NWS FORM E-5 (11-88) (PRES. by NWS Instruction 10-924)	**U.S. DEPARTMENT OF COMMERCE** NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE
MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS	HYDROLOGIC SERVICE AREA (HSA): **Tulsa, Oklahoma (TSA)** REPORT FOR: MONTH **December** YEAR **2024**
TO: Hydrometeorological Information Center, W/OH2 NOAA / National Weather Service 1325 East West Highway, Room 7230 Silver Spring, MD 20910-3283	SIGNATURE **Steven F. Piltz** (Meteorologist-in-Charge) DATE **January 22, 2025**

When no flooding occurs, include miscellaneous river conditions, such as significant rises, record low stages, ice conditions, snow cover, droughts, and hydrologic products issued (NWS Instruction 10-924)

[X] An "X" in the box indicates no flood stages were reached in this Hydrologic Service Area (HSA) during the month above.

There was a large gradient in rainfall from northwest to southeast across eastern OK and northwest AR in December 2024. The average temperatures across the area this month were generally 3-6°F above normal. Normal precipitation for December ranges from 1.5 inches in Pawnee County to 3.2 inches in Haskell County. Normal precipitation for the Ozark region of northwest Arkansas averages 3.2 inches for the month. This report, past E-5 reports, and monthly hydrology and climatology summaries can be found at https://www.weather.gov/tsa/climo_summary_e5list.

Monthly Summary

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 1a), rainfall totals for December 2024 ranged from around 0.25" to around 8" from northwest to southeast across eastern OK and northwest AR. These rainfall totals correspond to 10% to 200% of the normal December rainfall, with most of the area north of I-40 receiving below normal rainfall for the month and above normal rainfall south of I-40 (Fig. 1b).

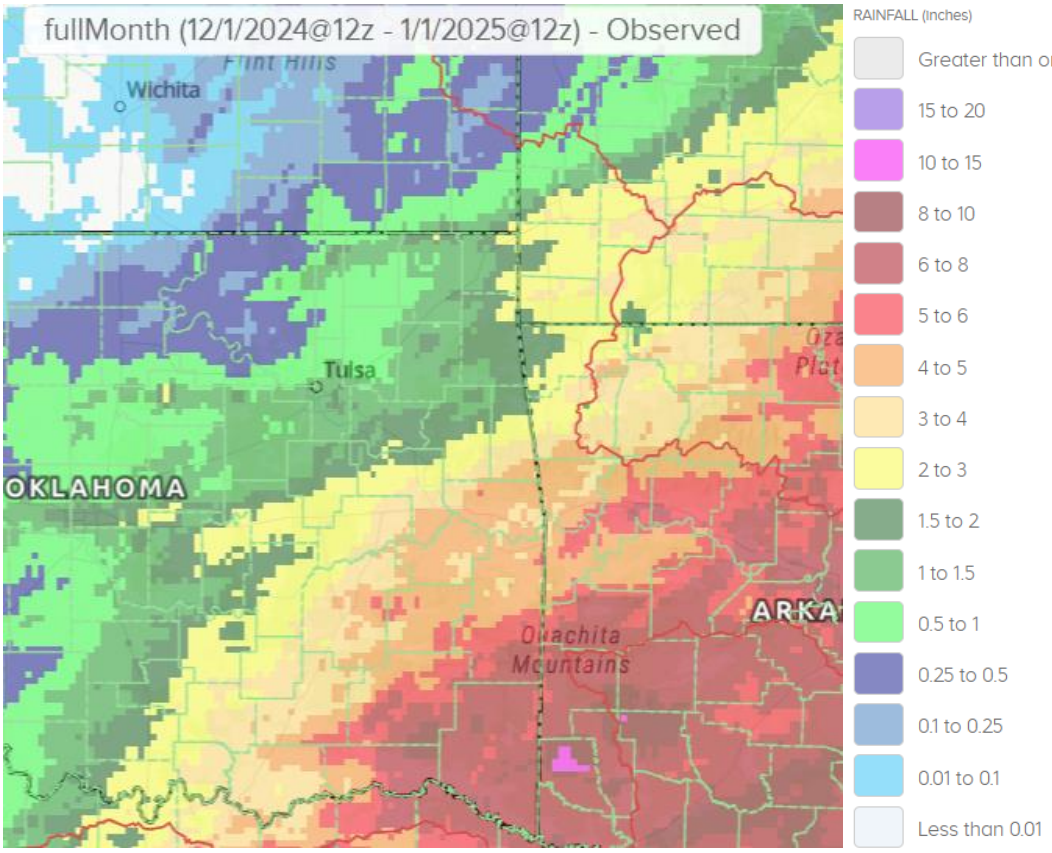


Fig. 1a. Estimated Observed Rainfall for December 2024

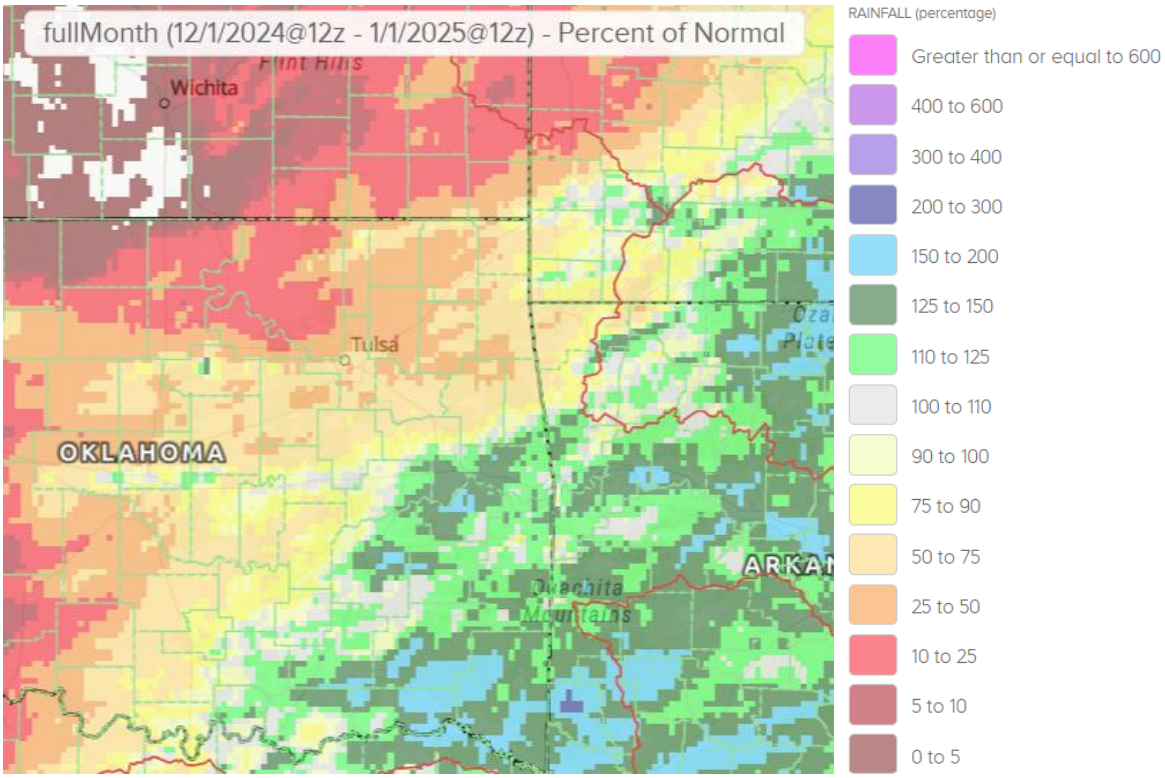


Fig. 1b. Estimated % of Normal Rainfall for December 2024

In Tulsa, OK, December 2024 ranked as the 13th warmest December (44.8°F; since records began in 1905) and the 56th driest December (1.29"; since records began in 1888). Fort Smith, AR had the 9th warmest December (47.4°F, tied 2006; since records began in 1882) and the 29th wettest December (4.43", tied 1991; since records began in 1882). Fayetteville, AR had the 5th warmest (44.2°F, tied 2015) and the 36th driest (2.87") December since records began in 1949.

Some of the larger precipitation reports (in inches) for December 2024 included:

Cloudy, OK (meso)	8.28	Hugo 1.9ENE, OK (coco)	6.77	Antlers, OK (coop)	6.10
Antlers 6.3SE, OK (coco)	6.07	War Eagle 1.4NNW, AR (coco)	5.61	Wister 3.0NNE, OK (coco)	5.50
Ozark 4.6S, AR (coco)	5.39	Talihina, OK (meso)	5.16	Springdale 0.6E, AR (coco)	5.05

Some of the lowest precipitation reports (in inches) for December 2024 included:

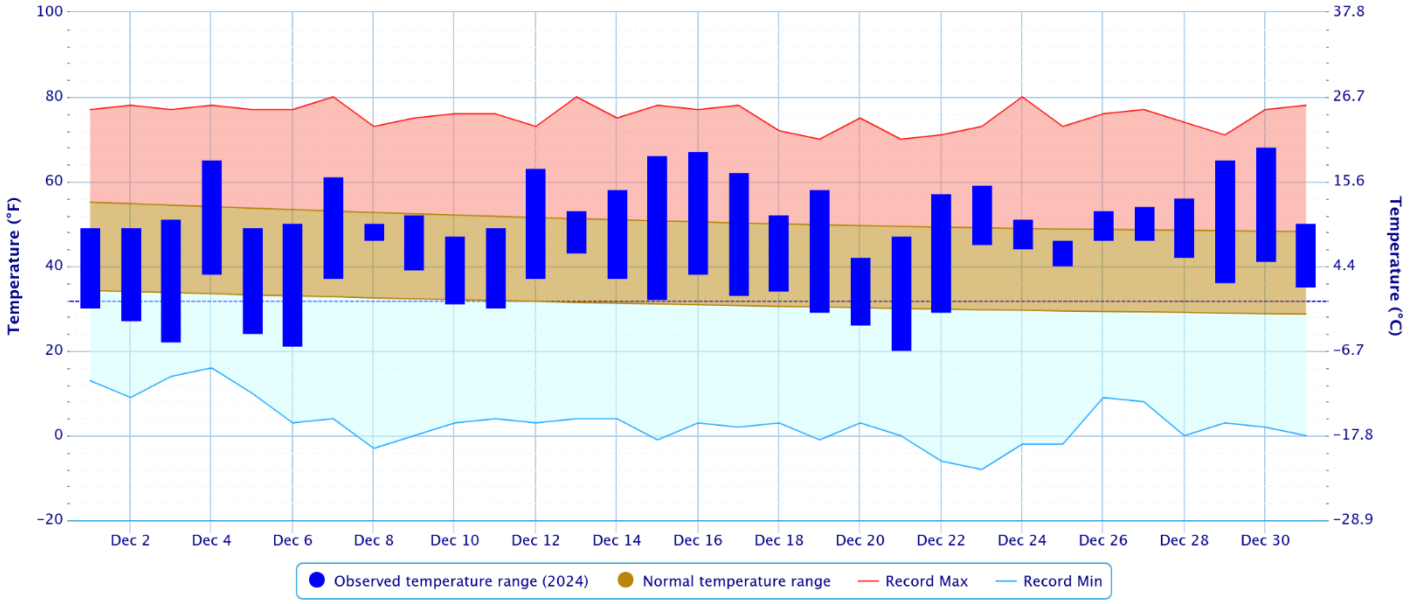
Foraker, OK (meso)	0.36	Burbank, OK (meso)	0.37	Pawnee, OK (meso)	0.38
Wynona, OK (meso)	0.39	Skiatook, OK (meso)	0.58	Owasso 4.6ENE, OK (coco)	0.81
Terlton 3.7ESE, OK (coco)	0.83	Talala, OK (meso)	0.87	Owasso 1.4NNW, OK (coco)	0.87

According to statistics from the Oklahoma Climatological Survey (OCS) Mesonet:

Rank since 1921	December 2024	Last 60 Days (Nov 2 – Dec 31)	Growing Season-to-Date (Sep 1 – Dec 31)	Water Year-to-Date (Oct 1, 2024 – Dec 31, 2024)	Last 180 Days (Jul 5 – Dec 31)	2024
Northeast OK	28th driest	**3rd wettest**	45th wettest	15th wettest	52nd wettest	51st wettest
East Central OK	34th wettest	**5th wettest**	43rd wettest	23rd wettest	28th wettest	26th wettest
Southeast OK	15th wettest	11th wettest	43rd wettest	31st wettest	47th driest	48th wettest
Statewide	50th driest	**2nd wettest**	38th wettest	22nd wettest	38th wettest	46th wettest

Daily Temperature Data – Tulsa Area, OK (ThreadEx)

