

<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>	
<b>MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS</b>		REPORT FOR:	
		MONTH <b>February</b>	YEAR <b>2022</b>
TO: Hydrometeorological Information Center, W/OH2 NOAA / National Weather Service 1325 East West Highway, Room 7230 Silver Spring, MD 20910-3283		SIGNATURE <b>Steven F. Piltz</b> (Meteorologist-in-Charge)	
		DATE <b>March 14, 2022</b>	

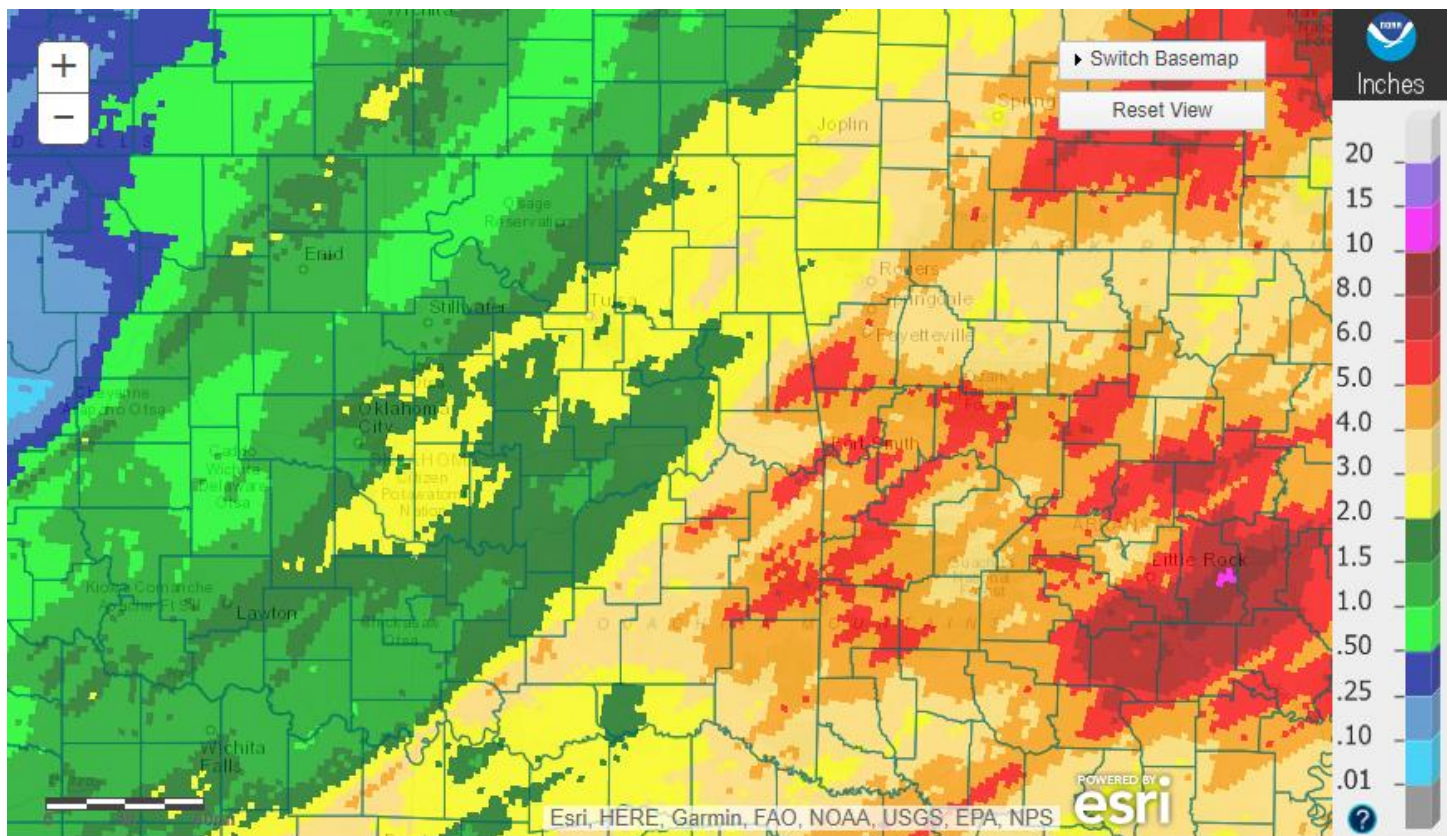
When no flooding occurs, include miscellaneous river conditions, such as significant rises, record low stages, ice conditions, snow cover, droughts, and hydrologic products issued (NWS Instruction 10-924)

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

A few winter storms affected eastern OK and northwest AR in February 2022, bringing freezing rain, sleet, and snow. Drought conditions continued across the western portion of the HSA, while some river rises occurred across the eastern portion. Normal precipitation across the HSA in February ranges from 1.8 inches in Osage County to 3.2 inches in Choctaw County. In the Ozark region of northwest AR, the normal monthly precipitation is 2.9 inches. 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

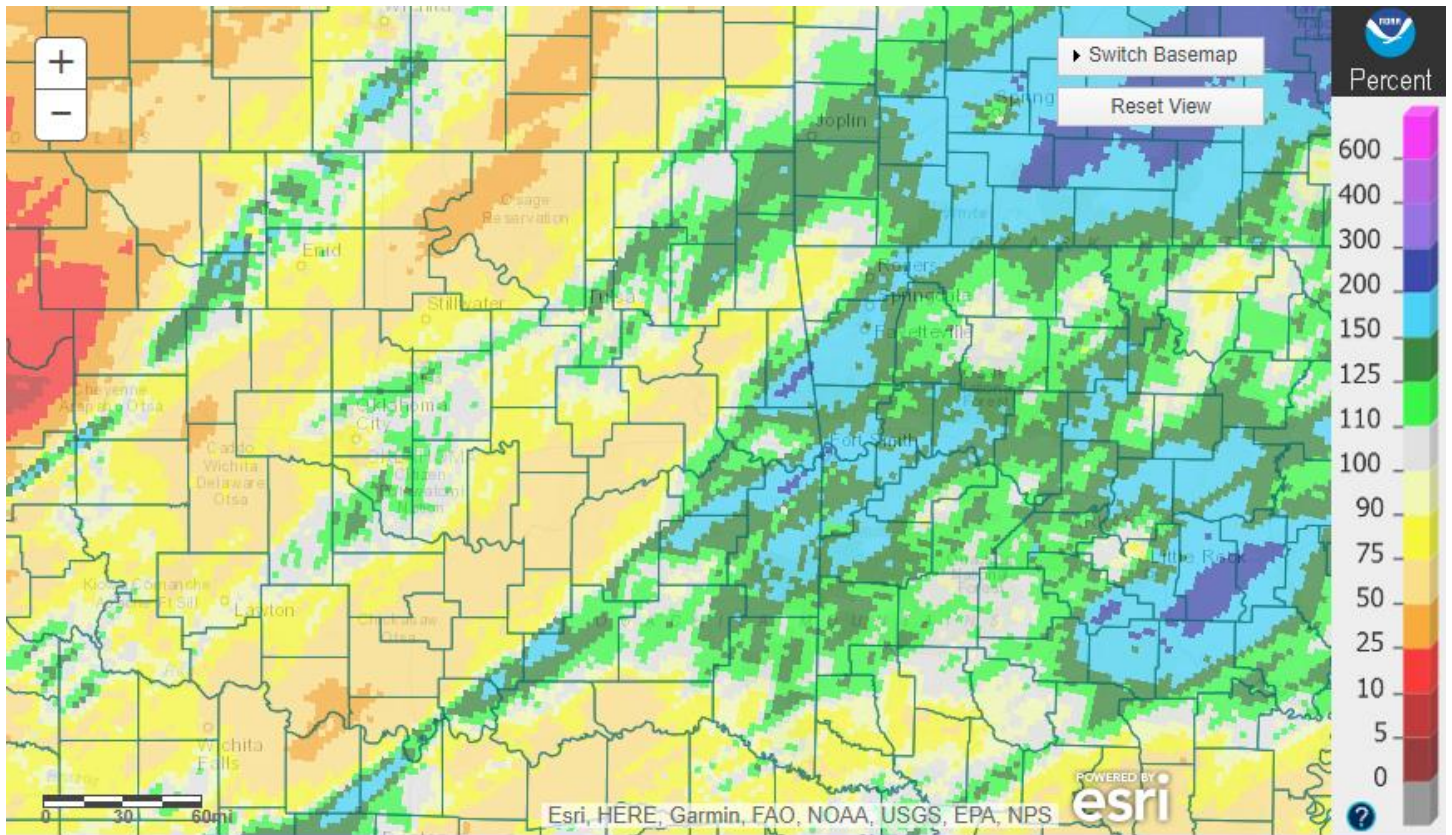
Using the radar-derived estimated observed precipitation from the RFCs (Fig. 1a), rainfall totals for February 2022 ranged from 0.50" to 6" across eastern OK and northwest AR, with much of the area only receiving 1.5"-4". These rainfall totals correspond to 25% to around 200% of the normal February rainfall (Fig. 1b).



Tulsa, OK: February, 2022 Monthly Observed Precipitation  
 Valid on: March 01, 2022 12:00 UTC

Fig. 1a. Estimated Observed Rainfall for February 2022





Tulsa, OK: February, 2022 Monthly Percent of Normal Precipitation  
Valid on: March 01, 2022 12:00 UTC

Fig. 1b. Estimated % of Normal Rainfall for February 2022

In Tulsa, OK, February 2022 ranked as the 49<sup>th</sup> coldest February (40.1°F; since records began in 1905), the 27<sup>th</sup> wettest February (2.56"; since records began in 1888), and the 7<sup>th</sup> snowiest February (8.7", tied 1929; since records began in 1900). Fort Smith, AR had the 53<sup>rd</sup> coldest February (42.1°F, tied 2002, 1917; since records began in 1883), the 25<sup>th</sup> wettest February (4.62"; since records began in 1883), and the 32<sup>nd</sup> snowiest February (3.0", tied 1968, 1911; since records began in 1884). Fayetteville, AR had the 30<sup>th</sup> coldest (38.8°F), the 11<sup>th</sup> wettest (4.47"), and the 3<sup>rd</sup> snowiest (10.6", tied 1960) February since records began in 1950.

Some of the larger precipitation reports (in inches) for February 2022 included:

Holiday Island 1.3SSW, AR (coco)	5.64	Kingston 2S, AR (coop)	5.32	Riverdale 4.2E, AR (coco)	5.17
Ozark 4.6S, AR (coco)	4.94	Bunch 0.8N, AR (coco)	4.81	Van Buren 2.1NNW, AR (coco)	4.67
Fort Smith, AR (ASOS)	4.62	Winslow 7NE, AR (coop)	4.54	Van Buren 0.7SSE, AR (coco)	4.48

Some of the lowest precipitation reports (in inches) for February 2022 included:

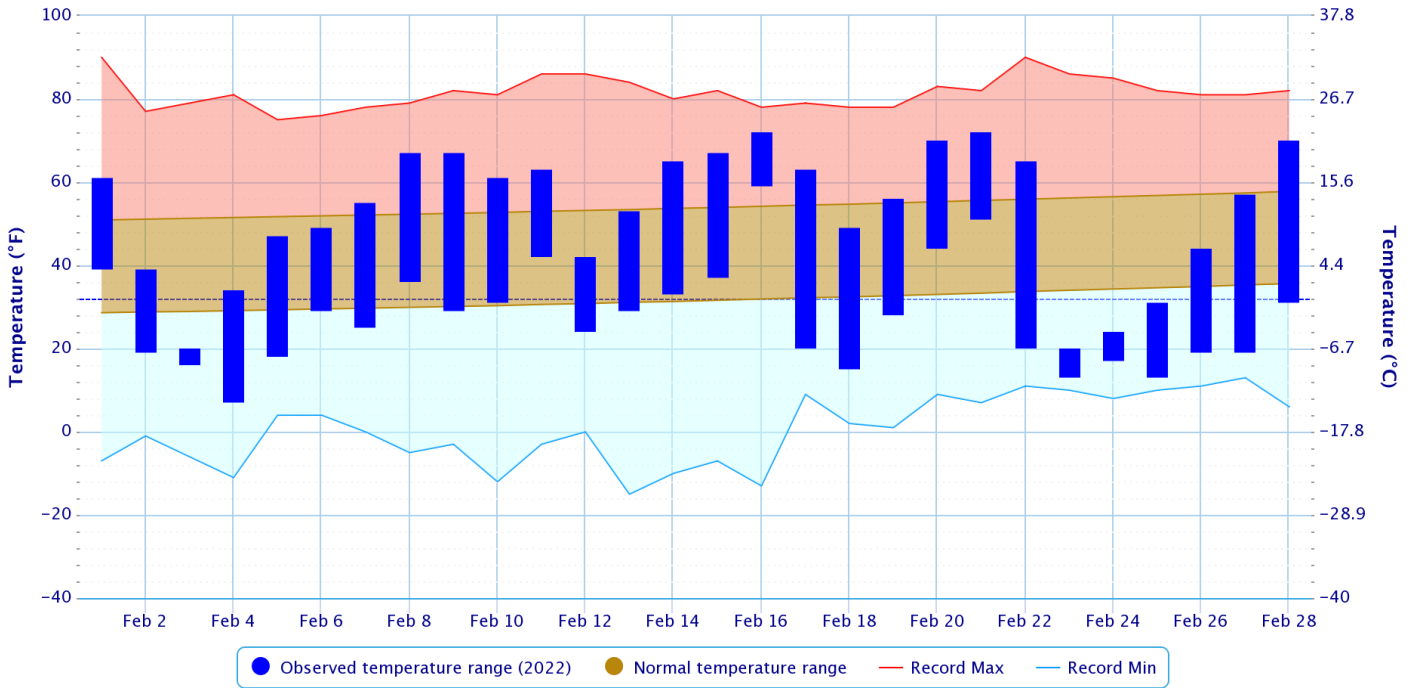
Foraker, OK (meso)	0.85	Burbank, OK (meso)	1.04	Bartlesville, OK (ASOS)	1.26
Muskogee, OK (ASOS)	1.45	Tulsa 7.7SSE, OK (coco)	1.60	Pawnee, OK (meso)	1.65
Glenpool 0.6S, OK (coco)	1.66	Wynona, OK (meso)	1.75	Tulsa 6.3S, OK (coco)	1.75

