

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)	
MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS		REPORT FOR:	
		MONTH September	YEAR 2022
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 October 6, 2022	

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.

It was another warm and dry month across eastern OK and northwest AR, with the entire area receiving below normal rainfall this month. Average temperatures were 2°-3°F above normal this month and drought conditions significantly worsened. Normal rainfall for September ranges from 4.2 inches in Okmulgee County to 5.4 inches in Delaware County. In the Ozark region of northwest Arkansas, rainfall averages 4.5 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 September 2022 ranged from less than 0.1" to 4" across eastern OK and northwest AR, with much of the area receiving only 0.5"-1.5". These rainfall totals correspond to less than 5% to 75% of the normal September rainfall for all of eastern OK and northwest AR (Fig. 1b).

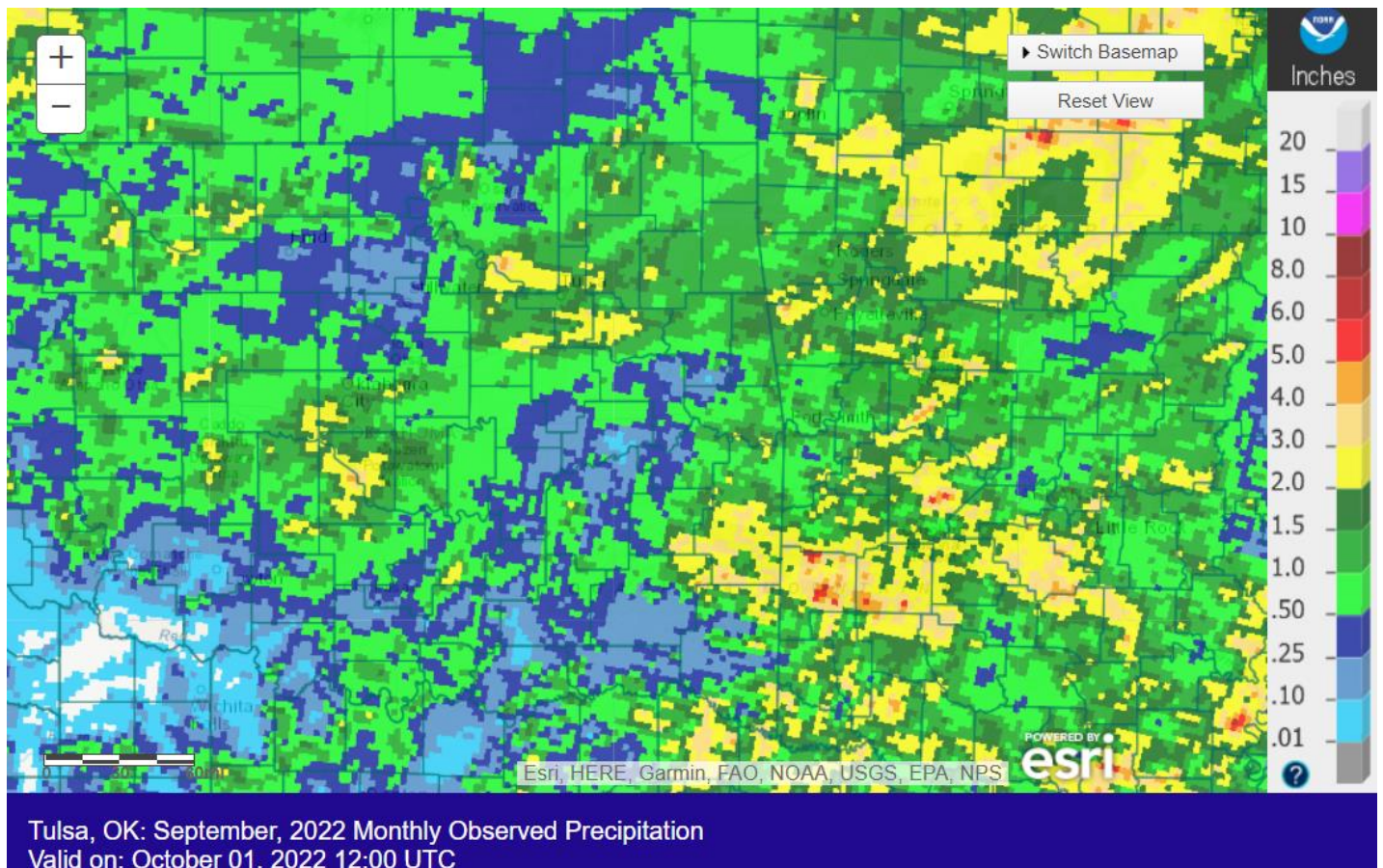


Fig. 1a. Estimated Observed Rainfall for September 2022

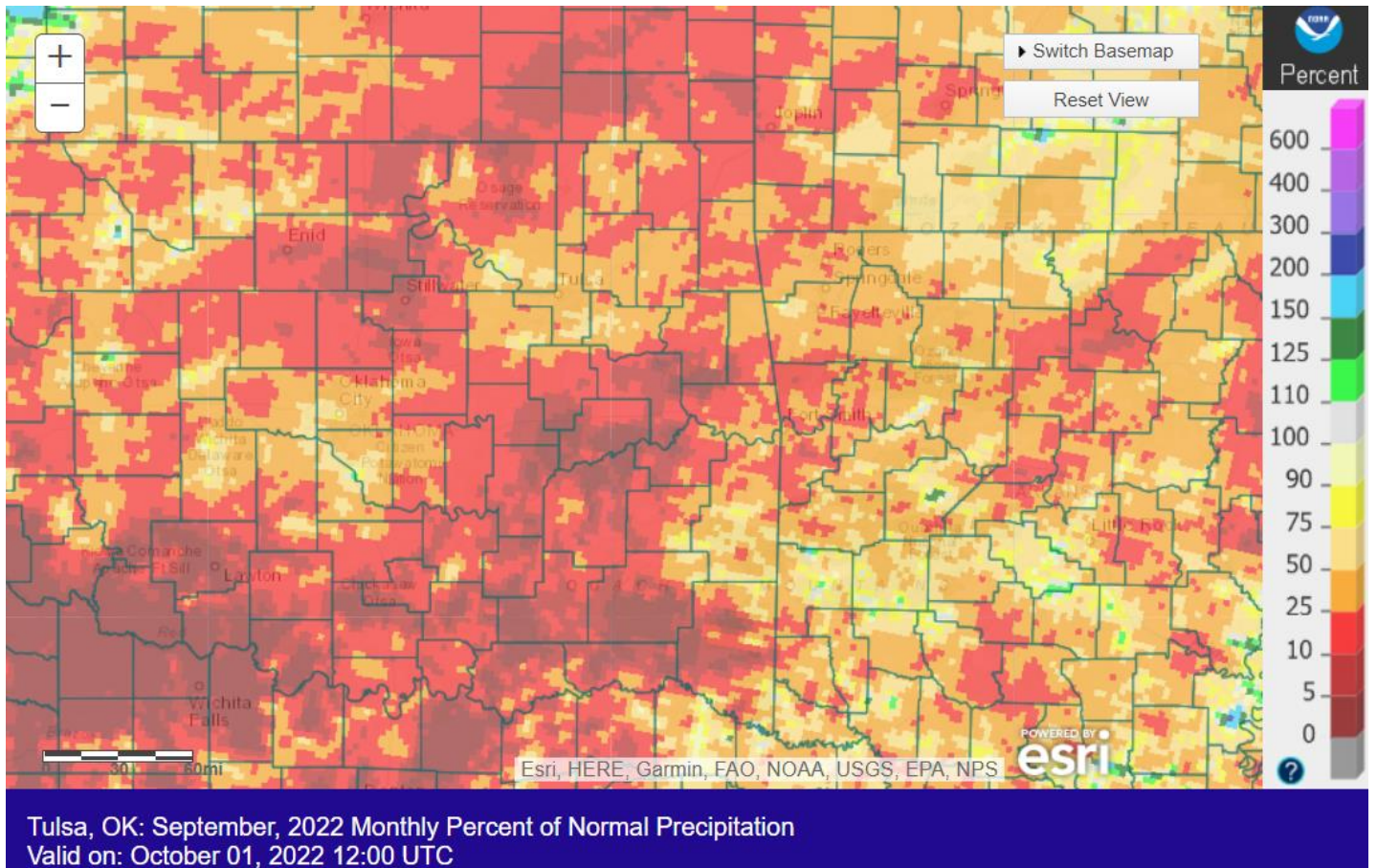


Fig. 1b. Estimated % of Normal Rainfall for September 2022

In Tulsa, OK, September 2022 ranked as the 24th warmest September (76.7°F; since records began in 1905) and the 39th driest September (1.91"; since records began in 1888). Fort Smith, AR had the 20th warmest September (77.6°F; since records began in 1882) and the 21st driest September (0.96"; since records began in 1882). Fayetteville, AR had the 18th warmest (71.4°F) and the 7th driest (1.28") September since records began in 1950.

