

<b>NWS FORM E-5</b> (11-88) (PRES. by NWS Instruction 10-924)	<b>U.S. DEPARTMENT OF COMMERCE</b> NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE	HYDROLOGIC SERVICE AREA (HSA) <b>Tulsa, Oklahoma (TSA)</b>
		REPORT FOR: MONTH <b>January</b> YEAR <b>2024</b>
<b>MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS</b>		SIGNATURE <b>Steven F. Piltz</b> (Meteorologist-in-Charge)
TO: Hydrometeorological Information Center, W/OH2 NOAA / National Weather Service 1325 East West Highway, Room 7230 Silver Spring, MD 20910-3283		DATE <b>February 1, 2024</b>

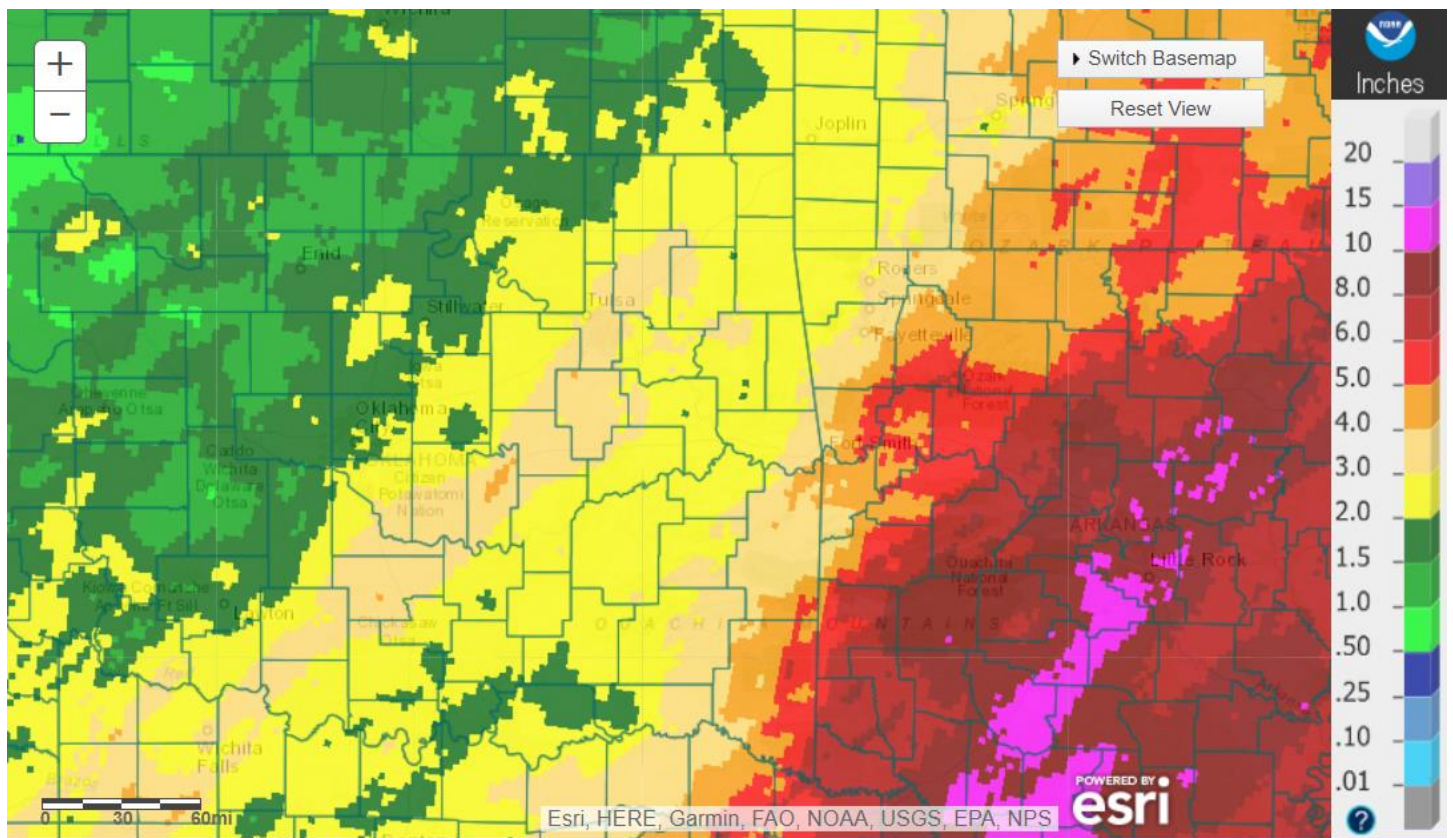
When no flooding occurs, include miscellaneous river conditions, such as significant rises, record low stages, ice conditions, snow cover, droughts, and hydrologic products issued (NWS Instruction 10-924)

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

Monthly average temperatures were well below normal in January 2024, with several rounds of winter precipitation during the month. Normal precipitation for January ranges from 1.2 inches in Pawnee County to 2.2 inches in Haskell County. In the Ozark region of northwest Arkansas, precipitation averages 2.2 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](https://www.weather.gov/tsa/climo_summary_e5list).

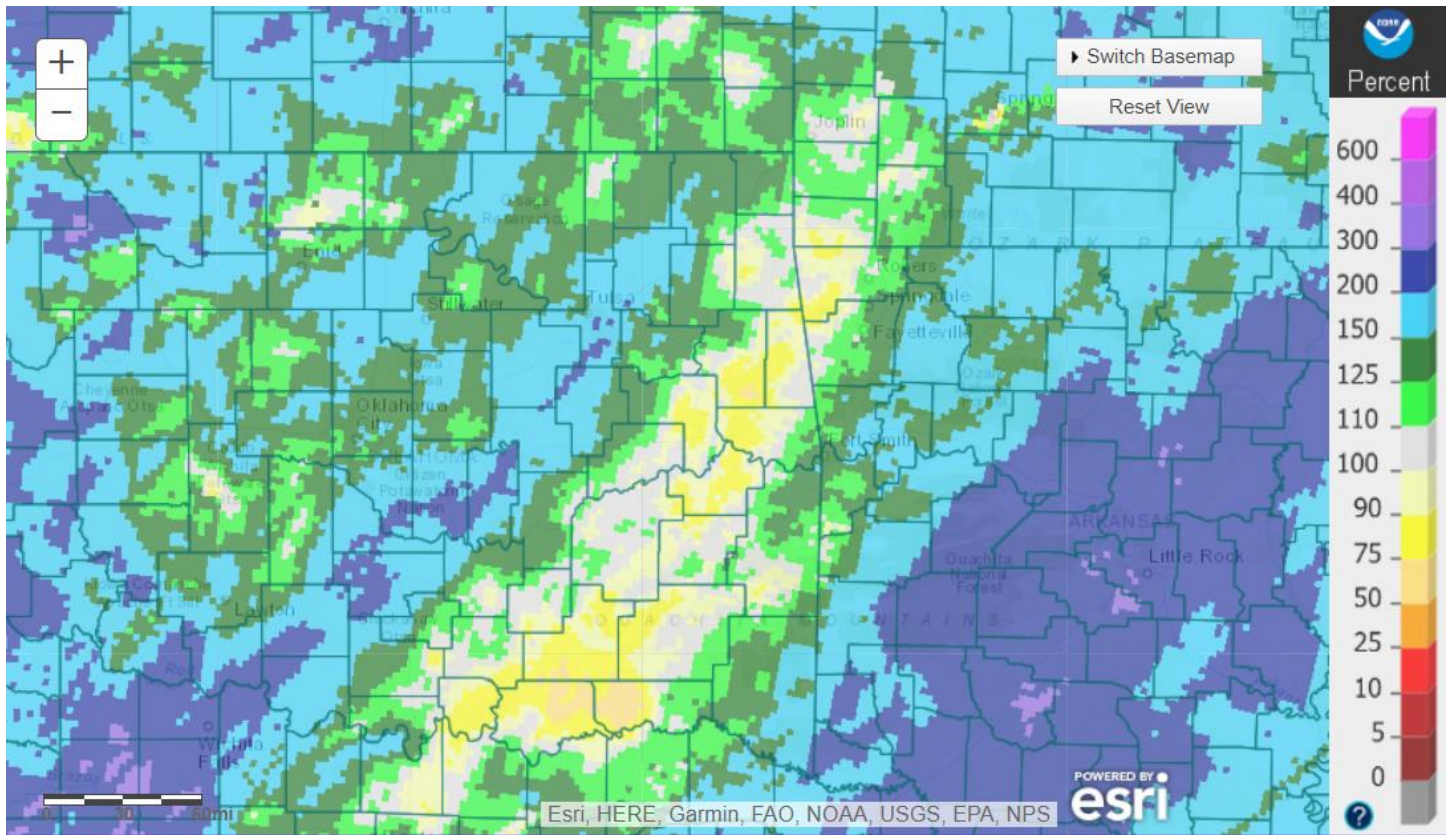
**Monthly Summary**

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 1a), rainfall totals for January 2024 ranged from 1.5" to around 6" across eastern OK and northwest AR, with much of the area receiving 2"-3". These rainfall totals correspond to 50% to 200% of the normal January rainfall (Fig. 1b).



Tulsa, OK: January, 2024 Monthly Observed Precipitation  
 Valid on: February 01, 2024 12:00 UTC

Fig. 1a. Estimated Observed Rainfall for January 2024



Tulsa, OK: January, 2024 Monthly Percent of Normal Precipitation  
Valid on: February 01, 2024 12:00 UTC

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

In Tulsa, OK, January 2024 ranked as the 16<sup>th</sup> coldest January (33.4°F; since records began in 1905), the 21<sup>st</sup> wettest January (3.00"; since records began in 1888), and the 60<sup>th</sup> snowiest January (1.5", tied 1924, 1913; since records began in 1900). Fort Smith, AR had the 29<sup>th</sup> coldest January (36.7°F, tied 1893; since records began in 1883), the 28<sup>th</sup> wettest January (3.92"; since records began in 1883), and the 38<sup>th</sup> snowiest January (2.5"; since records began in 1884). Fayetteville, AR had the 14<sup>th</sup> coldest (33.1°F, tied 2011), the 23<sup>rd</sup> wettest (2.97"), and the 12<sup>th</sup> snowiest (6.2") January since records began in 1950.