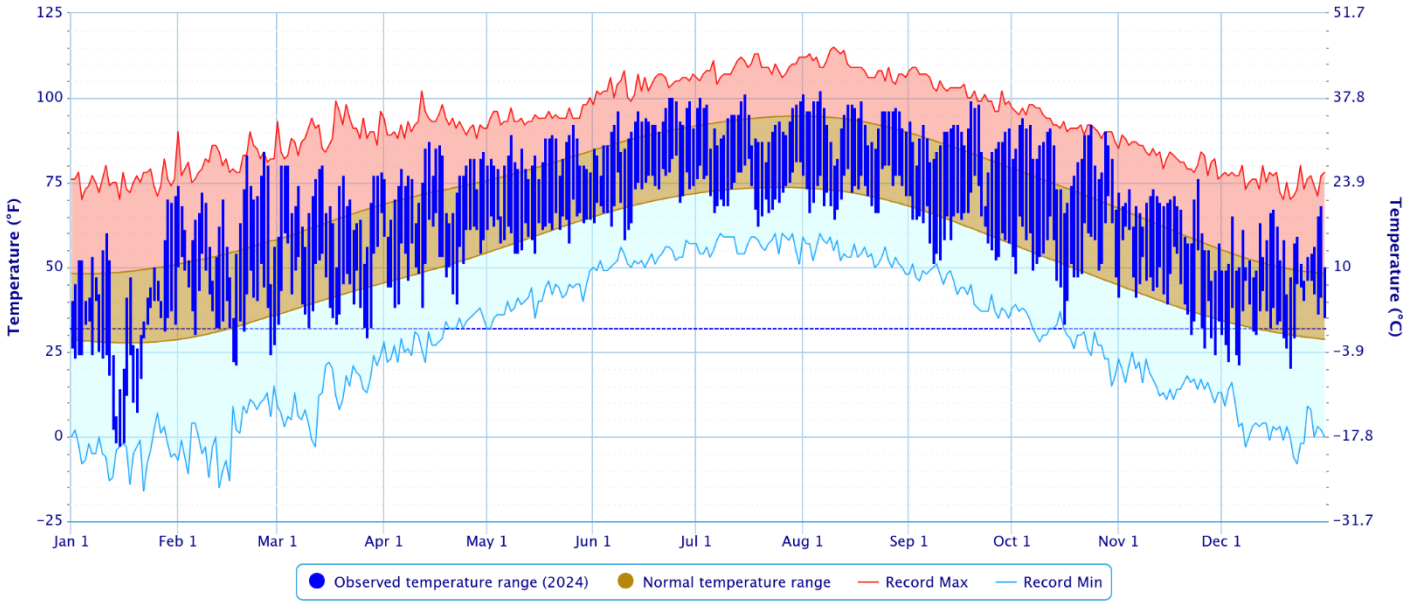
Period of Record – 1905-01-06 to 2025-01-12. Normals period: 1991-2020. Click and drag to zoom chart.



Powered by ACIS

Daily Temperature Data – Tulsa Area, OK (ThreadEx)

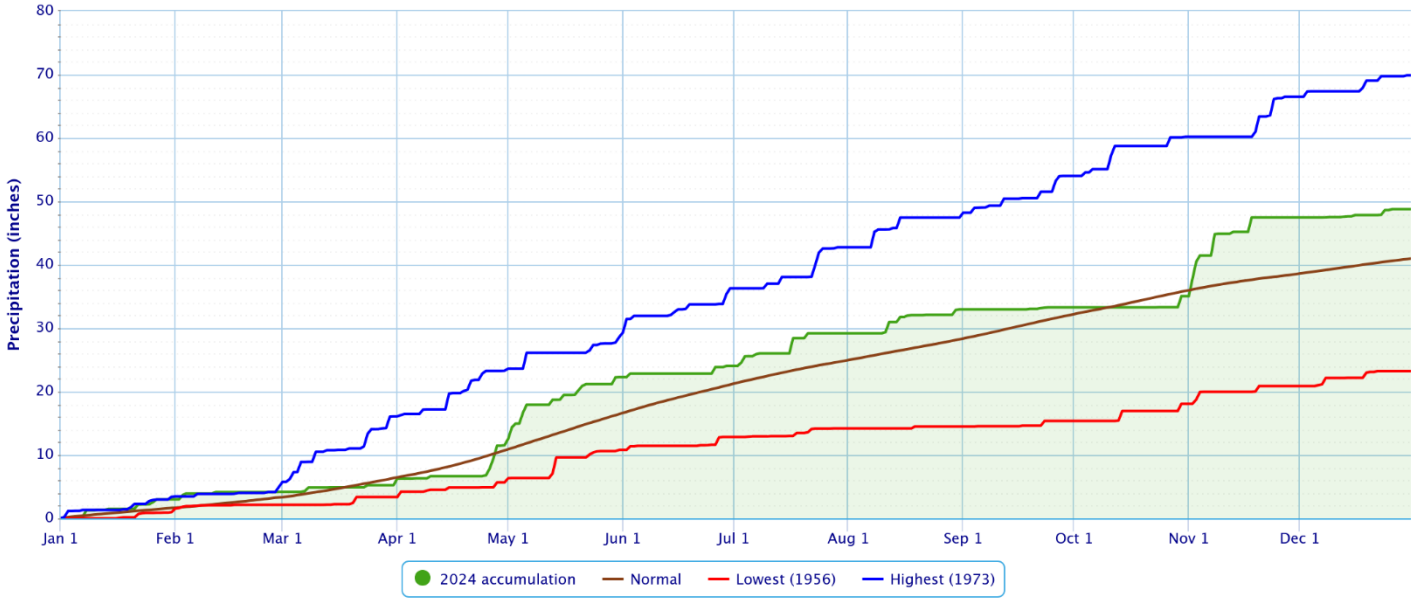
Period of Record – 1905-01-06 to 2025-01-12. Normals period: 1991-2020. Click and drag to zoom chart.



Powered by ACIS

Accumulated Precipitation – Tulsa Area, OK (ThreadEx)

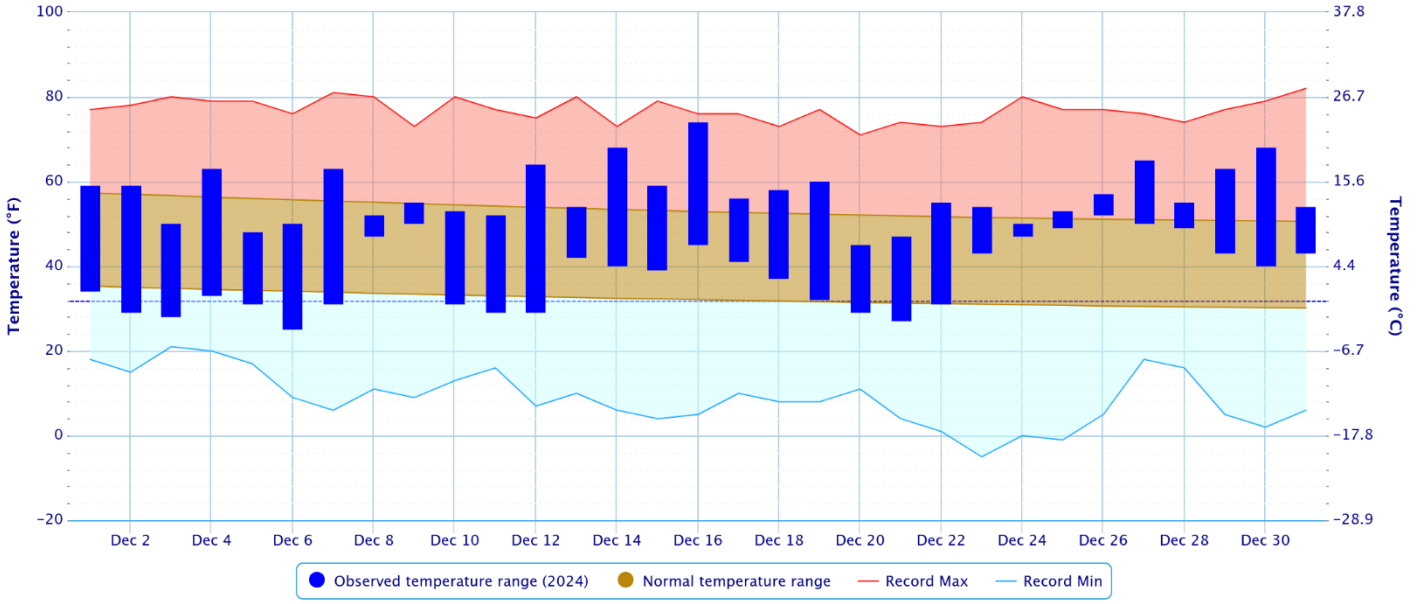
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

Daily Temperature Data – FORT SMITH REGIONAL AP, AR

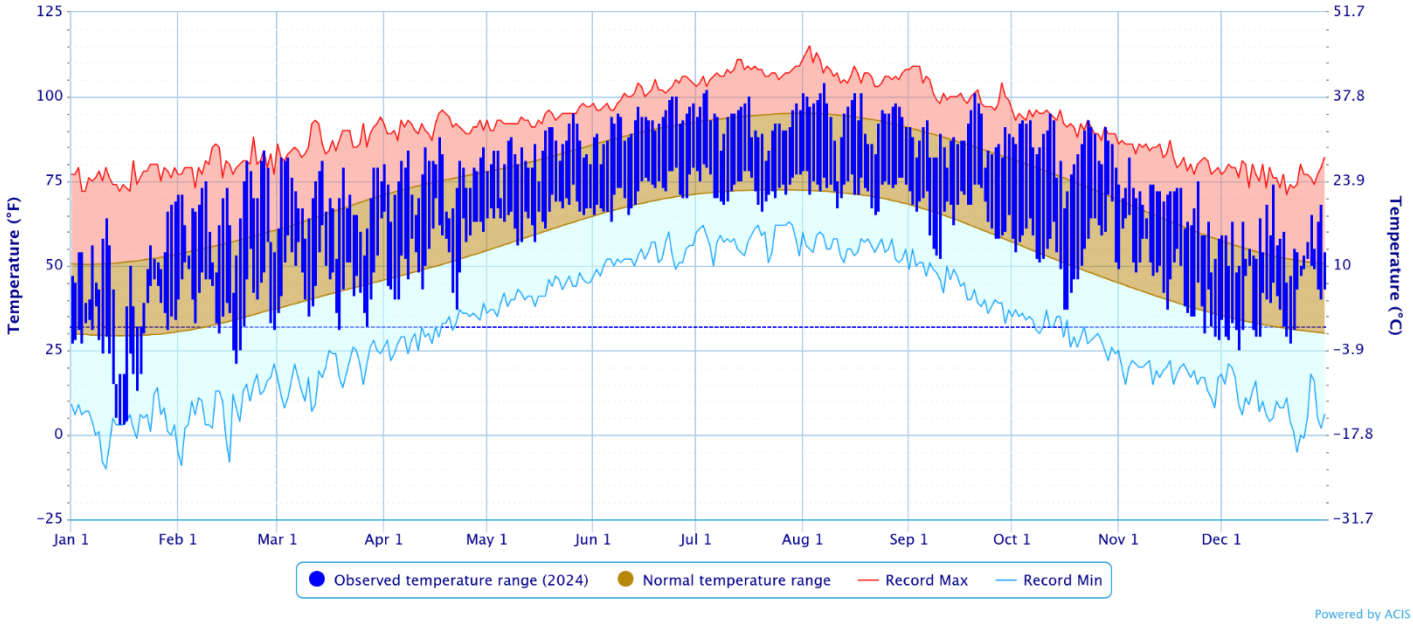
Period of Record – 1945-09-27 to 2025-01-12. Normals period: 1991-2020. Click and drag to zoom chart.



Powered by ACIS

Daily Temperature Data – FORT SMITH REGIONAL AP, AR

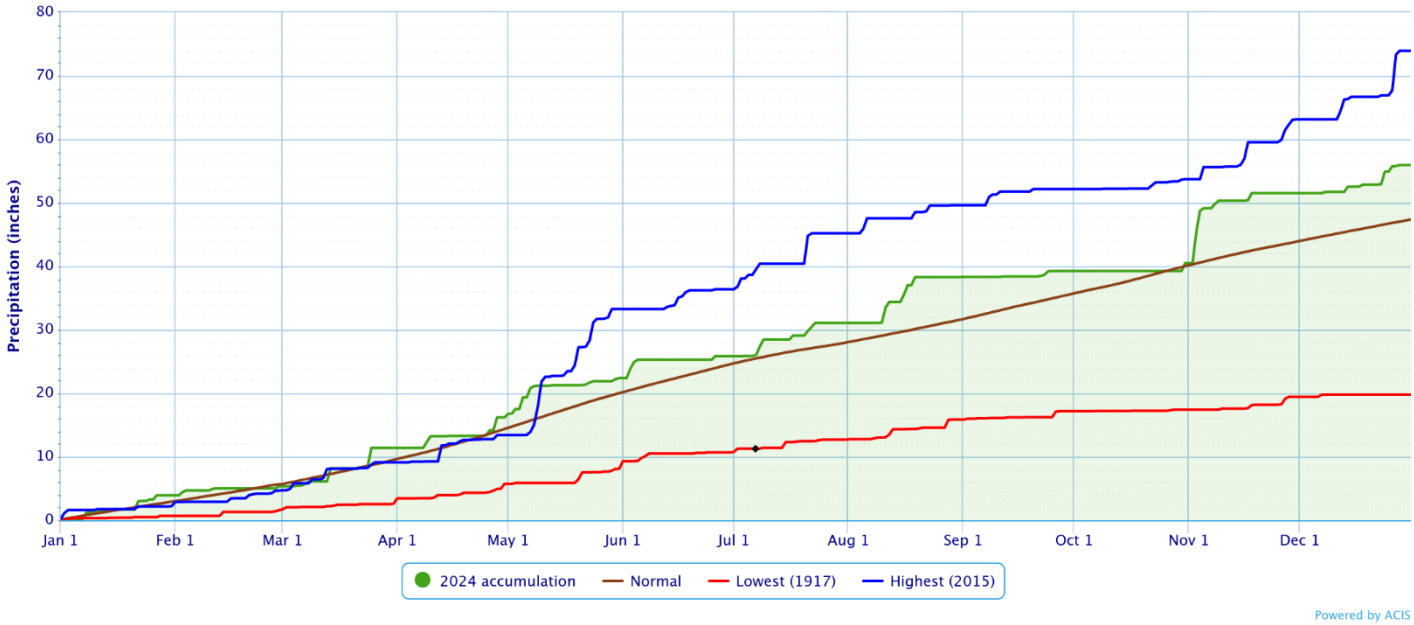
Period of Record – 1945-09-27 to 2025-01-12. Normals period: 1991-2020. Click and drag to zoom chart.