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

Tulsa 8.9SW, OK (coco)	2.84	Viney Grove 2.4NW, AR (coco)	2.82	Broken Arrow 1.5WSW, OK (coco)	2.81
Berryville 0.9E, AR (coco)	2.73	Tulsa 7.7SSE, OK (coco)	2.56	Terlton 3.7ESE, OK (coco)	2.50
Pryor 2.2SE, OK (coco)	2.46	Talihina, OK (meso)	2.34	Tulsa, OK (meso)	2.25

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

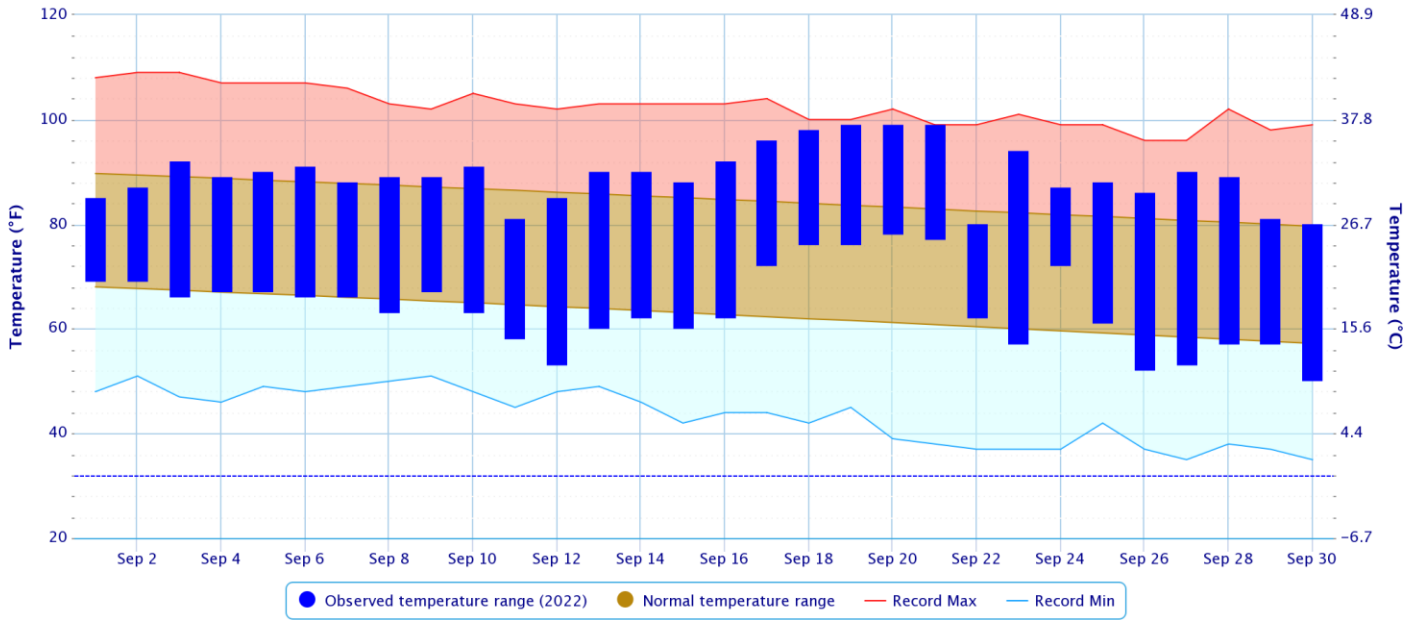
Eufaula, OK (meso)	0.08	Hugo, OK (meso)	0.14	Antlers 6.3SE, OK (coco)	0.16
McAlester, OK (ASOS)	0.20	Cloudy, OK (meso)	0.20	Stigler, OK (meso)	0.21
Cookson, OK (meso)	0.21	Antlers, OK (meso)	0.21	Muskogee, OK (ASOS)	0.25

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

Rank since 1921	September 2022	Last 60 Days (Aug 2 – Sep 30)	Last 90 Days (Jul 3 – Sep 30)	Last 120 Days (Jun 3 – Sep 30)	Last 180 Days (Apr 4 – Sep 30)	Year-to-Date (Jan 1 – Sep 30)	Water Year 2021-22 (Oct 1, 2021 – Sep 30, 2022)
Northeast OK	9th driest	4th driest	10th driest	6th driest	25 th driest	23 rd driest	26 th driest
East Central OK	5th driest	11 th driest	10th driest	17 th driest	46 th wettest	48 th wettest	41 st wettest
Southeast OK	6th driest	16 th driest	6th driest	5th driest	16 th driest	16 th driest	14 th driest
Statewide	5th driest	5th driest	7th driest	6th driest	17 th driest	13 th driest	12 th driest

Daily Temperature Data – Tulsa Area, OK (ThreadEx)

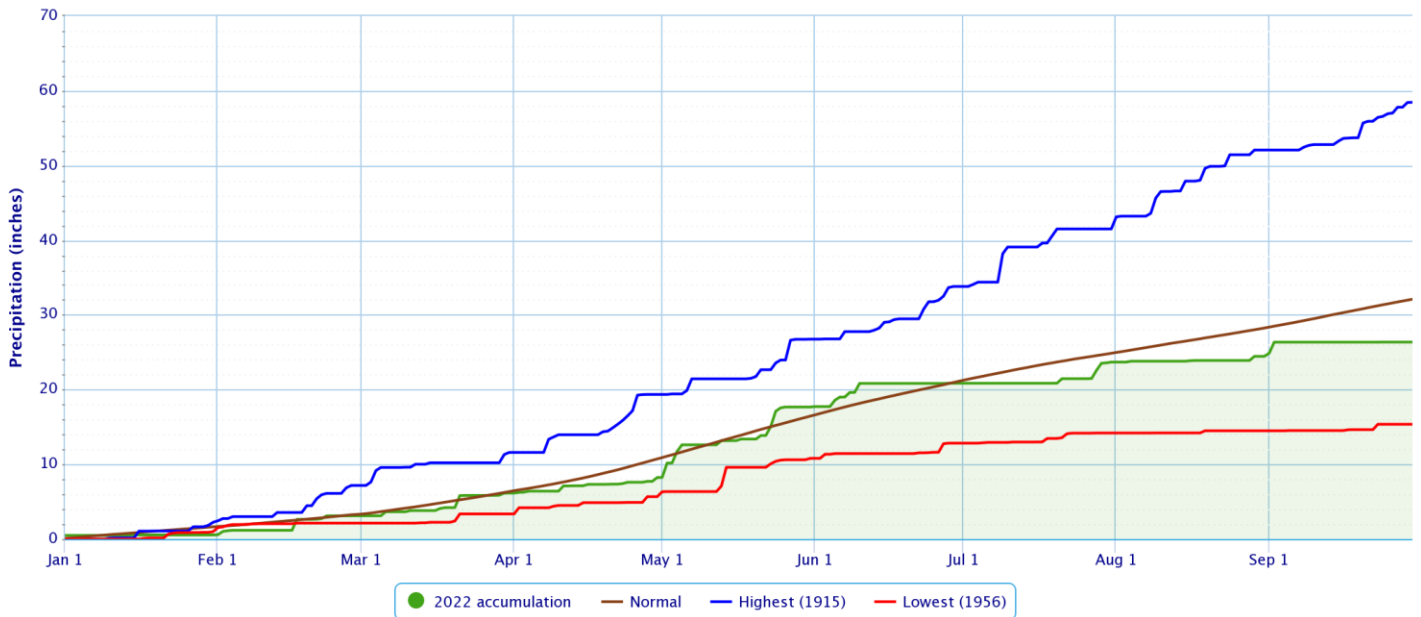
Period of Record – 1905-01-06 to 2022-10-05. Normals period: 1991-2020. Click and drag to zoom chart.