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

Mountainburg 2NE, AR (coop)	4.88	Green Forest 7NNE, AR (coop)	4.77	Ozark 4.6S, AR (coco)	4.71
Huntsville 10N, AR (coop)	4.55	Holiday Island 1.3SSW, AR (coco)	4.25	Muskogee, OK (coop)	4.03
Hectorville, OK (meso)	4.03	Cloudy, OK (meso)	3.95	Fort Smith, AR (ASOS)	3.92

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

Nowata, OK (meso)	1.58	Foraker, OK (meso)	1.64	Talala, OK (meso)	1.71
Copan, OK (meso)	1.87	Oilton, OK (meso)	1.93	Pawnee, OK (meso)	1.96
Wynona, OK (meso)	1.96	Burbank, OK (meso)	2.09	Vinita, OK (meso)	2.34

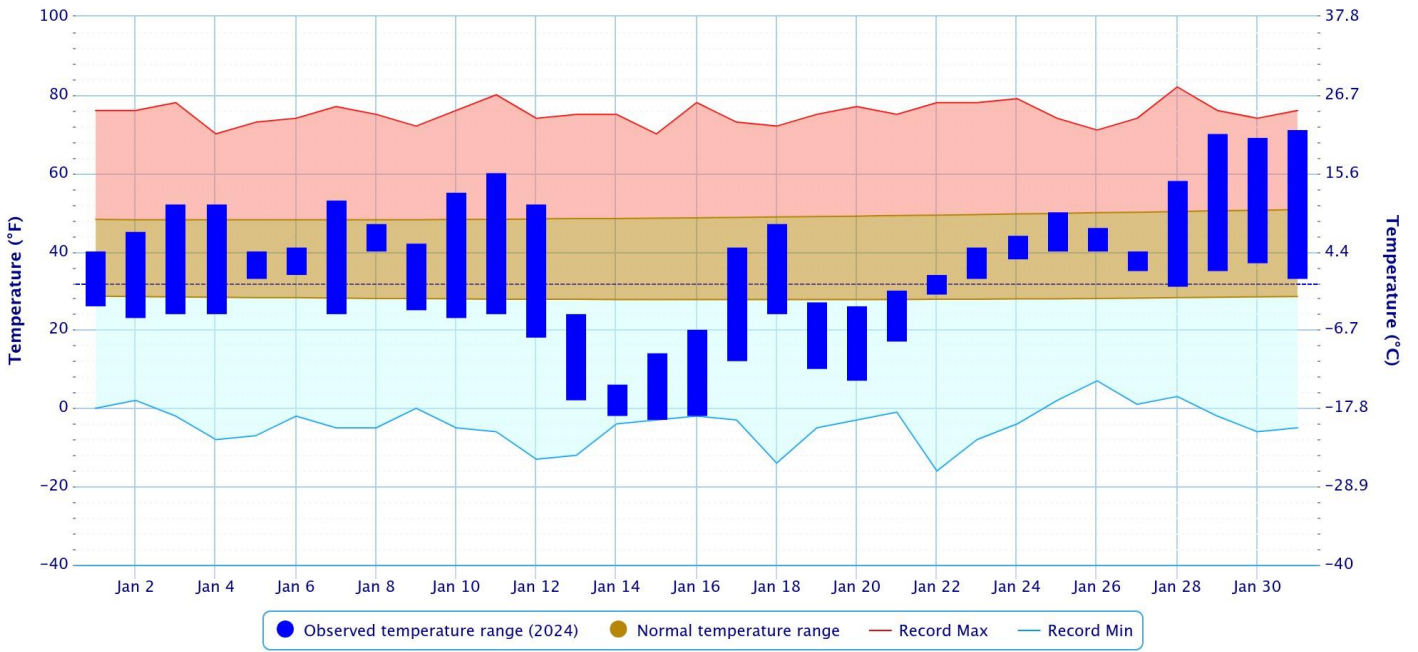
According to statistics from the [Oklahoma Climatological Survey \(OCS\)](#) Mesonet:

Rank since 1921	January 2024	Cool Growing Season (Sep 1 – Jan 31)	Water Year-to-Date (Oct 1, 2023 – Jan 31, 2024)	Winter-to-Date (Dec 1 – Jan 31)	Last 90 Days (Nov 3 – Jan 31)	Last 365 Days (Feb 1, 2023 – Jan 31, 2024)
Northeast OK	29 <sup>th</sup> wettest	48 <sup>th</sup> driest	51 <sup>st</sup> driest	27 <sup>th</sup> wettest	45 <sup>th</sup> wettest	47 <sup>th</sup> driest
East Central OK	24 <sup>th</sup> wettest	42 <sup>nd</sup> wettest	44 <sup>th</sup> wettest	33 <sup>rd</sup> wettest	45 <sup>th</sup> wettest	42 <sup>nd</sup> wettest
Southeast OK	28 <sup>th</sup> wettest	39 <sup>th</sup> wettest	46 <sup>th</sup> wettest	46 <sup>th</sup> driest	48 <sup>th</sup> driest	28 <sup>th</sup> wettest
Statewide	22 <sup>nd</sup> wettest	40 <sup>th</sup> wettest	32 <sup>nd</sup> wettest	15 <sup>th</sup> wettest	29 <sup>th</sup> wettest	35 <sup>th</sup> wettest



### Daily Temperature Data – Tulsa Area, OK (ThreadEx)

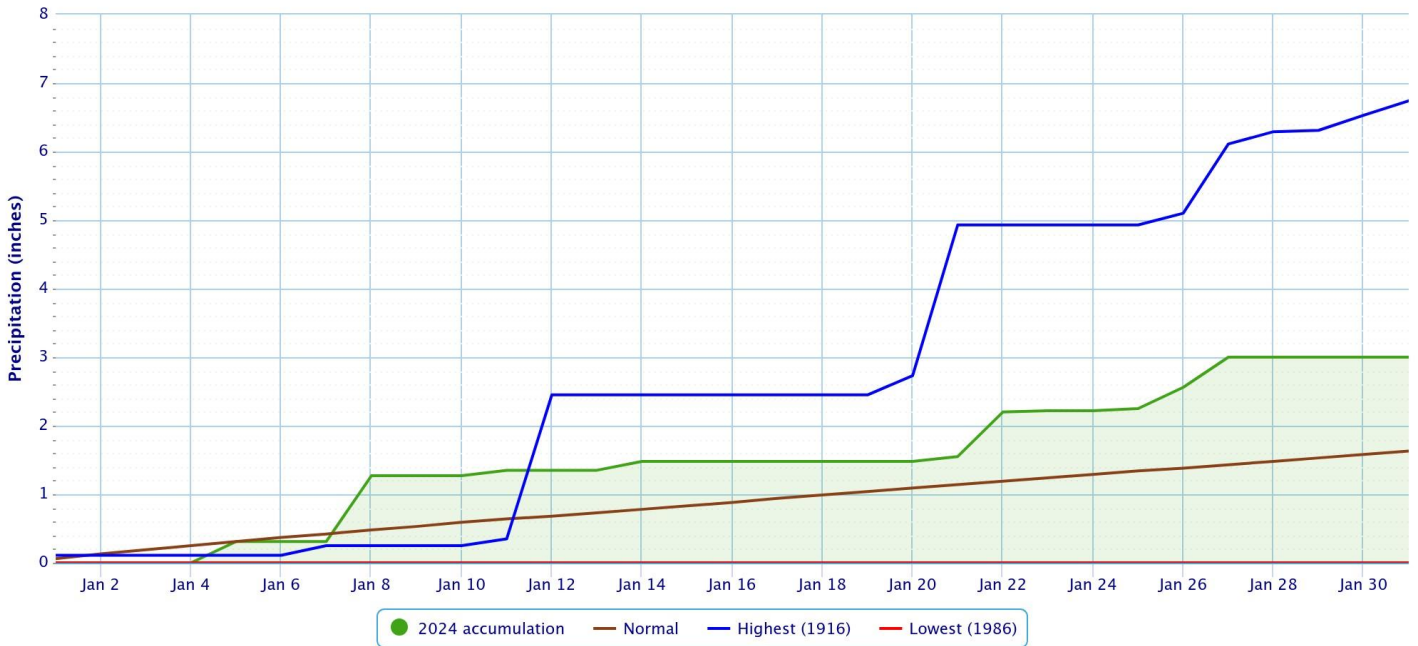
Period of Record – 1905-01-06 to 2024-01-31. Normals period: 1991-2020. Click and drag to zoom chart.



Powered by ACIS

### Accumulated Precipitation – Tulsa Area, OK (ThreadEx)

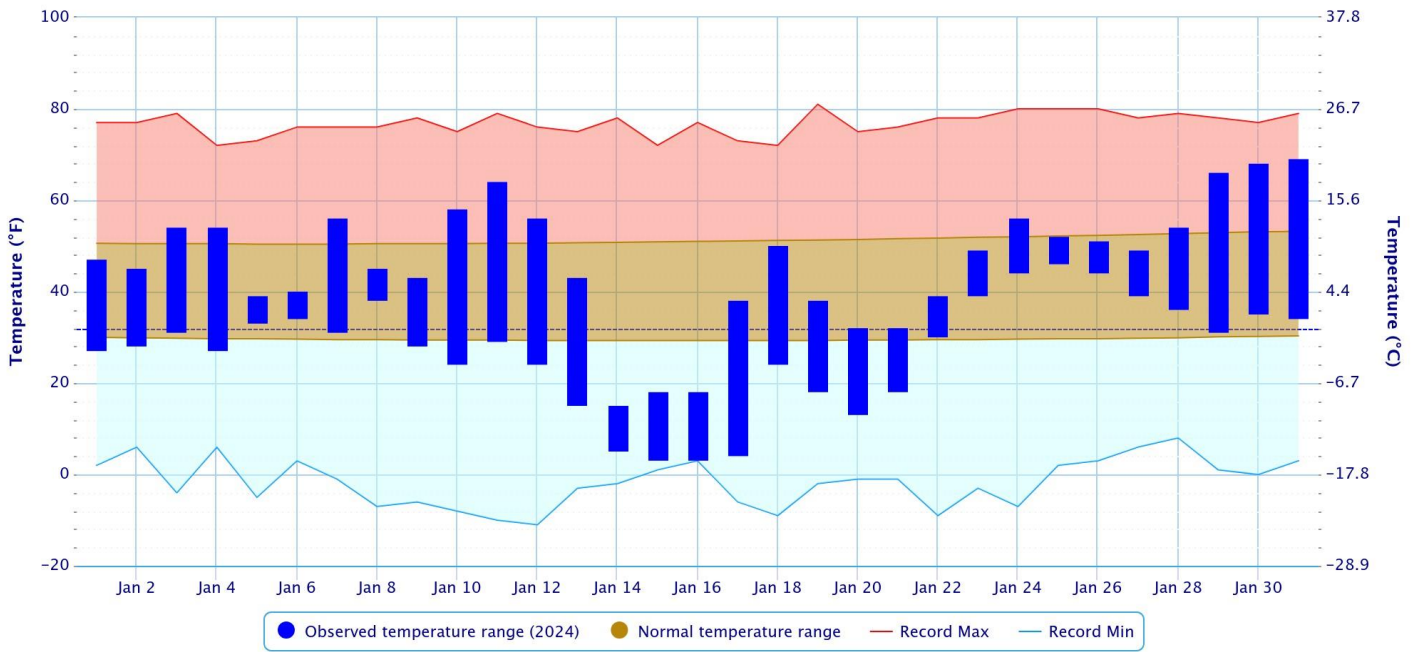
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

