

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	HYDROLOGIC SERVICE AREA (HSA) Tulsa, Oklahoma (TSA)
		REPORT FOR: MONTH November YEAR 2021
MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS		SIGNATURE Steven F. Piltz (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 December 2, 2021

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.

Other than one tornadic weather system, no significant rainfall occurred in November 2021 and the entire area saw below well below normal rainfall. Normal precipitation for November ranges from 2.6" in Pawnee County to 4.4" in Haskell County. Normal precipitation for the Ozark region of northwest Arkansas averages 4.2". This report, past E-5 reports, and monthly hydrology and climatology summaries can be found at <http://www.weather.gov/tsa/hydro-monthly-summary>.

Monthly Summary

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 1a), rainfall totals for November 2021 ranged from 0.50" to 4" across eastern OK and northwest AR, with much of the area receiving 1"-3". These rainfall totals correspond to 10% to 90% of the normal November rainfall, with a majority of the area only receiving 25%-50% of normal (Fig. 1b).

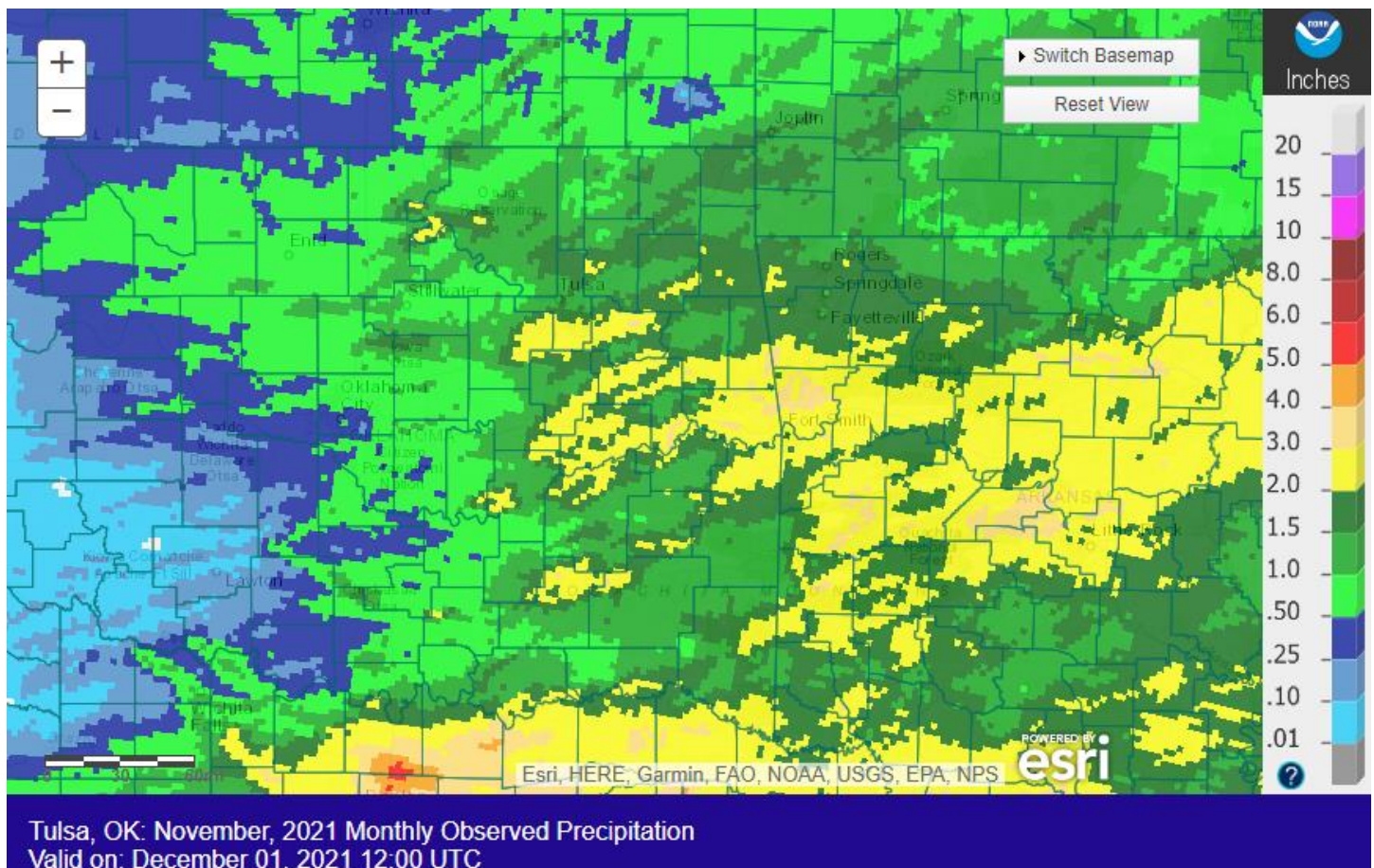


Fig. 1a. Estimated Observed Rainfall for November 2021

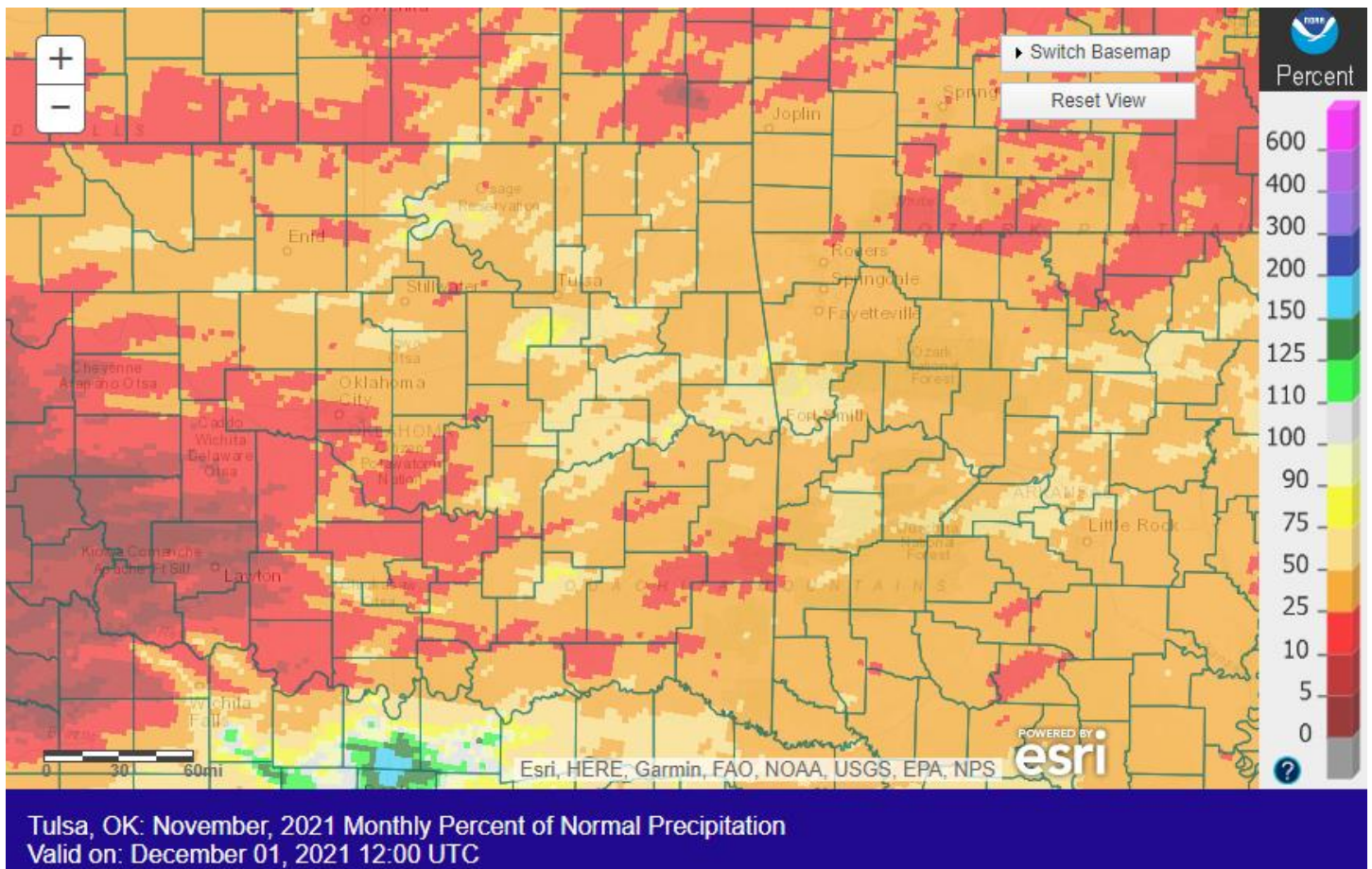


Fig. 1b. Estimated % of Normal Rainfall for November 2021

In Tulsa, OK, November 2021 ranked as the 41st warmest November (51.6°F, tied 2004, 1987, 1978; since records began in 1905) and the 47th driest November (1.54"; since records began in 1888). Fort Smith, AR had the 63rd warmest November (51.5°F, tied 1917; since records began in 1882) and the 60th driest November (2.30", tied 1894; since records began in 1882). Fayetteville, AR had the 29th warmest (48.6°F, tied 2010, 1987) and the 21st driest (1.57") November since records began in 1949.