Powered by ACIS

Accumulated Precipitation – Tulsa Area, OK (ThreadEx)

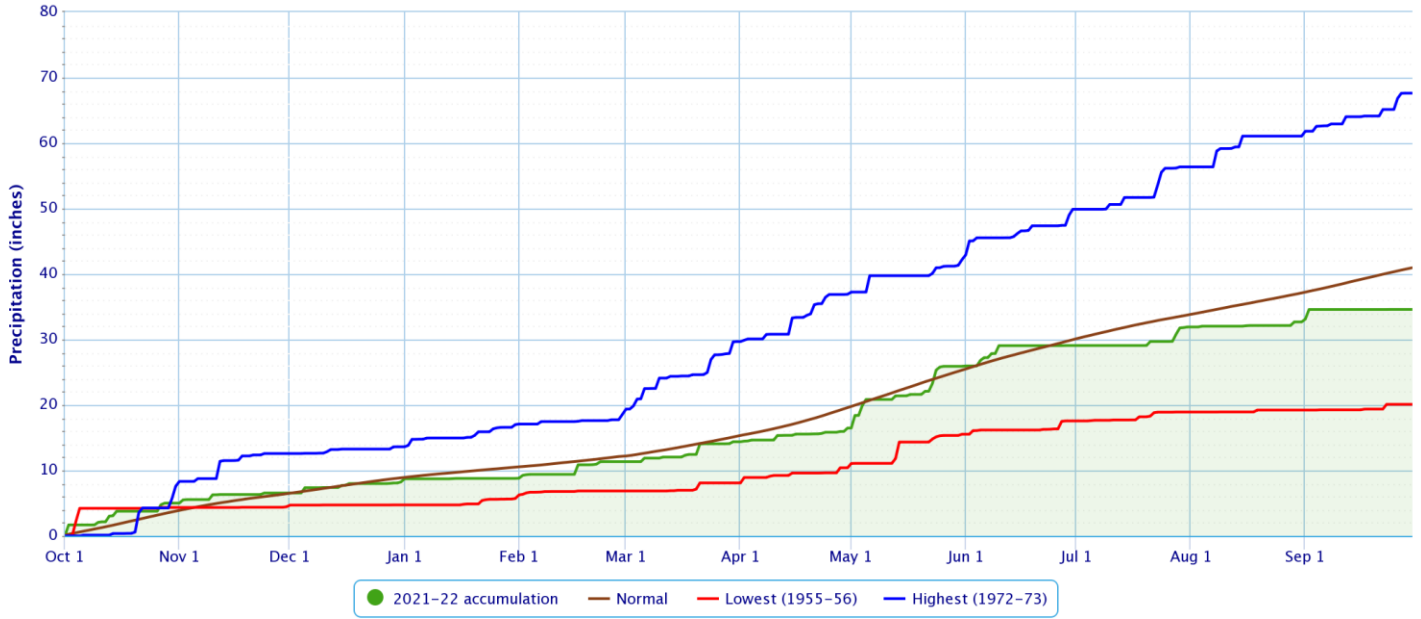
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

Accumulated Precipitation – Tulsa Area, OK (ThreadEx)

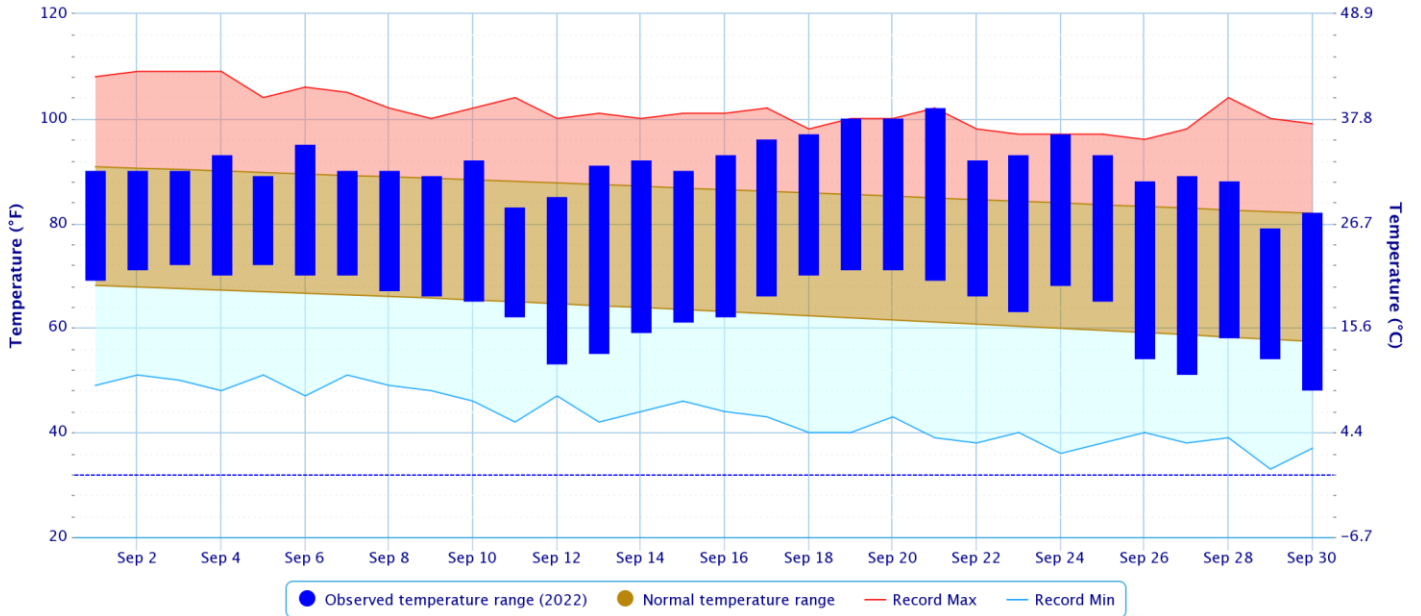
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

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

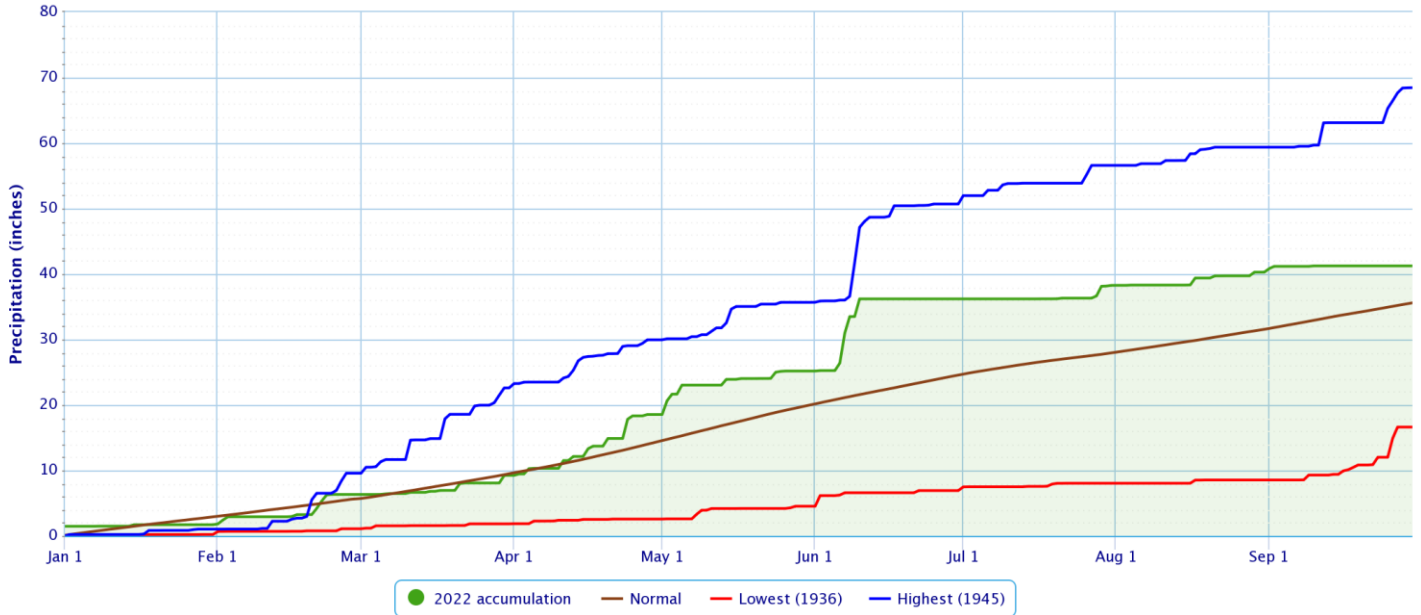
Period of Record – 1882-06-01 to 2022-10-05. Normals period: 1991-2020. Click and drag to zoom chart.