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

Rank since 1921	Last 30 Days (Jan 30 – Feb 28)	Year-to-Date (Jan 1 – Feb 28)	Last 120 Days (Nov 1 – Feb 28)	Winter 2021-22	Water Year-to-Date (Oct 1, 2021 – Feb 28, 2022)	Cool Growing Season (Sep 1 – Feb 28)	Last 365 Days (Mar 1, 2021 – Feb 28, 2022)
Northeast OK	49 <sup>th</sup> driest	23 <sup>rd</sup> driest	14 <sup>th</sup> driest	22 <sup>nd</sup> driest	44 <sup>th</sup> driest	23 <sup>rd</sup> driest	46 <sup>th</sup> wettest
East Central OK	42 <sup>nd</sup> wettest	38 <sup>th</sup> driest	33 <sup>rd</sup> driest	43 <sup>rd</sup> driest	46 <sup>th</sup> wettest	38 <sup>th</sup> driest	49 <sup>th</sup> driest
Southeast OK	36 <sup>th</sup> wettest	41 <sup>st</sup> driest	15 <sup>th</sup> driest	30 <sup>th</sup> driest	23 <sup>rd</sup> driest	<b>10<sup>th</sup> driest</b>	46 <sup>th</sup> driest
Statewide	51 <sup>st</sup> driest	28 <sup>th</sup> driest	<b>8<sup>th</sup> driest</b>	16 <sup>th</sup> driest	23 <sup>rd</sup> driest	<b>10<sup>th</sup> driest</b>	38 <sup>th</sup> driest

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

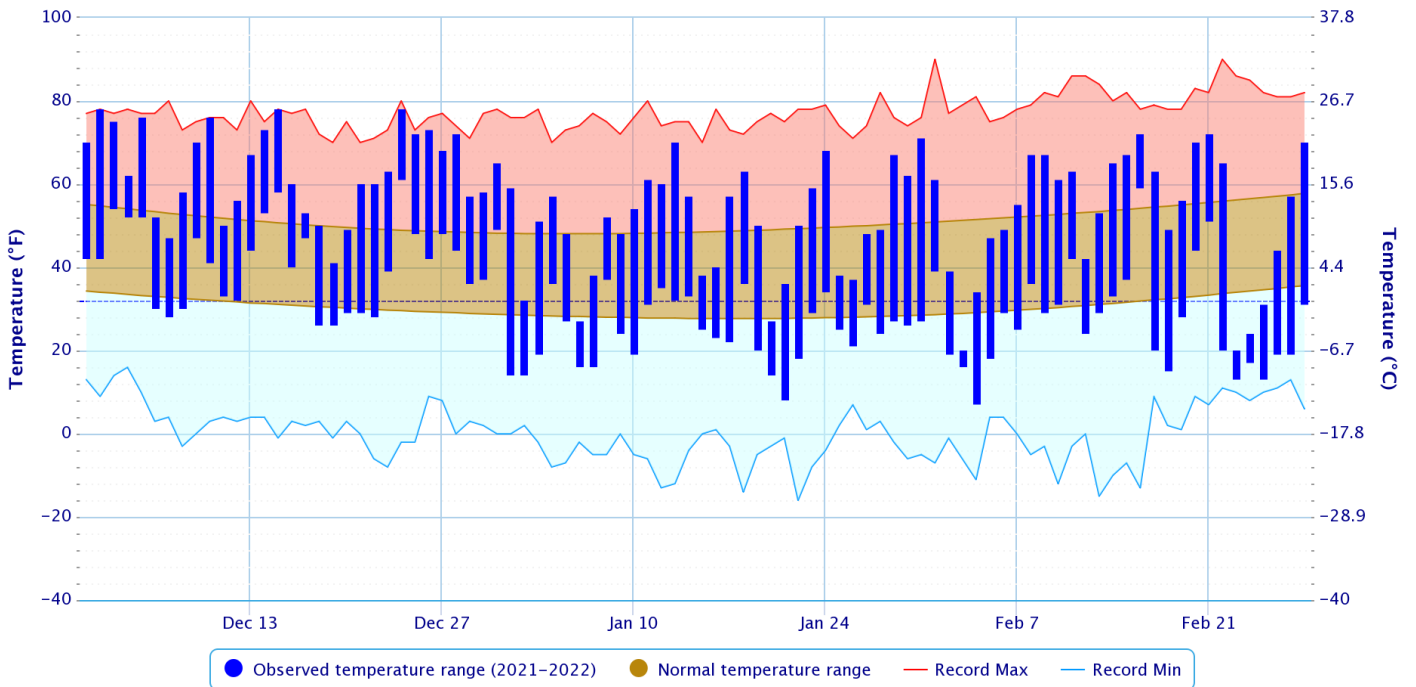
Period of Record – 1905-01-06 to 2022-03-03. Normals period: 1991-2020. Click and drag to zoom chart.



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

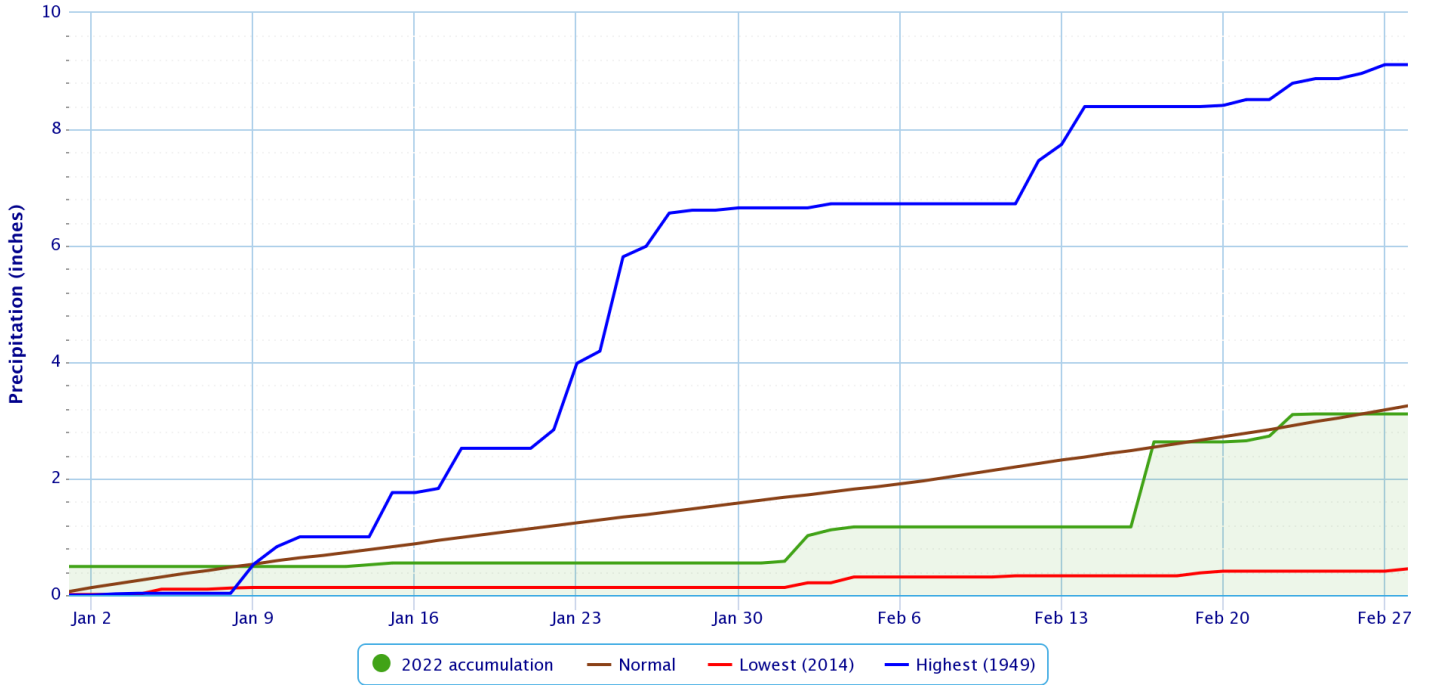
Period of Record – 1905-01-06 to 2022-03-03. Normals period: 1991-2020. Click and drag to zoom chart.



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

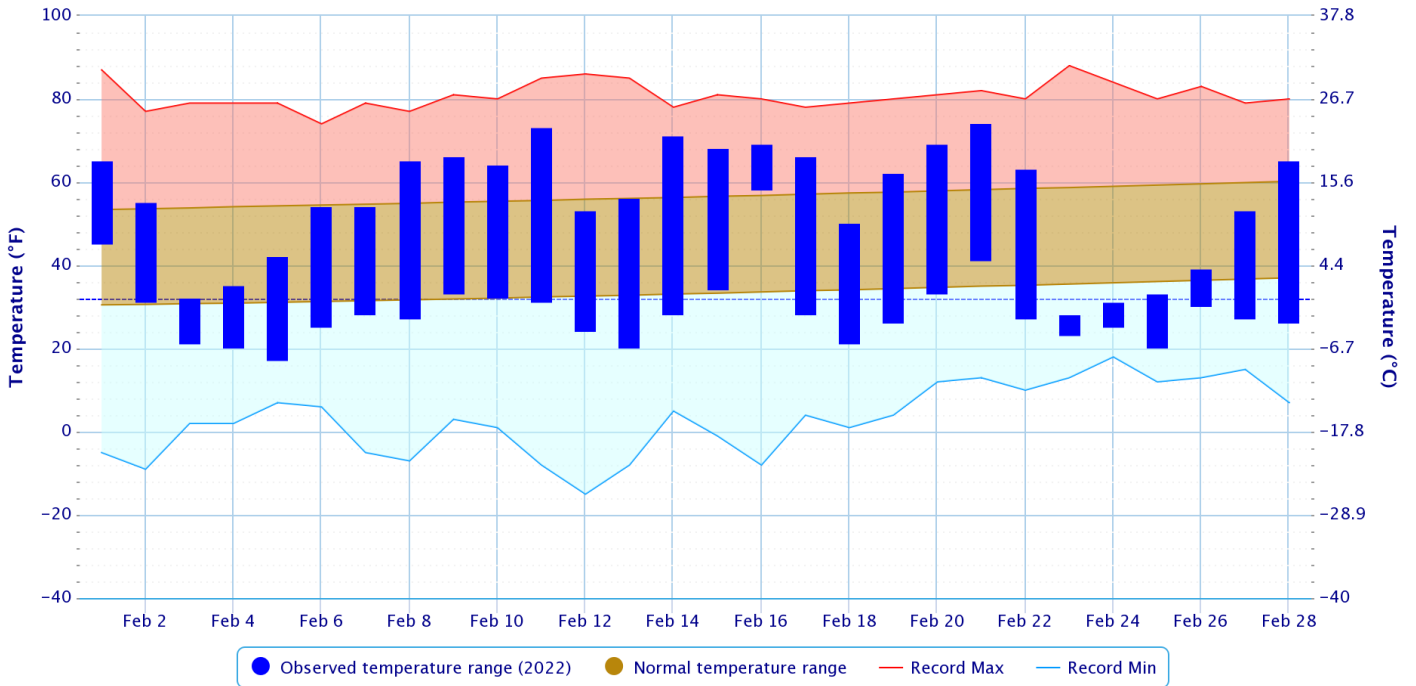
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