### Daily Temperature Data – Fort Smith Area, AR (ThreadEx)

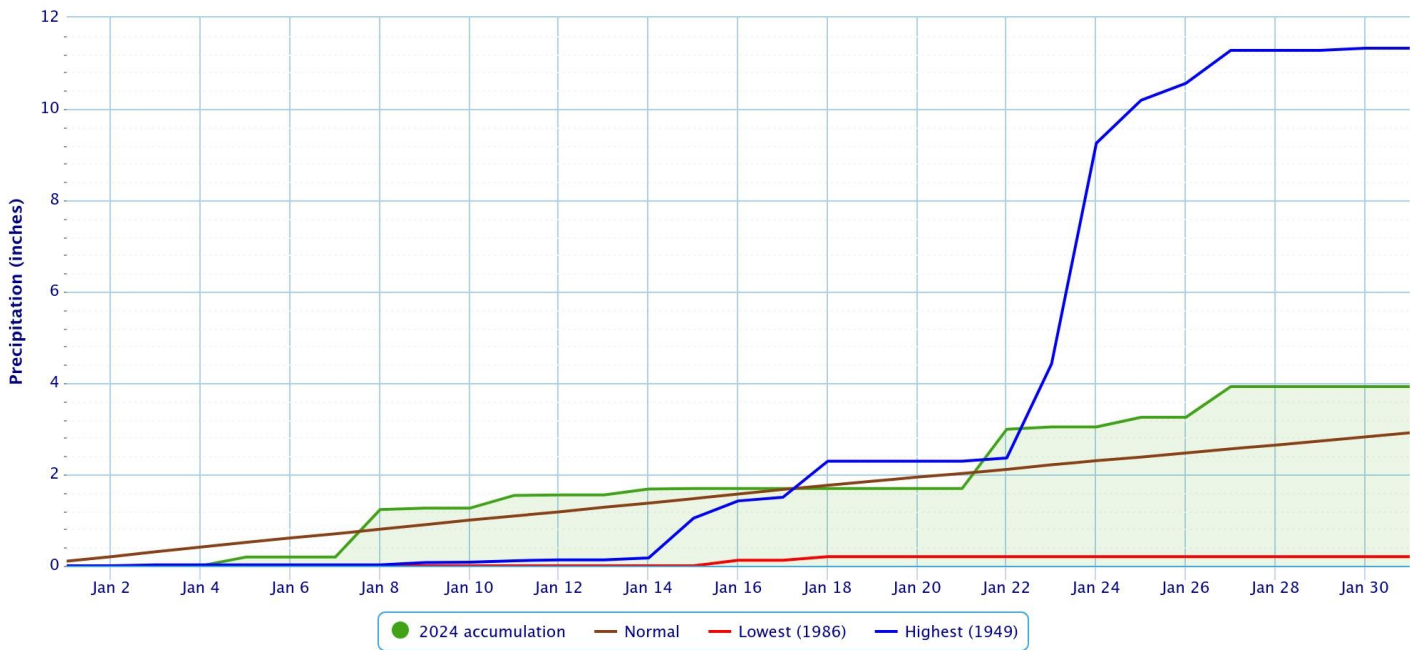
Period of Record – 1882-06-01 to 2024-01-31. Normals period: 1991–2020. Click and drag to zoom chart.



Powered by ACIS

### Accumulated Precipitation – Fort Smith Area, AR (ThreadEx)

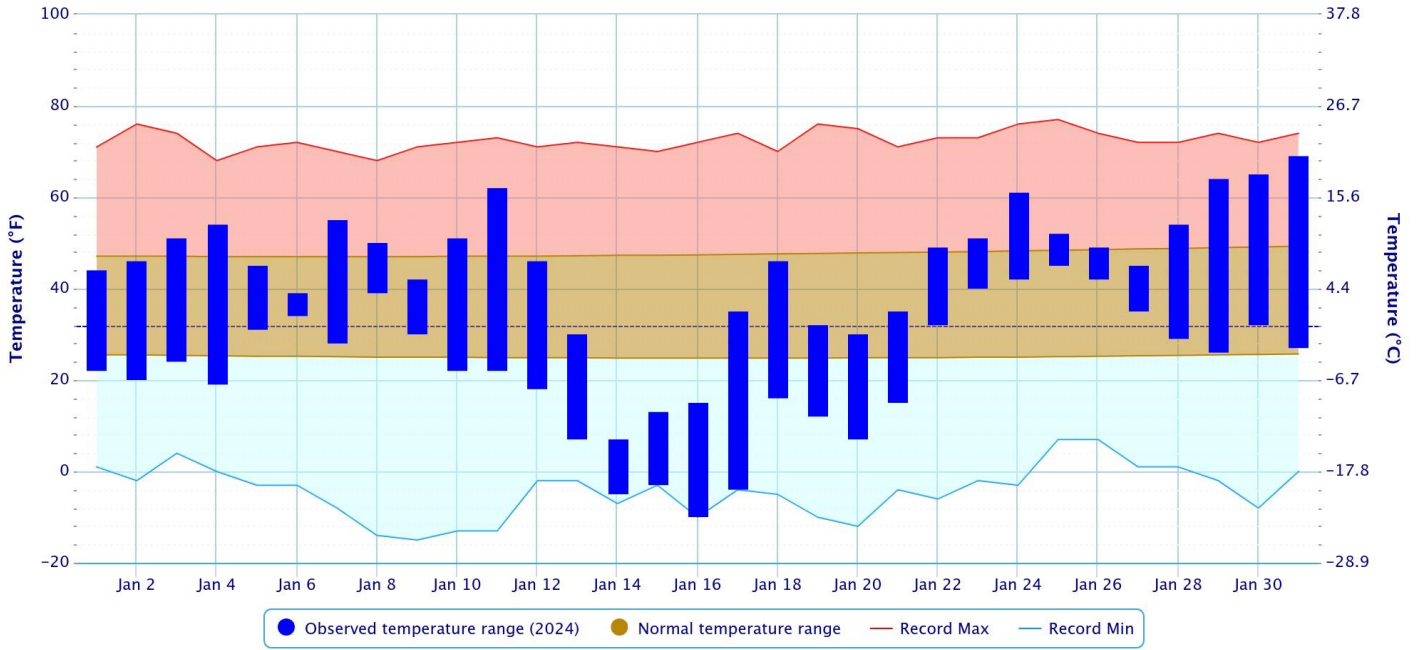
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

### Daily Temperature Data – FAYETTEVILLE DRAKE FIELD, AR

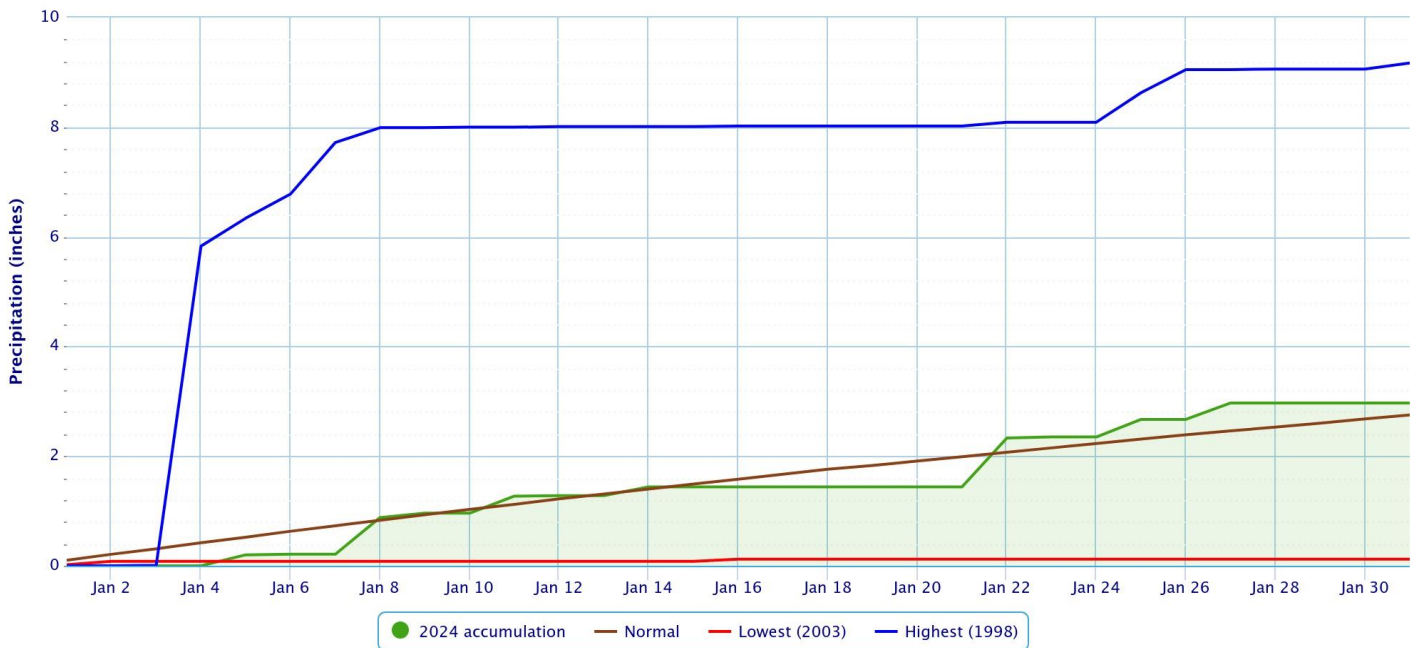
Period of Record – 1949-07-14 to 2024-01-31. Normals period: 1991-2020. Click and drag to zoom chart.