Powered by ACIS

Accumulated Precipitation – Fort Smith Area, AR (ThreadEx)

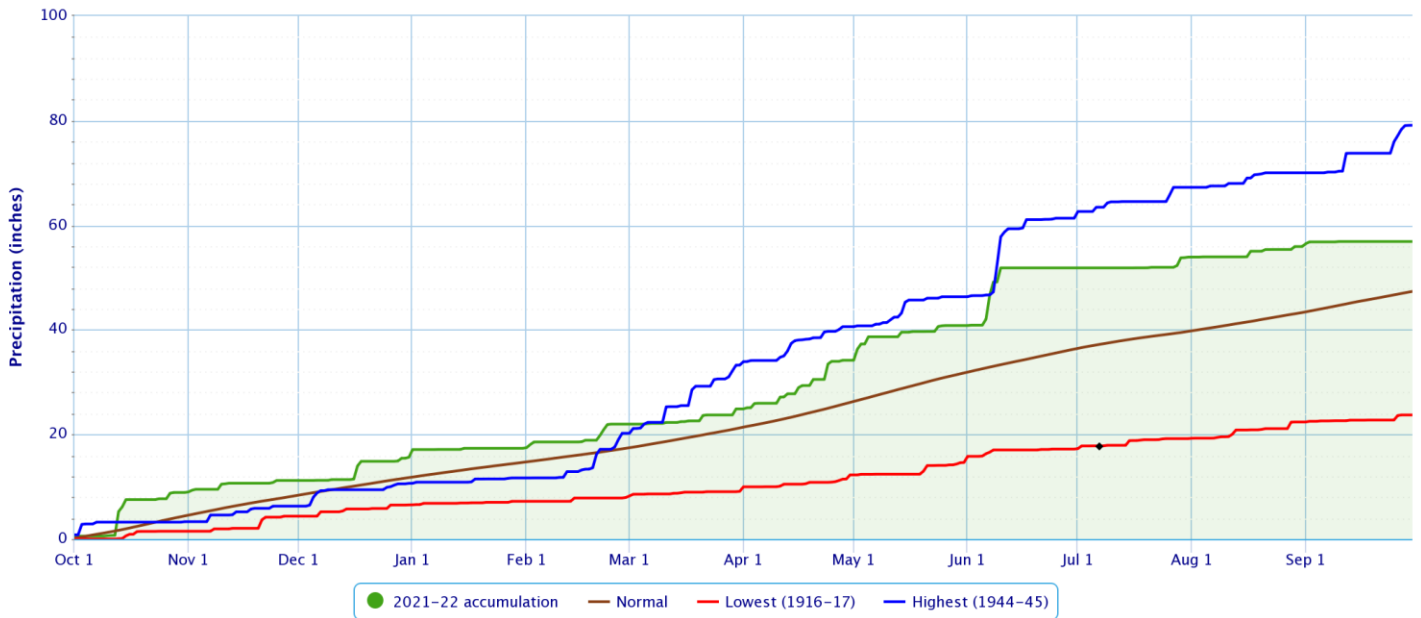
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

Accumulated Precipitation – Fort Smith Area, AR (ThreadEx)

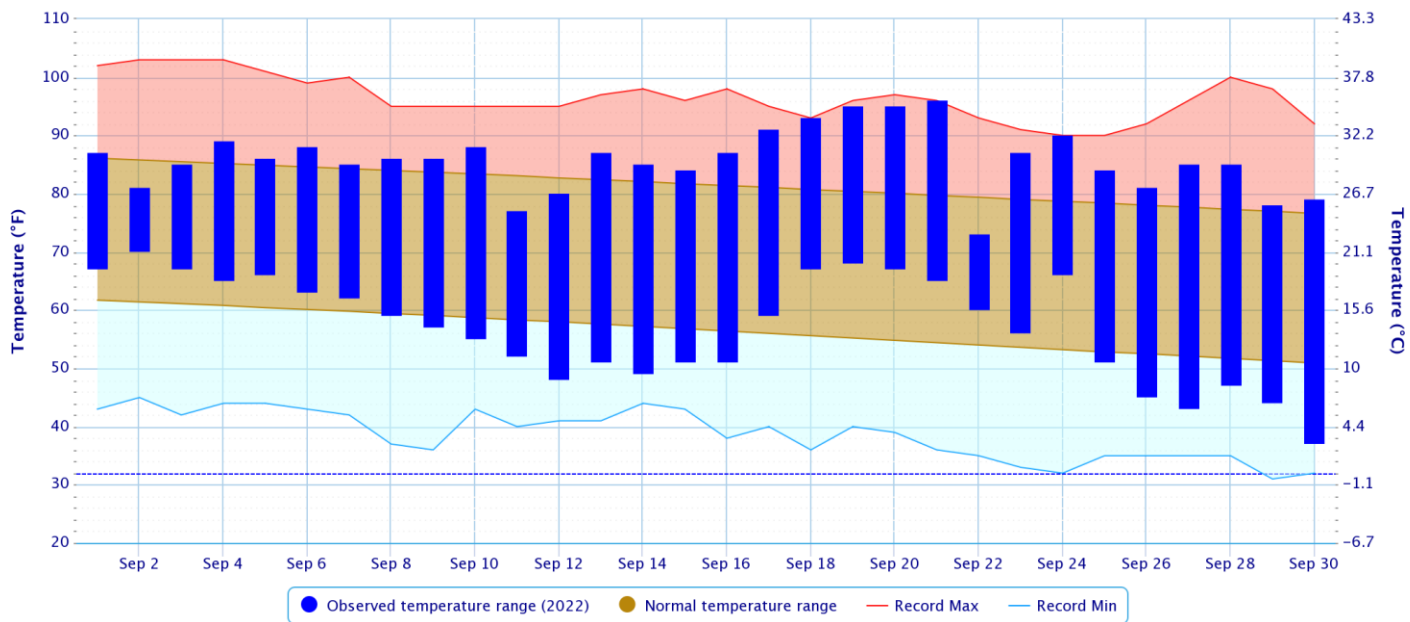
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

Daily Temperature Data – FAYETTEVILLE DRAKE FIELD, AR

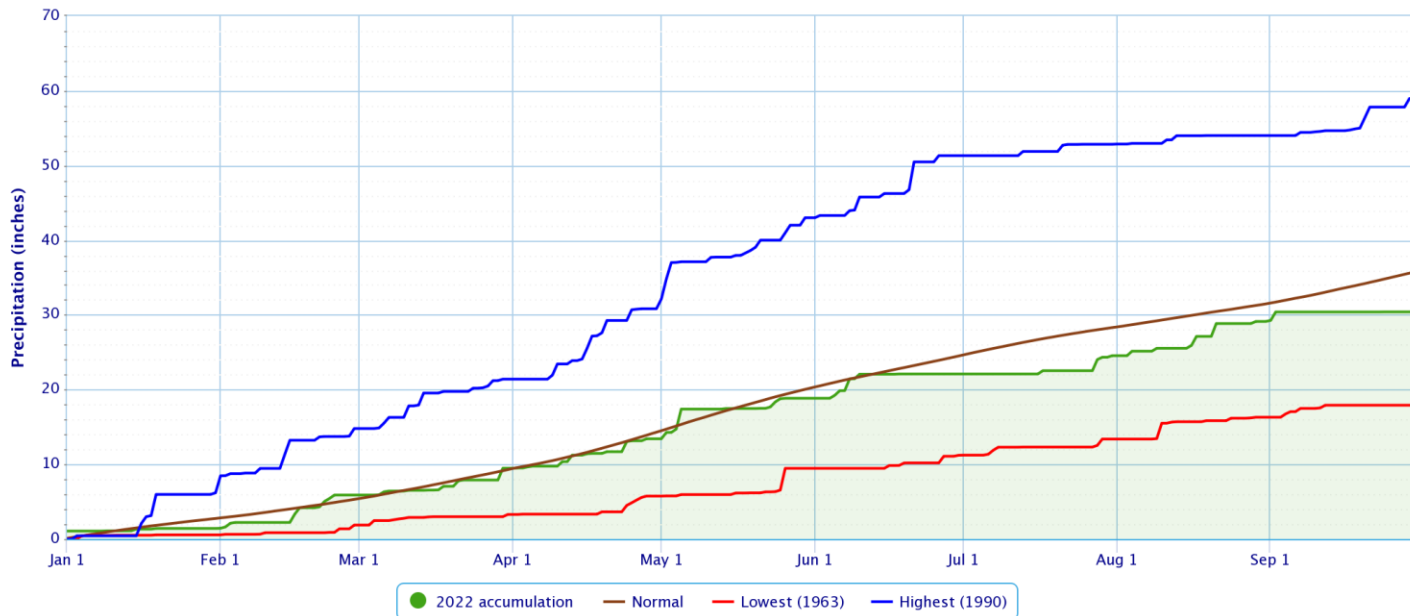
Period of Record – 1949-07-14 to 2022-10-05. Normals period: 1991-2020. Click and drag to zoom chart.