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

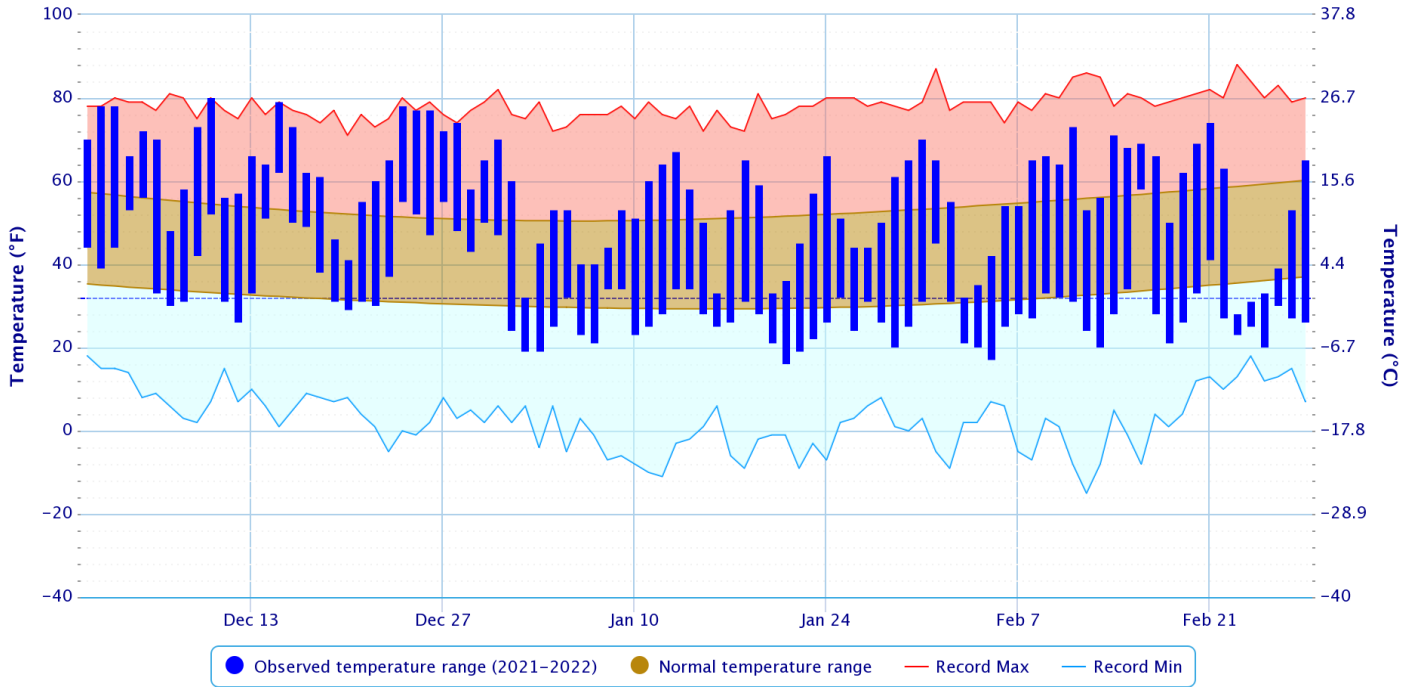
Period of Record – 1882-06-01 to 2022-03-03. Normals period: 1991-2020. Click and drag to zoom chart.



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

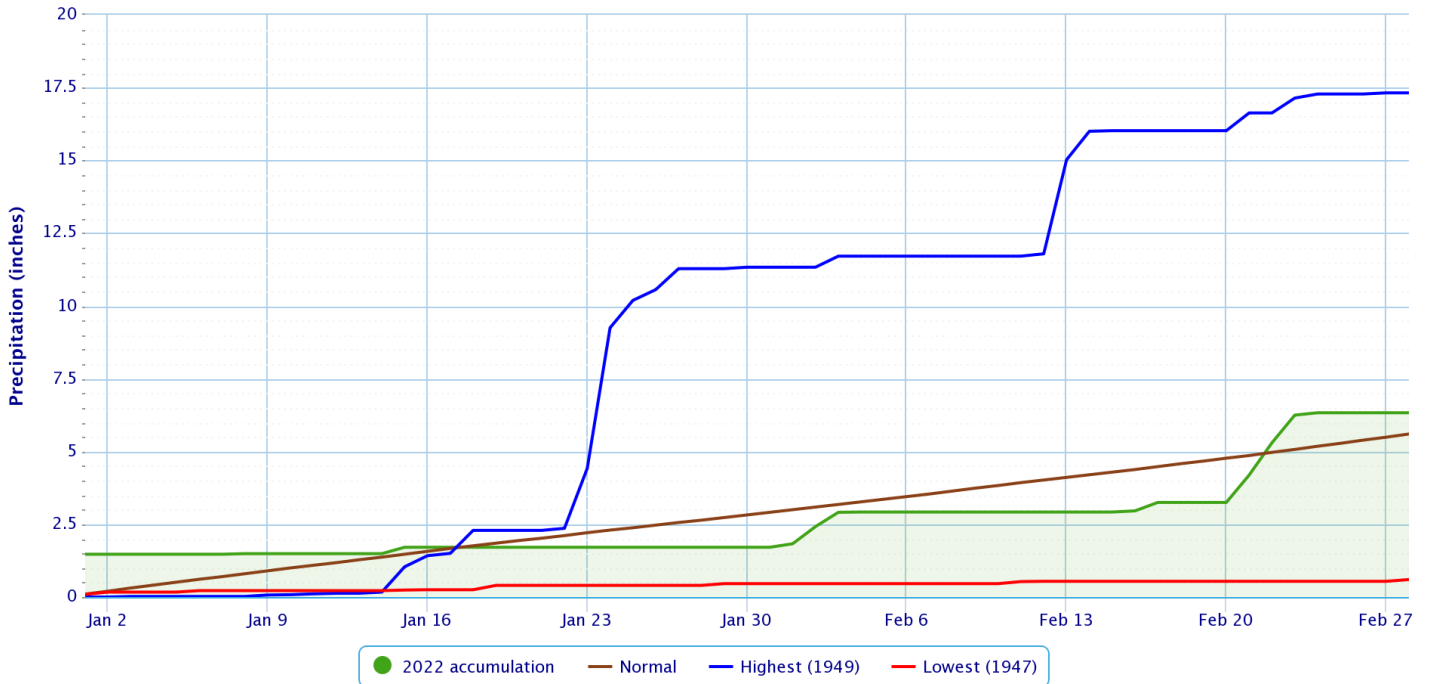
Period of Record – 1882-06-01 to 2022-03-03. Normals period: 1991-2020. Click and drag to zoom chart.



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

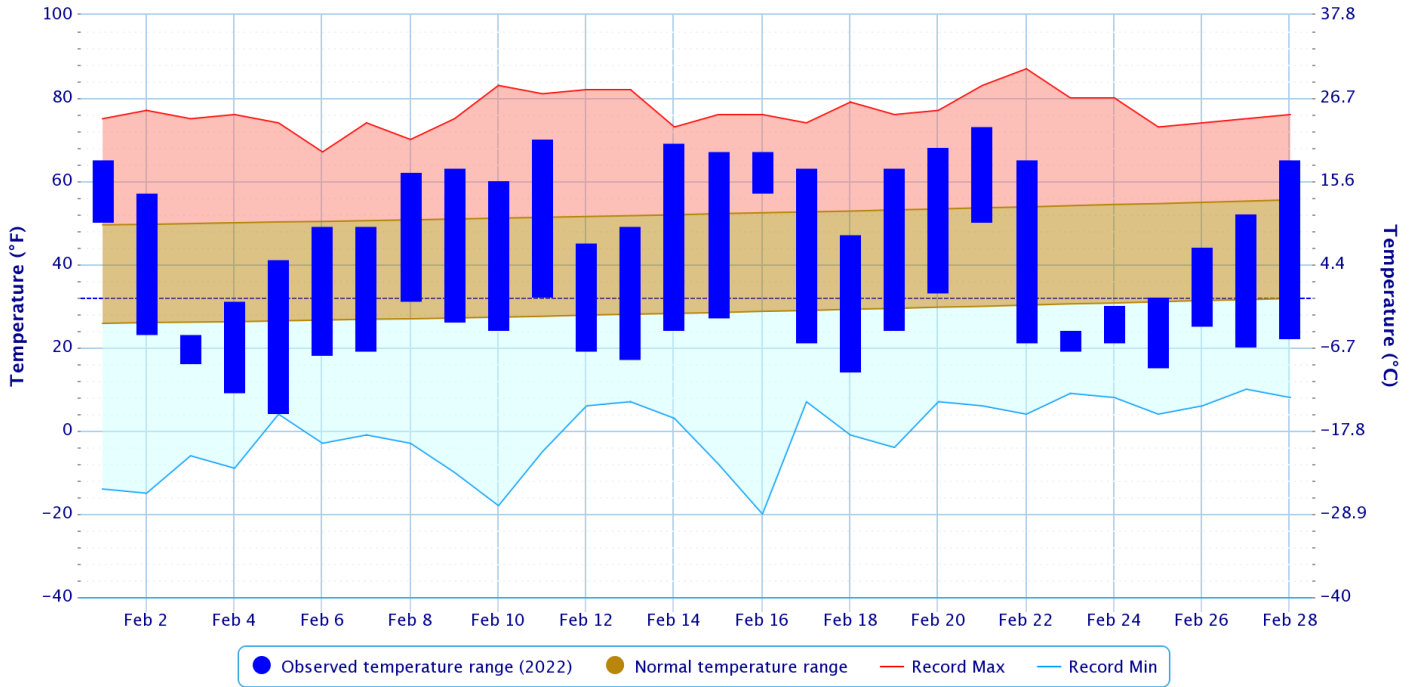
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



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

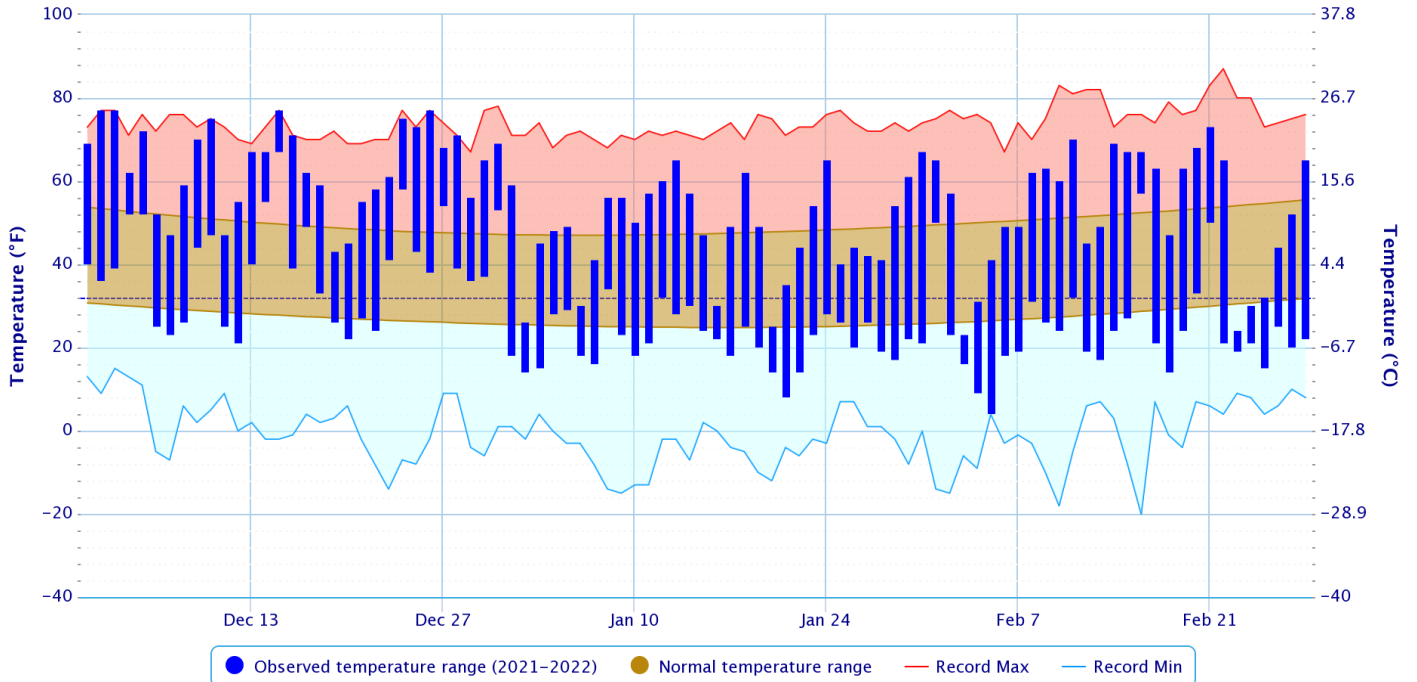
Period of Record – 1949-07-14 to 2022-03-03. Normals period: 1991-2020. Click and drag to zoom chart.



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

Period of Record – 1949-07-14 to 2022-03-03. Normals period: 1991-2020. Click and drag to zoom chart.