Powered by ACIS

Accumulated Precipitation – Fort Smith Area, AR (ThreadEx)

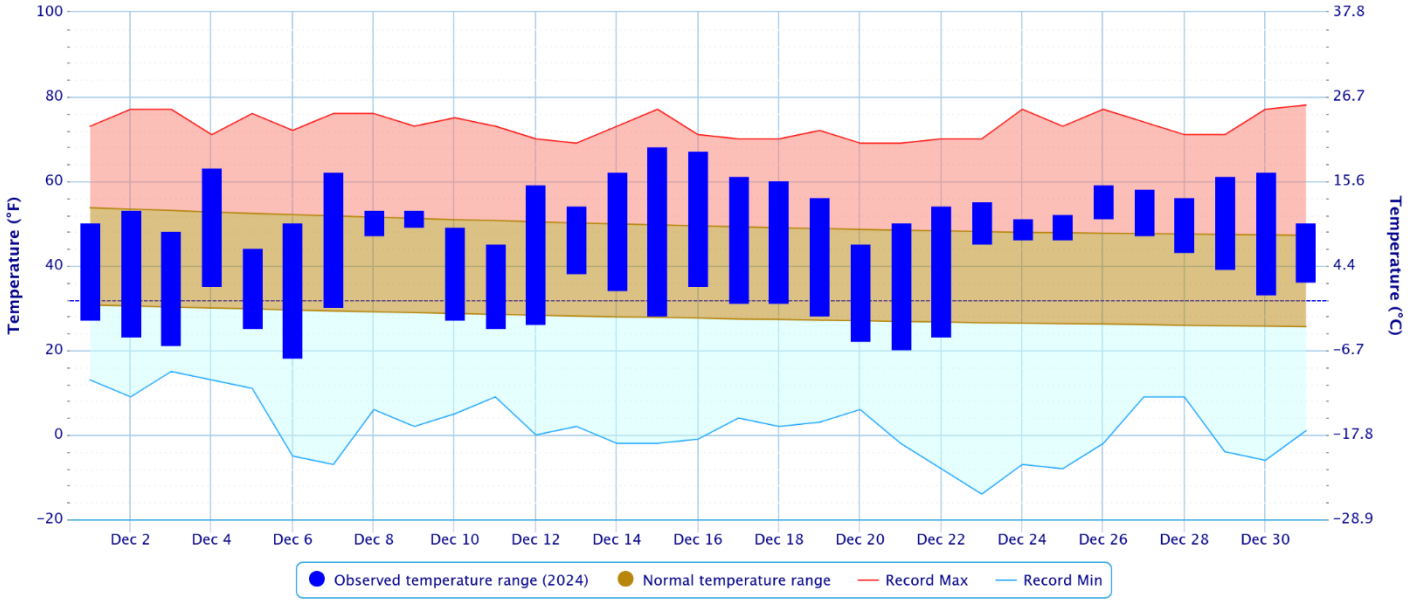
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

Daily Temperature Data – FAYETTEVILLE DRAKE FIELD, AR

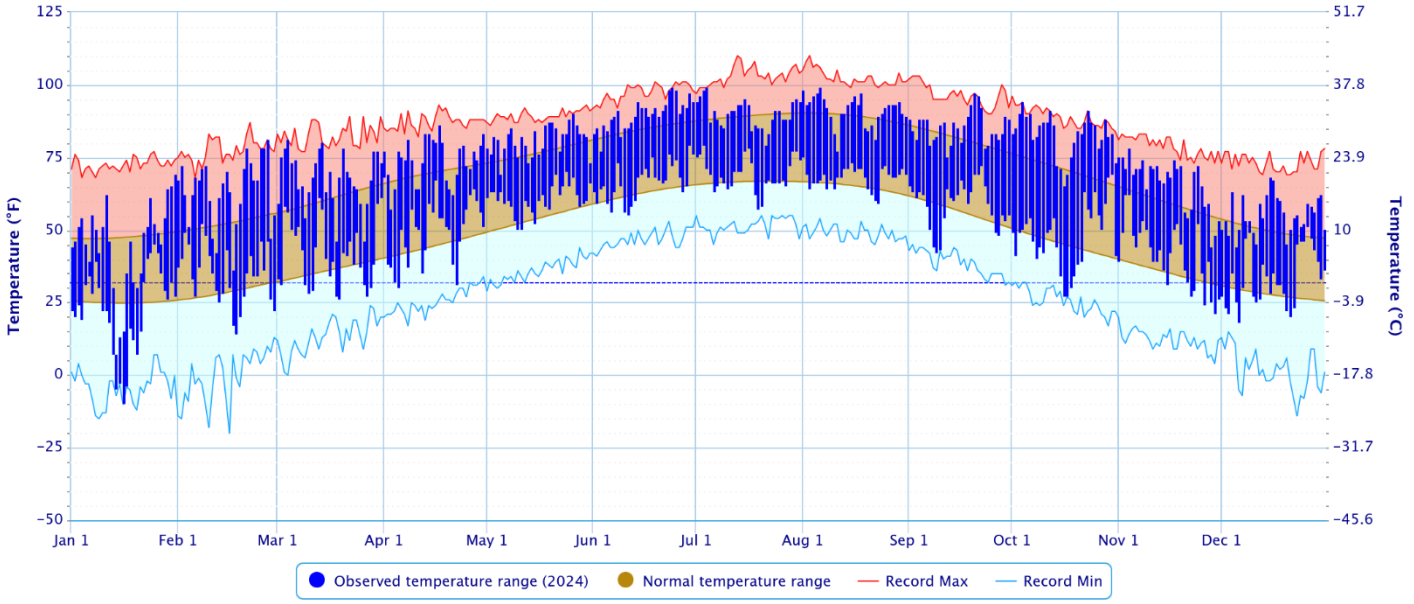
Period of Record – 1949-07-14 to 2025-01-12. Normals period: 1991-2020. Click and drag to zoom chart.



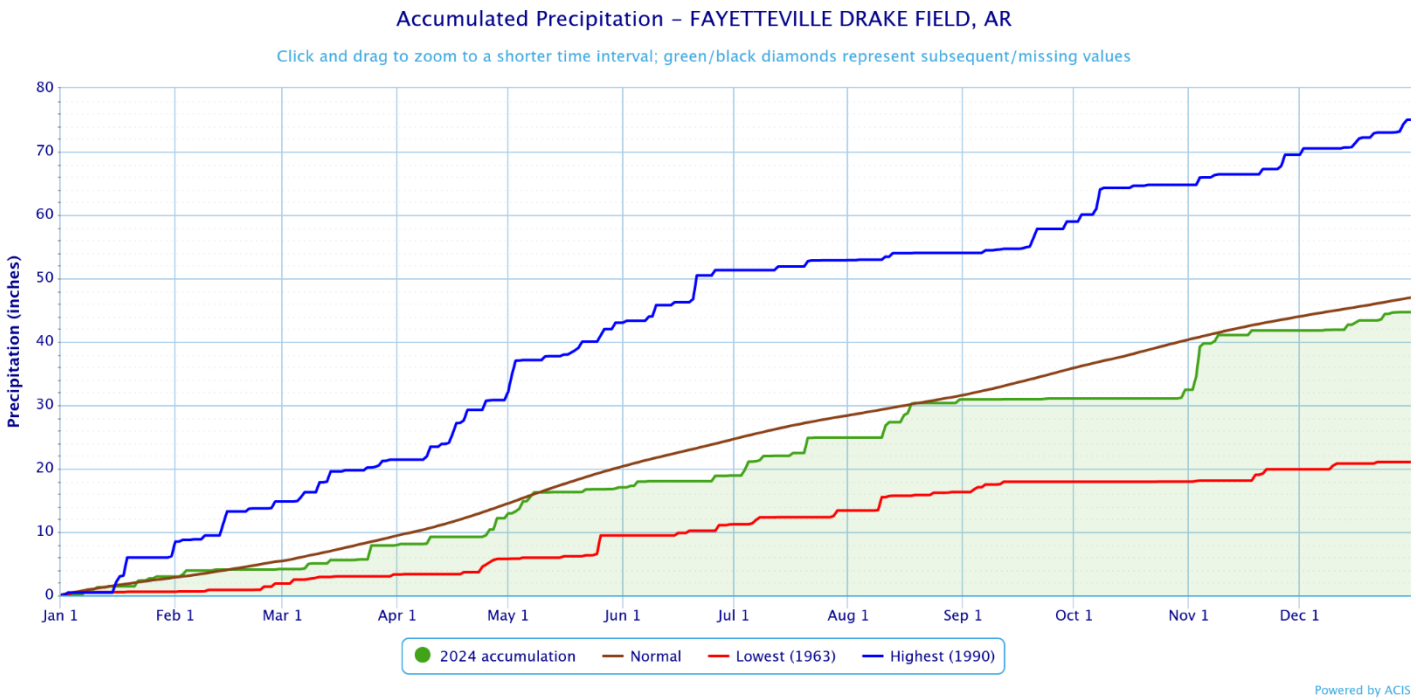
Powered by ACIS

Daily Temperature Data – FAYETTEVILLE DRAKE FIELD, AR

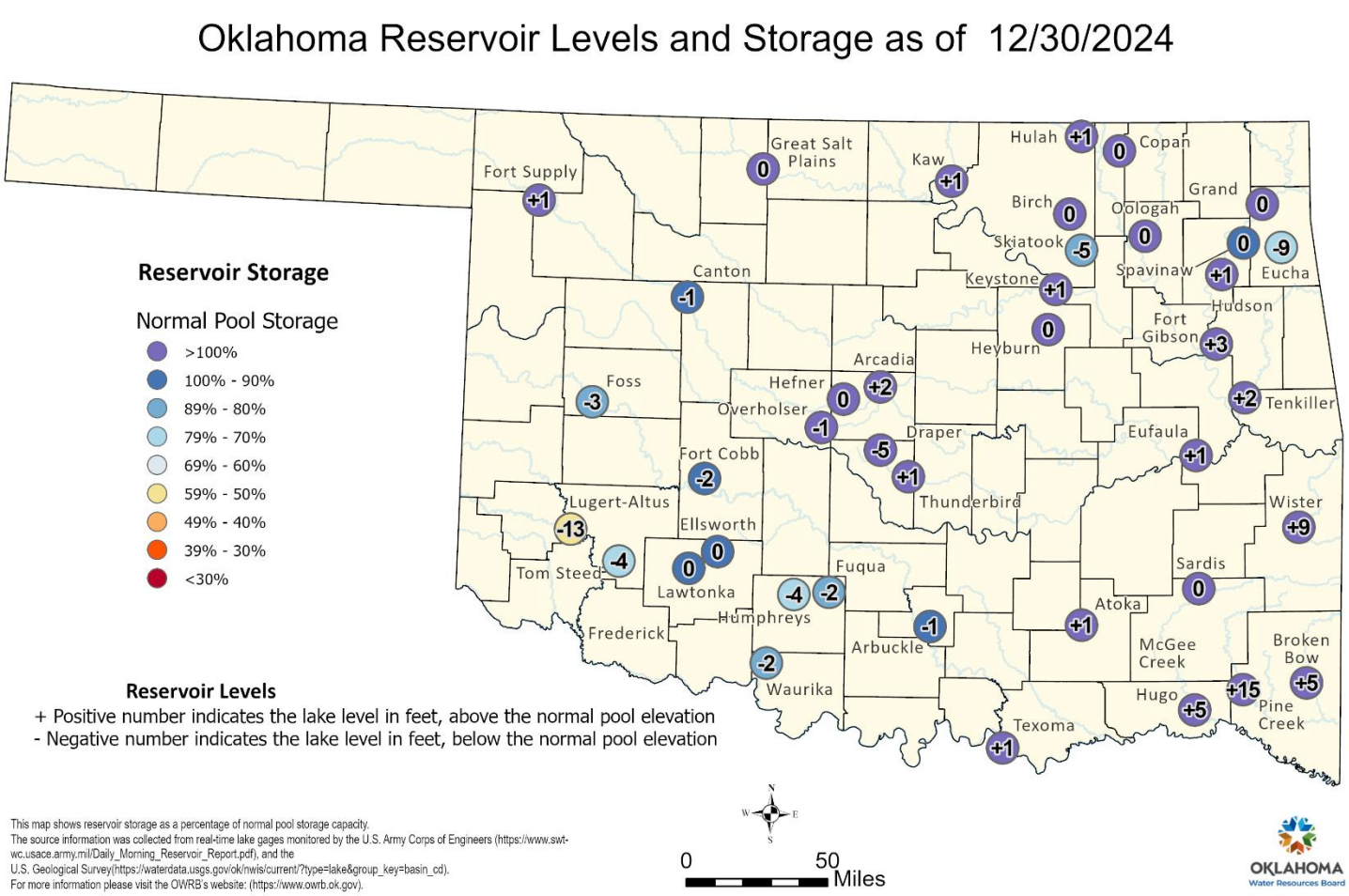
Period of Record – 1949-07-14 to 2025-01-12. Normals period: 1991-2020. Click and drag to zoom chart.