Powered by ACIS

Accumulated Precipitation – FAYETTEVILLE DRAKE FIELD, AR

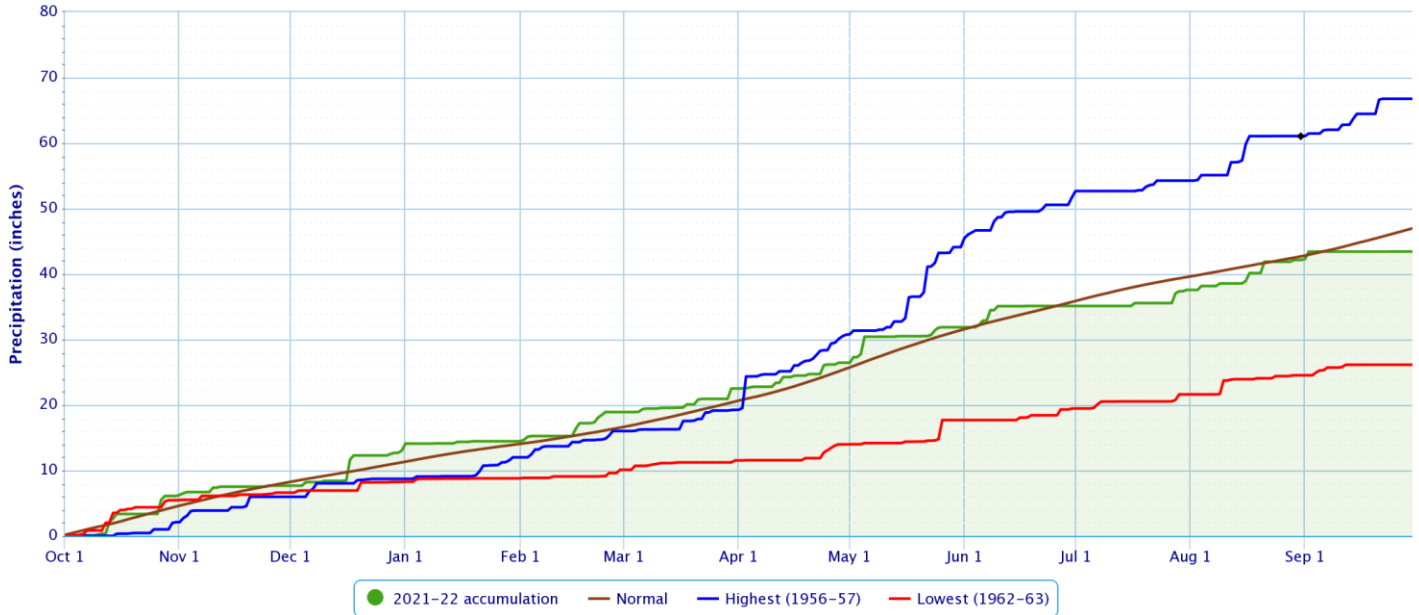
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

Accumulated Precipitation – FAYETTEVILLE DRAKE FIELD, AR

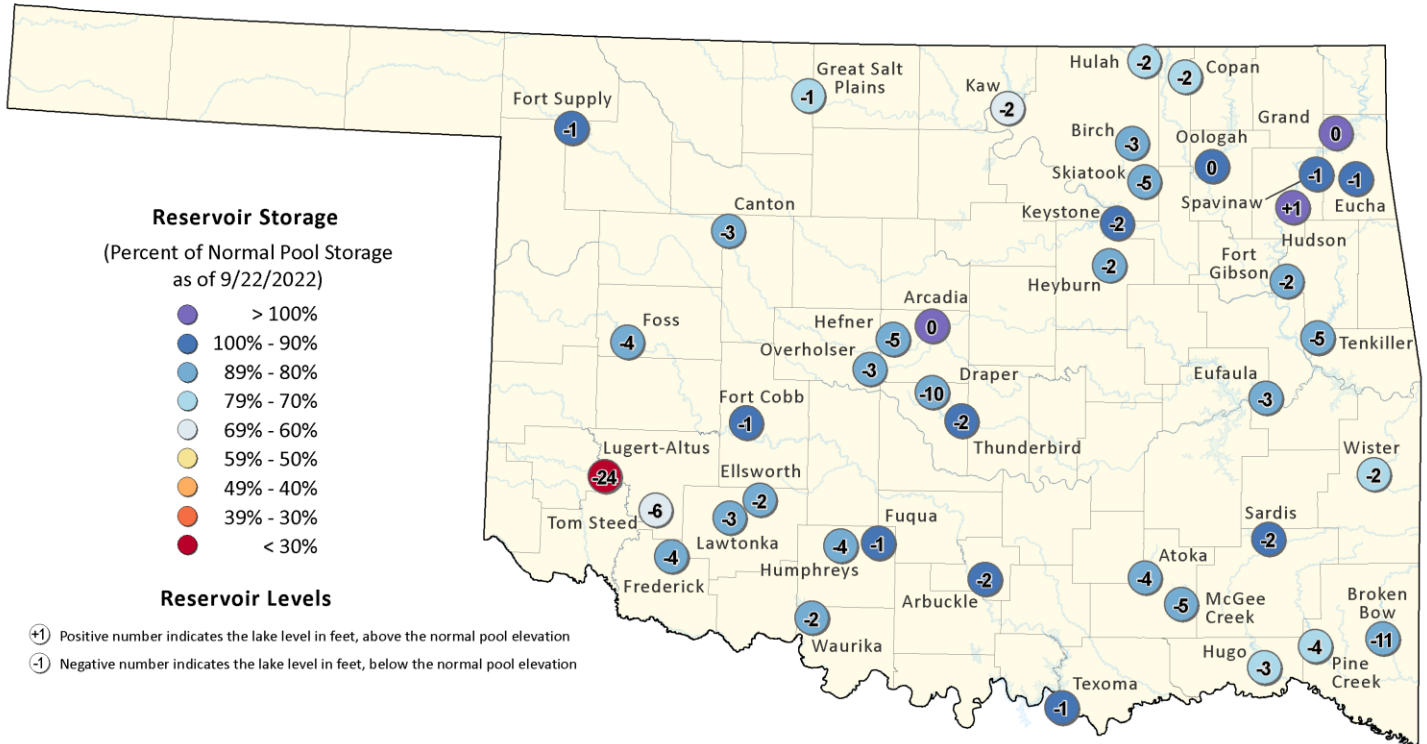
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



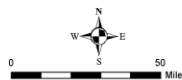
Powered by ACIS

Reservoirs

Oklahoma Reservoir Levels and Storage as of 9/22/2022



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 (https://www.swt-wc.usace.army.mil/Daily_Morning_Reservoir_Report.pdf), and the U.S. Geological Survey (https://waterdata.usgs.gov/ok/nwis/current/?type=lake&group_key=basin_cd). For more information please visit the OWRB's website: (<https://www.owrb.ok.gov>).



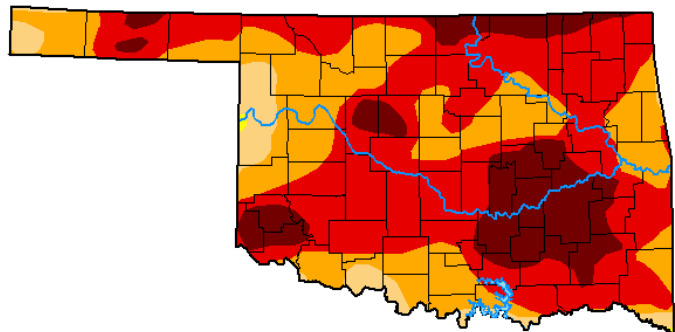
According to the USACE, most of the lakes in the HSA were below 3% of top of their conservation pools as of 9/30/2022: Heyburn Lake 59%, Hugo Lake 66%, Wister Lake 70%, Ft. Gibson Lake 72%, Hulah Lake 73%, Copan Lake 75%, Eufaula Lake 76%, Birch Lake 77%, Tenkiller 81%, Kaw Lake 82%, Keystone Lake 83%, Skiatook Lake 84%, Beaver Lake 90%, Sardis Lake 91%, and Oologah Lake 96%. One lake was above 3% of the top of its conservation pool: Hudson Lake 4%.