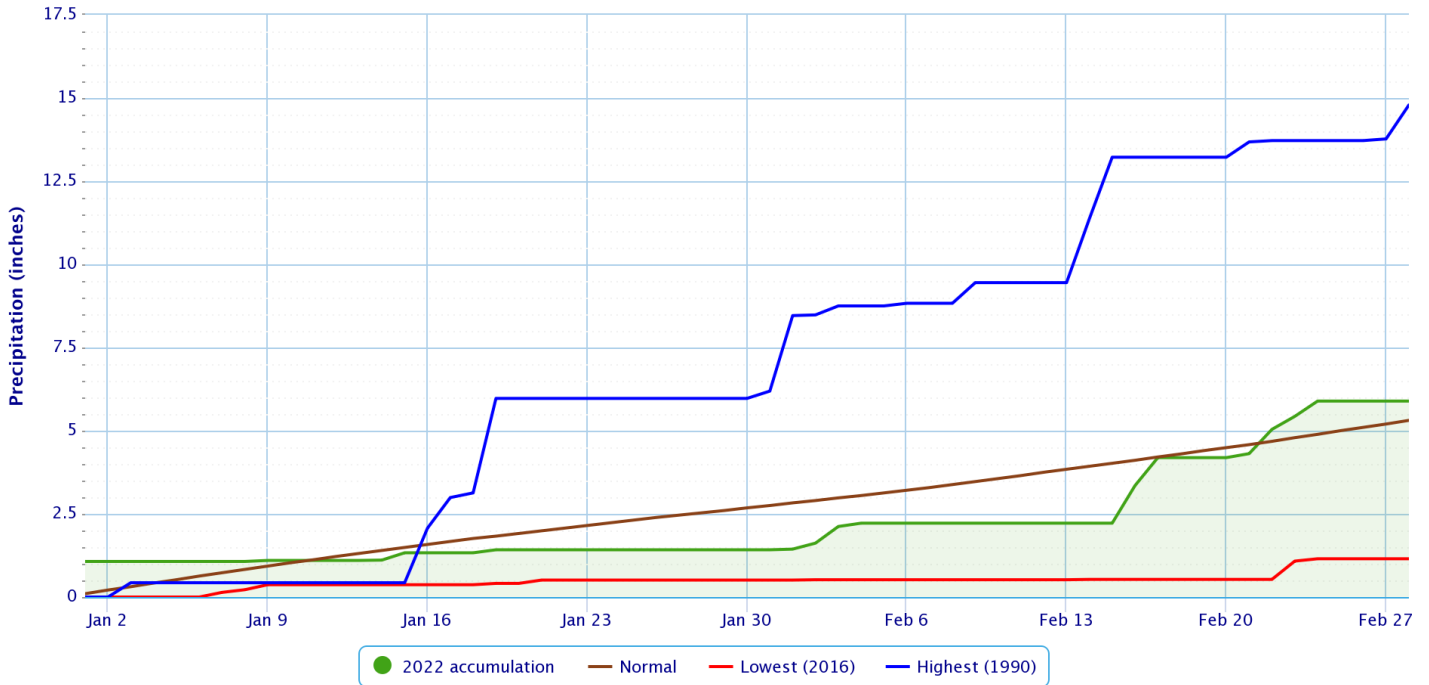


Powered by ACIS



## Accumulated Precipitation – FAYETTEVILLE DRAKE FIELD, AR

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

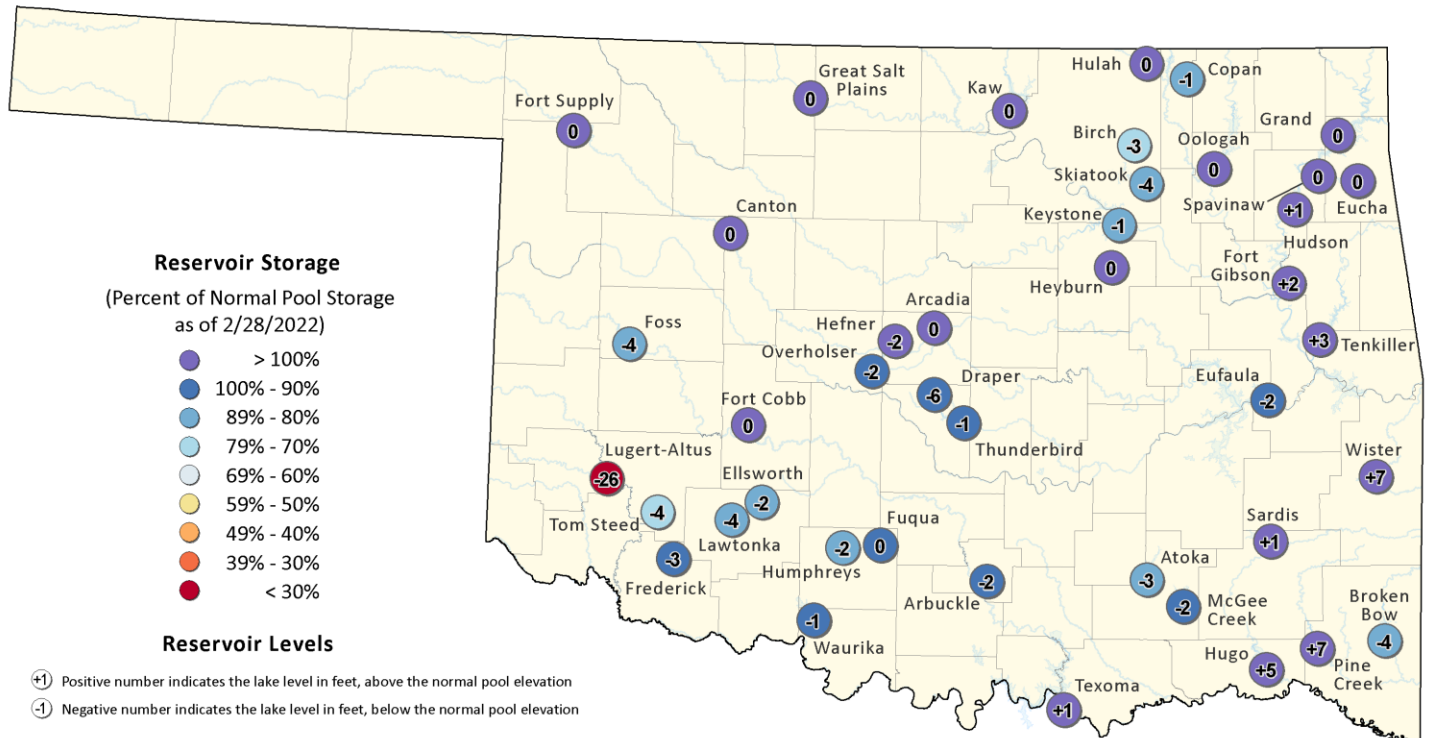


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## Reservoirs

# Oklahoma Surface Water Resources

## Reservoir Levels and Storage as of 2/28/2022



This map shows reservoir storage as a percentage of normal pool storage capacity. The source information was collected from real-time lake gages monitored by the U.S. Army Corps of Engineers ([http://www.swt-wc.usace.army.mil/Daily\\_Morning\\_Reservoir\\_Report.pdf](http://www.swt-wc.usace.army.mil/Daily_Morning_Reservoir_Report.pdf)), and the U.S. Geological Survey ([http://waterdata.usgs.gov/ok/nwis/current/?type=lake&group\\_key=basin\\_cd](http://waterdata.usgs.gov/ok/nwis/current/?type=lake&group_key=basin_cd)) For more information please visit the OWRB's website at: (<http://www.owrb.ok.gov>)



According to the USACE, several lakes in the HSA were below 3% of top of their conservation pools as of 3/01/2022: Birch Lake 77%, Copan Lake 85%, Skiatook Lake 87%, Lake Eufaula 90%, and Keystone 93%. Several lakes were more than 3% above the top of its conservation pool: Wister Lake 17%, Sardis Lake 13%, Hugo Lake 8%, Lake Tenkiller 6%, and Hudson Lake 6%.

## Drought

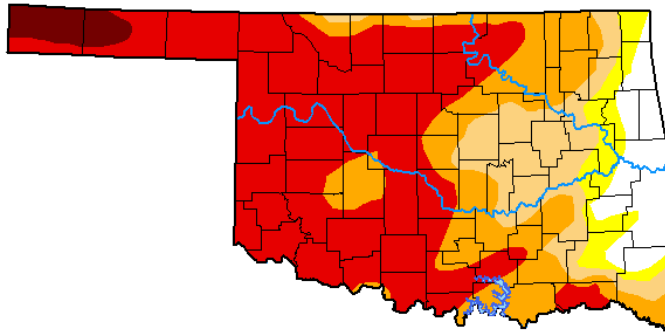
According to the [U.S. Drought Monitor](#) (USDM) from March 1, 2022 (Figs. 2, 3), drought conditions were present across a large portion of eastern OK. Extreme (D3) Drought conditions continued across portions of Choctaw, eastern Kay, Osage, and Pawnee Counties in eastern OK. Severe (D2) Drought conditions were present over parts of Osage, Pawnee, Tulsa, Creek, Washington, Nowata, Craig, Rogers, Mayes, Wagoner, Pushmataha, Choctaw, and Pittsburg Counties in eastern OK. Moderate (D1) Drought conditions were occurring across portions of Creek, Rogers, Tulsa, Craig, Mayes, Wagoner, Okfuskee, Okmulgee, McIntosh, Muskogee, Pittsburg, and Pushmataha Counties in eastern OK. Abnormally Dry (but not in drought) (D0) conditions were present over portions of Ottawa, Delaware, Cherokee, Wagoner, Mayes, Muskogee, Sequoyah, McIntosh, Pittsburg, Latimer, Haskell, Pushmataha, and Le Flore Counties in eastern OK. No drought or abnormally dry conditions were occurring in northwest AR.

### U.S. Drought Monitor Oklahoma

**March 1, 2022**  
(Released Thursday, Mar. 3, 2022)  
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	7.72	92.28	86.65	74.04	52.05	3.05
<b>Last Week</b> <i>02-22-2022</i>	6.69	93.31	86.65	73.94	52.05	2.90
<b>3 Months Ago</b> <i>11-30-2021</i>	13.32	86.68	60.71	15.92	2.23	0.00
<b>Start of Calendar Year</b> <i>01-04-2022</i>	5.02	94.98	88.14	72.26	40.44	0.00
<b>Start of Water Year</b> <i>09-28-2021</i>	6.45	93.55	73.23	23.72	2.65	0.00
<b>One Year Ago</b> <i>03-02-2021</i>	69.00	31.00	14.33	4.38	0.86	0.00



#### Intensity:

None	D2 Severe Drought
D0 Abnormally Dry	D3 Extreme Drought
D1 Moderate 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:

Brad Rippey  
U.S. Department of Agriculture



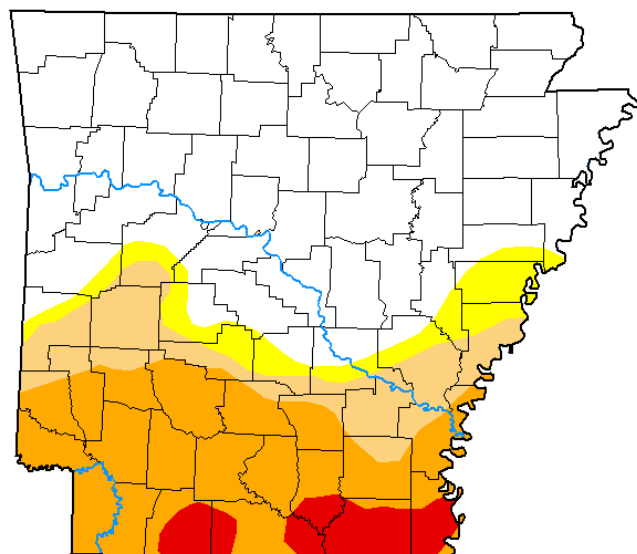
[droughtmonitor.unl.edu](https://droughtmonitor.unl.edu)

Fig. 2. Drought Monitor for Oklahoma



# U.S. Drought Monitor Arkansas

**March 1, 2022**  
(Released Thursday, Mar. 3, 2022)  
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	59.66	40.34	34.22	24.33	4.52	0.00
<b>Last Week</b> 02-22-2022	56.70	43.30	35.10	25.35	4.74	0.00
<b>3 Months Ago</b> 11-30-2021	9.62	90.38	41.41	7.18	0.00	0.00
<b>Start of Calendar Year</b> 01-04-2022	39.91	60.09	28.99	14.24	0.41	0.00
<b>Start of Water Year</b> 09-28-2021	51.41	48.59	5.17	0.00	0.00	0.00
<b>One Year Ago</b> 03-02-2021	91.24	8.76	0.00	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:

Brad Rippey  
U.S. Department of Agriculture



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

Fig. 3. Drought Monitor for Arkansas

## Winter (December-January-February) 2021-22

In Tulsa, OK, Winter 2021-22 ranked as the 11<sup>th</sup> warmest Winter (43.4°F; since records began in 1905-06) and the 62<sup>nd</sup> driest (4.79", tied 1990-91; since records began in 1888-89). Fort Smith, AR had the 11<sup>th</sup> warmest Winter (45.2°F, tied 1998-99; since records began in 1882-83) and the 25<sup>th</sup> wettest Winter (10.77"; since records began in 1882-83). Fayetteville, AR had the 6<sup>th</sup> warmest (41.9°F) and the 13<sup>th</sup> wettest (11.25") Winter since records began in 1949-50.