Powered by ACIS

### Accumulated Precipitation – FAYETTEVILLE DRAKE FIELD, AR

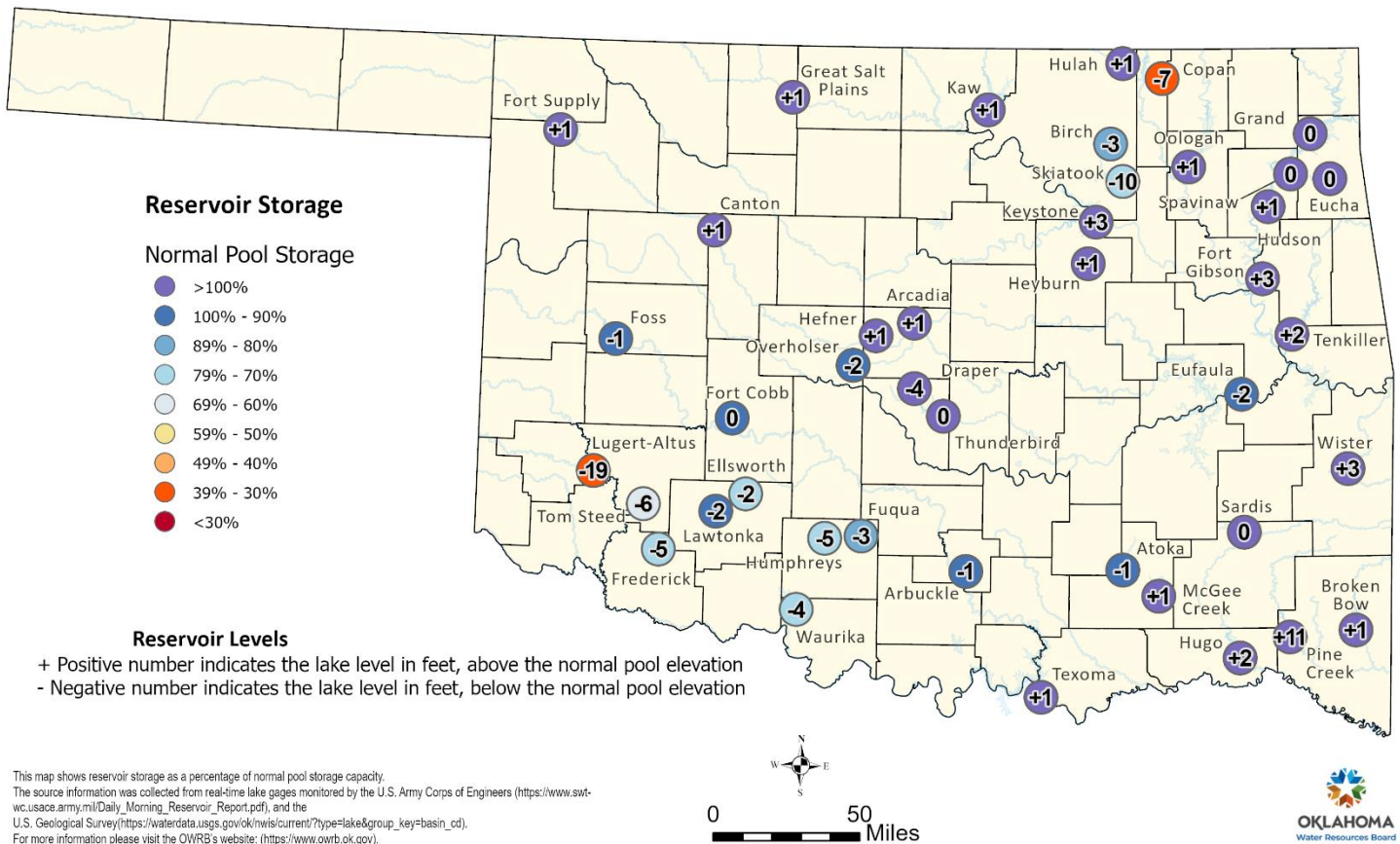
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

## Reservoirs

### Oklahoma Reservoir Levels and Storage as of 1/29/2024



According to the USACE, several of the lakes in the HSA were below 3% of top of their conservation pools as of 1/31/2024: Copan Lake 39%, Skiatook Lake 70%, Birch Lake 80%, Beaver Lake 81%, and Eufaula Lake 91%. Several lakes were also above 3% of the top of their conservation pools: Ft. Gibson 6%, Hudson Lake 5%, Wister Lake 5%, Keystone Lake 5%, and Oologah Lake 4%.

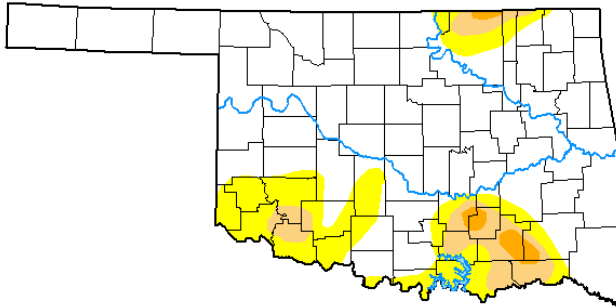
## Drought

According to the [U.S. Drought Monitor](#) (USDM) from January 30, 2024 (Figs. 2, 3), Severe (D2) Drought conditions exist in portions of Osage, Choctaw, and Pushmataha Counties in eastern Oklahoma. Moderate (D1) Drought conditions were present in portions of Nowata, Washington, Osage, Pushmataha, and Choctaw Counties in eastern Oklahoma. Abnormally Dry (D0) but not in drought conditions were occurring in Craig, Nowata, Washington, Osage, eastern Kay, Pittsburg, Pushmataha, and Choctaw Counties in eastern OK. No drought or abnormally dry conditions were occurring in northwest AR.



# U.S. Drought Monitor Oklahoma

**January 30, 2024**  
(Released Thursday, Feb. 1, 2024)  
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	77.55	22.45	7.18	1.36	0.00	0.00
<b>Last Week</b> <small>01-23-2024</small>	67.23	32.77	14.52	1.67	0.00	0.00
<b>3 Months Ago</b> <small>10-31-2023</small>	49.73	50.27	35.82	13.68	1.16	0.00
<b>Start of Calendar Year</b> <small>01-02-2024</small>	55.32	44.68	21.64	3.08	0.00	0.00
<b>Start of Water Year</b> <small>09-26-2023</small>	34.29	65.71	46.76	30.93	12.91	0.00
<b>One Year Ago</b> <small>01-31-2023</small>	5.16	94.84	84.95	79.21	55.71	10.17

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

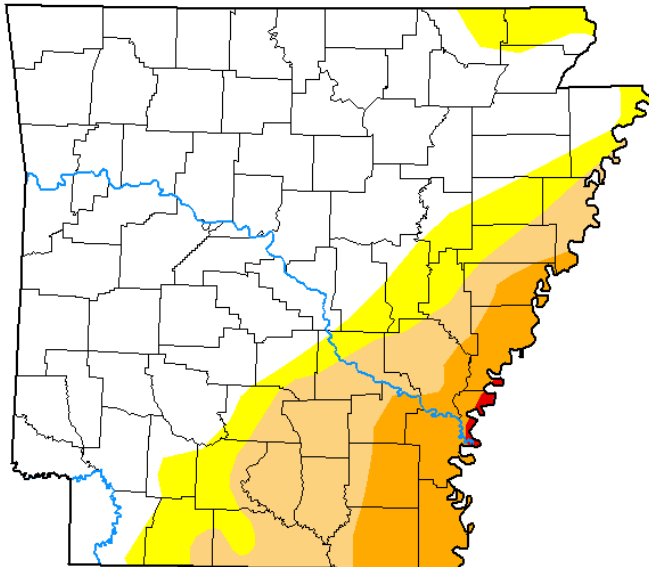


[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)

Fig. 2. Drought Monitor for Oklahoma

# U.S. Drought Monitor Arkansas

**January 30, 2024**  
(Released Thursday, Feb. 1, 2024)  
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	66.74	33.26	21.64	8.57	0.20	0.00
<b>Last Week</b> <small>01-23-2024</small>	36.40	63.60	33.28	21.90	8.54	0.20
<b>3 Months Ago</b> <small>10-31-2023</small>	54.40	45.60	32.28	16.08	0.02	0.00
<b>Start of Calendar Year</b> <small>01-02-2024</small>	15.06	84.94	44.54	23.39	13.71	0.79
<b>Start of Water Year</b> <small>09-26-2023</small>	38.45	61.55	25.37	3.70	0.00	0.00
<b>One Year Ago</b> <small>01-31-2023</small>	94.66	5.34	1.13	0.00	0.00	0.00

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](https://droughtmonitor.unl.edu)

Fig. 3. Drought Monitor for Arkansas

## Outlooks

The [Climate Prediction Center](#) (CPC) outlook for February 2024 (issued January 31, 2024) indicates an enhanced chance for above normal temperatures across eastern OK and northwest AR. This outlook also calls for above median precipitation across eastern OK and an equal chance for above, near, and below median precipitation across northwest AR. This outlook was based on dynamical model output, the Madden-Julian Oscillation (MJO), and El Niño.

For the 3-month period February-March-April 2024, CPC is forecasting an enhanced chance for above median precipitation and an equal chance for above, near, and below normal temperatures across eastern OK and northwest AR (outlook issued January 18, 2024). This outlook is based on long-term trends, ENSO state, and incorporates both statistical and dynamical forecast tools. The odds for above median precipitation are primarily due to the influence of El Niño. According to CPC, El Niño conditions are present in the equatorial Pacific Ocean. El Niño will gradually weaken and then transition to ENSO-neutral during spring 2024. There is an 73% chance of ENSO neutral conditions during the April-June season, and there are increasing odds for a return of La Niña conditions later this year. CPC continues the El Niño 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](http://water.weather.gov/precip/index.php?location_type=wfo&location_name=tsa)

Precipitation moved into eastern OK from the west around midnight of the 5<sup>th</sup> as a closed upper-level low approached the area. This precipitation evaporatively cooled the air, allowing for a transition from rain to snow. The precipitation continued to move east across eastern OK and northwest AR during the early morning hours and shifted east of the area by late morning. Snowfall totals were highest across east central OK and northwest AR, where 1"-3.5" of snow was measured (Fig. 4). Rain and liquid equivalent totals were 0.10"-0.50".