Drought

According to the [U.S. Drought Monitor](#) (USDM) from September 27, 2022 (Figs. 2, 3), drought conditions were impacting the entire HSA. 89% of the HSA was in D2-D4, 68% was in D3-D4, and 20% was in D4. Exceptional (D4) Drought conditions had developed across portions of eastern Kay, Osage, Washington, Nowata, Craig, Ottawa, Okfuskee, Okmulgee, McIntosh, Haskell, Pittsburg, Latimer, and Pushmataha Counties in eastern OK. Extreme (D3) Drought conditions were occurring in portions of eastern Kay, Osage, Pawnee, Washington, Nowata, Craig, Ottawa, Delaware, Mayes, Rogers, Wagoner, Tulsa, Creek, Okfuskee, Okmulgee, Muskogee, Cherokee, McIntosh, Haskell, Latimer, Sequoyah, Adair, Le Flore, Pushmataha, and Choctaw Counties in eastern Oklahoma, and Washington, Crawford, Sebastian, and Franklin Counties in northwest AR. Severe (D2) Drought conditions exist in portions of Osage, Pawnee, Tulsa, Creek, Okmulgee, Muskogee, Cherokee, Delaware, Adair, Sequoyah, Haskell, and Le Flore Counties in eastern Oklahoma, and Benton, Washington, Madison, and Franklin Counties in northwest Arkansas. Moderate (D1) Drought conditions were present in portions of Benton, Washington, Carroll, and Madison Counties in northwest Arkansas.

U.S. Drought Monitor Oklahoma

September 27, 2022
(Released Thursday, Sep. 29, 2022)
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	99.88	94.44	64.44	17.25
Last Week 09-20-2022	0.03	99.97	98.91	89.25	53.99	13.64
3 Months Ago 06-28-2022	54.09	45.91	30.76	14.79	5.07	1.46
Start of Calendar Year 01-04-2022	5.02	94.98	88.14	72.26	40.44	0.00
Start of Water Year 09-28-2021	6.45	93.55	73.23	23.72	2.65	0.00
One Year Ago 09-28-2021	6.45	93.55	73.23	23.72	2.65	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:

Richard Heim
NCEI/NOAA

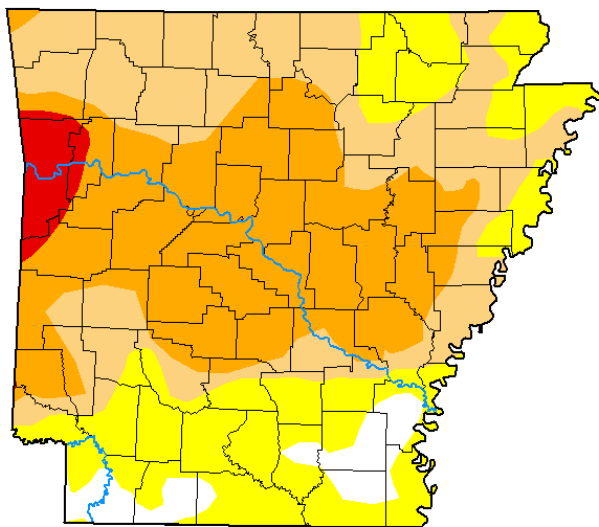


droughtmonitor.unl.edu

Fig. 2. Drought Monitor for Oklahoma

U.S. Drought Monitor
Arkansas

September 27, 2022
(Released Thursday, Sep. 29, 2022)
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	4.99	95.01	69.68	39.30	2.96	0.00
Last Week 09-20-2022	28.02	71.98	51.17	11.63	0.01	0.00
3 Months Ago 06-28-2022	68.12	31.88	1.85	0.00	0.00	0.00
Start of Calendar Year 01-04-2022	39.91	60.09	28.99	14.24	0.41	0.00
Start of Water Year 09-28-2021	51.41	48.59	5.17	0.00	0.00	0.00
One Year Ago 09-28-2021	51.41	48.59	5.17	0.00	0.00	0.00

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:

Richard Heim
NCEI/NOAA



droughtmonitor.unl.edu

Fig. 3. Drought Monitor for Arkansas

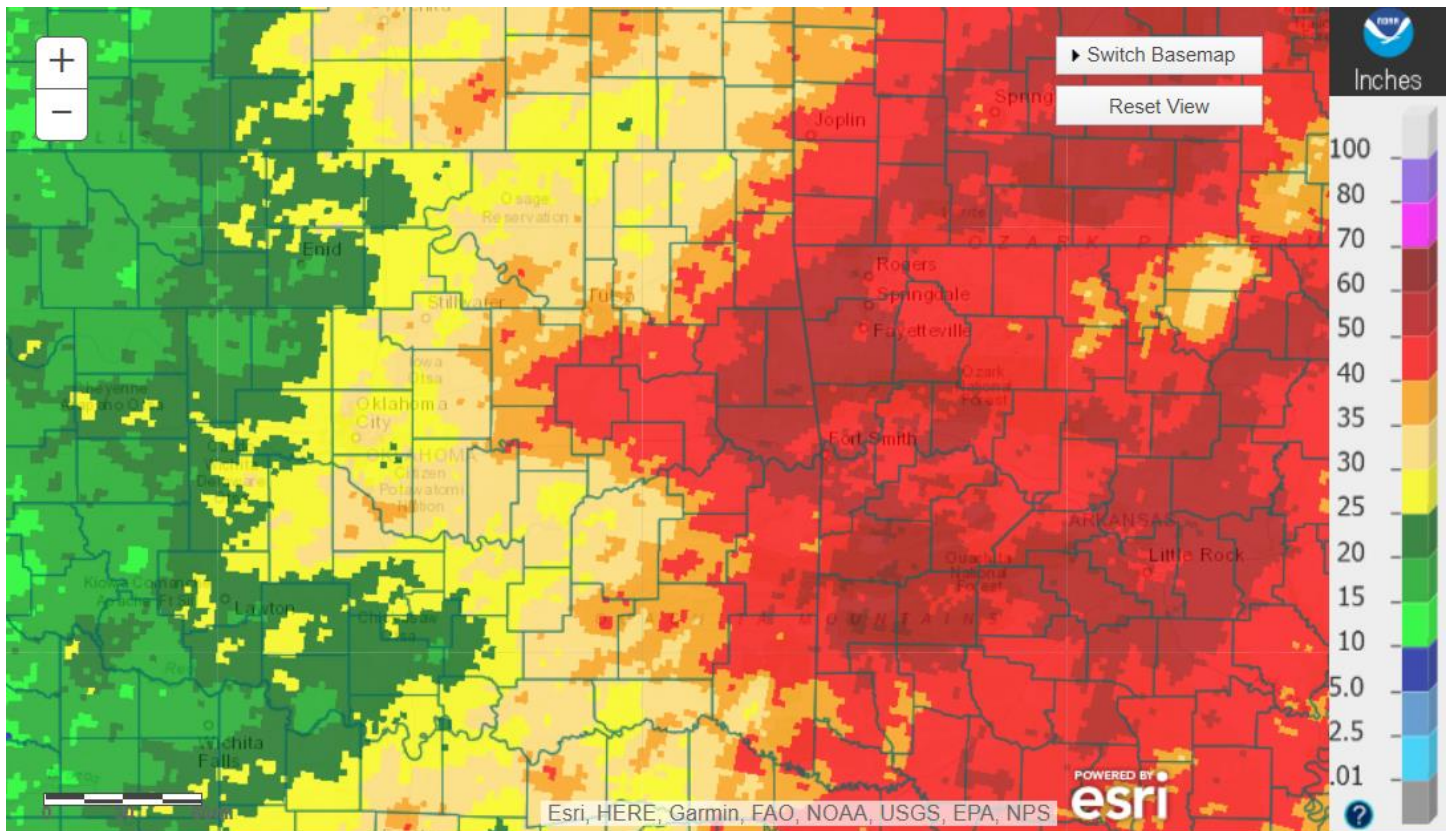
Outlooks

The [Climate Prediction Center](#) (CPC) outlook for October 2022 (issued September 30, 2022) indicates a likely 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 and La Niña and Madden-Julian Oscillation (MJO) influences.

For the 3-month period October-November-December 2022, CPC is forecasting an enhanced chance for above normal temperatures and an enhanced chance for below median precipitation across all of eastern OK and northwest AR (outlook issued September 15, 2022). This outlook is based on long-term trends, La Niña impacts, current soil moisture, 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. La Niña conditions are expected to continue through fall 2022 (91% chance), decreasing to a 54% chance of La Niña by late winter. CPC continues the La Niña Advisory.