Powered by ACIS



Reservoirs



According to the USACE, a few lakes in the HSA were above 3% of top of their conservation pools as of 12/31/2024: Wister Lake 23%, Hugo Lake 10%, Hudson Lake 7%, Ft. Gibson Lake 6%, and Tenkiller Lake 5%. One lake was more than 3% below the top of its conservation pool: Skiatook Lake 85%.

Drought

According to the U.S. Drought Monitor (USDM) from December 31, 2024 (Figs. 2, 3), Severe (D2) Drought was present in a small portion of eastern Kay County in eastern OK. Moderate (D1) drought conditions were occurring across portions of Osage, Pawnee, eastern Kay, and Choctaw Counties in eastern OK. Abnormally Dry (D0) but not in drought conditions existed over parts of Osage, Pawnee, Creek, Craig, Rogers, Mayes, Ottawa, Delaware, Pittsburg, Latimer, Le Flore, Pushmataha, and Choctaw Counties in eastern OK. There were no indications of drought across northwest AR.

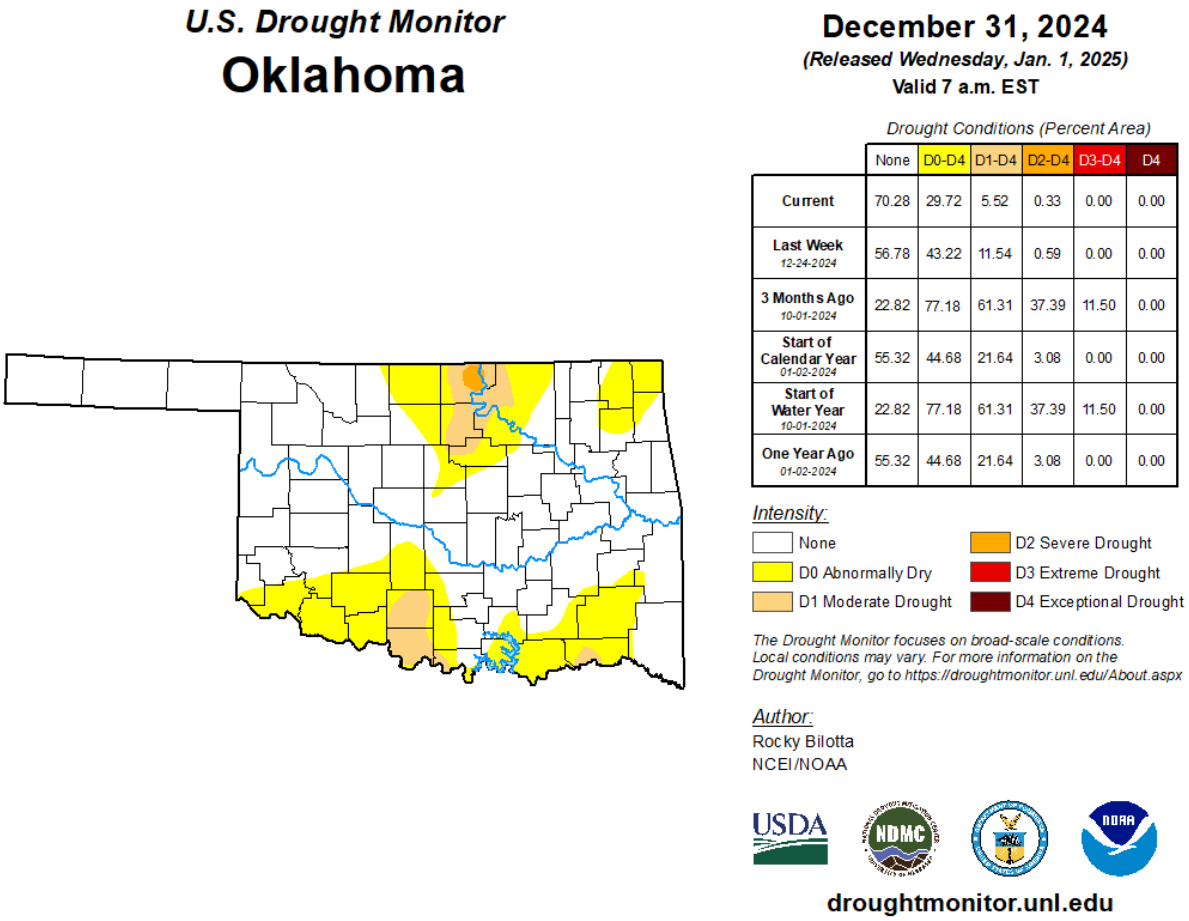


Fig. 2. Drought Monitor for Oklahoma

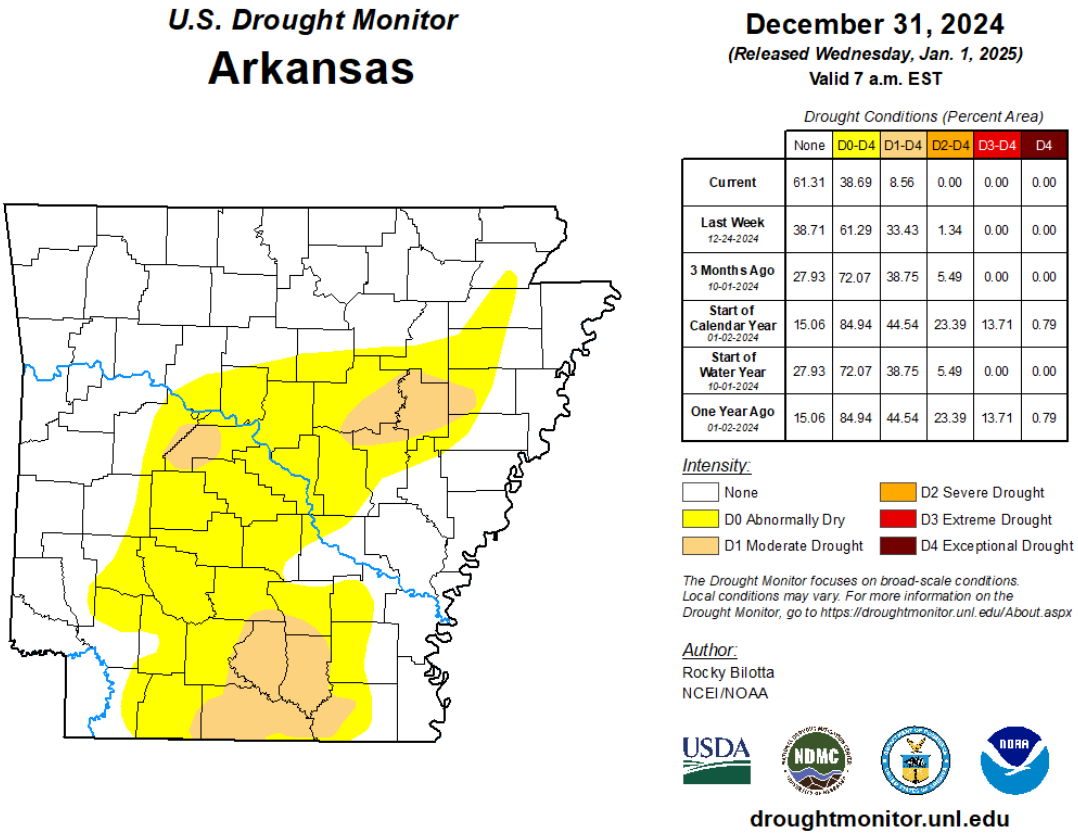


Fig. 3. Drought Monitor for Arkansas

2024 Annual Summary

Using the radar-derived estimated observed precipitation from the RFCs (Figs. 4a, 5), rainfall totals for 2024 ranged from around 30” to 72” across eastern OK and northwest AR, with much of the area receiving 40”-50”. These rainfall totals correspond to 70% to 140% of the normal annual rainfall, with most of the area receiving 75%-110% of normal for the year (Fig. 4b). In Oklahoma, there were 152 tornadoes confirmed in 2024, breaking the previous annual record number of tornadoes of 149 in 2019. Arkansas had 52 confirmed tornadoes in 2024. See https://arcg.is/0eHLf0 for details about the tornadoes that occurred in the NWS Tulsa area of eastern OK and northwest AR. The official observing station for Fayetteville, AR (located at Drake Field) recorded its warmest year since records began in 1950. Fort Smith, AR and Tulsa, OK recorded their 2nd and 3rd warmest year on record respectively. According to the National Centers for Environmental Information (NCEI), Oklahoma’s statewide average temperature for 2024 was 63.2°F, tying 2012 as the warmest calendar year on record (records began in 1895), and was 2.8 degrees above normal. The statewide average temperature for Arkansas was 63.3°F, tying 1921 as the 2nd warmest year on record since 1895.

In Tulsa, OK, 2024 ranked as the 3rd warmest Year (63.8°F, tied 1921; since records began in 1905), the 19th wettest Year (48.77”, tied 1984; since records began in 1888), and the 16th least snowy Year (1.6”; since records began in 1900). Fort Smith, AR had the 2nd warmest Year (65.6°F; since records began in 1883), the 17th wettest Year (55.94”; since records began in 1883), and the 51st least snowy Year (2.5”, tied 1926; since records began in 1884). Fayetteville, AR had the Record warmest (61.7°F, previous record 60.8°F in 2023), the 34th driest (44.65”), and the 32nd least snowy Year since records began in 1950.

Some of the larger precipitation reports (in inches) for 2024 included:

Winslow 7NE, AR (coop)	60.18	Ozark 4.6S, AR (coco)	58.83	Wister 3.0NNE, OK (coco)	58.70
Bunch 0.8N, OK (coco)	58.01	Riverdale 4.2E, AR (coco)	56.48	Fort Smith, AR (ASOS)	55.94
McAlester, OK (meso)	55.13	Greenwood 0.9S, AR (coco)	54.96	Van Buren 2.1NNW, AR (coco)	54.15

Some of the lowest precipitation reports (in inches) for 2024 included:

Foraker, OK (meso)	34.31	Burbank, OK (meso)	34.38	Copan, OK (meso)	35.71
XNA Springdale, AR (ASOS)	35.78	Oilton, OK (meso)	36.15	Nowata, OK (meso)	36.92
Pawnee, OK (meso)	36.95	Miami, OK (meso)	37.26	Talala, OK (meso)	37.51