Strong isentropic lift over the region in advance of a strengthening mid-level low resulted in widespread showers with embedded thunderstorms across eastern OK and northwest AR through the morning and afternoon hours of the 8<sup>th</sup>. Some precipitation lingered across far northern OK and northwest AR into the evening hours. Light wrap-around rain and snow showers then moved over the area during the early through mid-morning hours of the 9<sup>th</sup> as the low passed overhead. Snowfall accumulations were minor, with a trace to 0.5" amounts measured. Rainfall and liquid equivalent totals were around 0.50" to 1.5" (Figs. 5, 6).

An arctic airmass with sub-freezing temperatures was in place as a storm system moved into the area on the 14<sup>th</sup>. Snow showers began mid-morning in eastern OK and quickly spread eastward. Snow was widespread across eastern OK and northwest AR by noon, then ended from west to east during the afternoon through early evening hours. Additional scattered light snow showers impacted the area during the morning of the 15<sup>th</sup> as a secondary wave moved through and interacted with an elevated frontal zone over the area. The snow finally shifted east of the region by noon on the 15<sup>th</sup>. Snowfall totals ranged from a trace to around 6" (Fig. 7), and the liquid equivalent ranged from a trace to 0.5" (Fig. 9). The snowfall was still visible from satellite at noon on the 16<sup>th</sup> (Fig. 8).

The very cold arctic air persisted over the area, with a large portion of eastern OK and northwest AR remaining below freezing from the 13<sup>th</sup> through the 17<sup>th</sup>, which was around 90 to around 130 consecutive hours (Fig. 10). Several daily temperatures records were set during this time as minimum temperatures fell into the single digits and below 0°F, and maximum temperatures were in the single digits to mid-teens. Fayetteville, AR set a new coldest maximum temperature for January, with a high of only 7°F on the 14<sup>th</sup>, breaking the previous record of 9°F set on 1/6/2014, 1/12/1963, 1/20/1985, and 1/29/1966 (records began in 1950). McAlester, OK also set a record for the coldest maximum temperature in January with 10°F on the 14<sup>th</sup>. The previous record was 13°F on 1/12/1963 (records began in 1953).

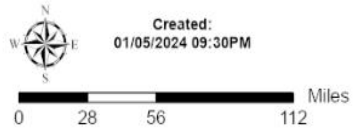
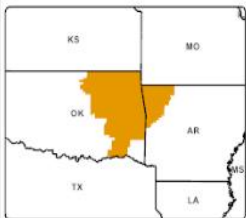
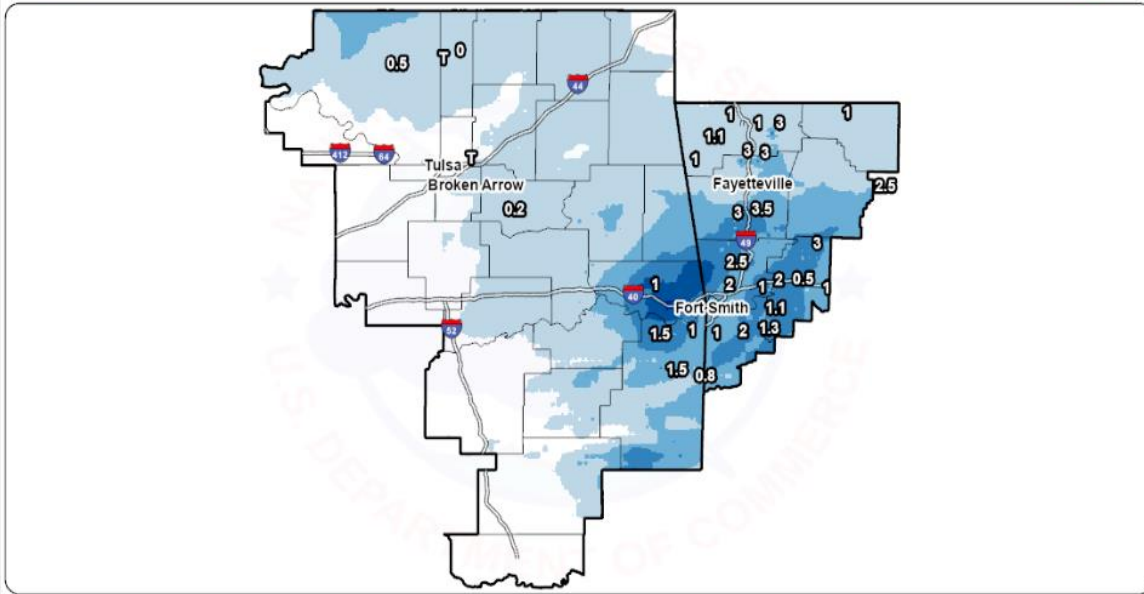




# National Weather Service Tulsa Oklahoma

Snowfall Analysis 01/04/2024 12:00PM to 01/05/2024 12:00PM CST

Preliminary Analysis Data Source: NOHRSC and Regional Observations (Values Estimated at Locations)



This is an experimental product of the NWS GAZPACHO software package. Care should be taken in using the data. Unofficial observations may be plotted. Values at interpolated locations may not represent actual reports at that location.

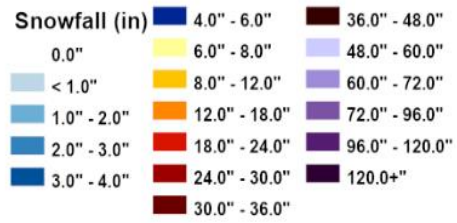
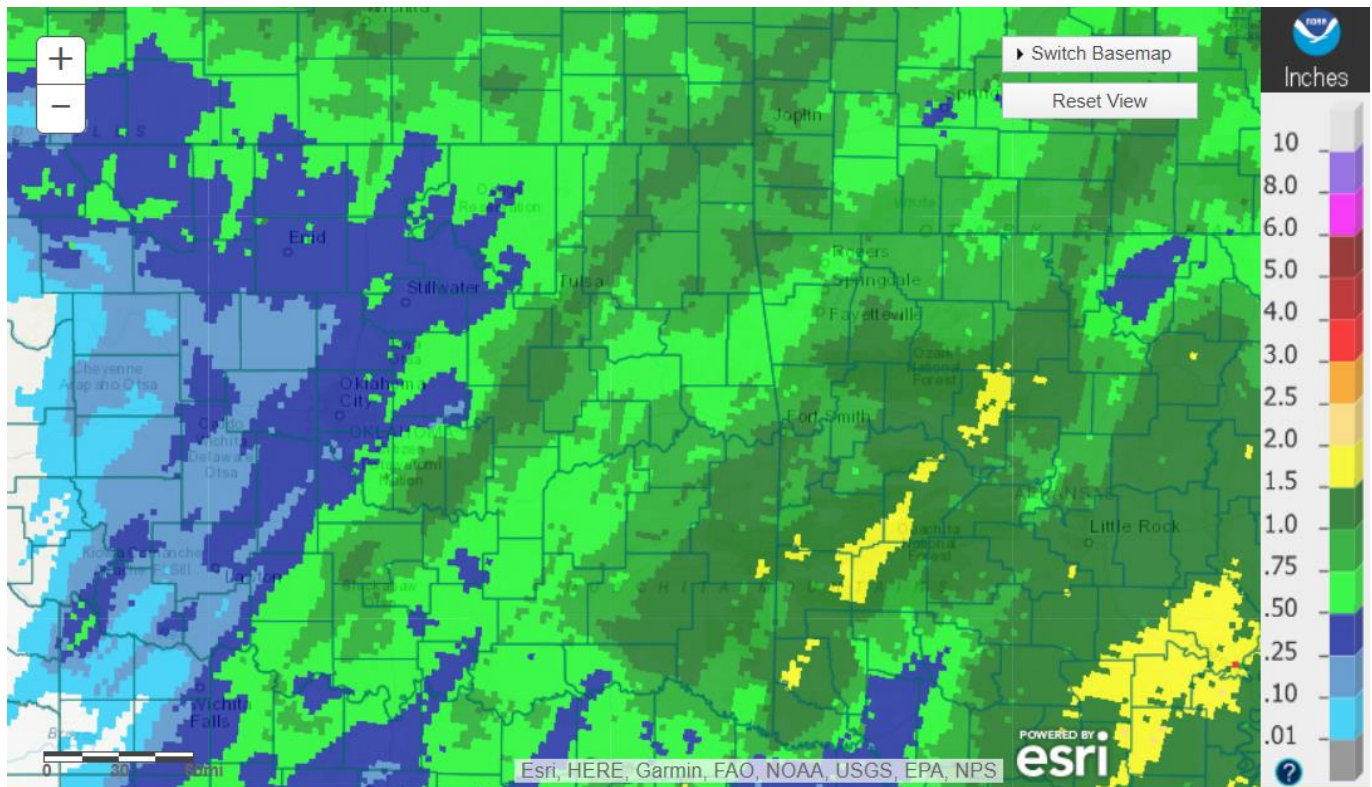