## Outlooks

The [Climate Prediction Center](#) (CPC) outlook for March 2022 (issued February 28, 2022) indicates an enhanced chance for above normal temperatures and above median precipitation across all of eastern OK and northwest AR. This outlook was largely based on dynamical model output and La Niña impacts. A variable pattern is expected for the month of March with changeable weather across large swathes of the country as the month progresses.

For the 3-month period March-April-May 2022, CPC is forecasting an enhanced chance for above normal temperatures and equal chances for above, near, and below median precipitation across all of eastern OK and northwest AR (outlook issued February 17, 2022). This outlook is based on long-term trends, La Niña impacts, and incorporates both statistical and dynamical forecast tools. According to CPC, the combined effect of the ocean-atmosphere system remains consistent with La Niña conditions. There is an 77% chance that La Niña conditions will continue through early spring 2022 and a 56% chance for ENSO-neutral conditions by summer 2022. CPC continues the 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](http://water.weather.gov/precip/index.php?location_type=wfo&location_name=tsa)

A cold front moved across the area from the afternoon of the 1<sup>st</sup> through sunrise on the 2<sup>nd</sup>. Some light showers developed behind the front, and as low-level temperatures began to fall below freezing across northeast OK during the early morning hours of the 2<sup>nd</sup>, the rain changed to freezing rain and sleet. There was a lull in the precipitation during the afternoon, though the freezing line continued to push south with patches of freezing drizzle. Moderate to heavy precipitation then began again in the late afternoon as the region was in the favorable left exit region of an intensifying jet streak within a broader area of synoptic-scale lift. Precipitation was affecting all of eastern OK and northwest AR through the evening hours. The cold front became hung up across the terrain of northwest AR, and due to the track of the storm system, also slowed down its southward progress over southeast OK. This allowed for a longer period of freezing rain, mixed with sleet at times, from southeast OK into west central AR during the evening. Further north, the cold air was deep enough for primarily snow, with moderate to heavy snowfall affecting northeast OK and northwest AR. A mix with sleet occurred in the transition zone primarily from east central OK into northwest AR. Lake effect snow off of Oologah Lake resulted in some additional light snow accumulations. Snowfall to liquid equivalent ratios were on the order of 15:1, and with gusty winds of 20-30 mph, the powdery snow drifted 18"-24" in places. The precipitation tapered off from northwest to southeast during the early morning through mid-afternoon hours of the 3<sup>rd</sup>. Across southeast OK and west central AR, the freezing rain eventually changed to mostly sleet, then some snow. After a relatively short break from the snow, the next round began to move into northeast OK during the afternoon as a mid-level low approached the region. Cold temperatures kept the snow-to-liquid equivalent ratios high with this next wave of precipitation. Light to moderate snow primarily affected locations north of I-40 during the late evening through the early morning hours of the 4<sup>th</sup>. Some light snow fell across east central OK and west central AR through mid-morning before finally coming to an end. In total, southeast OK and west central AR received 0.1" to near 0.7" of ice accumulation, with some light ice accumulation also reported across far northeast OK (Fig. 4). Sleet and snow accumulations ranged from 0.5" to around 10" across eastern OK and northwest AR, with the highest totals generally from Tulsa County to Carroll County (Fig. 5). The storm total liquid equivalent values ranged from 0.50" to near 2" (Figs. 6-8).

A few bands of showers and thunderstorms moved across eastern OK and northwest AR during the evening hours of the 16<sup>th</sup>. However, more intense rainfall began after midnight on the 17<sup>th</sup> as thunderstorms developed along a cold front to the west and moved east into the area. Just before sunrise on the 17<sup>th</sup>, showers and thunderstorms were widespread across eastern OK and northwest AR. This activity then quickly progressed east, coming to an end by mid-morning. However, sub-freezing temperatures moved in behind the front, resulting in some sleet and freezing rain before the precipitation ended. Wrap-around snow primarily impacted Osage and Pawnee Counties in northeast OK midday as the upper-level low moved through. Rainfall/liquid equivalent totals ranged from around 0.50" to near 2.5" (Figs. 9-11) due to precipitable water values of around 1.25" (near record for this time of year). This rainfall resulted in rises along the Illinois River, with the gage near Tahlequah exceeding action stage but remaining below flood stage (see preliminary hydrographs at the end of this report).

Showers and thunderstorms developed over north TX during the afternoon of the 21<sup>st</sup> in response to a mid-level shortwave. This activity spread northeast into eastern OK and northwest AR through the evening and late-night hours as the low-level jet strengthened. The rain ended from west to east by sunrise on the 22<sup>nd</sup> as a cold front swept through. A large portion of the area received rainfall, but the primary corridor of heavy rain fell across southeast OK and west central AR, where rainfall totals were 1"-3" (Fig. 12). Heavy rain fell over the Poteau River basin, with the gage near Panama rising to just below flood stage (see preliminary hydrographs at the end of this report).

Another winter storm impacted the area starting on the 23<sup>rd</sup>. Showers and thunderstorms that had developed over north central TX spread northeast into eastern OK and northwest AR after sunrise. Widespread precipitation continued through the morning as a mid-level vorticity maximum ejected out into the Plains before beginning to shift further northeast during the early afternoon hours. Much of this precipitation fell as sleet (with some "thundersleet" occurring), though the northern areas received a mix of sleet and snow and the southern areas saw some light freezing rain too. This sleet storm brought 0.5"-2" of sleet and snow to most of eastern OK and northwest AR (Fig. 13), with rainfall and liquid equivalent totals of around 0.10" - 1.5" (Fig. 14).

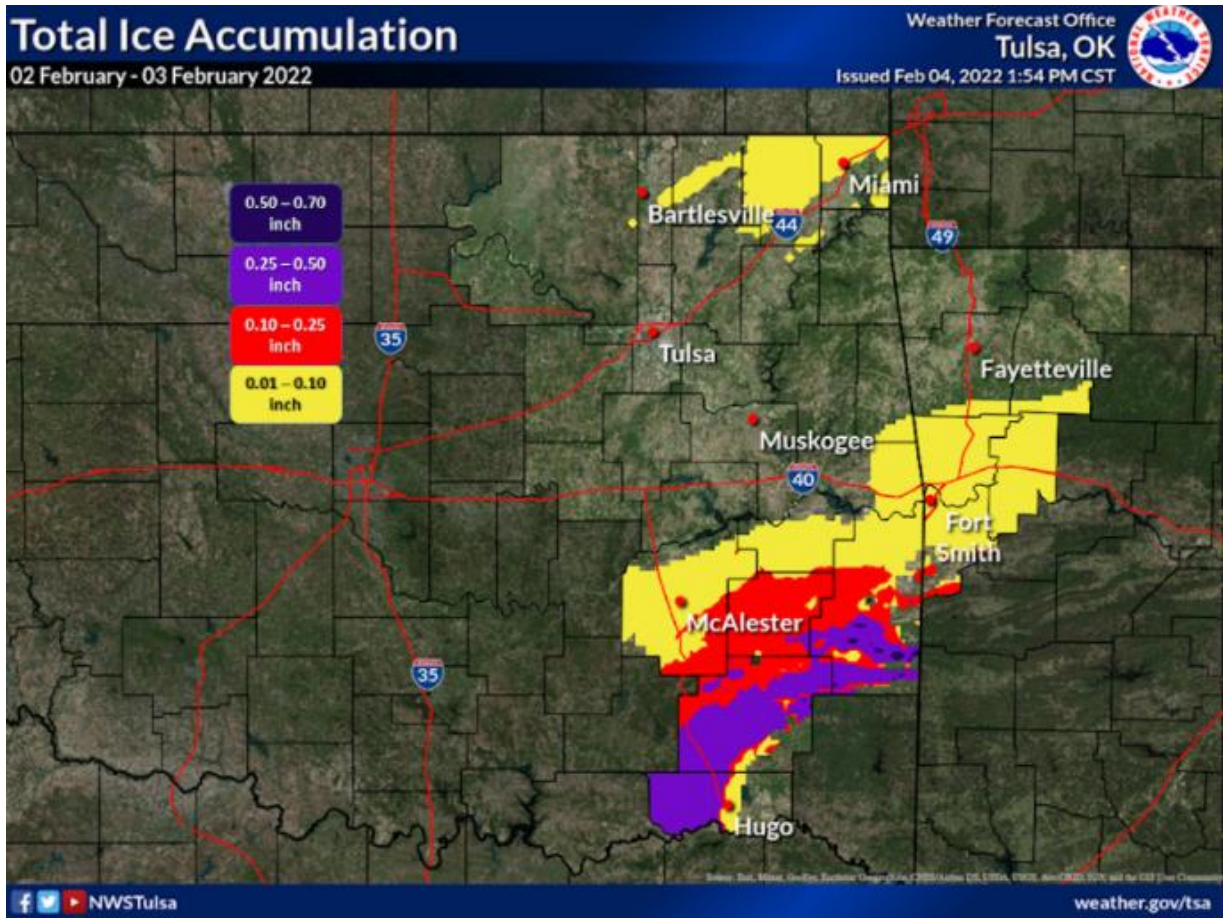


Fig. 4. Ice accumulation estimate based on reports for February 2-3, 2022.

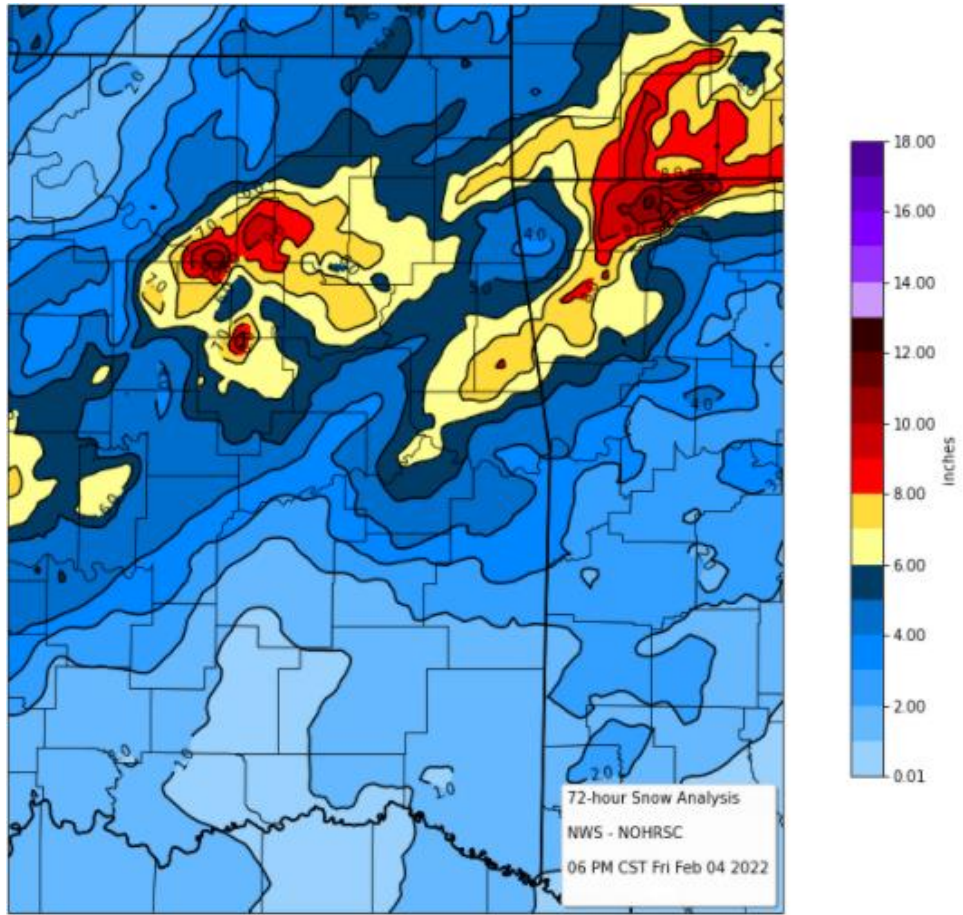
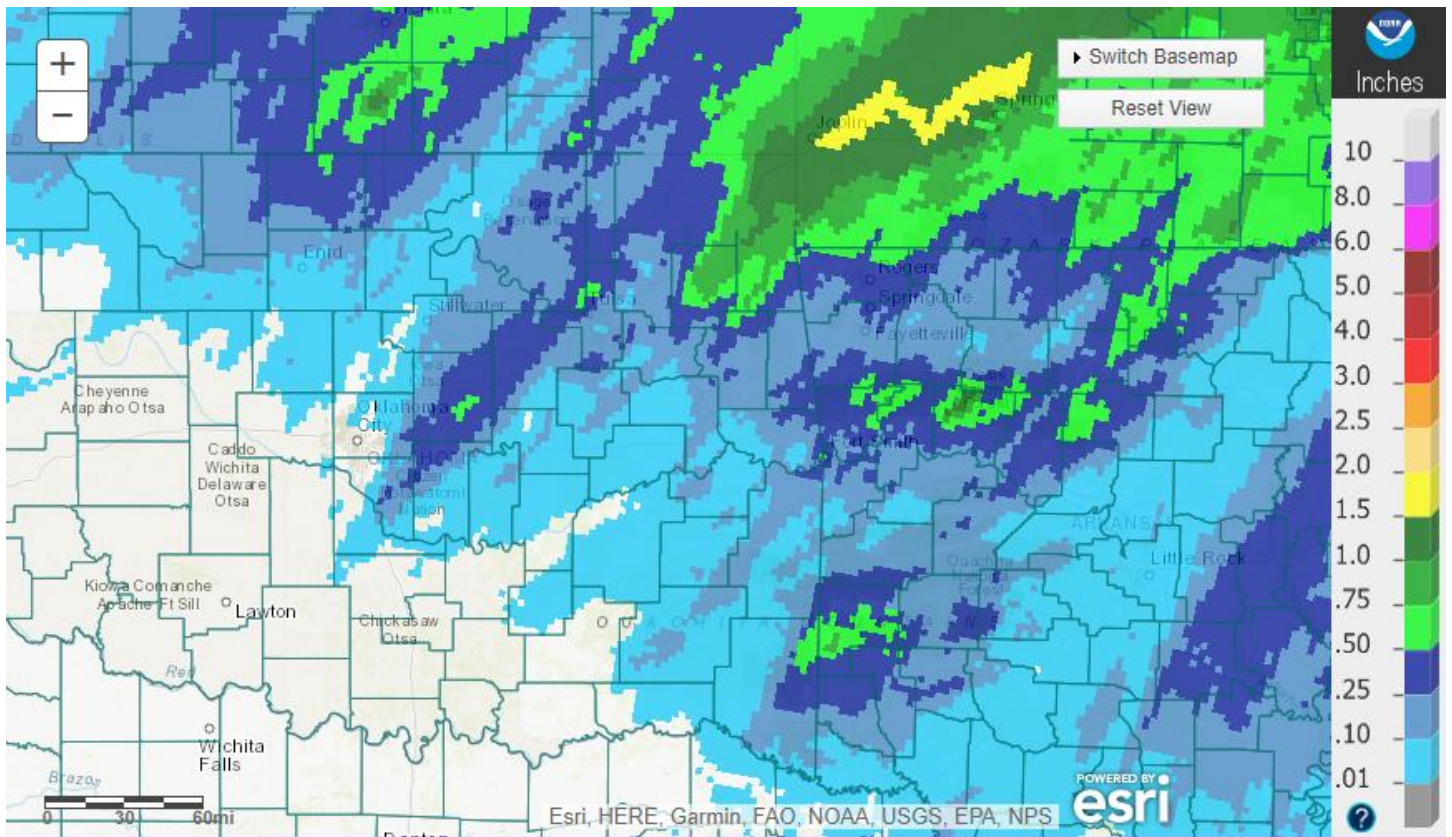