Some of the larger precipitation reports (in inches) for November 2021 included:

Tulsa 8.9SW, OK (coco)	3.47	Kellyville 7.8S, OK (coco)	3.12	Sallisaw 0.3SE, OK (coco)	2.83
Mountainburg 2NE, AR (coop)	2.69	Sallisaw 1.0SE, OK (coco)	2.58	Glenpool 0.6S, OK (coco)	2.54
Sperry 0.7WSW, OK (coco)	2.39	Sallisaw, OK (meso)	2.38	Van Buren 2.1NNW, AR (coco)	2.35

Some of the lowest precipitation reports (in inches) for November 2021 included:

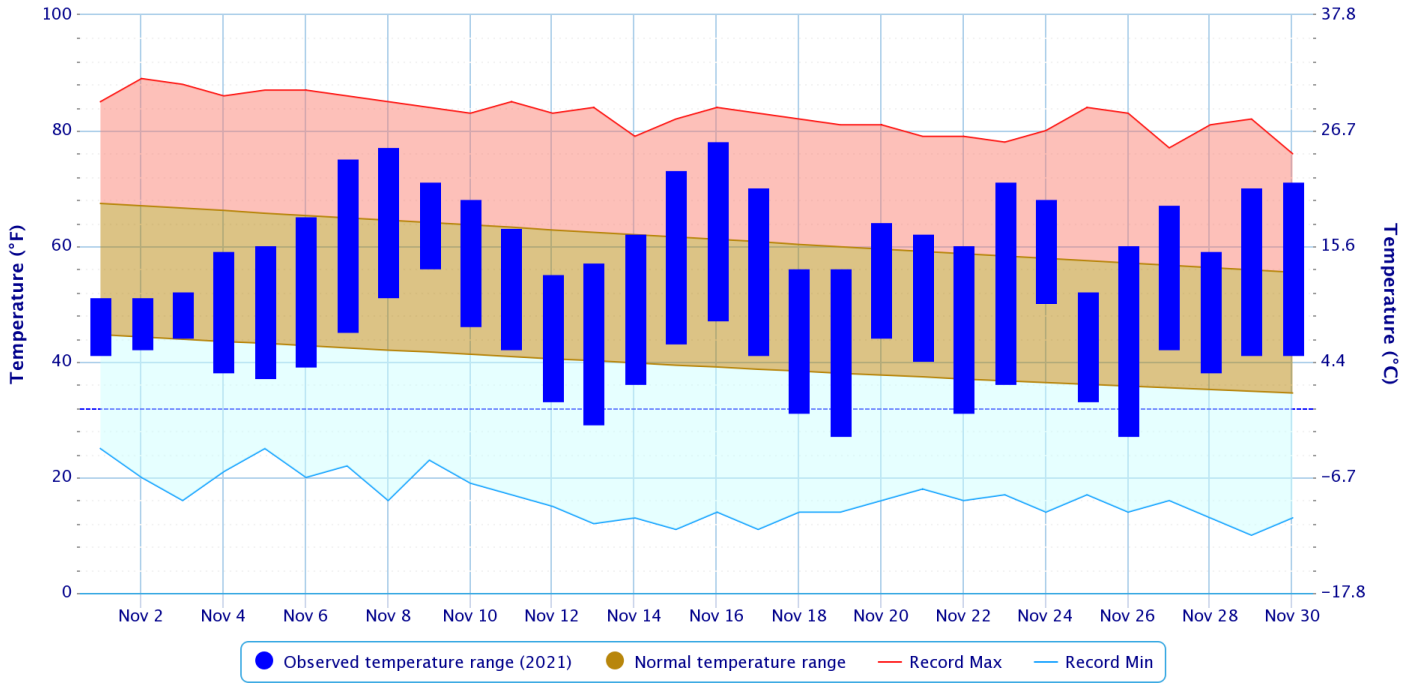
Foraker, OK (meso)	0.76	Wilburton, OK (meso)	1.03	Pawnee, OK (meso)	1.03
McAlester, OK (ASOS)	1.09	Oilton, OK (meso)	1.09	Okemah, OK (meso)	1.10
Burbank, OK (meso)	1.10	Copan, OK (meso)	1.21	Talala, OK (meso)	1.23

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

Rank since 1921	November 2021	Autumn 2021	Water Year-to-Date (Oct 1, 2021 – Nov 30, 2021)	Last 120 Days (Aug 3 – Nov 30)	Last 180 Days (Jun 4 – Nov 30)	Year-to-Date (Jan 1 – Nov 30)	Last 365 Days (Dec 1, 2020 – Nov 30, 2021)
Northeast OK	29 th driest	31 st driest	39 th wettest	24 th driest	45 th wettest	38 th wettest	35 th wettest
East Central OK	31 st driest	43 rd driest	35 th wettest	41 st driest	35 th driest	46 th driest	46 th wettest
Southeast OK	16 th driest	19 th driest	32 nd driest	33 rd driest	38 th driest	43 rd wettest	37 th wettest
Statewide	23 rd driest	17 th driest	44 th driest	16 th driest	34 th driest	43 rd driest	50 th driest

Daily Temperature Data – Tulsa Area, OK (ThreadEx)