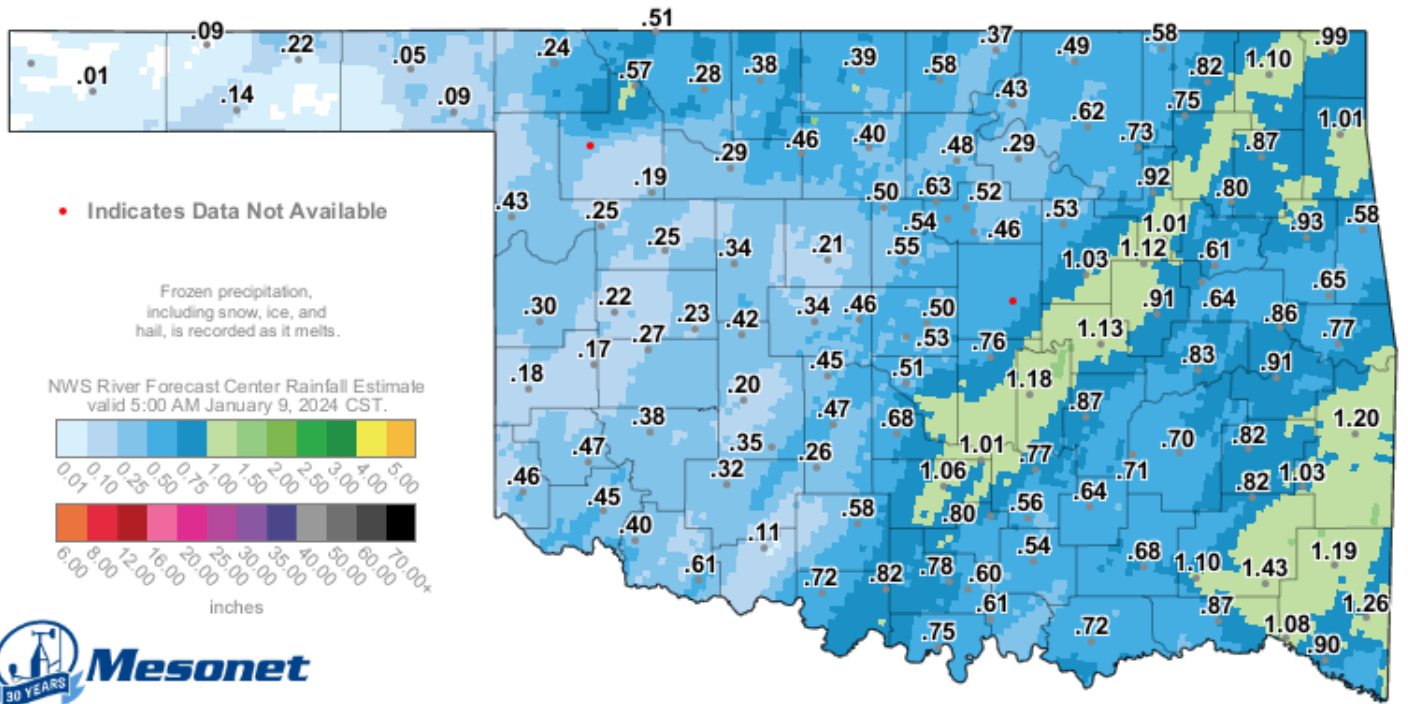
Fig. 4. Estimated snowfall analysis from noon 1/04/2024 through noon 1/05/2024 CST.



Tulsa, OK: January 09, 2024 1-Day Observed Precipitation  
Valid on: January 09, 2024 12:00 UTC

Fig. 5. 24-hour Estimated Observed Rainfall ending at 6am CST 01/09/2024.





## 2-Day Rainfall Accumulation (inches)

6:30 AM January 9, 2024 CST

Created 6:35:52 AM January 9, 2024 CST. © Copyright 2024

Fig. 6. OK Mesonet (values) and NWS RFC rainfall estimate (image) 48-hour rainfall ending at 6:30 am CST 01/09/2024.

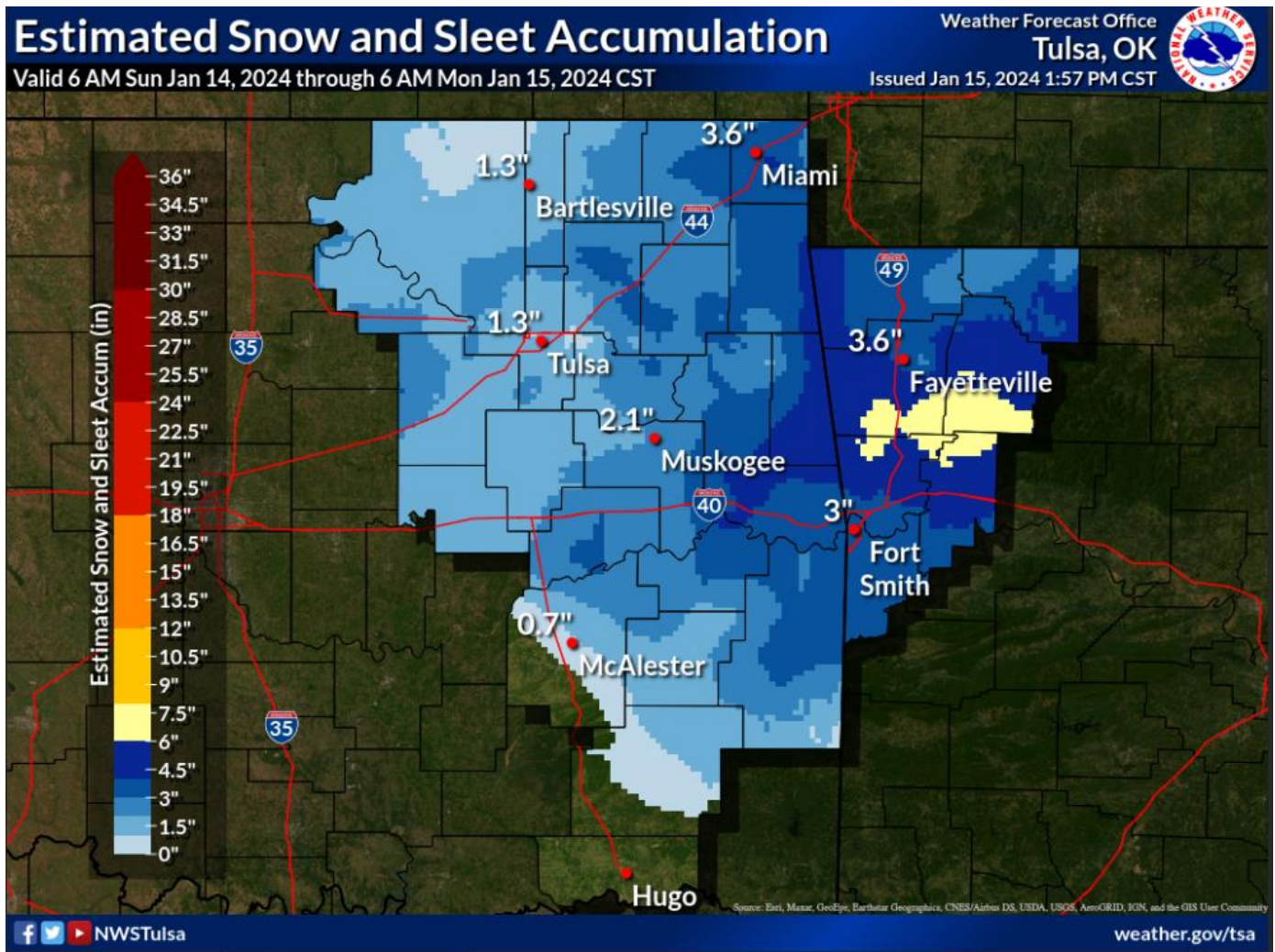


Fig. 7. Estimated snowfall analysis from 6am 1/14/2024 through 6am 1/15/2024 CST.



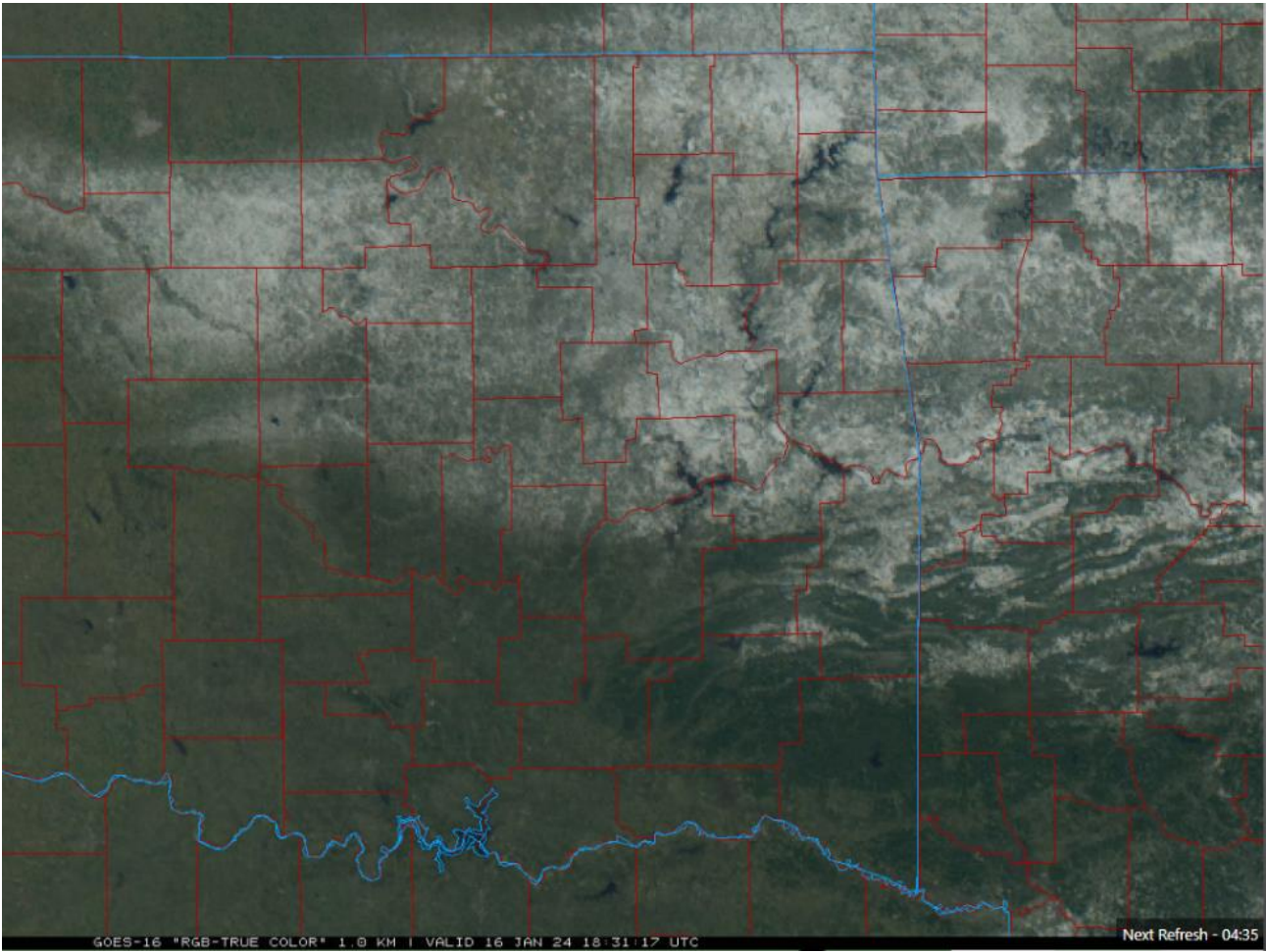
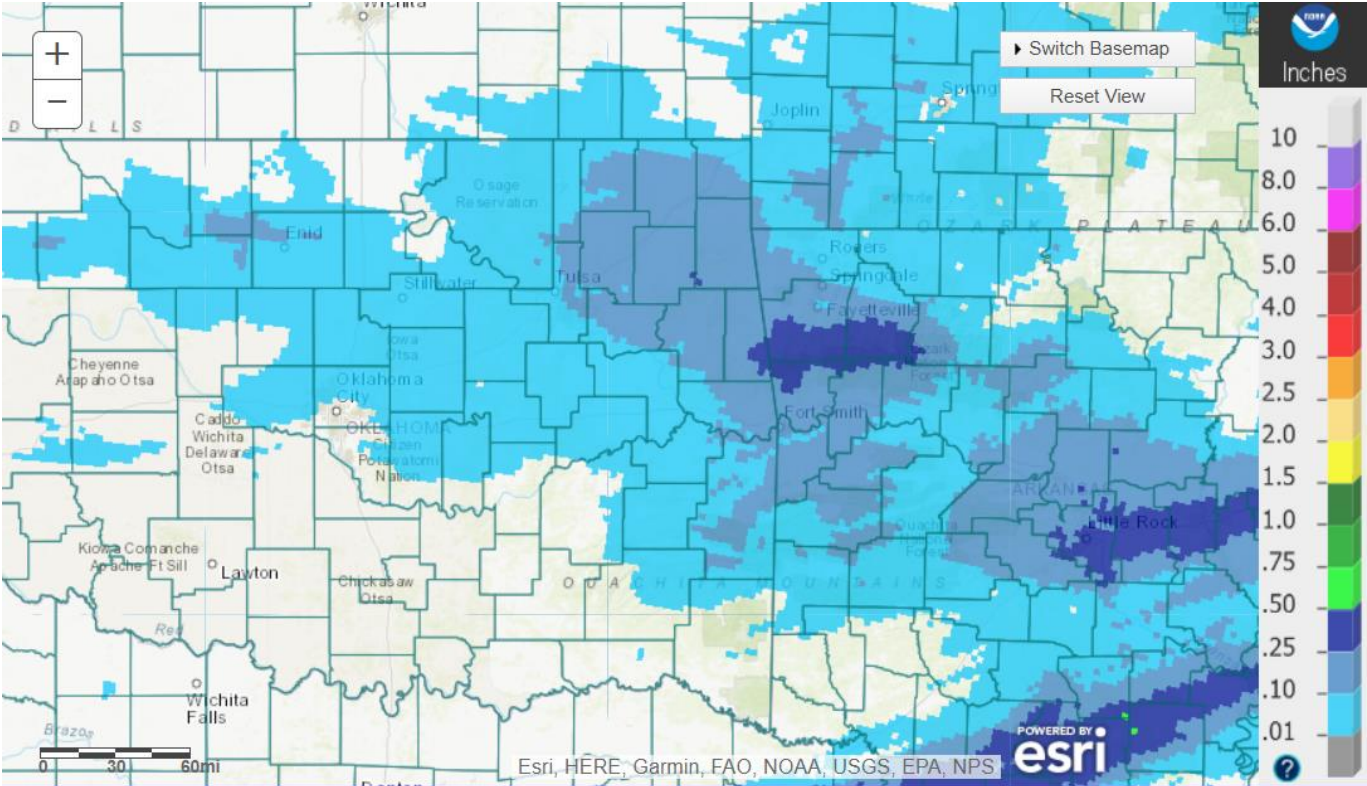