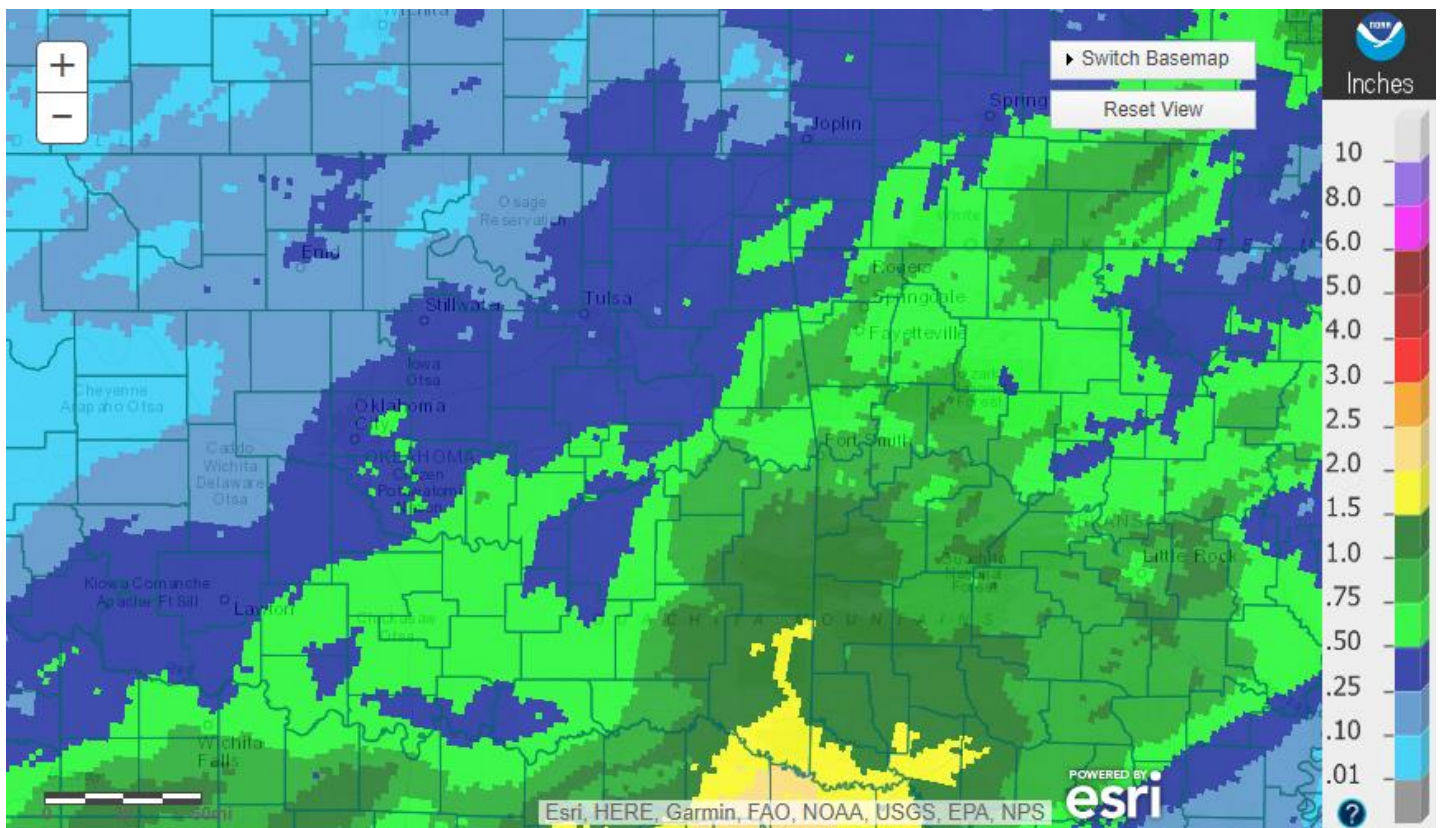
Fig. 5. 72-hour snowfall analysis ending at 6pm CST 2/04/2022.





Tulsa, OK: February 02, 2022 1-Day Observed Precipitation  
Valid on: February 02, 2022 12:00 UTC

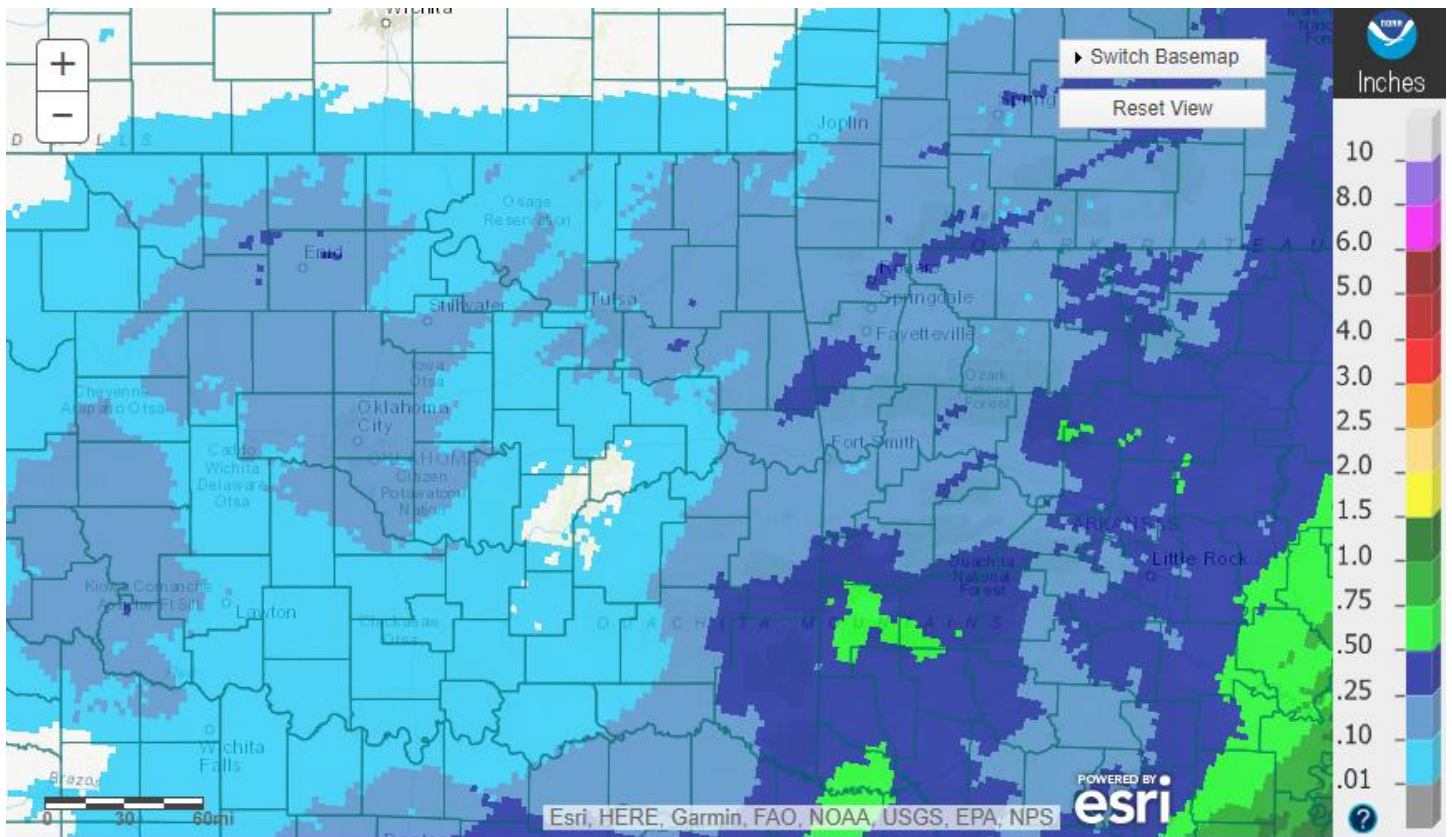
Fig. 6. 24-hour Estimated Observed Rainfall ending at 6am CST 2/02/2022.



Tulsa, OK: February 03, 2022 1-Day Observed Precipitation  
Valid on: February 03, 2022 12:00 UTC

