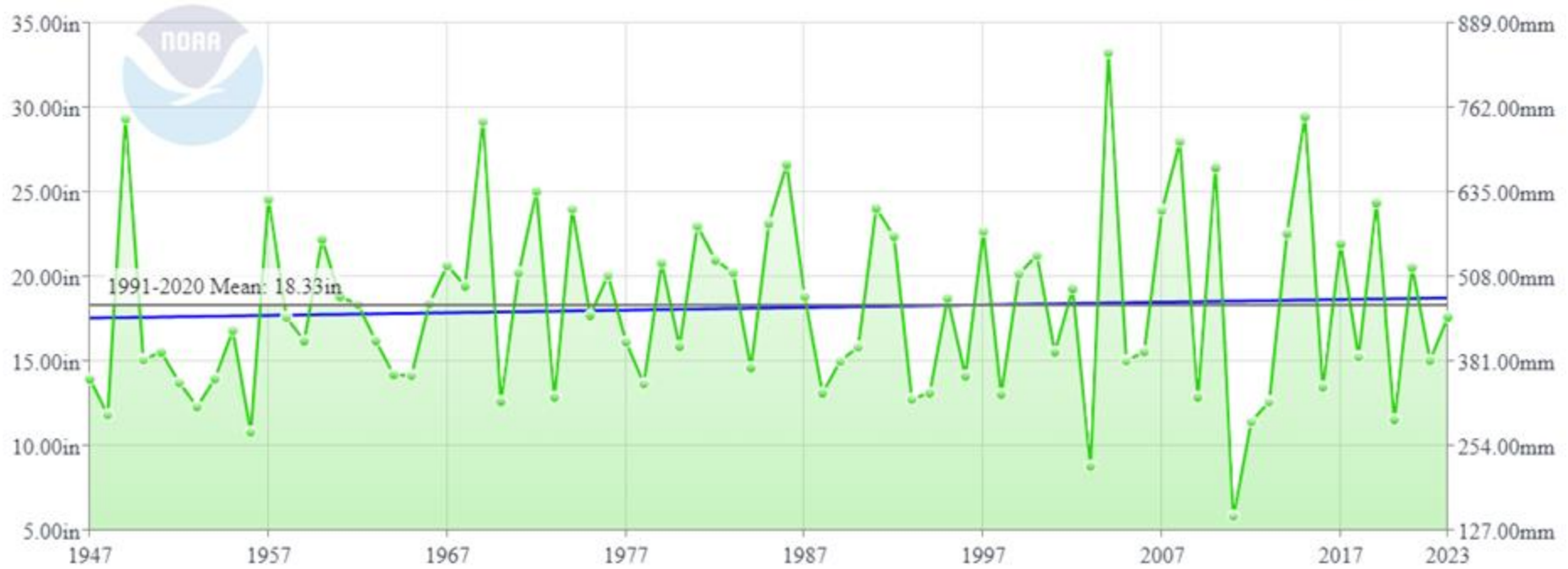
June-August



Long-term trends: Precipitation

Lubbock, Texas Precipitation

January-December



Thank You

For more information, email
joel.lisonbee@noaa.gov.



www.drought.gov



@DroughtGov



@Joel_Lisonbee



@DroughtGov



National Integrated Drought
Information System