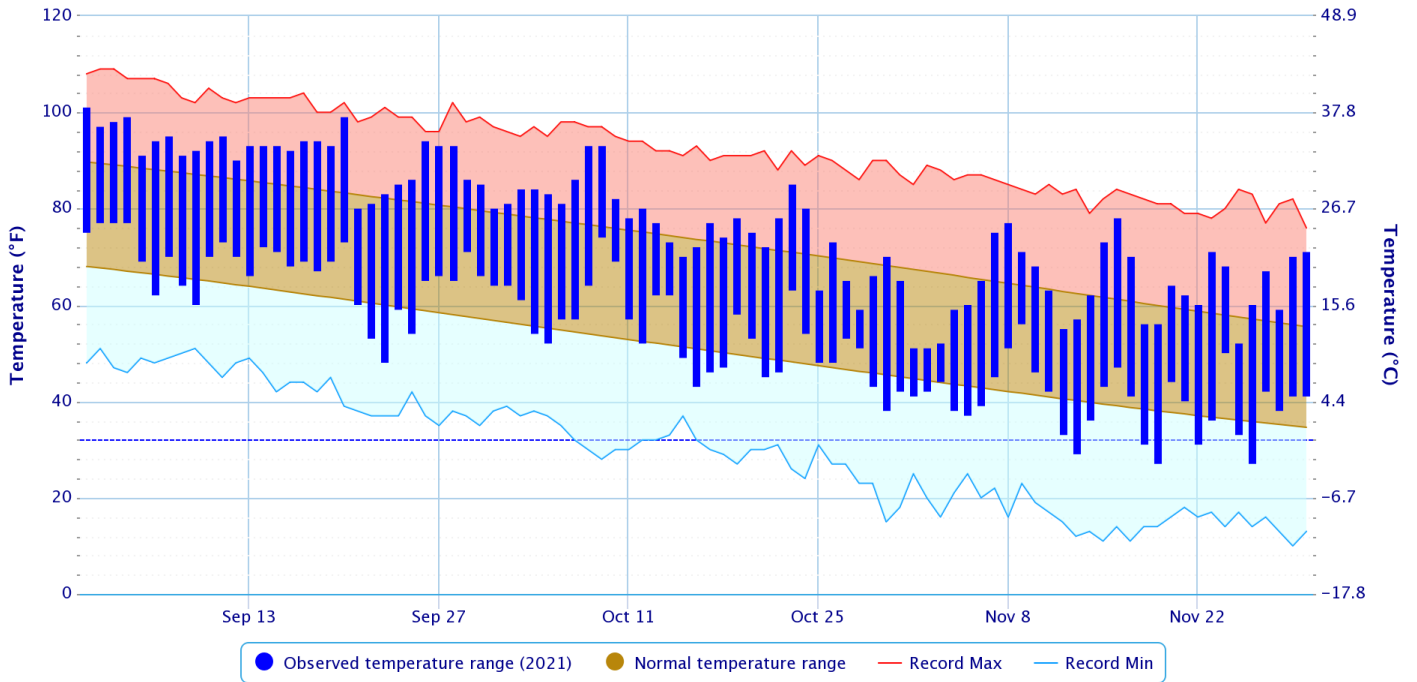
Period of Record – 1905-01-06 to 2021-11-30. Normals period: 1991-2020. Click and drag to zoom chart.



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Daily Temperature Data – Tulsa Area, OK (ThreadEx)

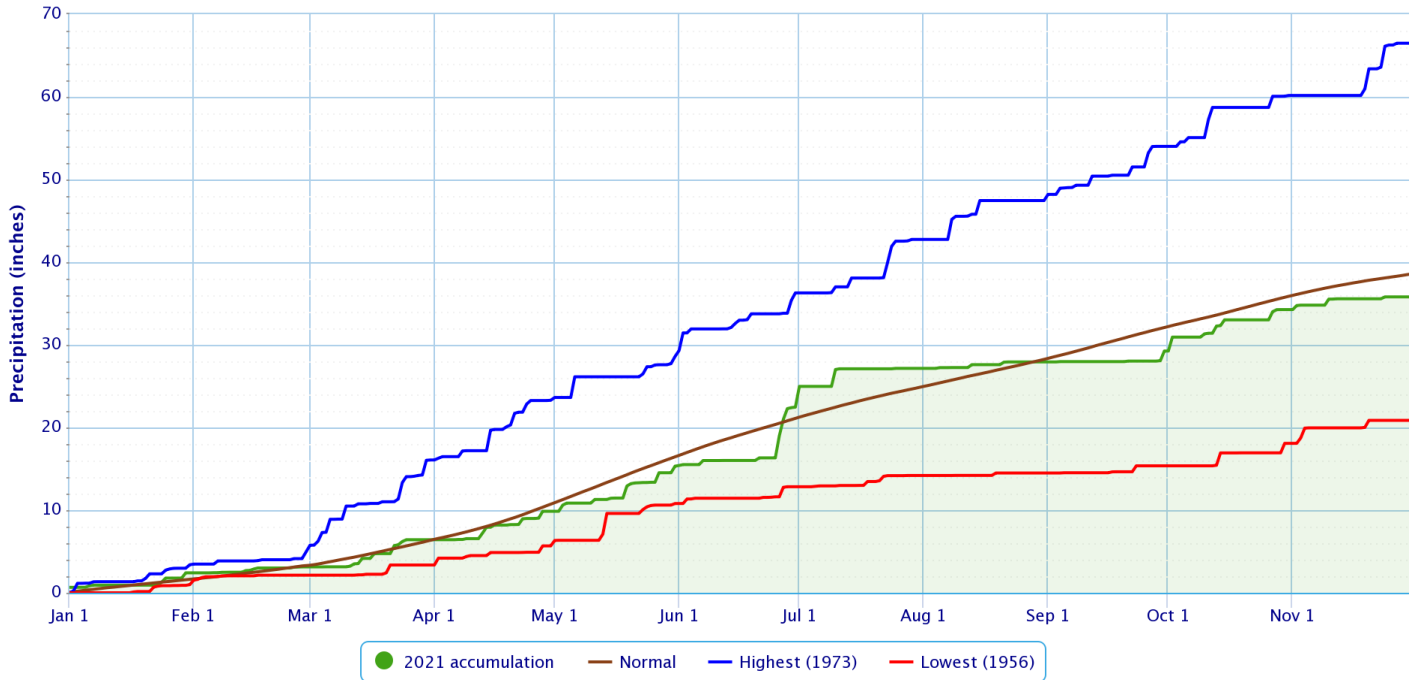
Period of Record – 1905-01-06 to 2021-11-30. Normals period: 1991-2020. Click and drag to zoom chart.



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Accumulated Precipitation – Tulsa Area, OK (ThreadEx)

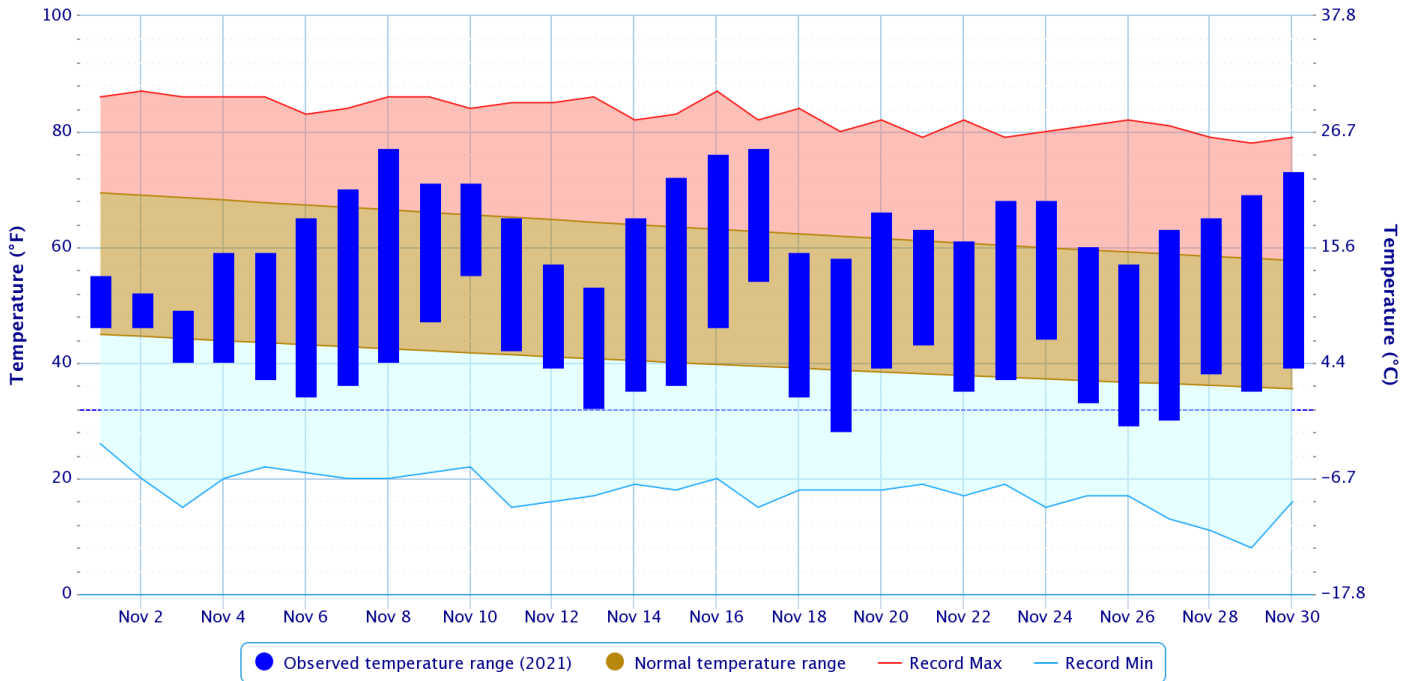
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