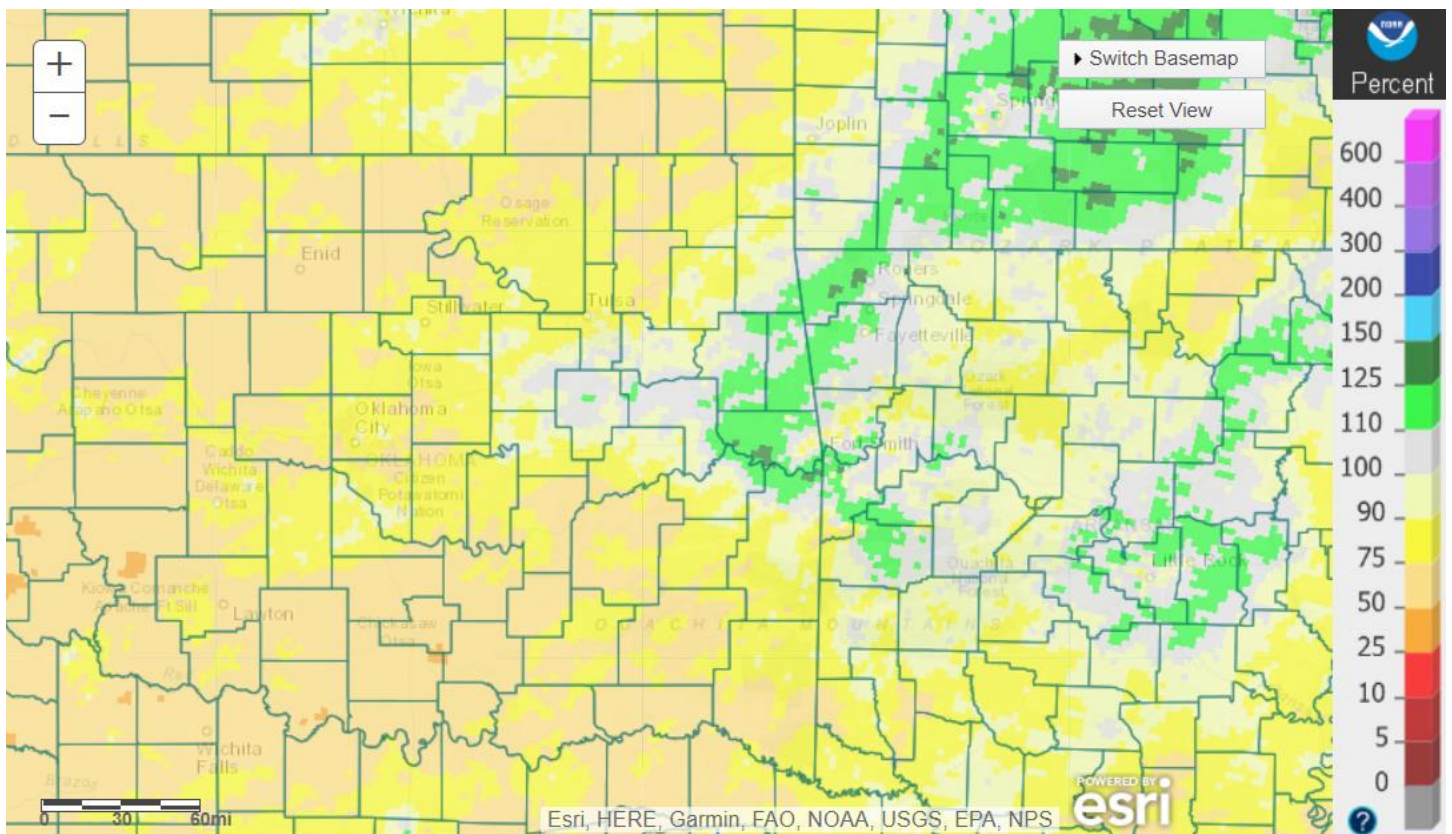
Water Year 2021-22 (October 1, 2021-September 30, 2022)

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 4a), rainfall totals for Water Year 2021-22 ranged from 25” to 60” across eastern OK and northwest AR, with much of the area receiving 30”-50”. These rainfall totals correspond to 100% to around 125% of the normal water year rainfall along the OK/AR state line in east central OK and northwest AR (Fig. 4b). The remainder of eastern OK and northwest AR received 50% to 100% of the normal water year rainfall (Fig. 4b).



Tulsa, OK: 2022 Water Year (Oct. 1) Observed Precipitation
Valid on: October 01, 2022 12:00 UTC

Fig. 4a. Estimated Observed Rainfall for Water Year 2021-22



Tulsa, OK: 2022 Water Year (Oct. 1) Percent of Normal Precipitation
Valid on: October 01, 2022 12:00 UTC

Fig. 4b. Estimated % of Normal Rainfall for Water Year 2021-22

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

At mid-day of the 1st, showers and thunderstorms from central OK expanded eastward into the area as an upper-level low lifted east-northeast. This activity increased in coverage, impacting nearly all of eastern OK and northwest AR during the afternoon and evening hours. Precipitable water (PWAT) values of near 2" combined with slower storm motion allowed for heavy rainfall with these storms. Overnight, there was strong low-level moisture transport ahead of the slow moving upper-level low, and showers and thunderstorms continued across northeast OK and northwest AR. By 7am on the 2nd, rainfall totals ranged from around 0.10" to 4" across eastern OK and northwest AR (Fig. 5, 6). These storms continued to slowly progress east, ending from west to east by noon. Additional scattered convection flared up across east central OK into northwest AR during the heat afternoon as the slow moving low still had influence over the region. This activity continued into the early evening before most of it dissipated with the loss of daytime heating. A few isolated storms lingered until around midnight. An additional 0.10" to 3" of rain fell after 7am (Fig. 7).

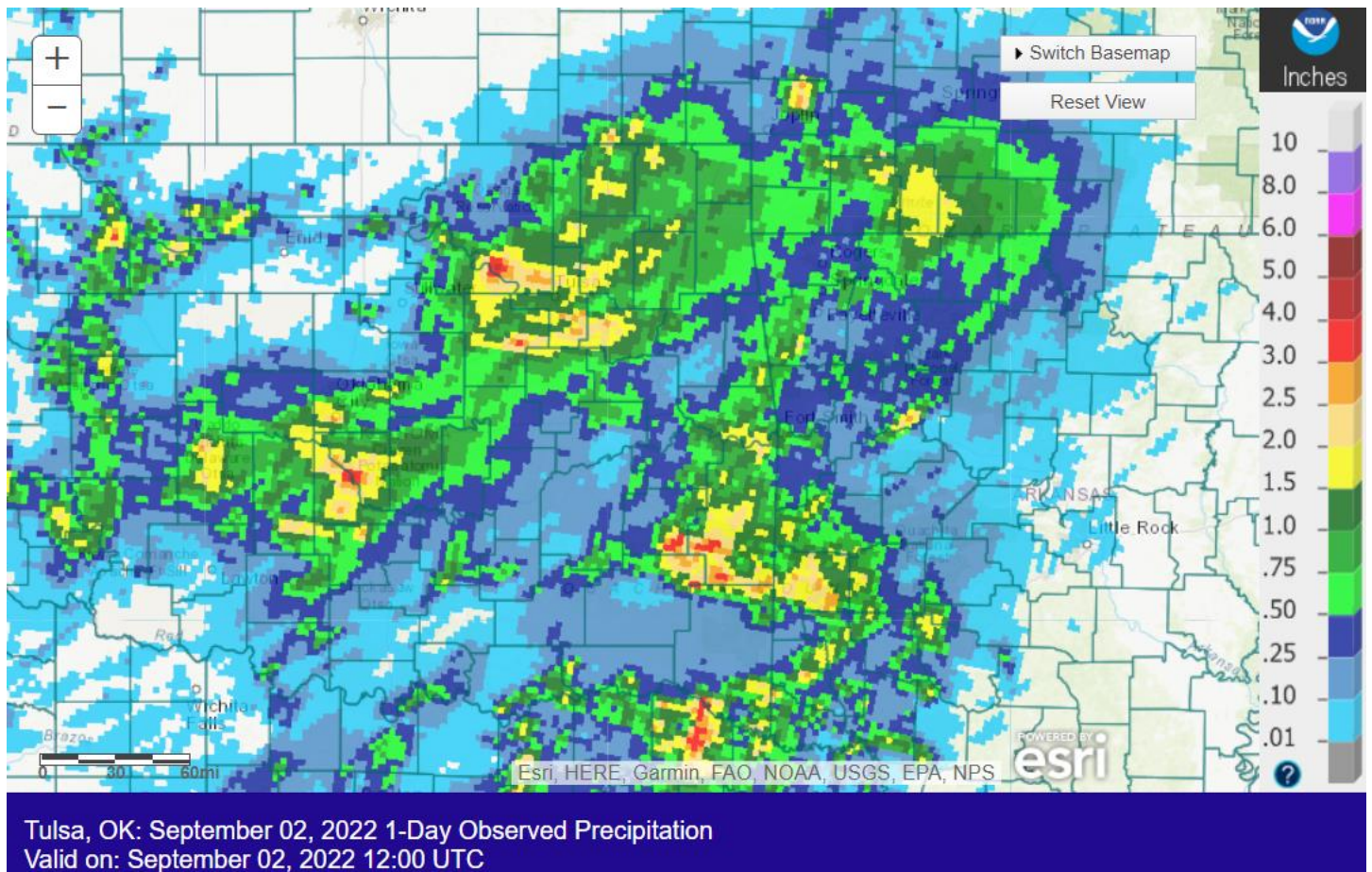


Fig. 5. 24-hour Estimated Observed Rainfall ending at 7am CDT 9/02/2022.