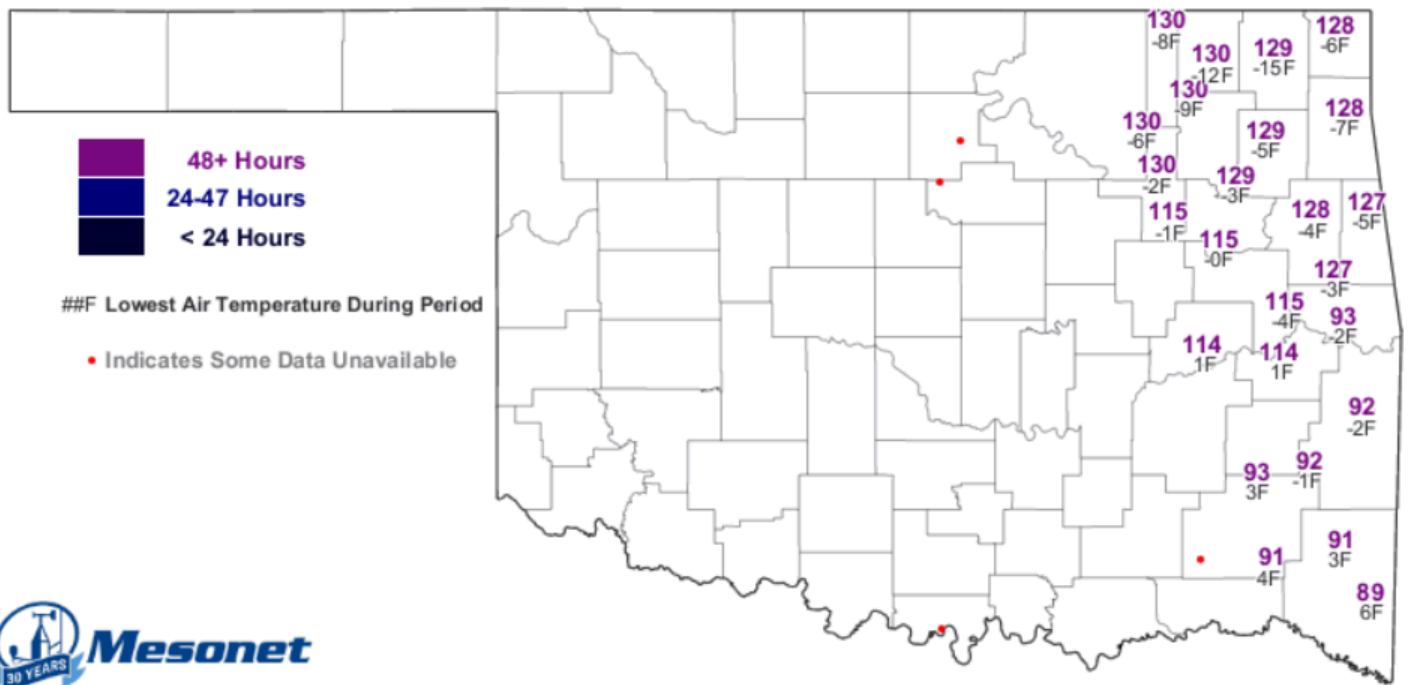
Fig. 8. GOES 16 satellite image valid 12:31 pm CST 01/16/2024.



Tulsa, OK: January 15, 2024 1-Day Observed Precipitation  
Valid on: January 15, 2024 12:00 UTC

Fig. 9. 24-hour Estimated Observed Rainfall ending at 6am CST 01/15/2024.



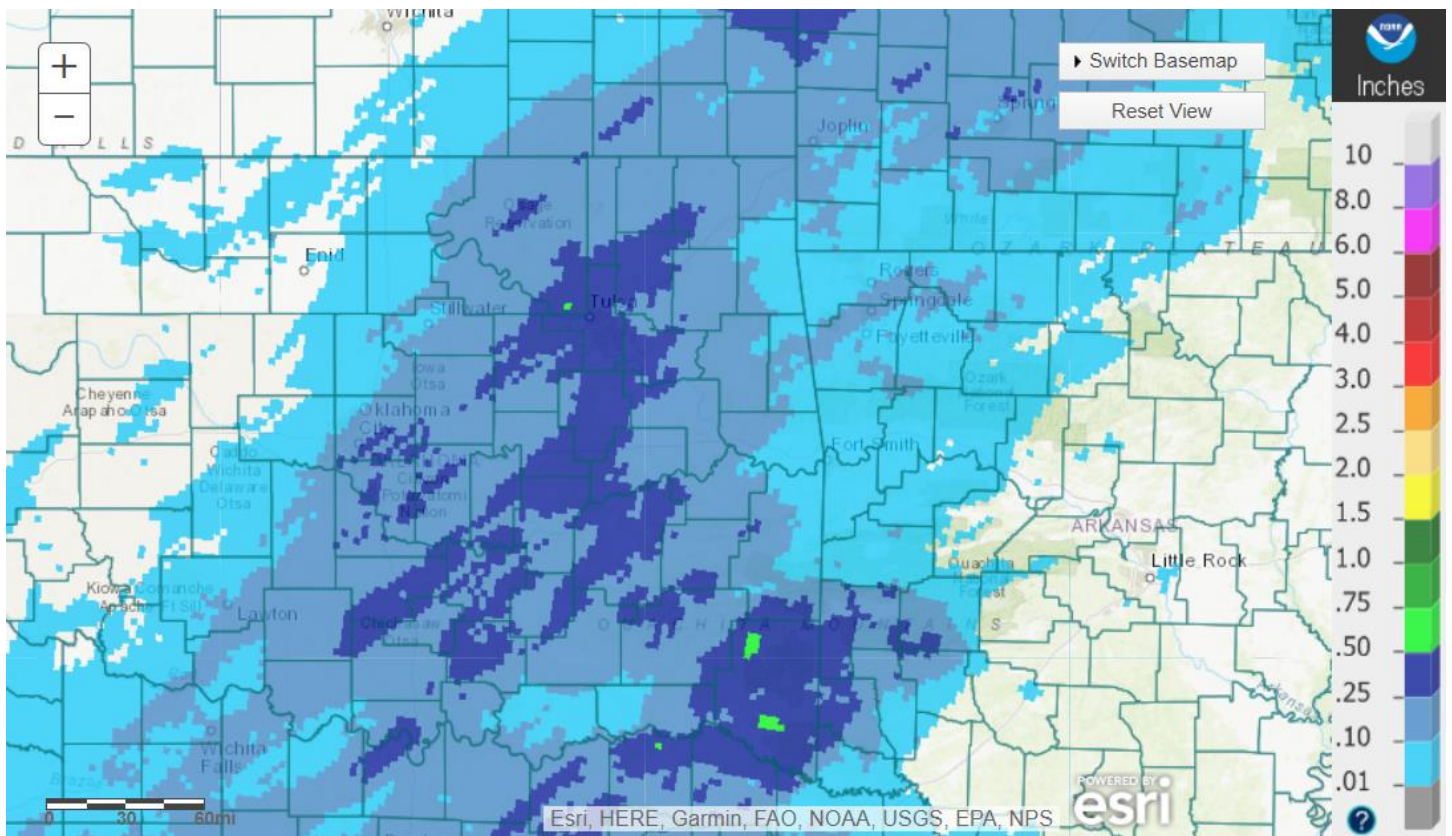


### Consecutive Hours Below Freezing

11:45 AM January 17, 2024 CST

Created 11:50:58 AM January 17, 2024 CST. © Copyright 2024

Fig. 10. OK Mesonet consecutive hours below freezing as of 11:45 am 01/17/2024.