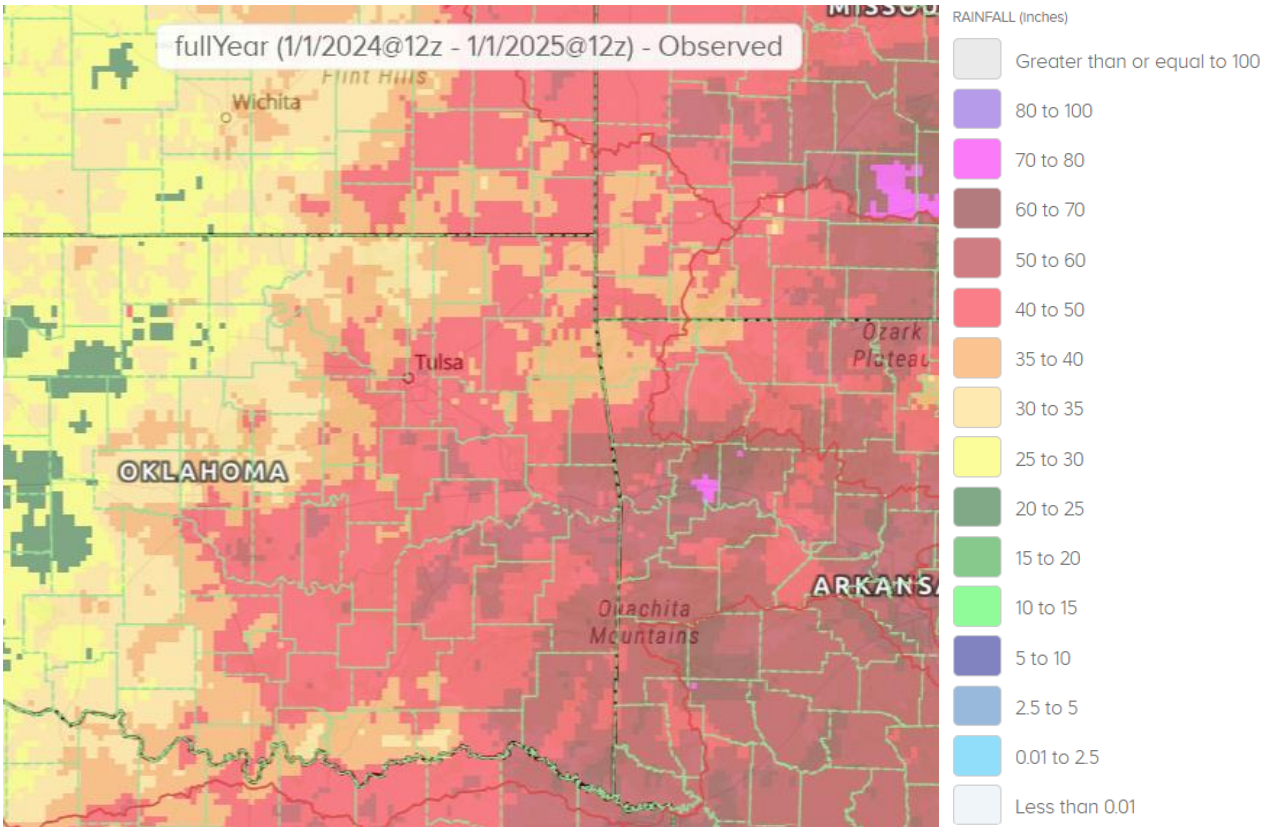


Fig. 4a. Estimated Observed Rainfall for 2024

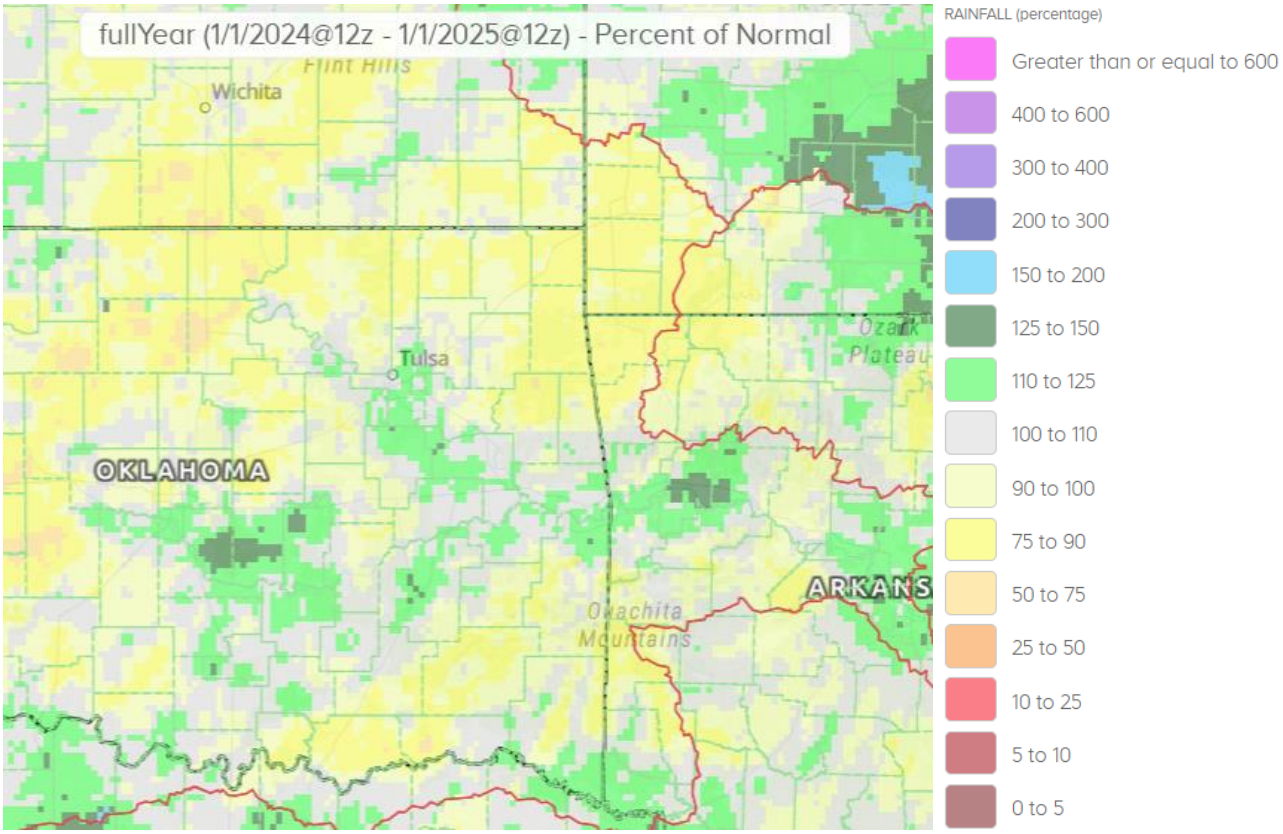


Fig. 4b. Estimated % of Normal Rainfall for 2024

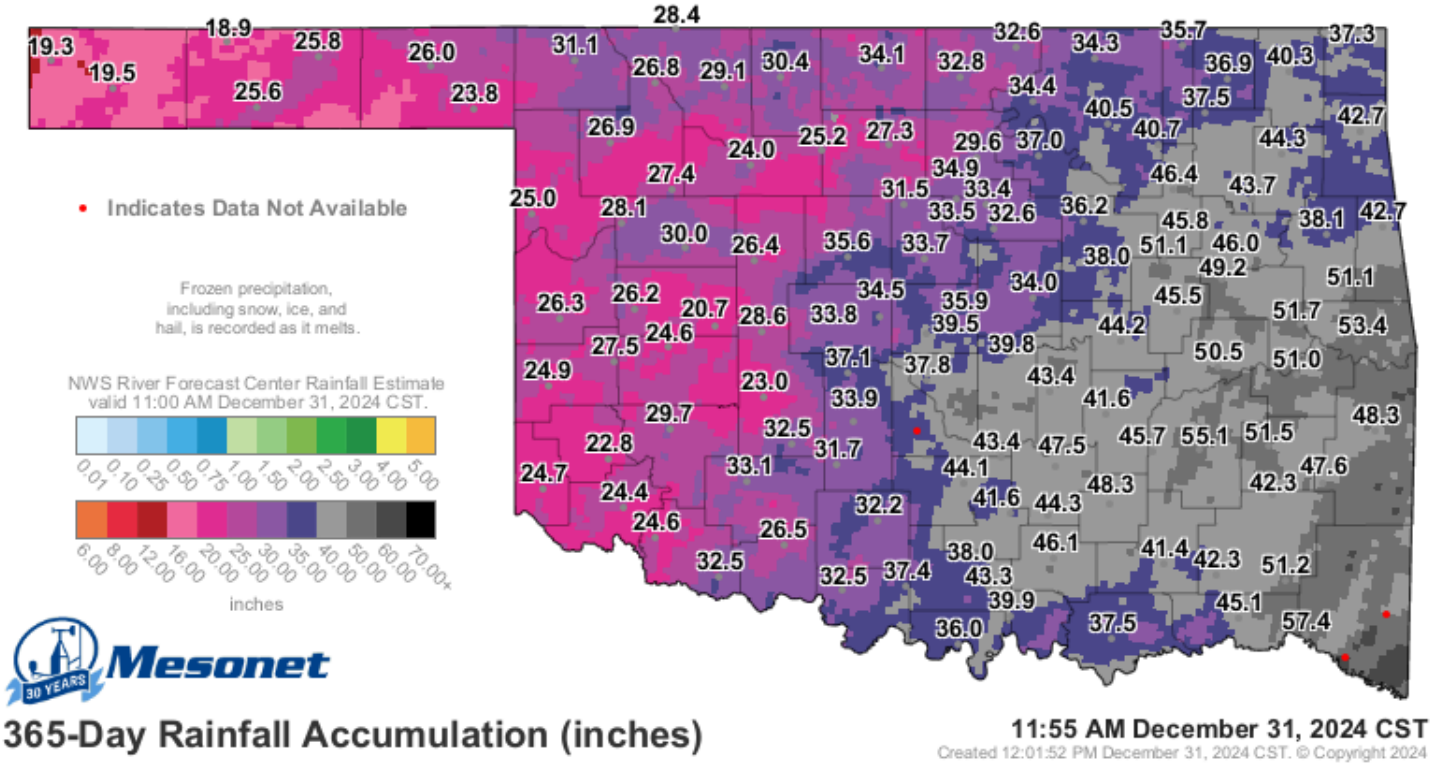


Fig. 5. OK Mesonet (values) and NWS RFC rainfall estimate (image) 365-day rainfall ending at 11:55 am CST 12/31/2024.

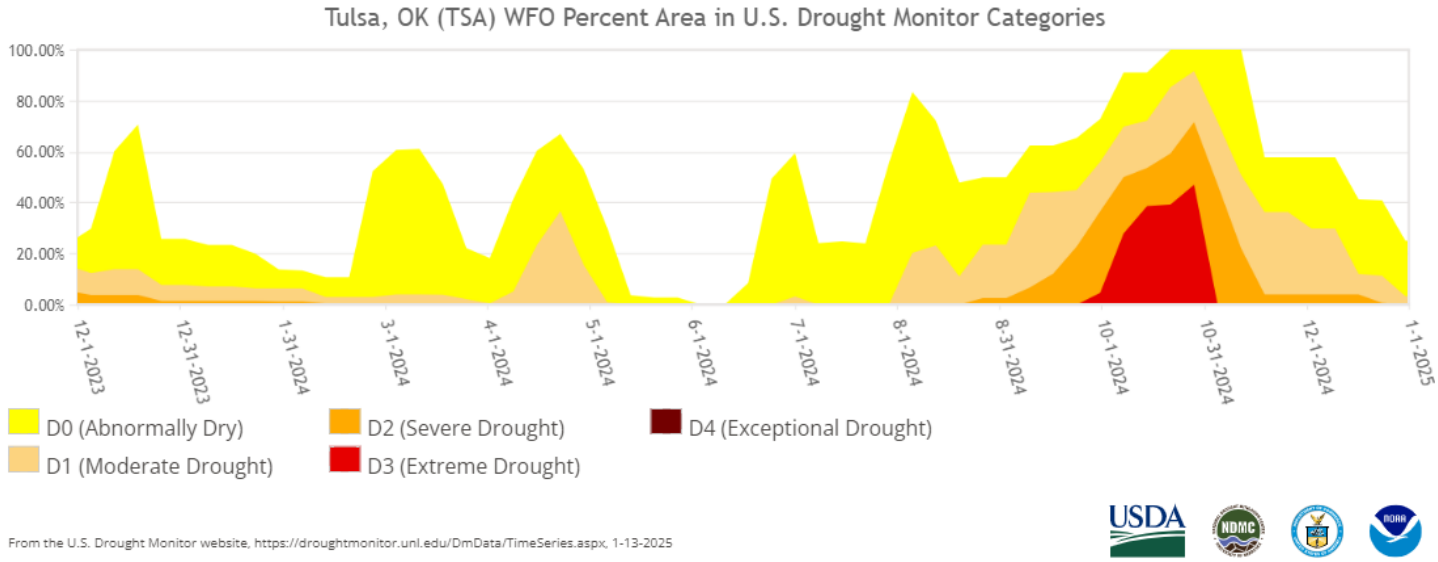


Fig. 6. Time series of the percent of drought categories covering the NWS Tulsa County Warning Area (CWA) during 2024.

Outlooks

The Climate Prediction Center (CPC) outlook for January 2025 (issued December 31, 2024) indicates an equal chance for above, near, and below normal temperatures across all of eastern OK and northwest AR. This outlook also calls for a slightly enhanced chance for below median precipitation for all of eastern OK and northwest AR, except for the counties along the OK/KS state line where there is an equal chance for above, near, and below median precipitation. This outlook was based on dynamical and statistical model output along with long-term trends, ENSO state, the Madden-Julian Oscillation (MJO), and the Arctic Oscillation (AO).

For the 3-month period January-February-March 2025, CPC is forecasting equal chances for above, near, and below normal temperatures and precipitation for eastern OK and northwest AR (outlook issued December 19, 2024). This outlook is based on long-term trends, ENSO state, and incorporates a suite of statistical and dynamical forecast tools. According to CPC, "La Niña conditions are present and are expected to persist through February-April 2025 (59% chance), with a transition to ENSO-neutral likely during March-May 2025 (60% chance)." CPC issued a La Niña Advisory.

Summary of Heavy Precipitation Events Daily quality-controlled rainfall maps can be found at: http://water.weather.gov/precip/index.php?location_type=wfo&location_name=tsa

Just before midnight of the 14th, scattered showers and thunderstorms developed across eastern OK and northwest AR and increased in coverage through the overnight hours as a broad area of warm air advection combined with an increasing low-level jet and moisture transport set up over the region ahead of a cold front. This area of precipitation continued to shift eastward through the night before exiting the area to the east by mid-morning. Rainfall totals ranged from a few hundredths of an inch to 1.5" (Fig. 7).

Shortly before midnight of the 16th, showers and thunderstorms developed across northeast OK and northwest AR. This activity increased after midnight within a zone of warm air advection associated with a mid-level wave and an unseasonably moist airmass. While most of the precipitation impacted northeast OK and northwest AR, a smaller area of showers and thunderstorms moved across southeast OK and west central AR during the early morning hours as well. By mid-morning, a cold front had entered the area and moved southeast through the day, ending the precipitation from northwest to southeast. While most of the rain had diminished by noon, a narrow line of showers and isolated thunderstorms continued along the front as it moved through west central AR and southeast OK during the afternoon. Rainfall totals ranged from around a tenth of an inch to near 2" (Figs. 8, 9).