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

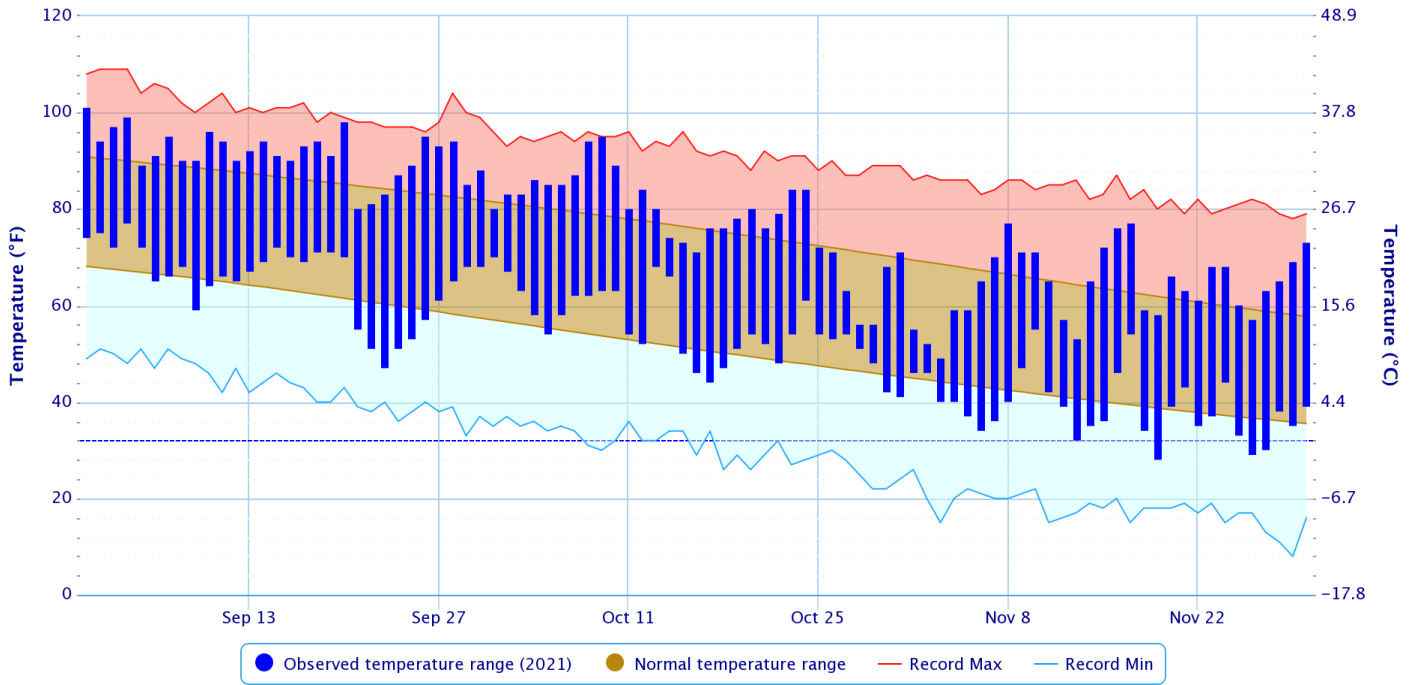
Period of Record – 1882-06-01 to 2021-11-30. Normals period: 1991-2020. Click and drag to zoom chart.



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

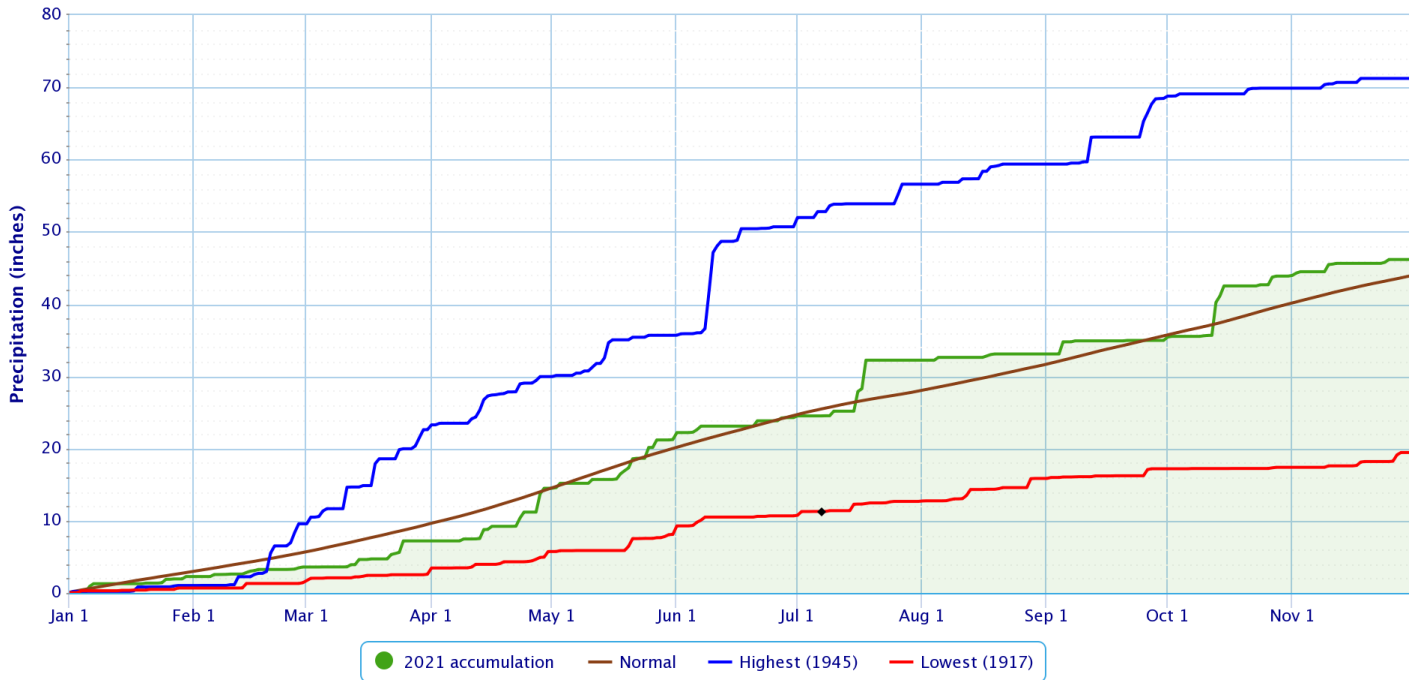
Period of Record – 1882-06-01 to 2021-11-30. Normals period: 1991-2020. Click and drag to zoom chart.