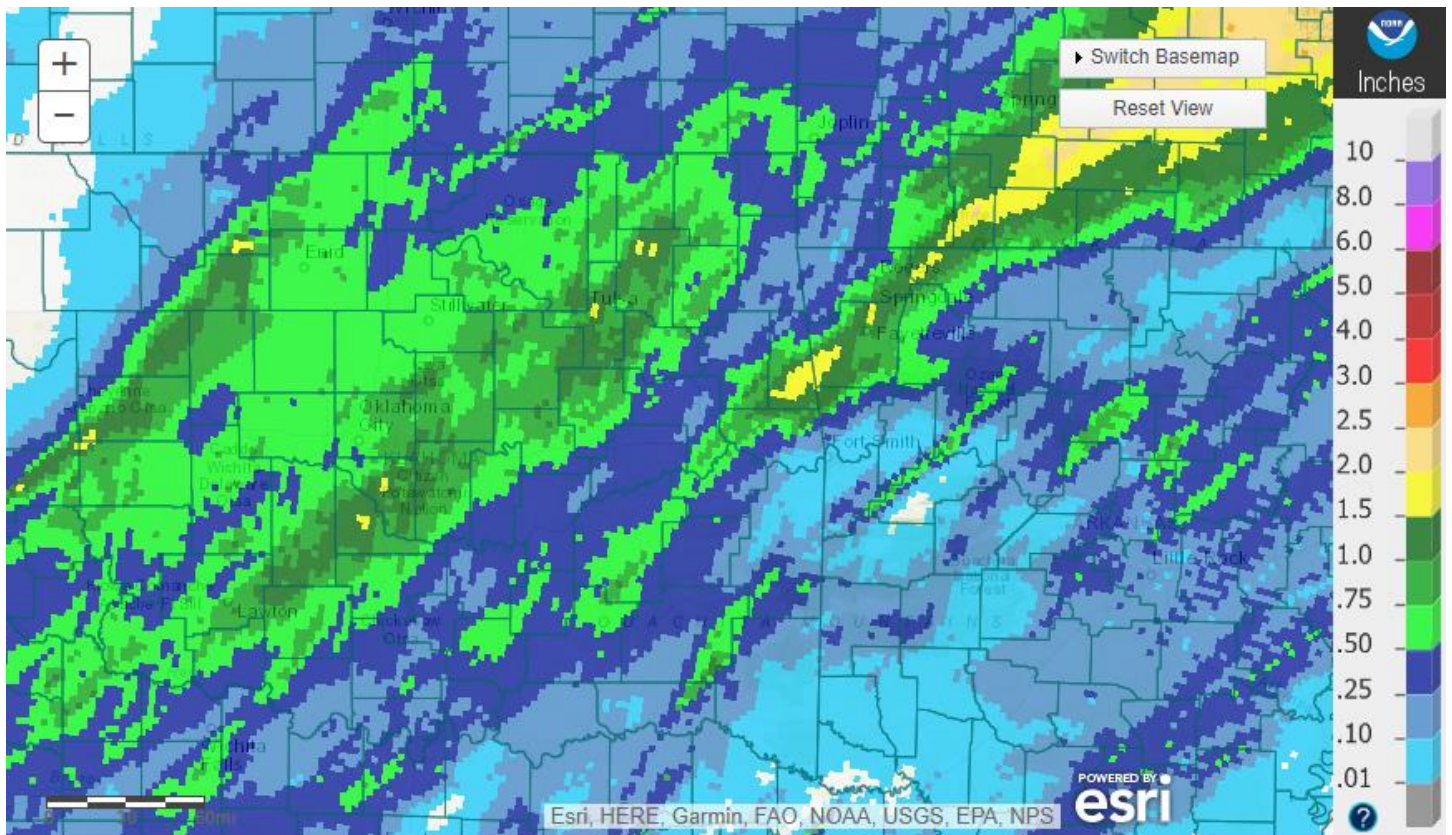
Fig. 7. 24-hour Estimated Observed Rainfall ending at 6am CST 2/03/2022.





Tulsa, OK: February 04, 2022 1-Day Observed Precipitation  
Valid on: February 04, 2022 12:00 UTC

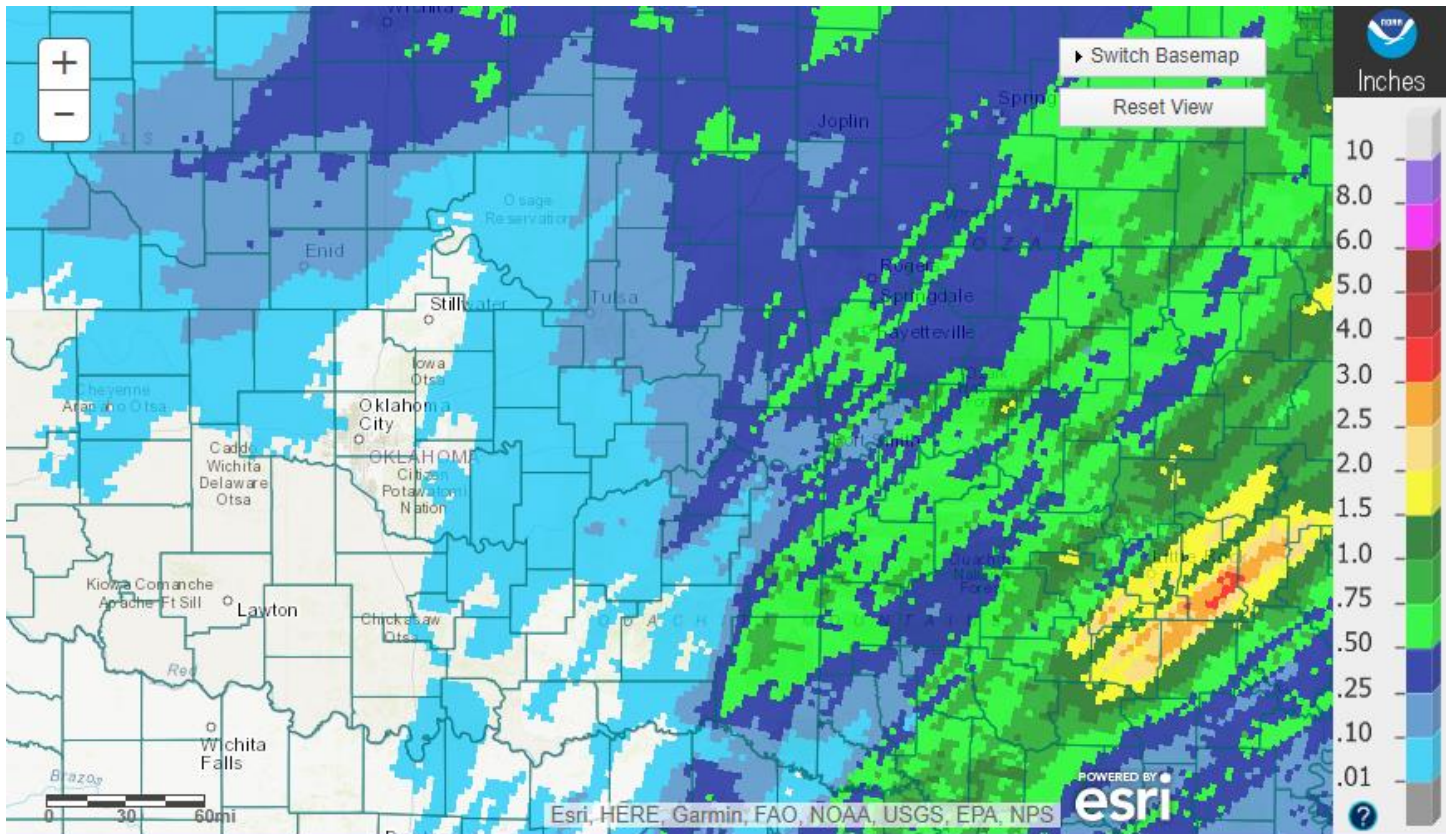
Fig. 8. 24-hour Estimated Observed Rainfall ending at 6am CST 2/04/2022.



Tulsa, OK: February 17, 2022 1-Day Observed Precipitation  
Valid on: February 17, 2022 12:00 UTC

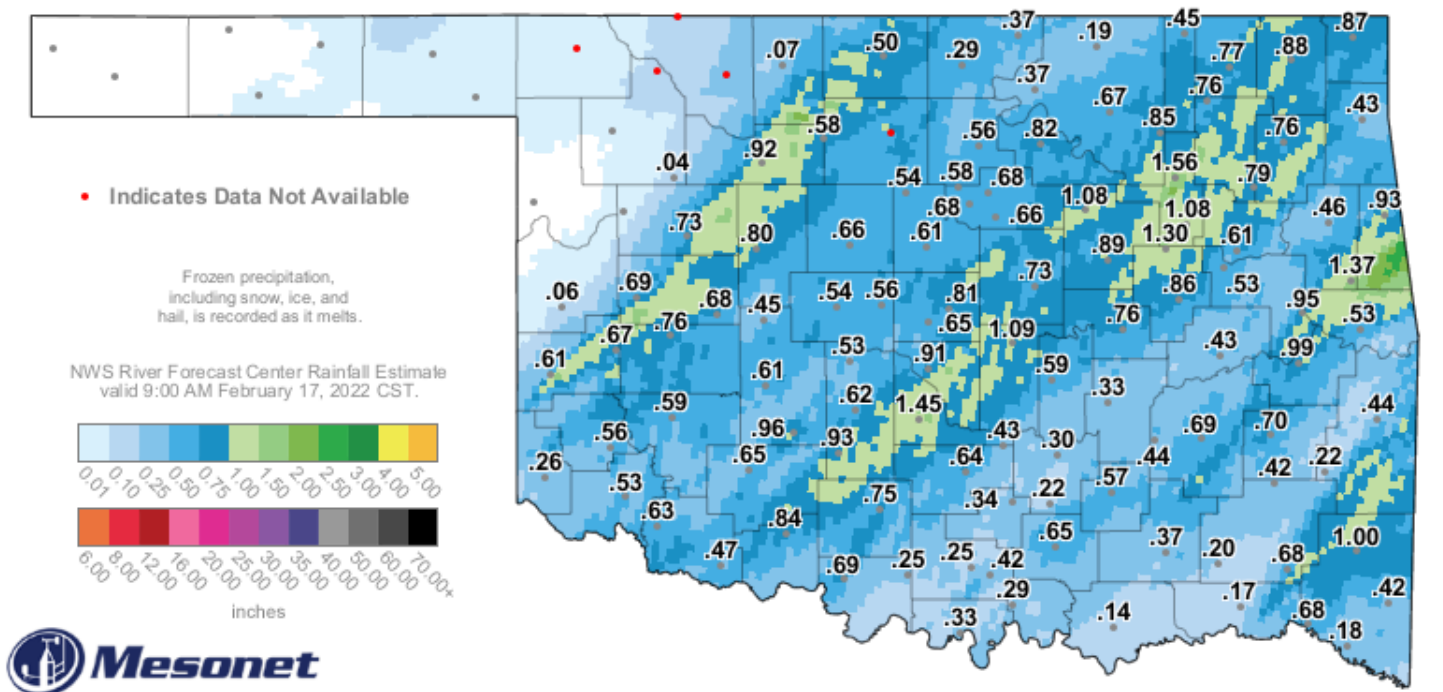
Fig. 9. 24-hour Estimated Observed Rainfall ending at 6am CST 2/17/2022.





Tulsa, OK: February 18, 2022 1-Day Observed Precipitation  
Valid on: February 18, 2022 12:00 UTC

Fig. 10. 24-hour Estimated Observed Rainfall ending at 6am CST 2/18/2022.



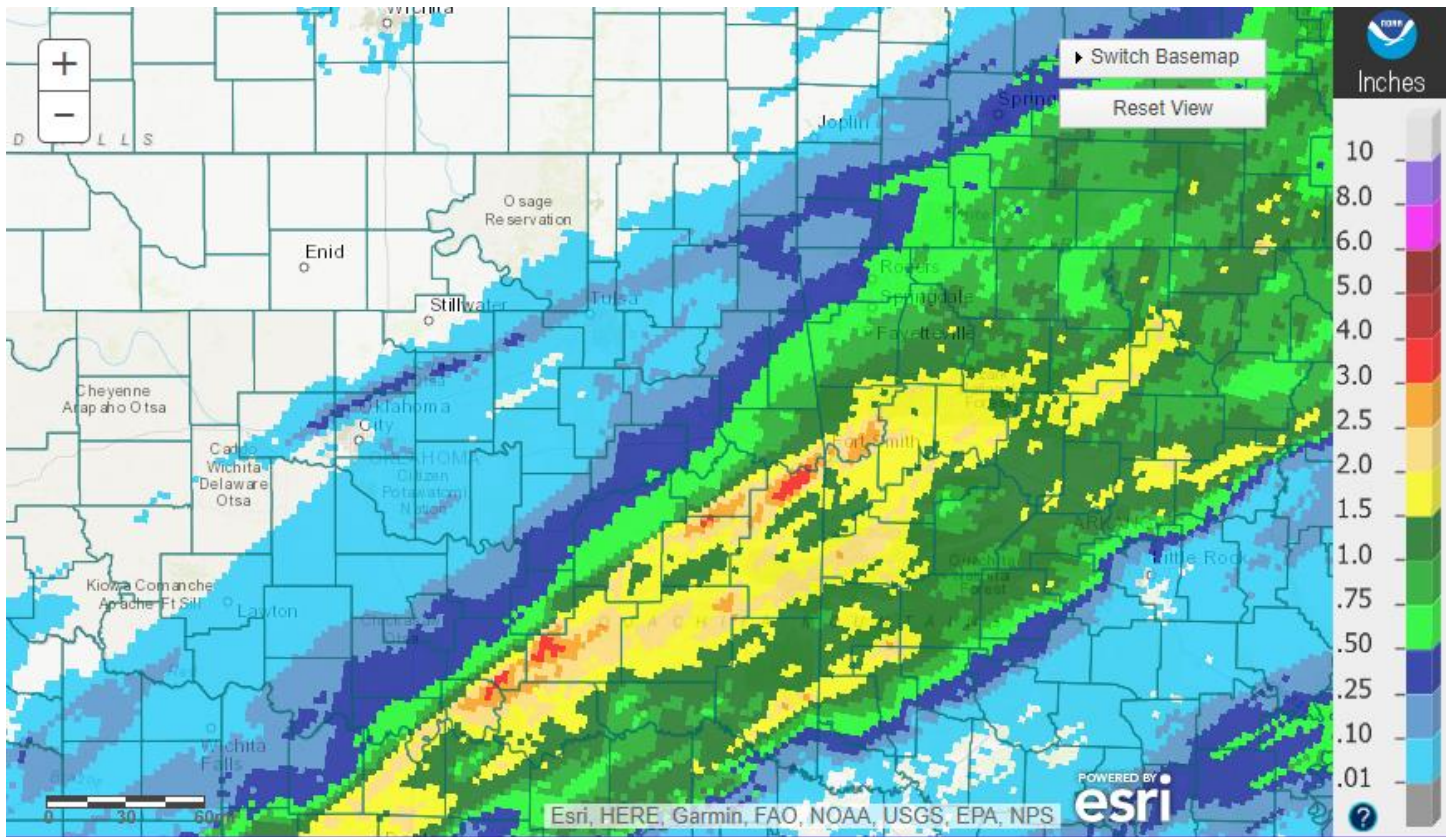
24-Hour Rainfall Accumulation (inches)

10:30 AM February 17, 2022 CST

Created 10:35:59 AM February 17, 2022 CST. © Copyright 2022

Fig. 11. OK Mesonet (values) and NWS RFC rainfall estimate (image) 24-hour rainfall ending at 10:30 am CST 2/17/2022.