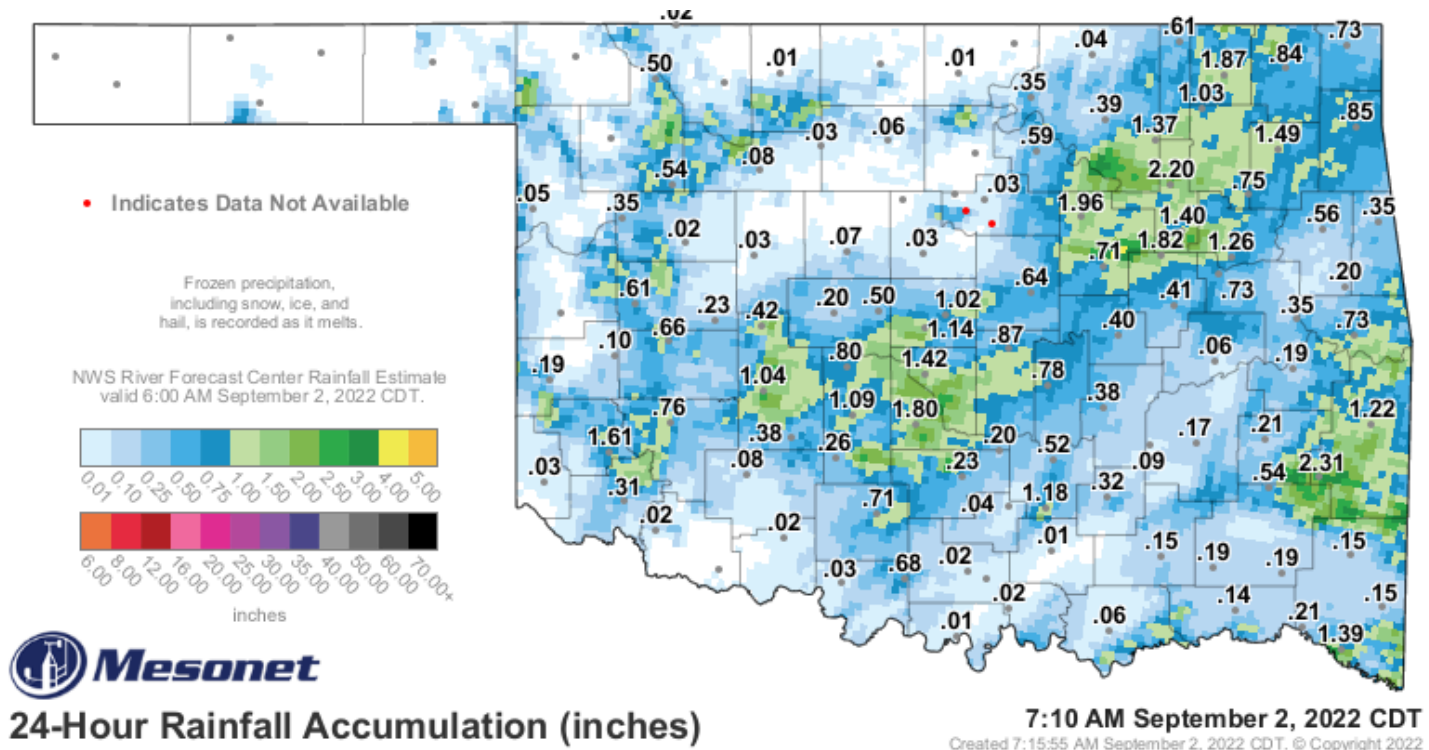


Fig. 6. OK Mesonet (values) and NWS RFC rainfall estimate (image) 24-hour rainfall ending at 7:10 am CDT 9/02/2022.

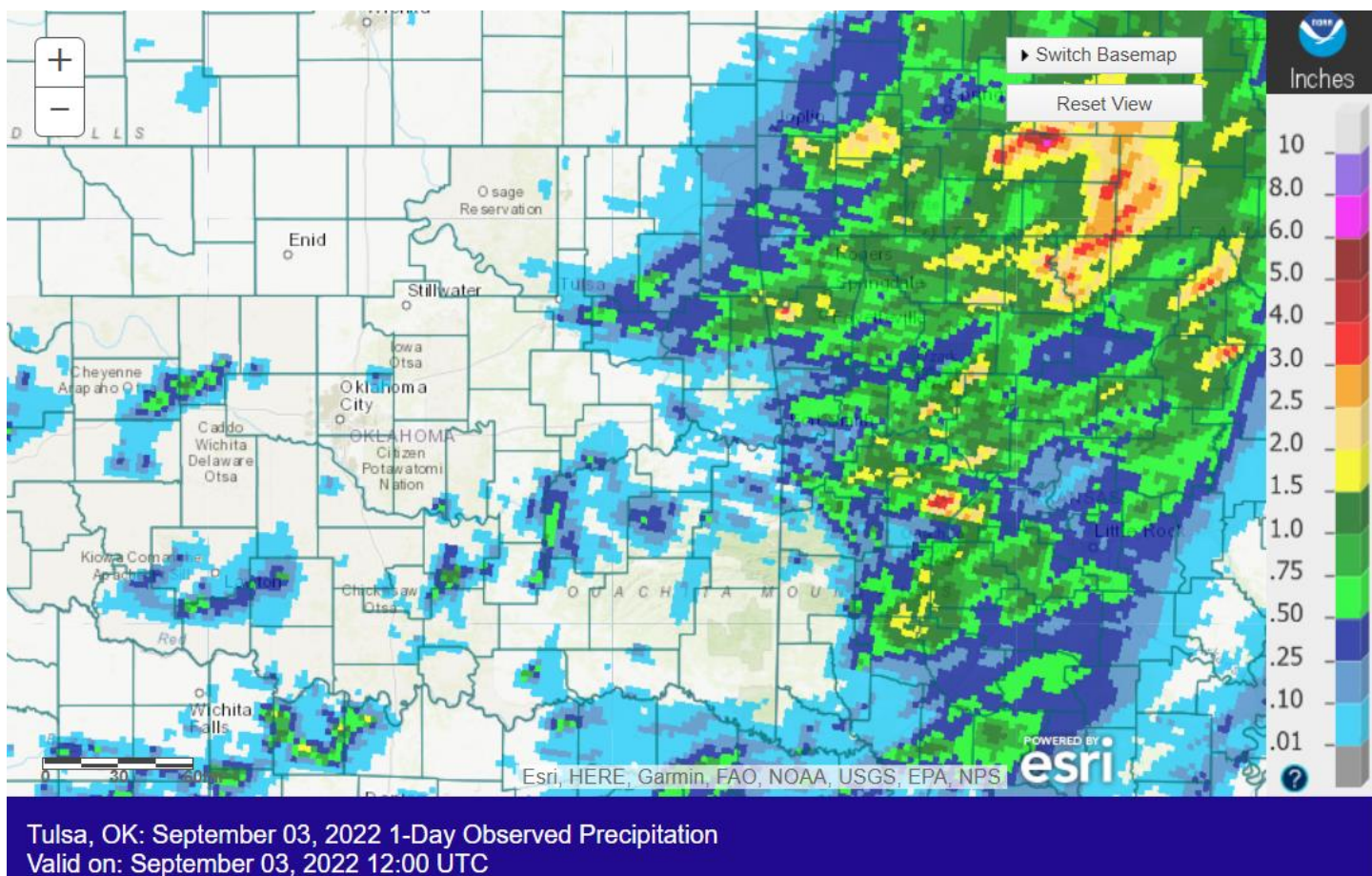


Fig. 7. 24-hour Estimated Observed Rainfall ending at 7am CDT 9/03/2022.

Written by:

Nicole McGavock
Service Hydrologist
WFO Tulsa

Products issued in September 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

- 0 Flash Flood Warnings (FFW)
- 0 Flash Flood Statements (FFS)
- 0 Flash/Areal Flood Watches (FFA) (0 Watch FFA CON/EXT/EXA/EXB/CAN)
- 8 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