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Accumulated Precipitation – Fort Smith Area, AR (ThreadEx)

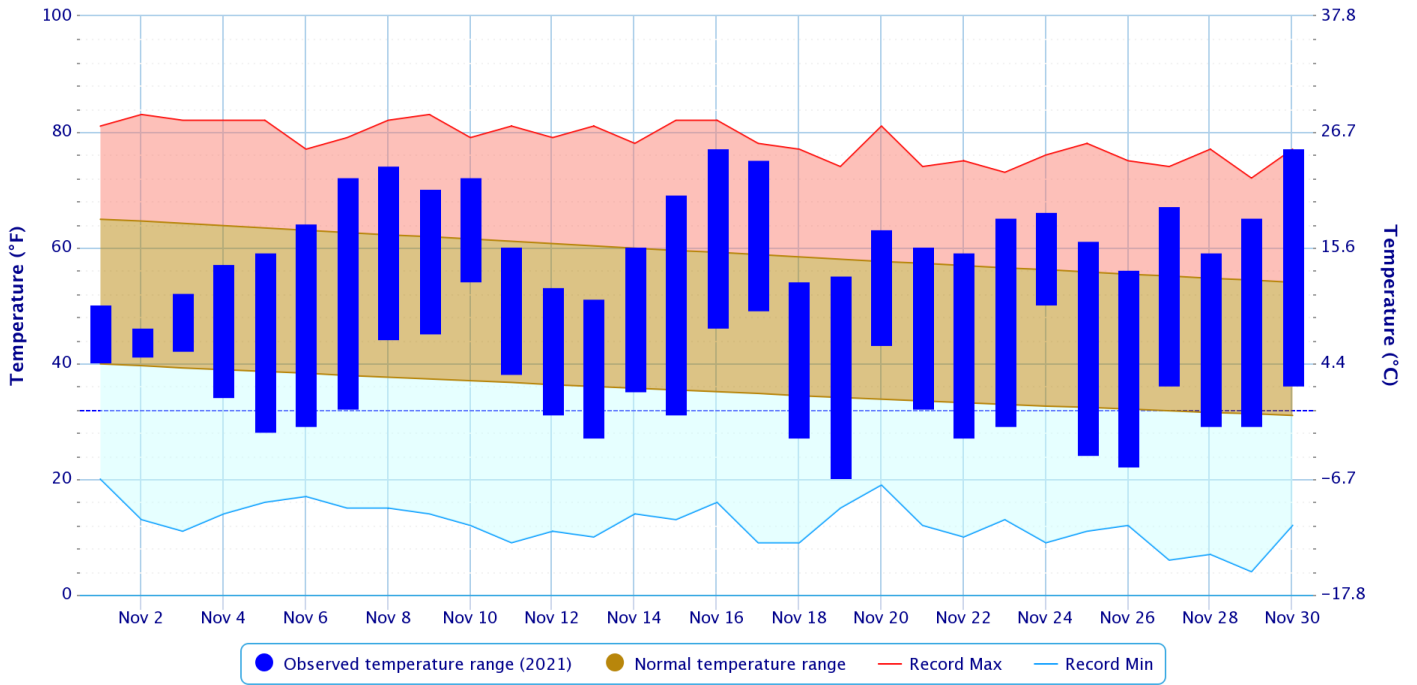
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



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Daily Temperature Data – FAYETTEVILLE DRAKE FIELD, AR

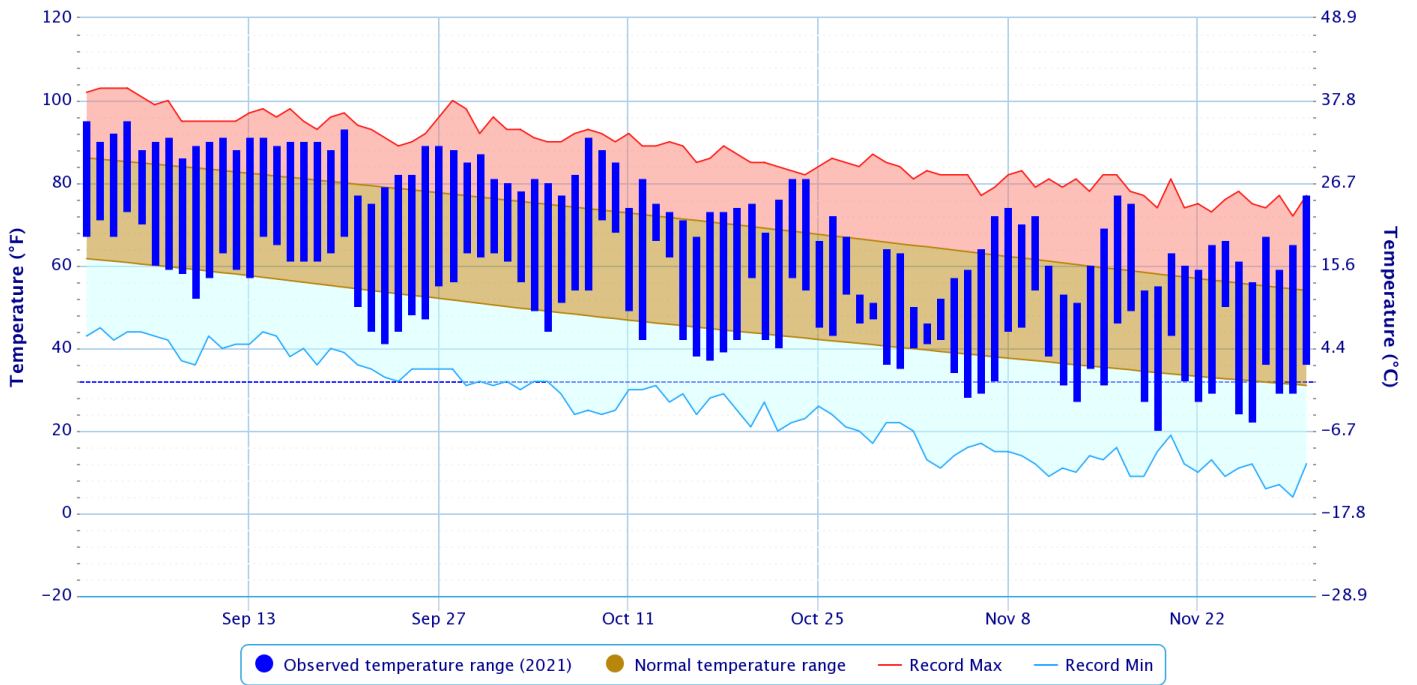
Period of Record – 1949-07-14 to 2021-11-30. Normals period: 1991-2020. Click and drag to zoom chart.



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Daily Temperature Data – FAYETTEVILLE DRAKE FIELD, AR

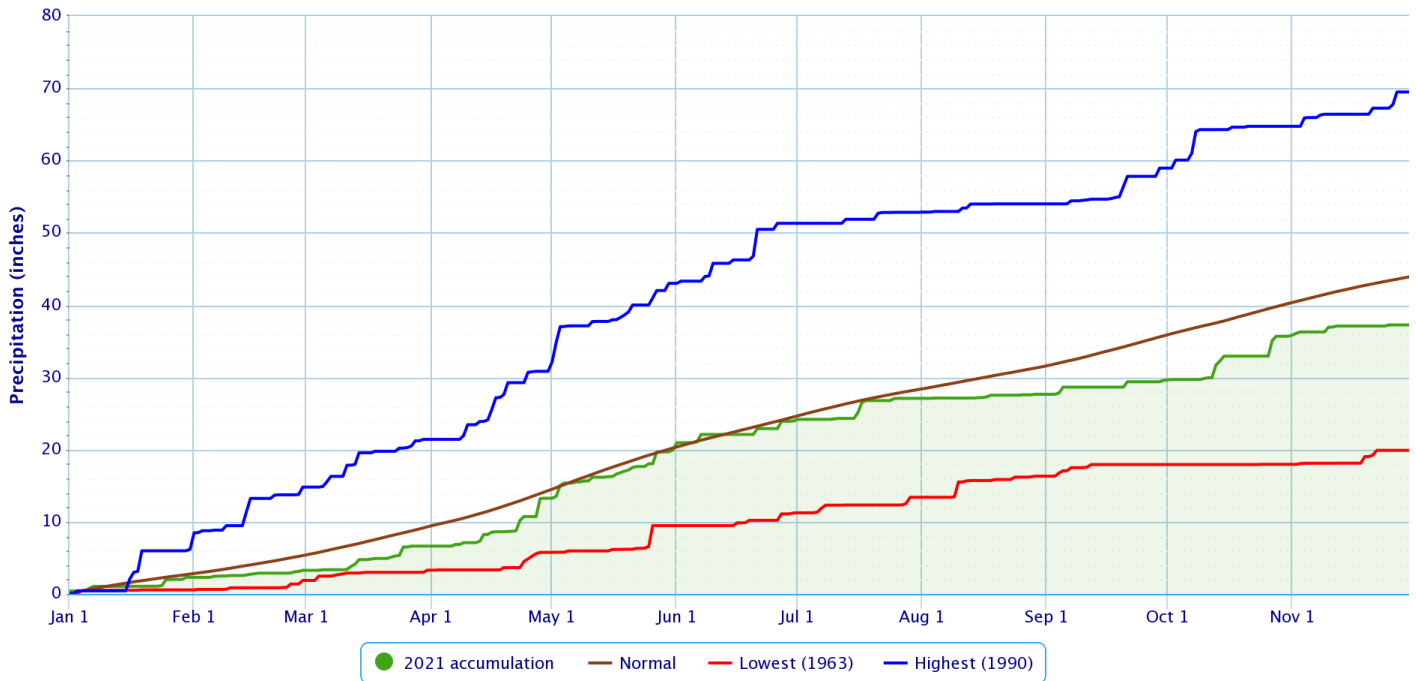
Period of Record – 1949-07-14 to 2021-11-30. Normals period: 1991-2020. Click and drag to zoom chart.