A warm front moved north into eastern OK and west central AR during the afternoon of the 17th. Showers and thunderstorms then developed mid-evening over northwest AR as the low-level jet increased over the region. The precipitation transitioned into a line of storms oriented southwest to northeast across east central OK and west central AR during the late evening and into the overnight hours as large-scale lift steadily increased and a cold front moved into this area. This line of storms progressed southeast through the night, exiting the region in the early morning hours. Rainfall totals were 0.25" to 2" along and southeast of a McAlester, OK to Bentonville, AR line (Figs. 10, 11).

Showers and isolated thunderstorms moved into eastern OK and northwest AR from the west during the late evening hours of the 23rd in response to warm advection and a strengthening low-level jet ahead of an approaching upper-level low pressure system. The precipitation was widespread through the overnight hours, affecting nearly all of eastern OK and northwest AR, the exception being Choctaw, Pushmataha, and southern Le Flore Counties in southeast OK. However, around sunrise, the large area of rain began to shift southeast into these areas. By 6 am on the 24th, rainfall totals ranged from around 0.10" to around 2" (Fig. 12). From mid-morning through the late afternoon, the showers and thunderstorms remained near/south of I-40 before exiting the area to the southeast. This activity likewise brought around 0.10" to around 2" of rain (Fig. 13).

Just before noon on the 26th, a large area of showers and thunderstorms began to move northeast out of TX and into southeast OK as a quick moving upper-level wave approached the region. This activity continued to move northeast across east central OK and northwest AR during the afternoon and early evening hours. Some additional showers developed over eastern OK behind this initial area on the back side of the low during the late evening. This rain also moved northeast into northwest AR, exiting the area around midnight. Rainfall totals were 0.10" to 2.5", with the highest amounts falling over southeast OK and west central AR (Fig. 14). Combined, the last two storm systems brought widespread 2"-5" of rain to southeast OK and west Central AR (Fig. 15). While this caused rises on area rivers, flood stage was not exceeded at any of the NWS river forecast points. The Poteau River near Panama rose to two feet below flood stage (see preliminary hydrographs at the end of this report).

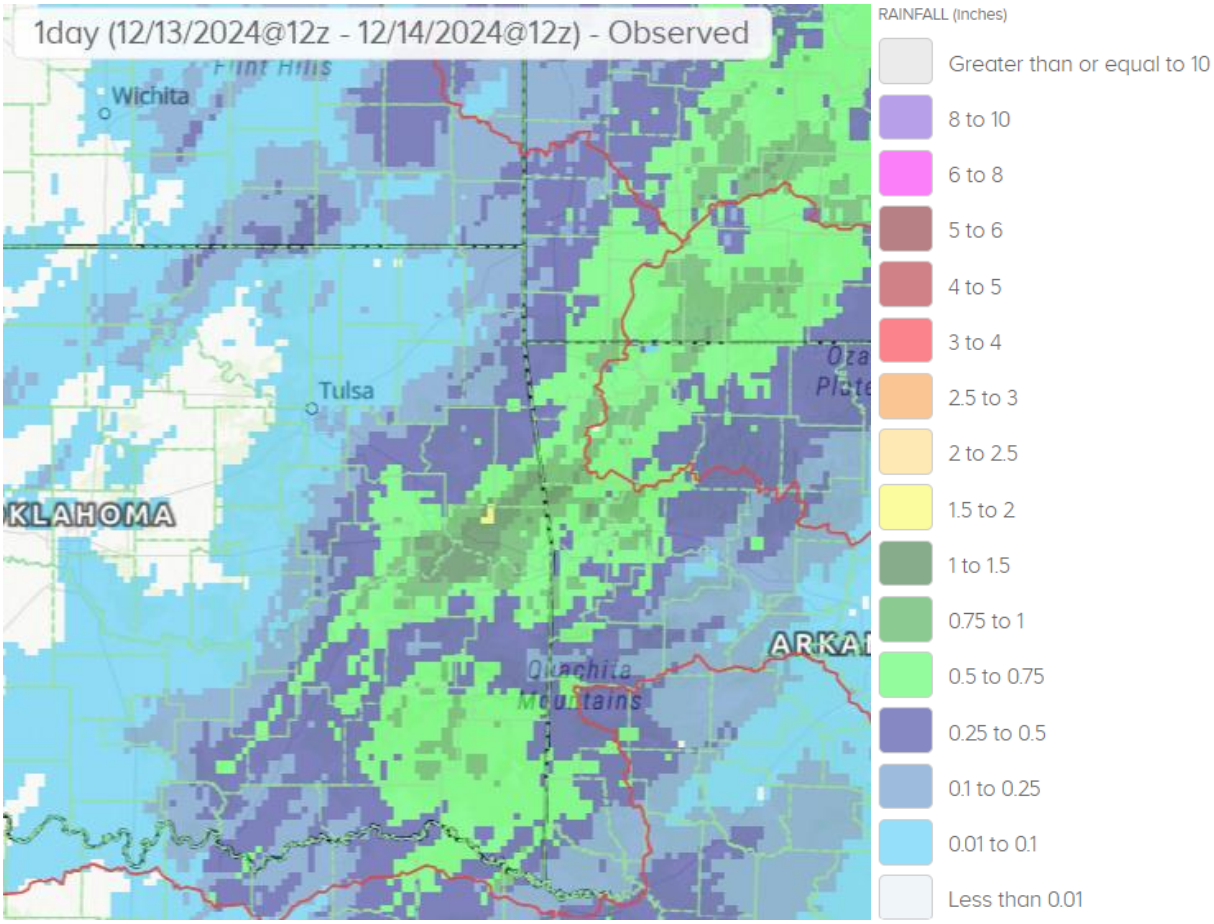


Fig. 7. 24-hour Estimated Observed Rainfall ending at 6am CST 12/14/2024.

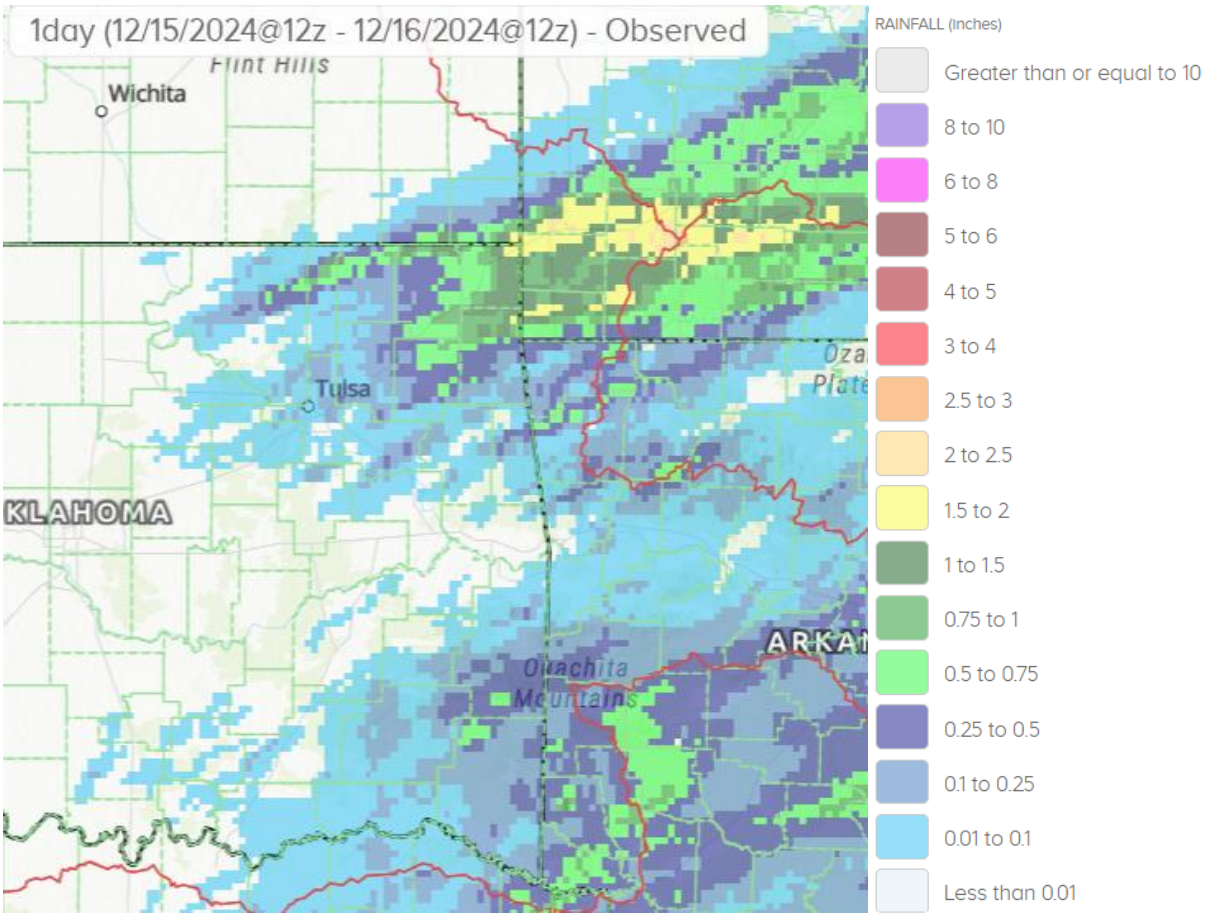


Fig. 8. 24-hour Estimated Observed Rainfall ending at 6am CST 12/16/2024.

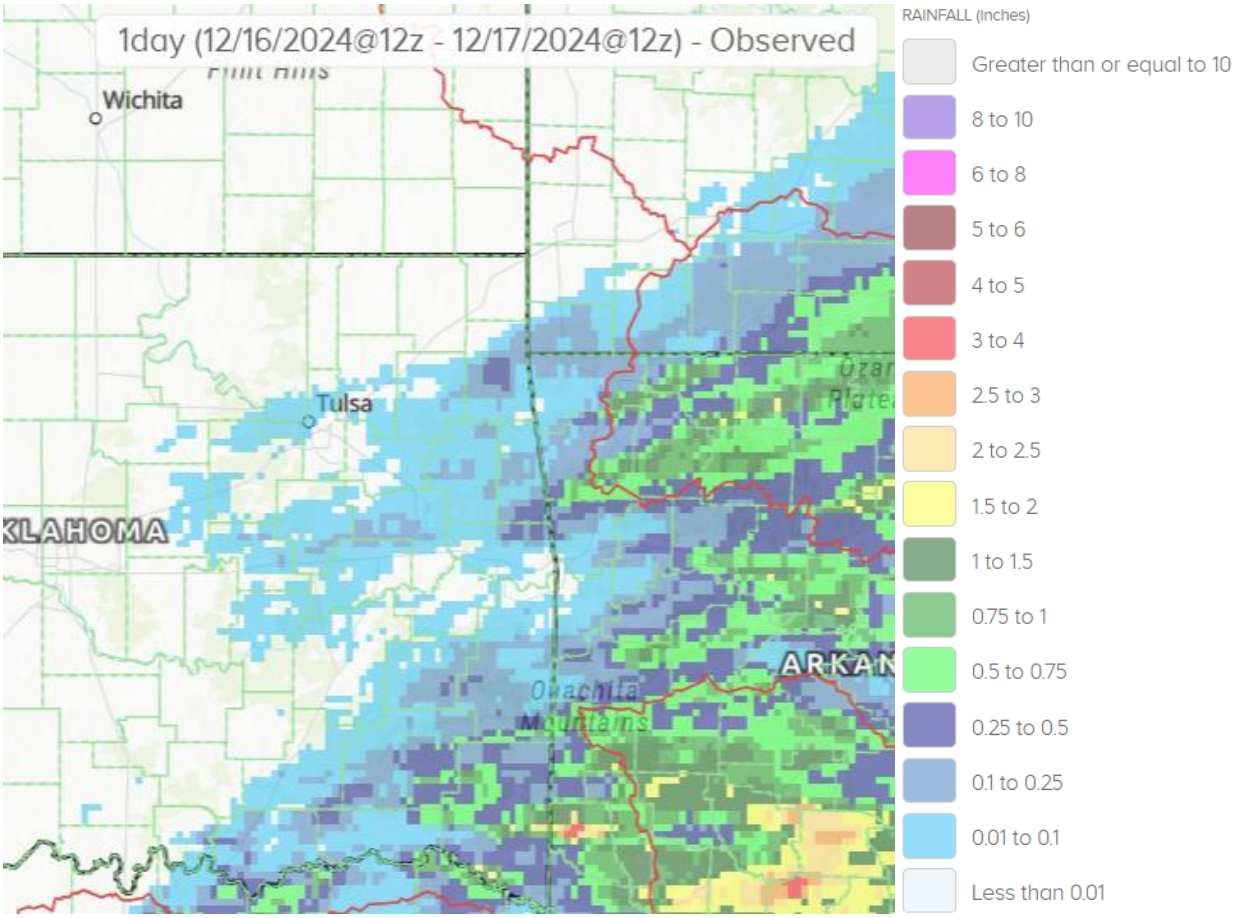


Fig. 9. 24-hour Estimated Observed Rainfall ending at 6am CST 12/17/2024.