Tulsa, OK: February 22, 2022 1-Day Observed Precipitation  
Valid on: February 22, 2022 12:00 UTC

Fig. 12. 24-hour Estimated Observed Rainfall ending at 6am CST 2/22/2022.

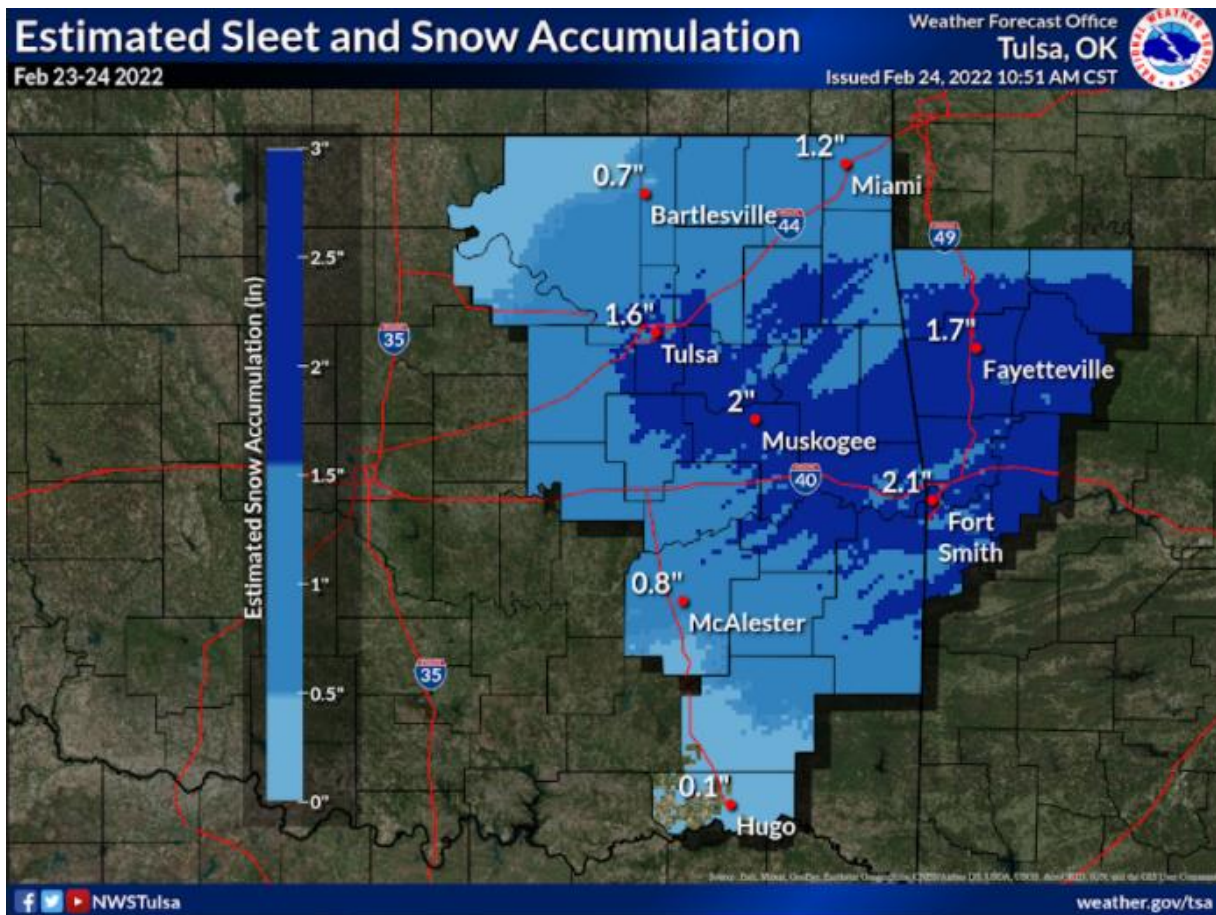
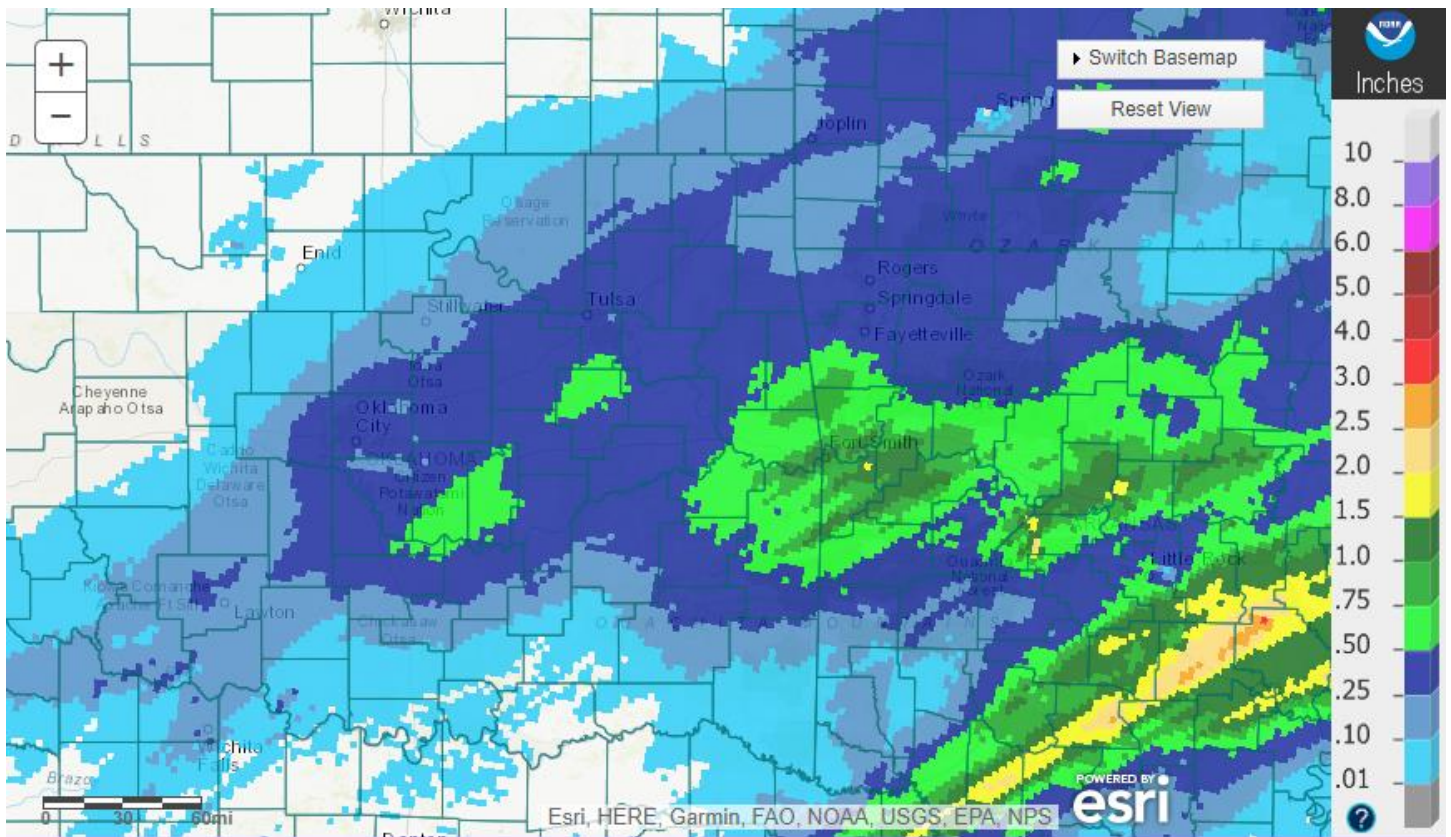


Fig. 12. Estimated sleet and snow accumulations for February 23-24, 2022.





Tulsa, OK: February 24, 2022 1-Day Observed Precipitation  
 Valid on: February 24, 2022 12:00 UTC

Fig. 14. 24-hour Estimated Observed Rainfall ending at 6am CST 2/24/2022.

Written by:

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**Products issued in February 2022:**

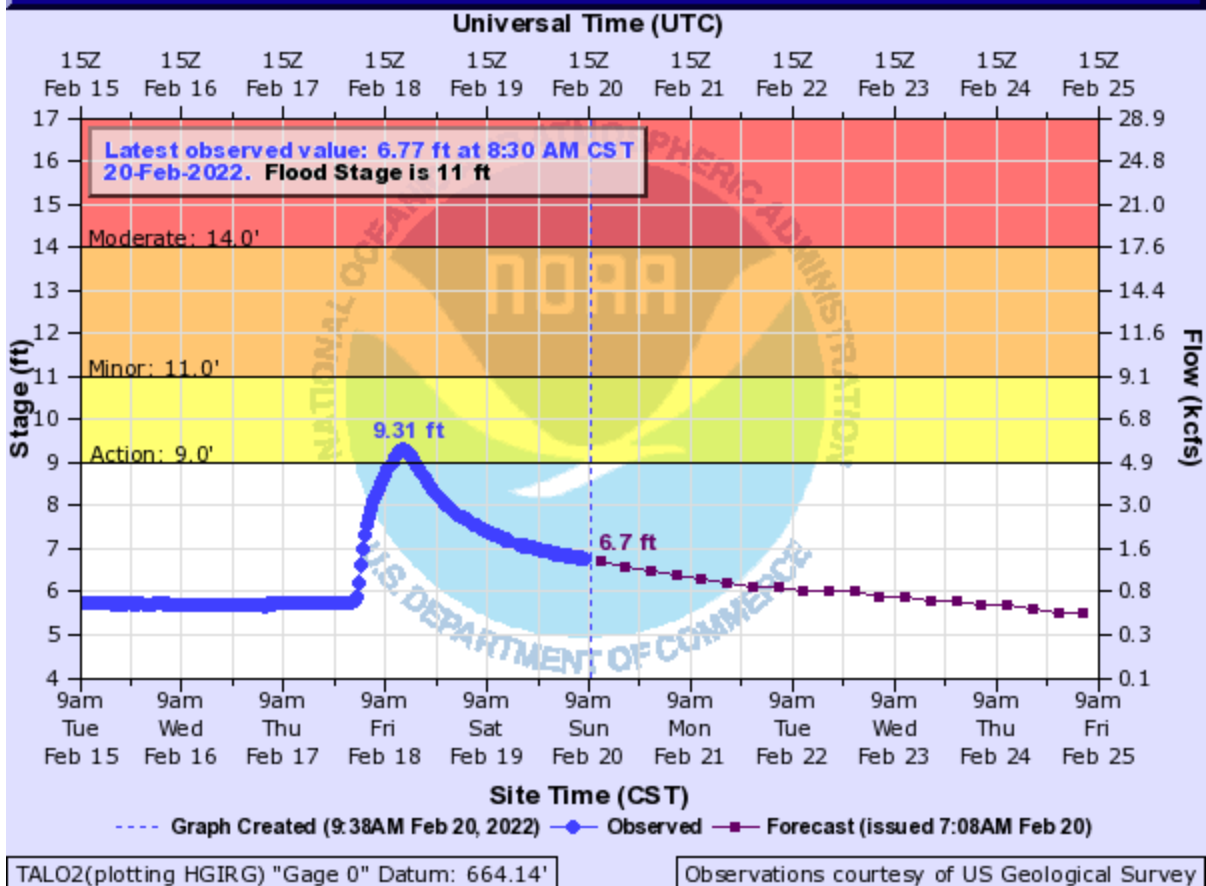
- \*CWYO2 became a daily river forecast point September 7, 2016
- \*MLBA4 and OZGA4 transferred to NWS Tulsa HSA February 5, 2014
- \*Mixed case River Flood products began July 31, 2013

- 1 Flash Flood Warnings (FFW)
- 1 Flash Flood Statements (FFS)
- 1 Flash/Areal Flood Watches (FFA) (2 Watch FFA CON/EXT/EXA/EXB/CAN)
- 1 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)
- 1 River Flood Advisories (FLS) (4 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:**



## ILLINOIS RIVER (AR OK) NEAR TAHLEQUAH



## POTEAU RIVER NEAR PANAMA