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

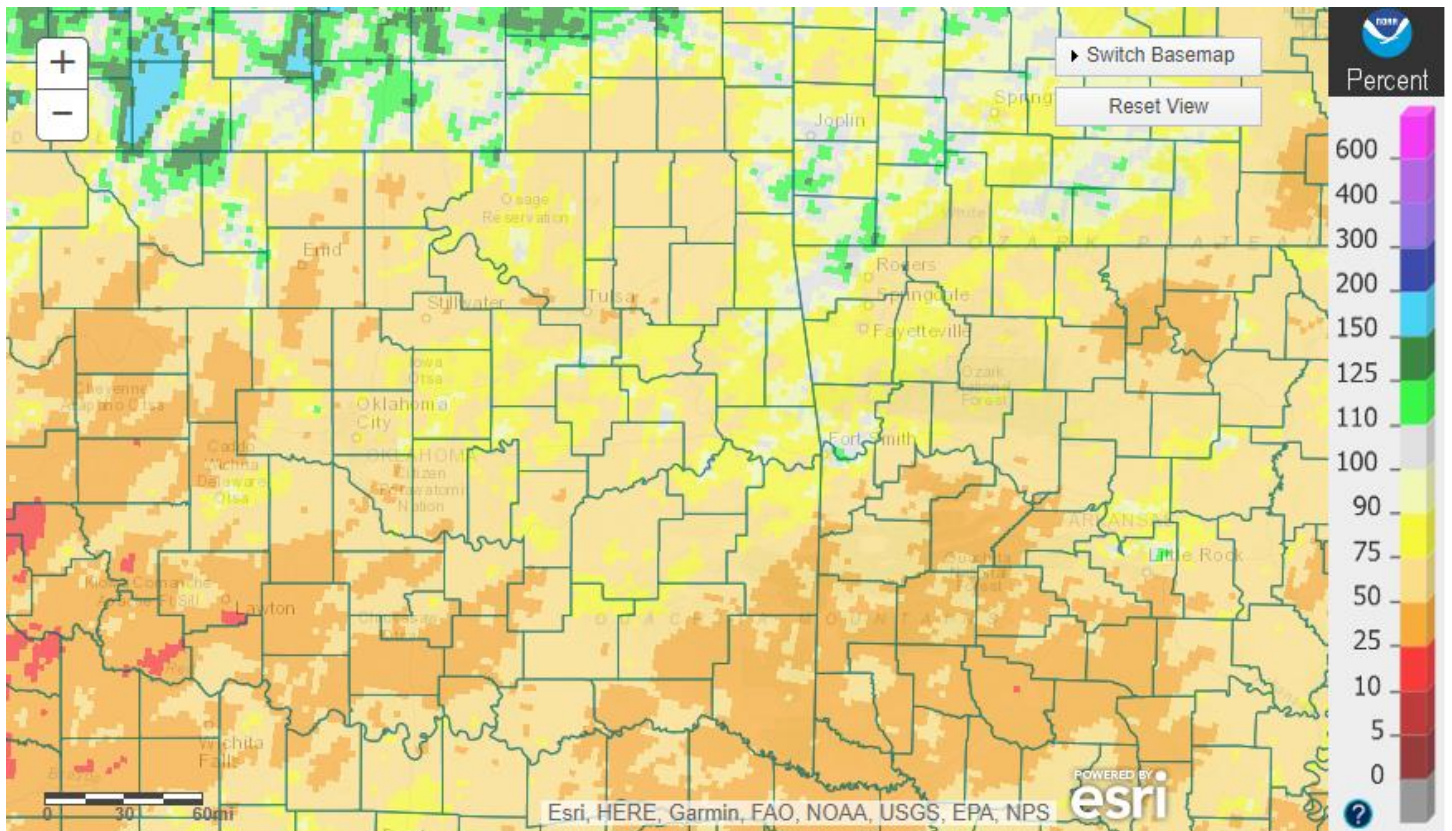


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Autumn (September-October-November) 2021

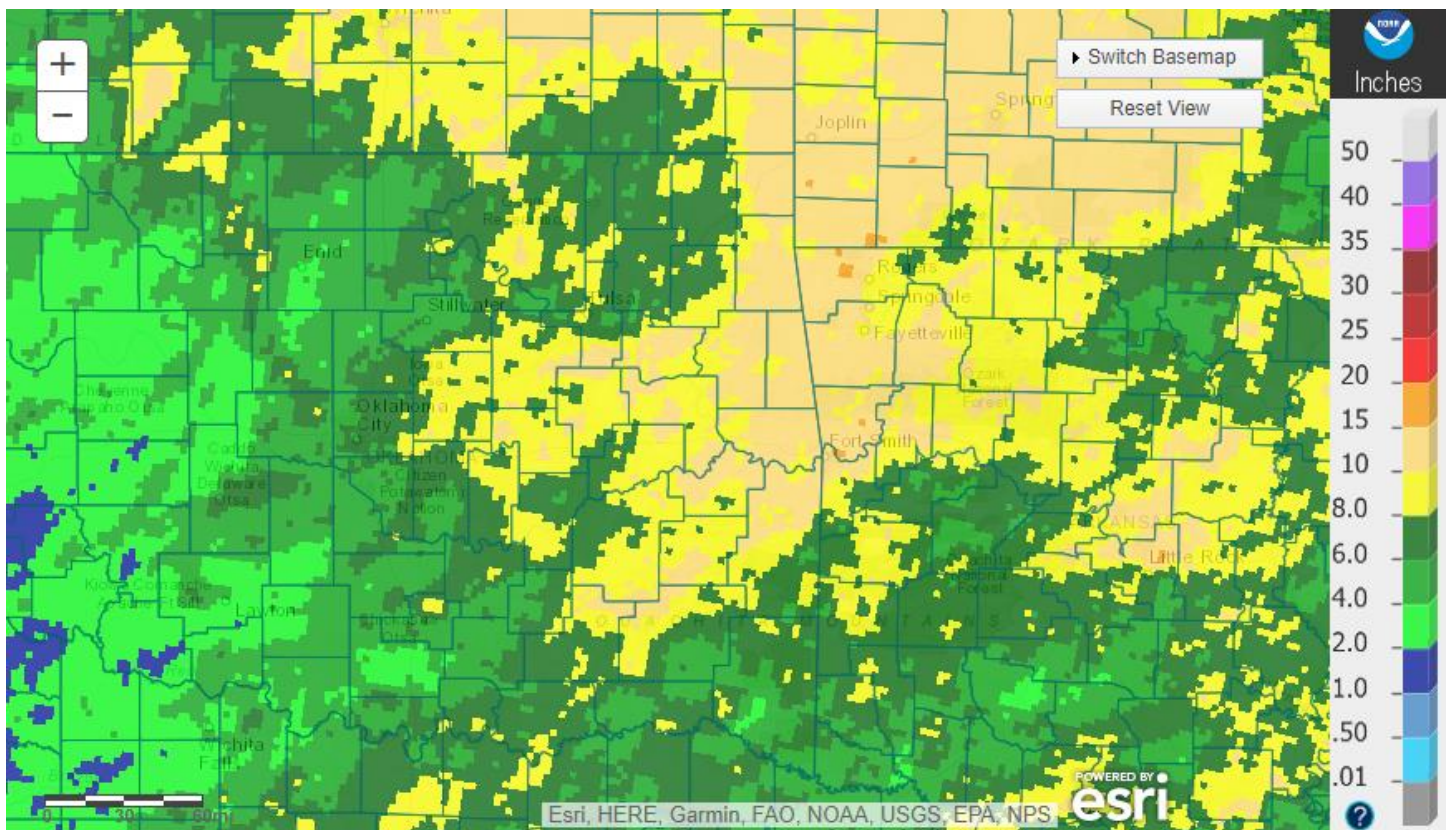
In Tulsa, OK, Autumn 2021 ranked as the 7th warmest Autumn (65.4°F; since records began in 1905) and the 49th driest Autumn (7.87"; since records began in 1888). Fort Smith, AR had the 14th warmest Autumn (65.5°F, tied 2004, 1938, 1915; since records began in 1882) and the 37th wettest Autumn (13.08"; since records began in 1882). Fayetteville, AR had the 5th warmest (61.4°F) and the 24th driest (9.60") Autumn since records began in 1949.