Tulsa, OK: January 22, 2024 1-Day Observed Precipitation

Valid on: January 22, 2024 12:00 UTC

Fig. 11. 24-hour Estimated Observed Rainfall ending at 6am CST 01/22/2024.



# Estimated Ice Accumulation

Weather Forecast Office  
Tulsa, OK



Valid 6 PM Sun Jan 21, 2024 through 12 AM Tue Jan 23, 2024 CST

Issued Jan 23, 2024 11:35 AM CST

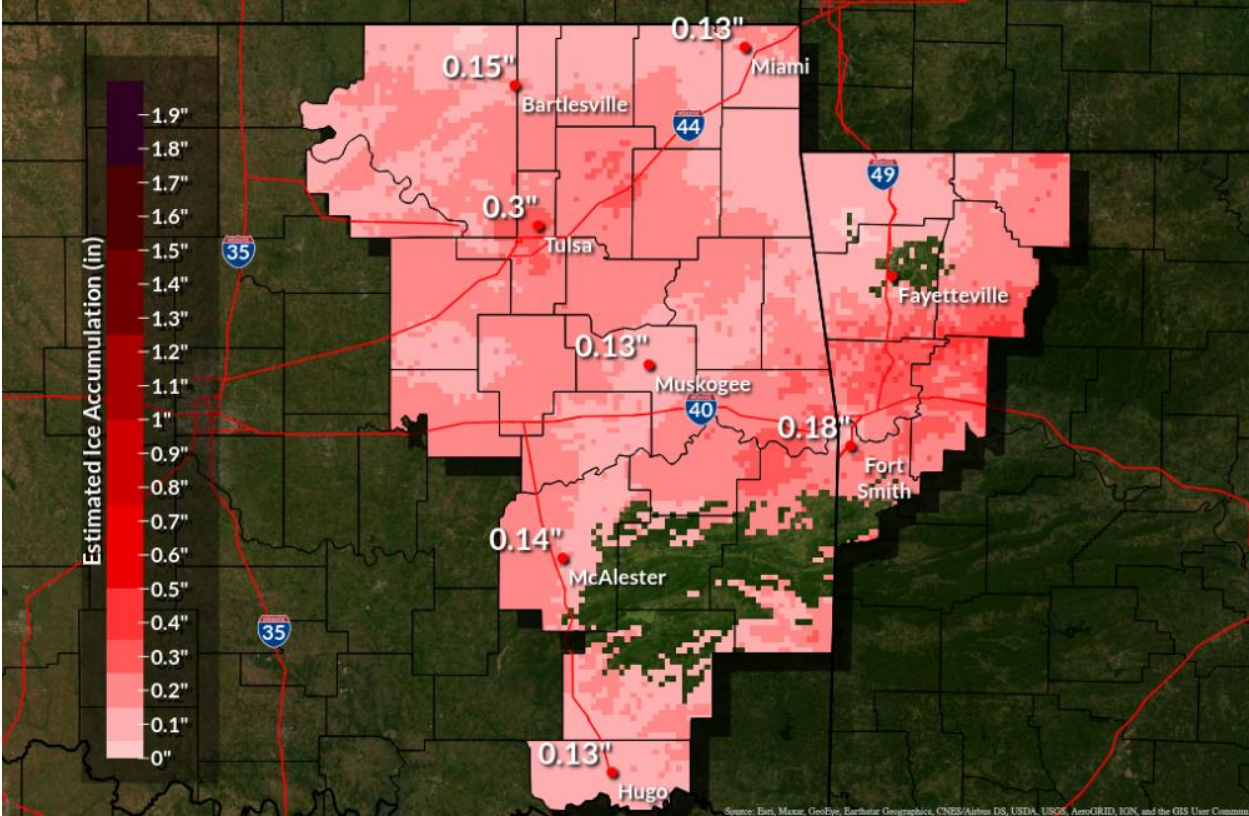
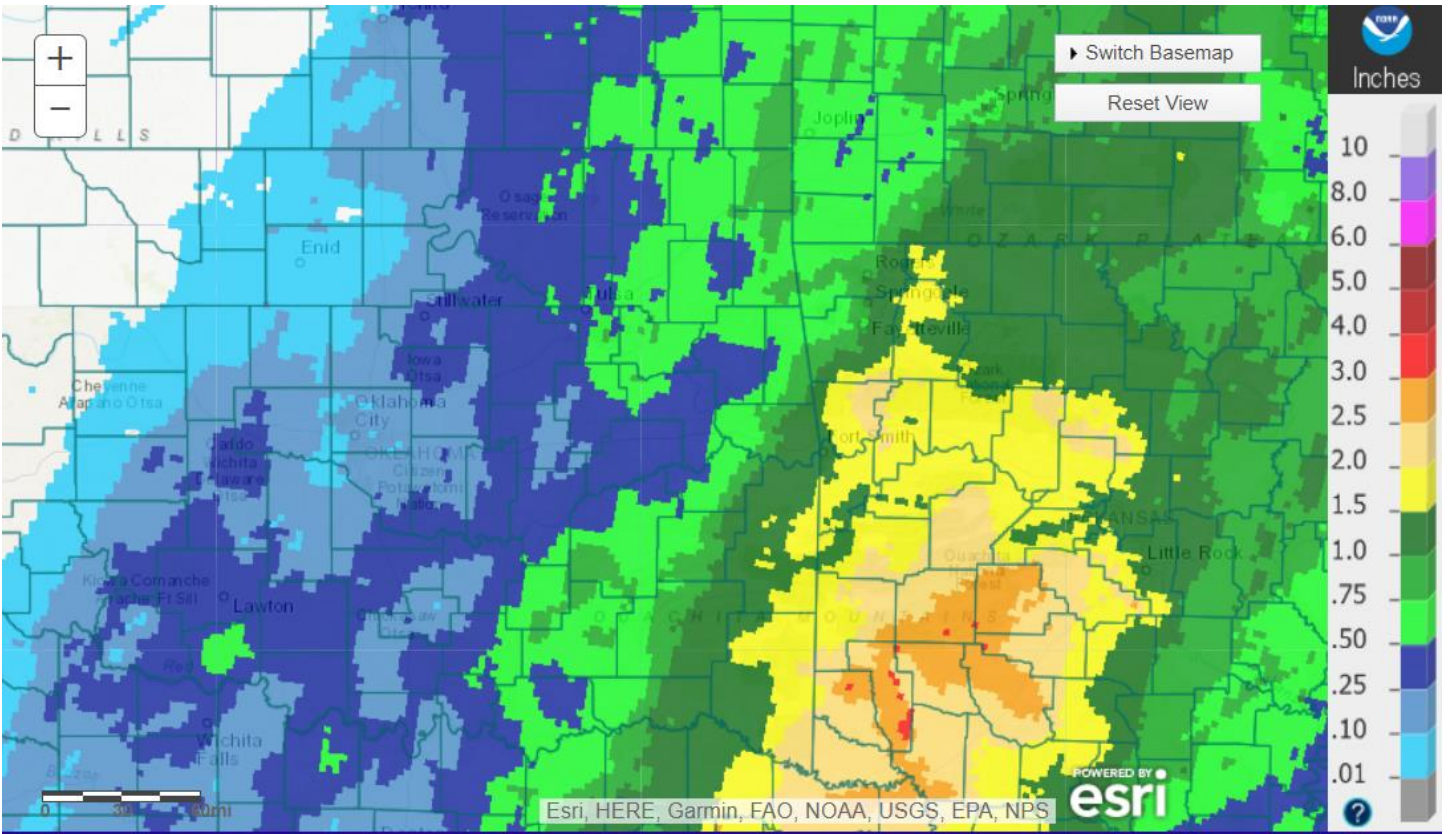


Fig. 12. Estimated ice accumulation analysis from 6pm 1/21/2024 through 12am 1/23/2024 CST.



Tulsa, OK: January 23, 2024 1-Day Observed Precipitation  
Valid on: January 23, 2024 12:00 UTC

Fig. 13. 24-hour Estimated Observed Rainfall ending at 6am CST 01/23/2024.

A strong but nearly stationary upper-level low settled across the Desert Southwest on the 21<sup>st</sup>, setting up a pattern of strong warm advection and isentropic lift above the retreating arctic airmass over eastern OK and northwest AR. Scattered showers first began to move into eastern OK during the evening hours, with more widespread showers and freezing rain by late evening. By midnight on the 22<sup>nd</sup>, rain and/or freezing rain was affecting all of eastern OK and northwest AR. Scattered showers of freezing rain then continued through the overnight and morning hours of the 22<sup>nd</sup>. By 6 am, rainfall totals were a few hundredths of an inch to half an inch (Fig. 11). Roadways became iced over due to the cold ground temperatures. Some power outages occurred, but the light winds precluded large outages. Ice accumulations ranged from a light glaze to around 0.3" (Fig. 12). By early afternoon, the air temperature had risen above freezing across the majority of the region, resulting in a switch back to primarily all liquid precipitation from southeast OK into northwest AR. This widespread light to moderate rain began to shift back north during the afternoon as another wave of moisture streamed into the area. The rain then ended from southwest to northeast during the evening hours, coming to an end by midnight. An additional 0.10" to around 2" of rain fell during this time (Fig. 13).

Written by:

Nicole McGavock  
Service Hydrologist  
WFO Tulsa

#### **Products issued in January 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)
- 0 Urban and Small Stream Advisories (FLS)
- 0 Areal Flood Warnings (FLW)
- 0 Areal Flood Statements (FLS)
- 0 River Flood Warnings (FLW) (includes category increases)
- 0 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:**

None