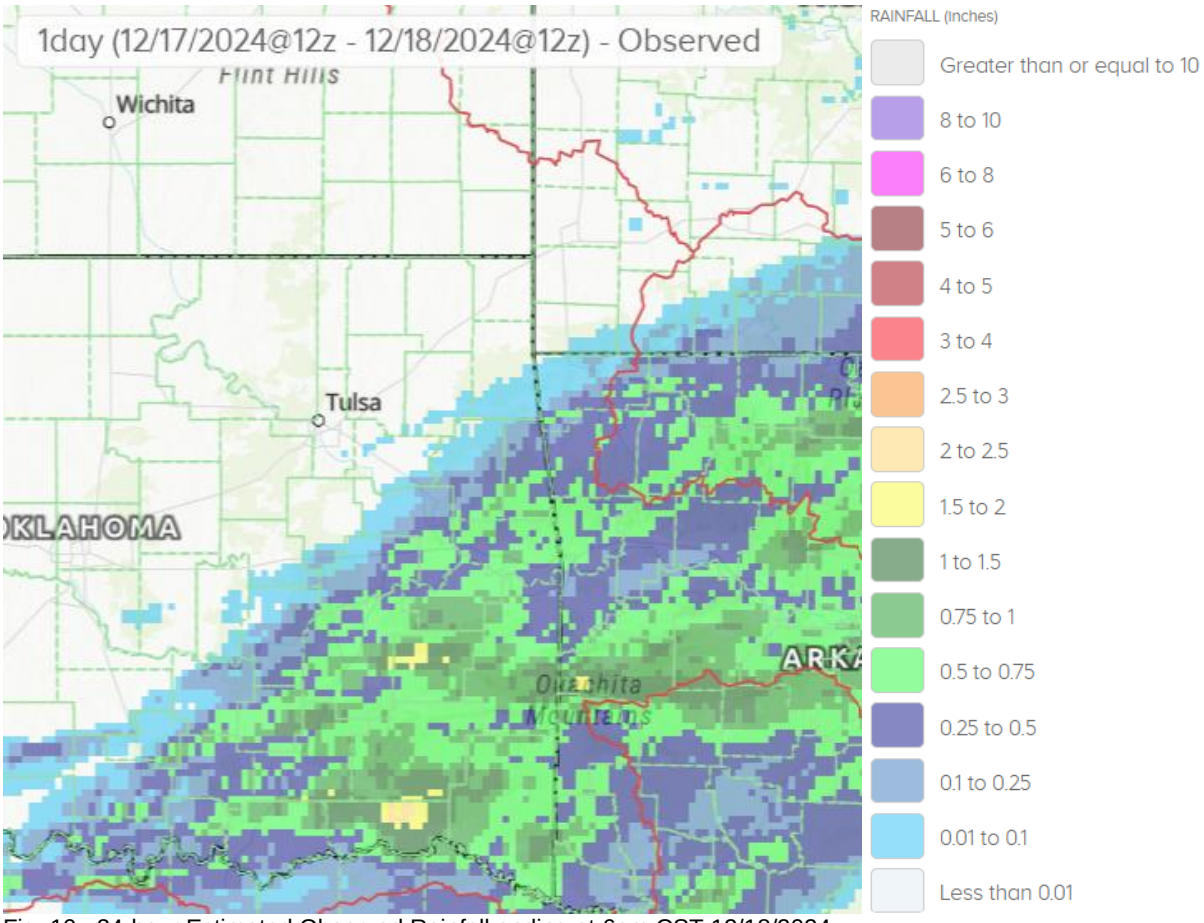


Fig. 10. 24-hour Estimated Observed Rainfall ending at 6am CST 12/18/2024.

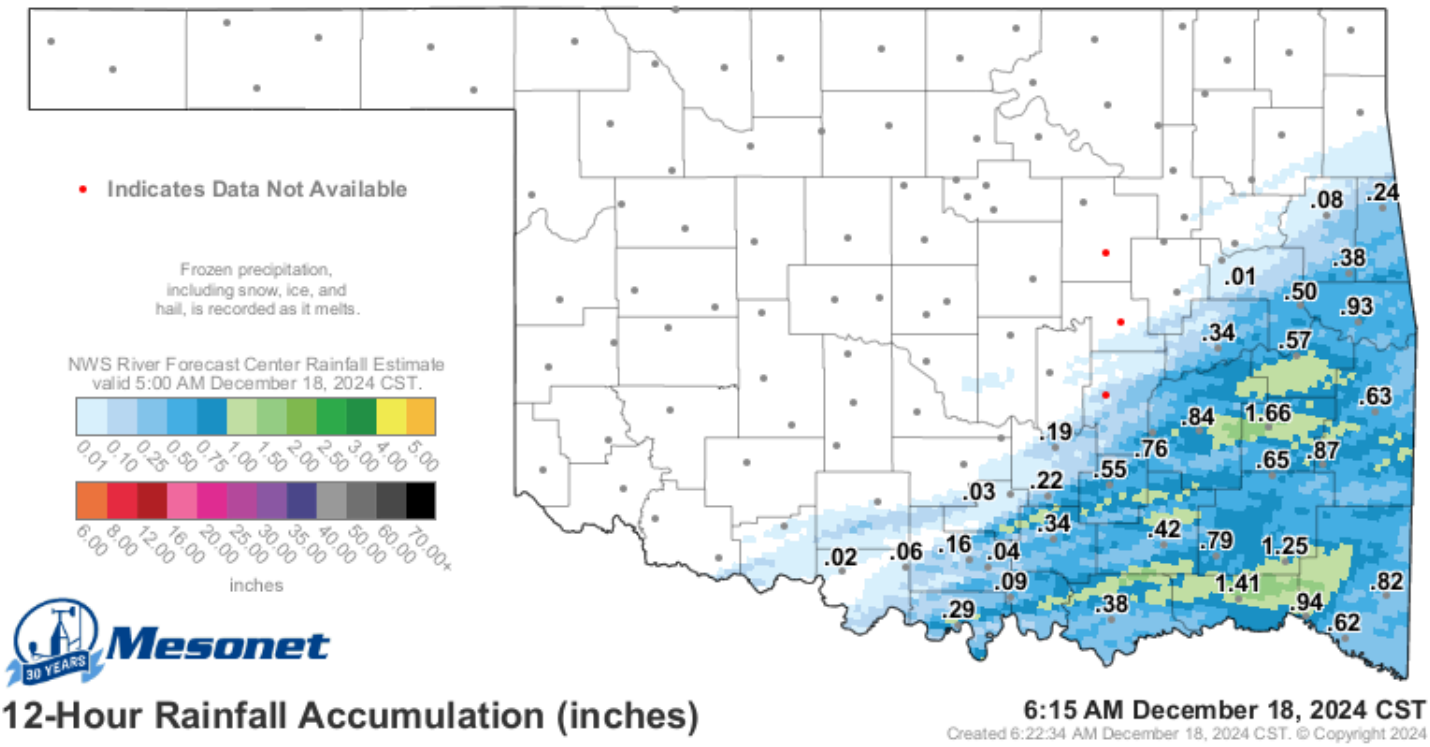


Fig. 11. OK Mesonet (values) and NWS RFC rainfall estimate (image) 12-hour rainfall ending at 6:15 am CST 12/18/2024.

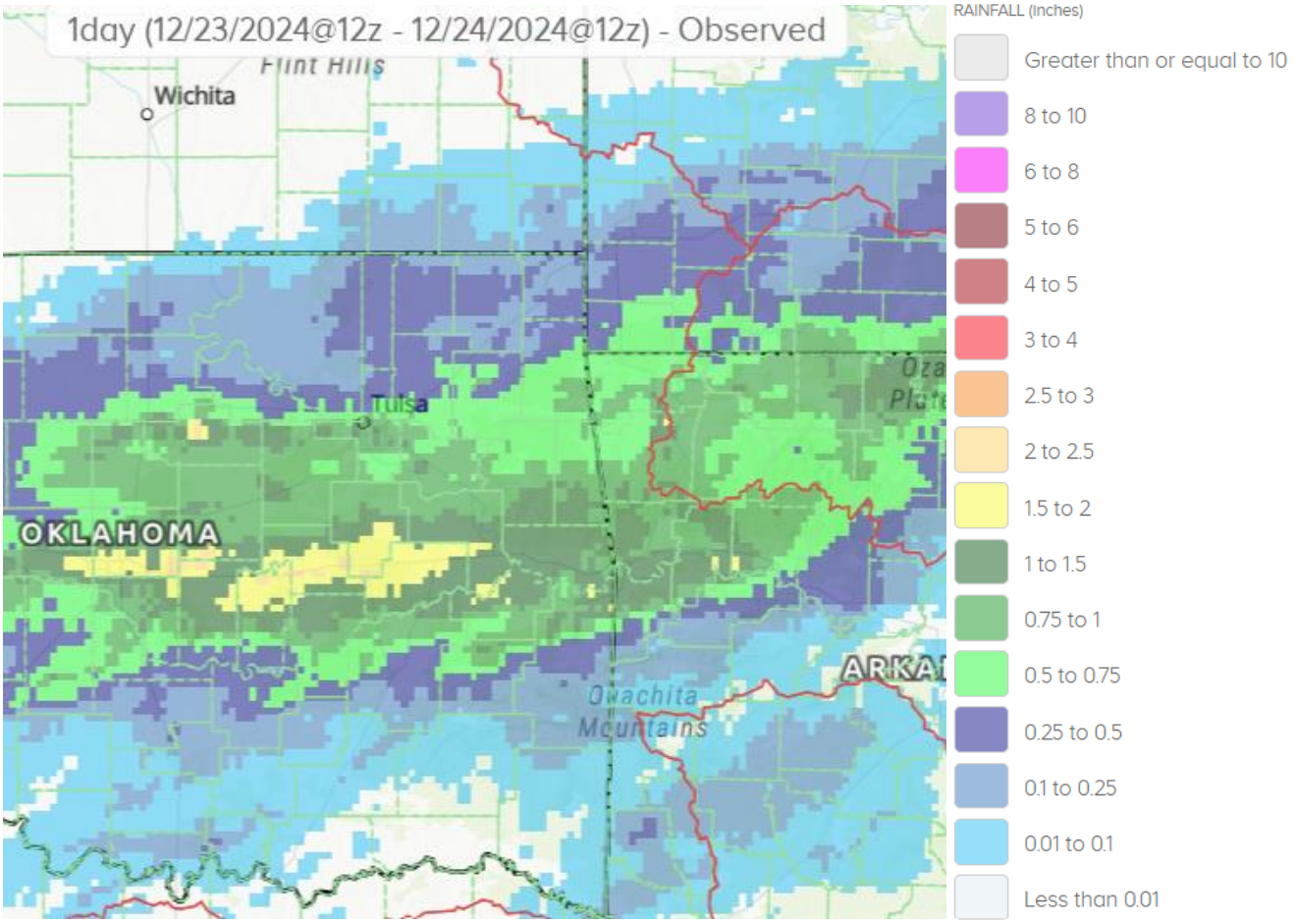


Fig. 12. 24-hour Estimated Observed Rainfall ending at 6am CST 12/24/2024.

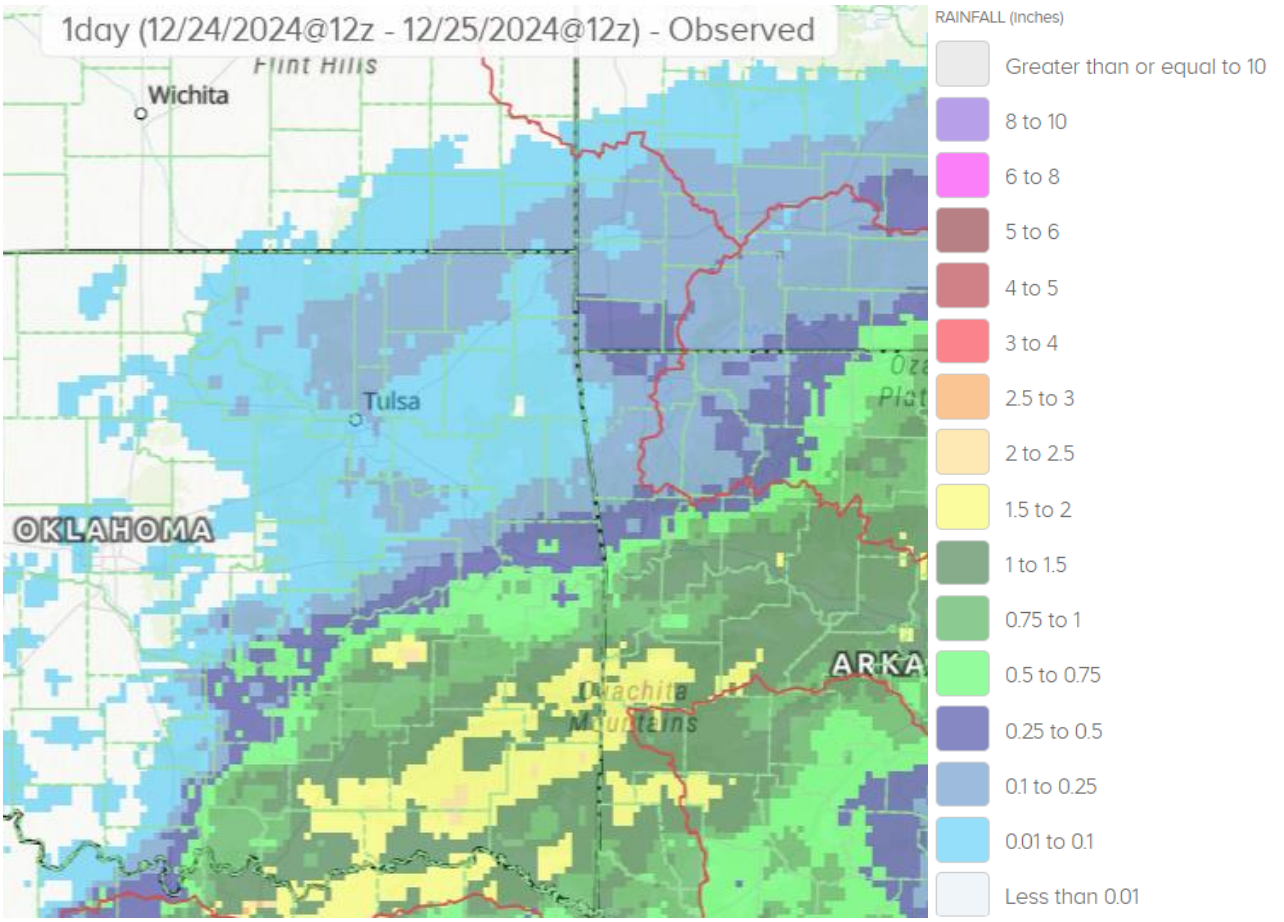


Fig. 13. 24-hour Estimated Observed Rainfall ending at 6am CST 12/25/2024.