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 2a), rainfall totals for Autumn 2021 ranged from 4" to around 15" across eastern OK and northwest AR, with much of the area receiving 8"-12". These rainfall totals correspond to 25% to around 90% of the normal Autumn rainfall for the majority of the area (Fig. 2b). A few isolated spots had 100% to 125% of the normal Autumn rainfall.



Tulsa, OK: Last 90-Day Percent of Normal Precipitation
Valid on: December 01, 2021 12:00 UTC

Fig. 2a. Estimated Observed Rainfall for Autumn 2021



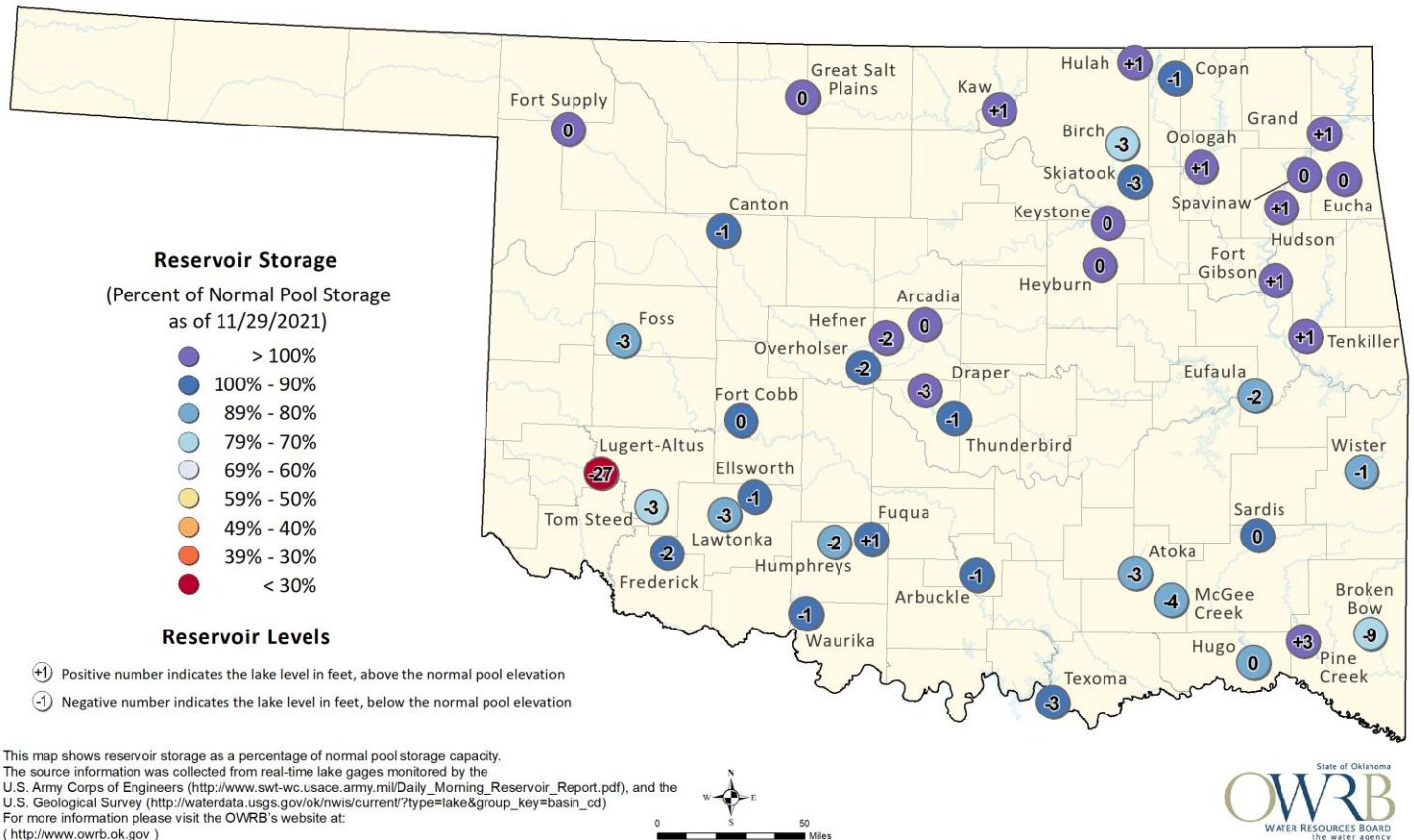
Tulsa, OK: Last 90-Day Observed Precipitation
Valid on: December 01, 2021 12:00 UTC

Fig. 2b. Estimated % of Normal Rainfall for Autumn 2021

Reservoirs

Oklahoma Surface Water Resources

Reservoir Levels and Storage as of 11/29/2021



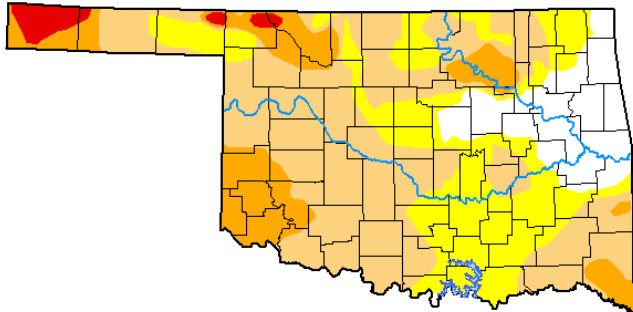
According to the USACE, several lakes in the HSA were below 3% of top of their conservation pools as of 12/01/2021: Birch Lake 78%, Wister Lake 83%, Lake Eufaula 88%, Skiatook Lake 90%, Copan Lake 90%, Beaver Lake 94%, and Hugo Lake 95%. A couple of lakes were more than 3% above the top of their conservation pools: Grand Lake 6% and Hudson Lake 4%.

Drought

According to the [U.S. Drought Monitor](#) (USDM) from November 30, 2021 (Figs. 3, 4), drought conditions were present across a large portion of eastern OK and northwest AR. Severe (D2) Drought conditions were present over parts of Osage, Pawnee, Tulsa, and Le Flore Counties in eastern OK. Moderate (D1) Drought conditions were occurring across portions of Osage, Pawnee, Washington, Rogers, Tulsa, Okfuskee, Okmulgee, McIntosh, Pittsburg, Haskell, Pushmataha, Choctaw and Le Flore Counties in eastern OK. Abnormally Dry (but not in drought) (D0) conditions were occurring over portions of Osage, Tulsa, Creek, Nowata, Craig, Ottawa, Rogers, Mayes, Okfuskee, Okmulgee, McIntosh, Pittsburg, Latimer, Le Flore, and Pushmataha Counties in eastern OK, and Sebastian, Franklin, Crawford, Washington, Madison, Benton, and Carroll Counties in northwest AR.

U.S. Drought Monitor Oklahoma

November 30, 2021
(Released Thursday, Dec. 2, 2021)
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	13.32	86.68	60.71	15.92	2.23	0.00
Last Week 11-23-2021	20.17	79.83	41.69	12.36	2.23	0.00
3 Months Ago 08-31-2021	81.57	18.43	6.61	0.72	0.00	0.00
Start of Calendar Year 12-29-2020	56.83	43.17	25.21	7.75	1.45	0.00
Start of Water Year 09-28-2021	6.45	93.55	73.23	23.72	2.65	0.00
One Year Ago 12-01-2020	42.85	57.15	25.18	7.79	1.45	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:

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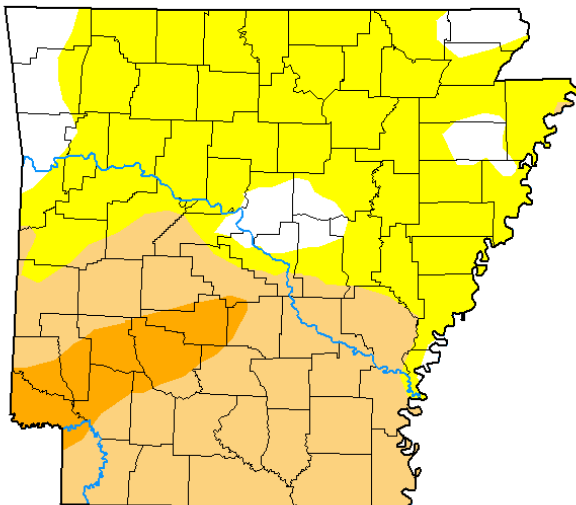


droughtmonitor.unl.edu

Fig. 3. Drought Monitor for Oklahoma

U.S. Drought Monitor Arkansas

November 30, 2021
(Released Thursday, Dec. 2, 2021)
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	9.62	90.38	41.41	7.18	0.00	0.00
Last Week 11-23-2021	38.21	61.79	20.23	0.00	0.00	0.00
3 Months Ago 08-31-2021	90.47	9.53	0.00	0.00	0.00	0.00
Start of Calendar Year 12-29-2020	16.45	83.55	6.87	0.00	0.00	0.00
Start of Water Year 09-28-2021	51.41	48.59	5.17	0.00	0.00	0.00
One Year Ago 12-01-2020	59.54	40.46	10.71	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>

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droughtmonitor.unl.edu

Fig. 4. Drought Monitor for Arkansas

Outlooks

The [Climate Prediction Center](#) (CPC) outlook for December 2021 (issued November 30, 2021) indicates a greatly enhanced chance for above normal temperatures and an enhanced chance for below median precipitation across all of eastern OK and northwest AR. This outlook was largely based on dynamical model output, decadal trends, and La Niña impacts.

For the 3-month period December-January-February 2021-22, CPC is forecasting an enhanced chance for above normal temperatures and equal chance for above, near, and below median precipitation across all of eastern OK and northwest AR (outlook issued November 18, 2021). 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 90% chance that La Niña conditions will continue through winter 2021-22 and a 50% chance conditions will continue into spring 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

A cold front moved into the region on the 10th as an upper-level trough approached. Showers and thunderstorms developed along the frontal boundary in north central and northeast OK during the afternoon hours, while a second area of scattered thunderstorms developed ahead of this line over southeast OK. This activity continued to expand southward while overall propagating eastward across most of eastern OK and northwest Arkansas through the evening hours. The storms moved east of the area shortly after midnight. Three short-lived EF-0 tornadoes occurred in the Tulsa metro area during this event (for more information, visit <https://noaa.maps.arcgis.com/apps/MapJournal/index.html?appid=6c67ff81e9a742039e8a15888d9c02b5>). Precipitable water (PWA) values were around 1.25", which is two standard deviations from normal. However, the fast movement of the line of storms kept overall storm total rainfall between 0.10" to around 2.5" (Fig. 5). Most of the area received 0.50"-1" of rain.

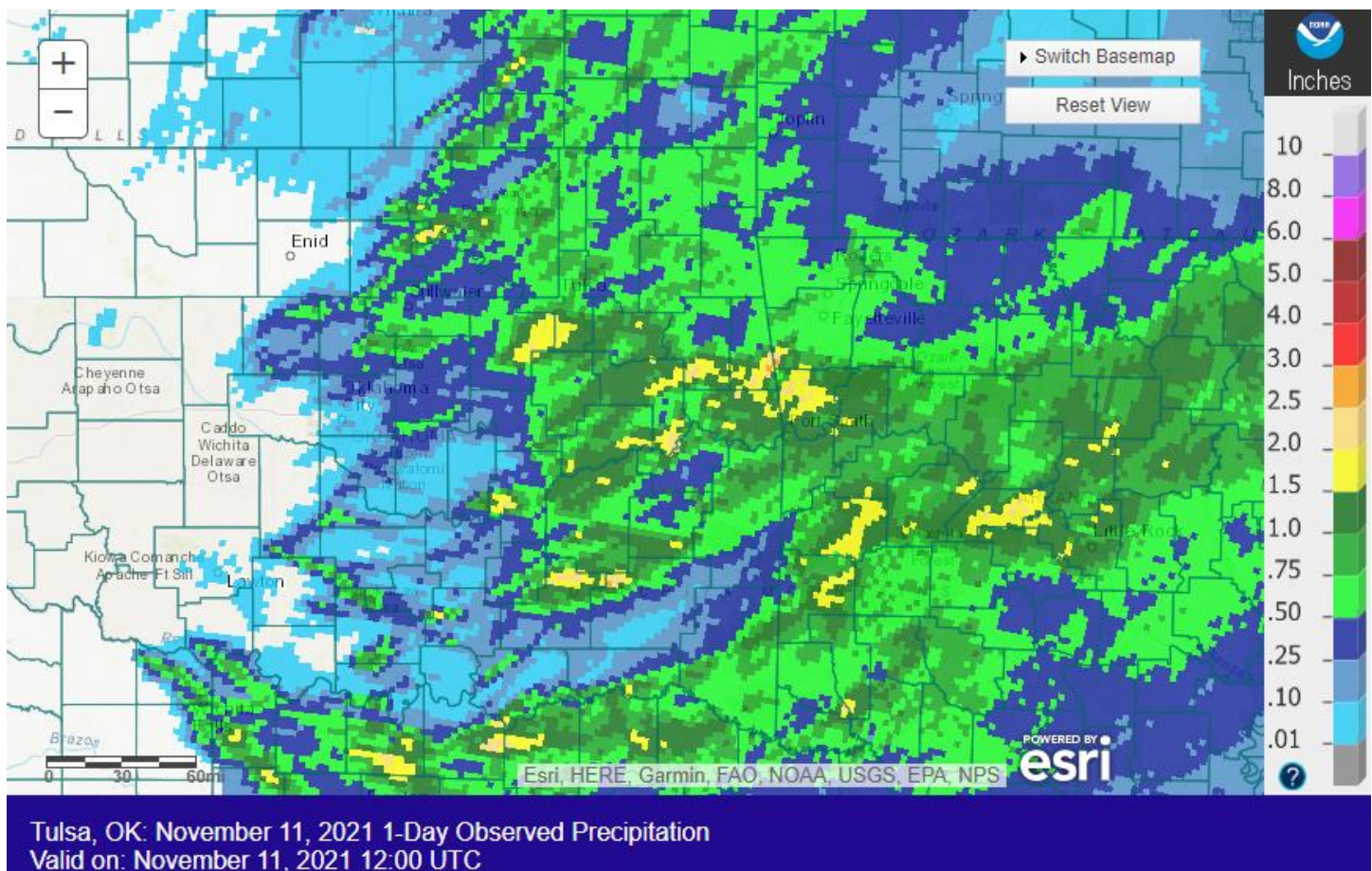


Fig. 5. 24-hour Estimated Observed Rainfall ending at 6am CST 11/11/2021.

Written by:

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Service Hydrologist
WFO Tulsa

Products issued in November 2021:

*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

- 0 Flash Flood Warnings (FFW)
- 0 Flash Flood Statements (FFS)
- 0 Flash/Areal Flood Watches (FFA) (0 Watch FFA CON/EXT/EXA/EXB/CAN)
- 4 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