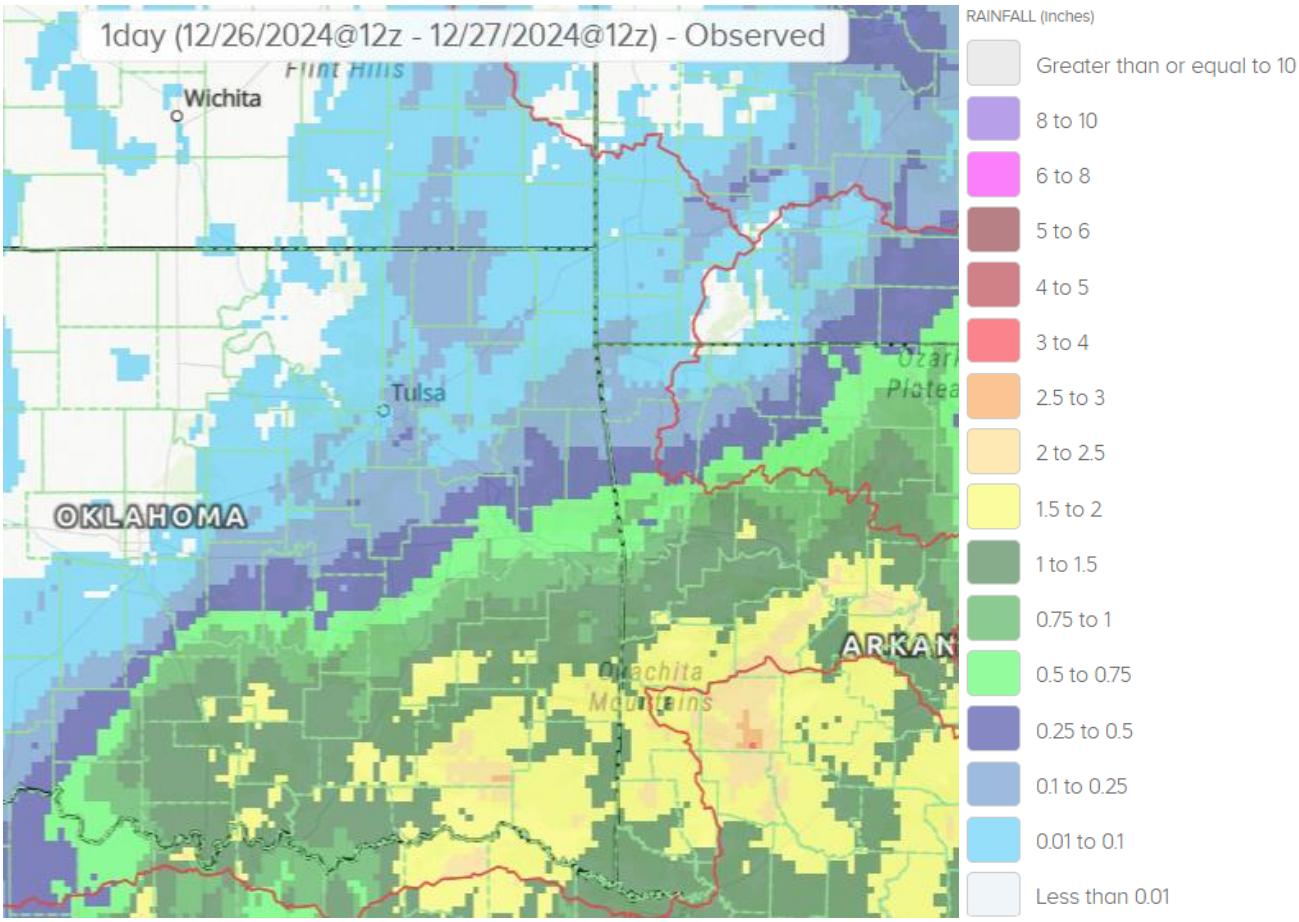


Fig. 14. 24-hour Estimated Observed Rainfall ending at 6am CST 12/27/2024.

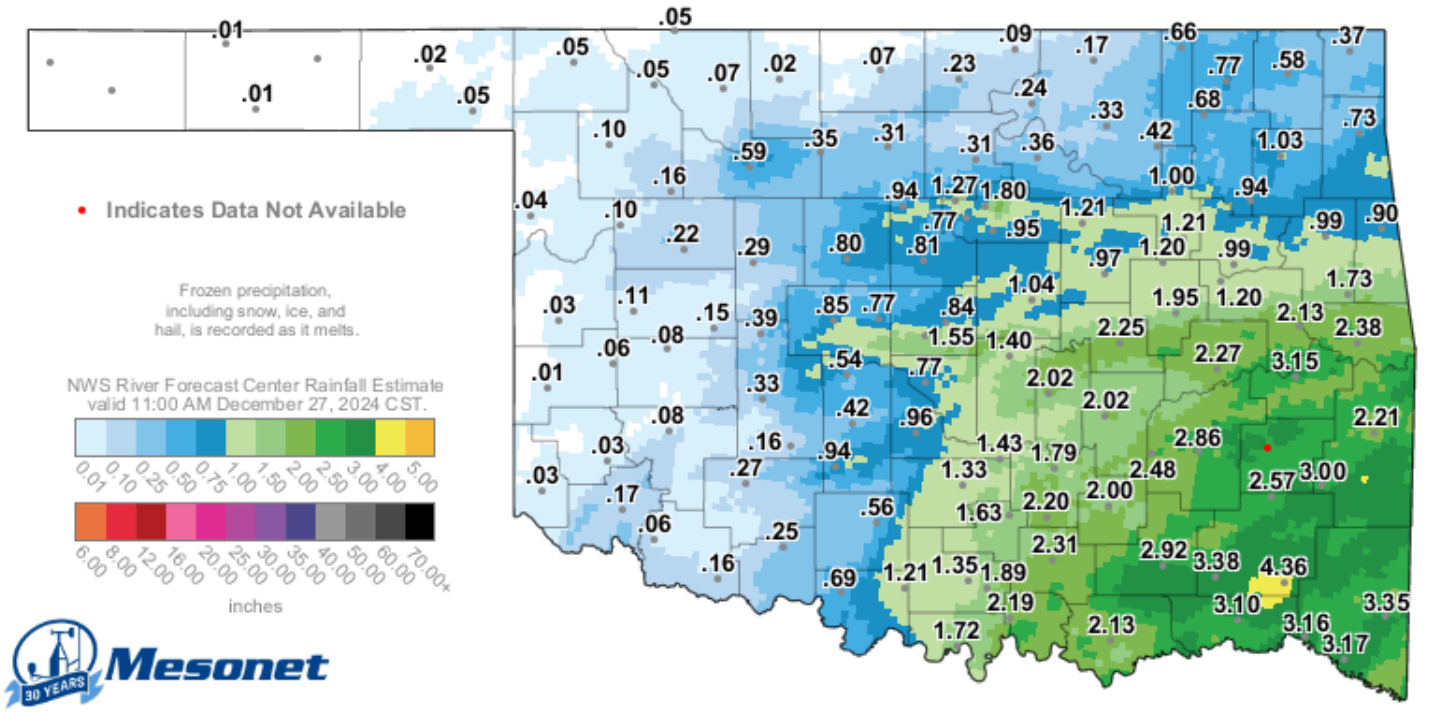


Fig. 15. OK Mesonet (values) and NWS RFC rainfall estimate (image) 4-Day rainfall ending at 12:10 pm CST 12/27/2024.

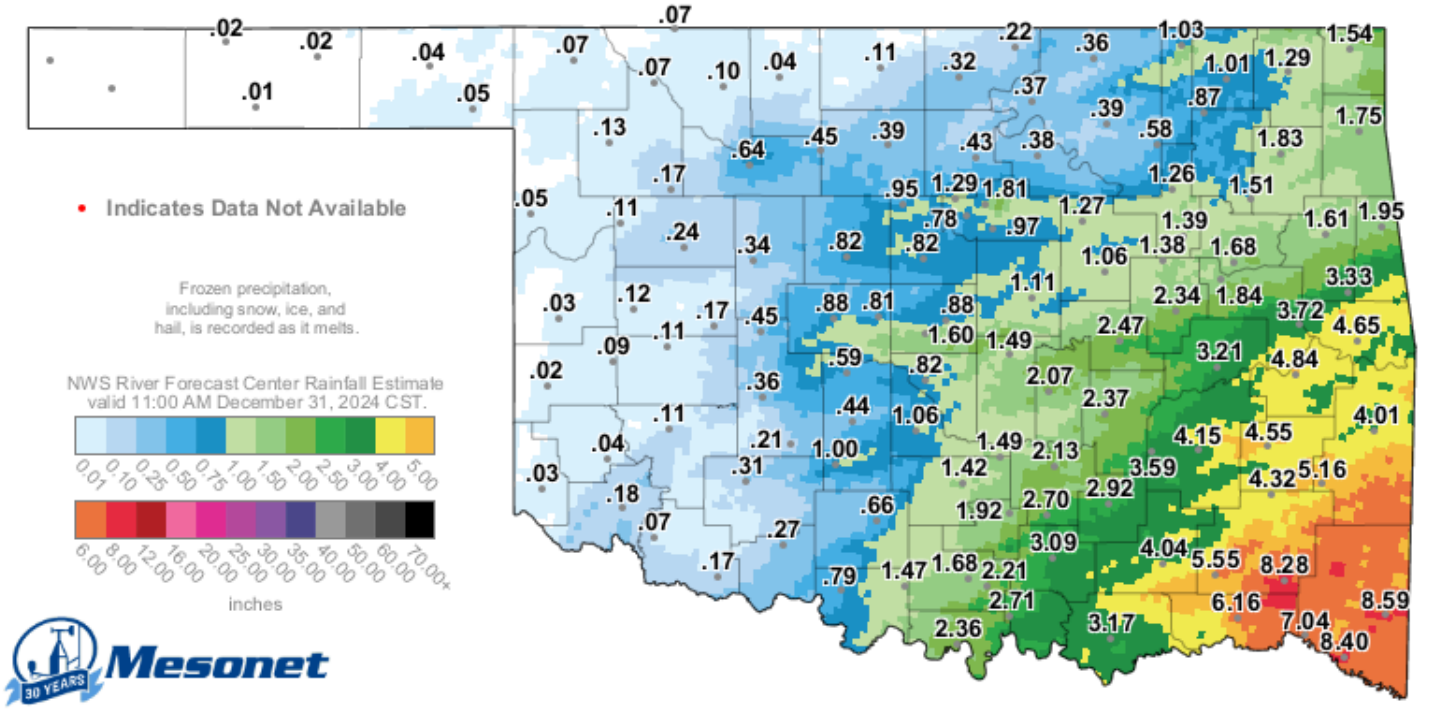


Fig. 16. OK Mesonet (values) and NWS RFC rainfall estimate (image) 30-day rainfall ending at 11:55 am CST 12/31/2024.

Written by:
Nicole McGavock
Service Hydrologist
WFO Tulsa

Products issued in December 2024:

0 Flash Flood Warnings (FFW)
0 Flash Flood Statements (FFS)
0 Flash/Areal Flood Watches (FFA) (0 Watch FFA CON/EXT/EXA/EXB/CAN)
2 Urban and Small Stream Advisories (FLS)
0 Areal Flood Warnings (FLW)
0 Areal Flood Statements (FLS)
1 River Flood Warnings (FLW) (includes category increases)
1 River Flood Statements (FLS)
0 River Flood Advisories (FLS) (0 Advisory FLS CON/EXT/CAN)
0 River Flood Watches (FFA) (0 Watch FFA CON/EXT/CAN)
0 River Statements (RVS)
0 Hydrologic Outlooks (ESF)
1 Drought Information Statements (DGT)

Preliminary Hydrographs: