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 **April** YEAR **2023**
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 **May 15, 2023**

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 a drier than normal April, with no mainstem river flooding in the HSA. Normal precipitation for the month of April ranges from 3.1 inches in Pawnee County to 4.7 inches in Latimer County. The Ozark region of northwest Arkansas averages 4.3 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 April 2023 ranged from 0.50" to around 6" across eastern OK and northwest AR, with much of the area receiving 2"-3". These rainfall totals correspond to 10% to 90% of the normal April rainfall for all but southern Le Flore County, which received 100% to 125% of normal (Fig. 1b).

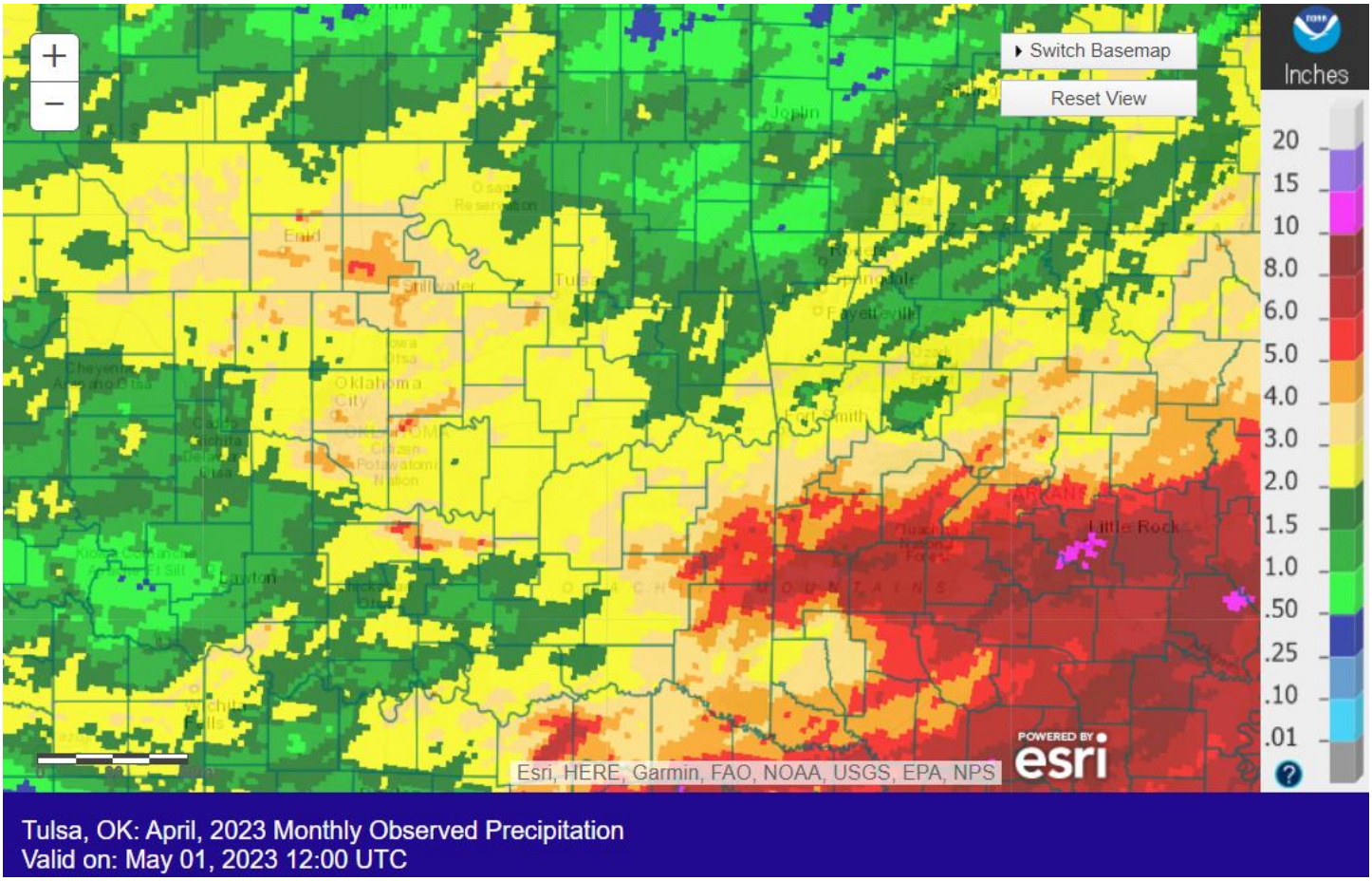


Fig. 1a. Estimated Observed Rainfall for April 2023

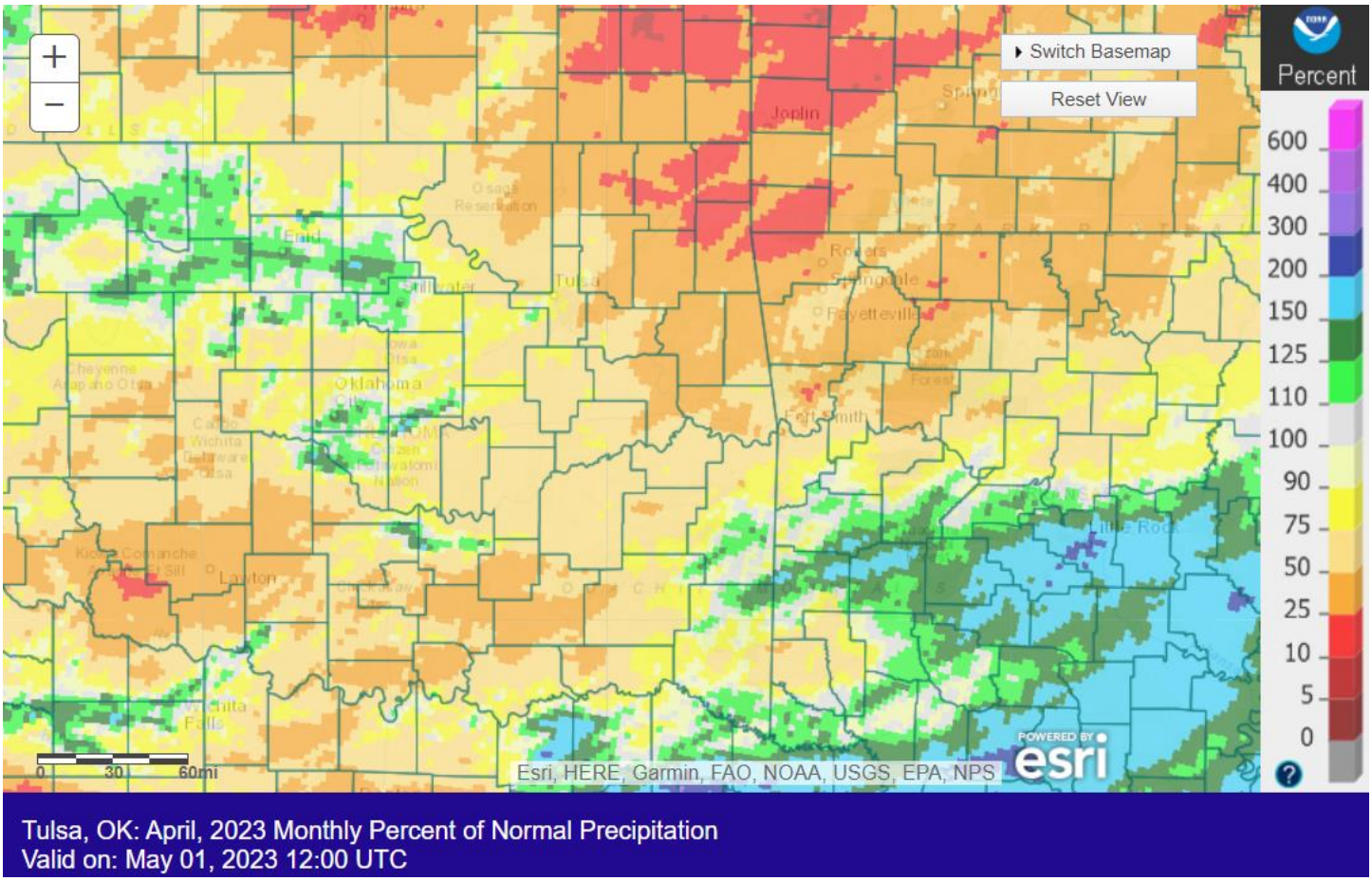


Fig. 1b. Estimated % of Normal Rainfall for April 2023

In Tulsa, OK, April 2023 ranked as the 50th coldest April (59.9°F, tied 1910; since records began in 1905) and the 44th driest April (2.67"; since records began in 1888). Fort Smith, AR had the 65th warmest April (61.8°F, tied 1923, 1903; since records began in 1883) and the 38th driest April (2.68"; since records began in 1883). Fayetteville, AR had the 36th warmest (57.6°F) and the 7th driest (1.80") April since records began in 1950.

Some of the larger precipitation reports (in inches) for April 2023 included:

Greenwood 0.9S, AR (coco)	4.15	Wister 3.0 NNE, OK (coco)	4.10	Wister, OK (meso)	4.00
Drumright 0.6SW, OK (coco)	3.92	Clayton, OK (meso)	3.90	Pawnee, OK (meso)	3.65
Talihina, OK (meso)	3.49	Berryville 0.9E, AR (coco)	3.48	Tulsa 3.7W, OK (coco)	3.39

Some of the lowest precipitation reports (in inches) for April 2023 included:

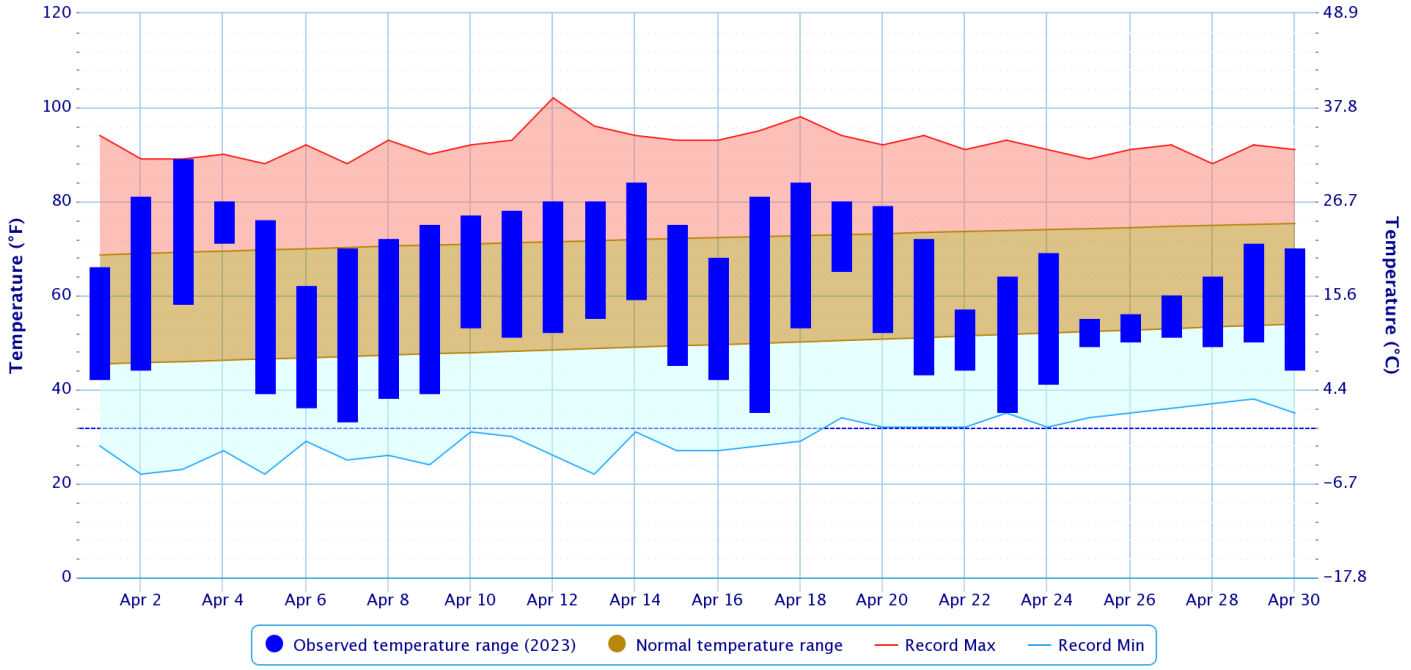
Miami, OK (meso)	0.68	Bella Vista 2.2E, AR (coco)	0.69	Gravette, OK (coop)	0.87
Vinita, OK (meso)	0.97	Nowata, OK (meso)	0.98	Copan, OK (meso)	1.18
Jay, OK (meso)	1.19	Siloam Springs Arpt, AR (AWOS)	1.22	Bartlesville, OK (ASOS)	1.23

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

Rank since 1921	April 2023	Spring-to-Date (Mar 1 – Apr 30)	Last 90 Days (Jan 31 – Apr 30)	Year-to-Date (Jan 1 – Apr 30)	Last 180 Days (Nov 2 – Apr 30)	Water Year-to-Date (Oct 1 – Apr 30)	Last 365 Days (May 1, 2022 – Apr 30, 2023)
Northeast OK	12th driest	36th driest	52nd wettest	47th driest	47th wettest	48th driest	29th driest
East Central OK	13th driest	42nd wettest	17th wettest	17th wettest	19th wettest	26th wettest	37th wettest
Southeast OK	31st driest	17th wettest	**7th wettest**	11th wettest	18th wettest	14th wettest	47th wettest
Statewide	23rd driest	43rd driest	50th wettest	50th driest	46th wettest	45th wettest	28th driest

Daily Temperature Data – Tulsa Area, OK (ThreadEx)

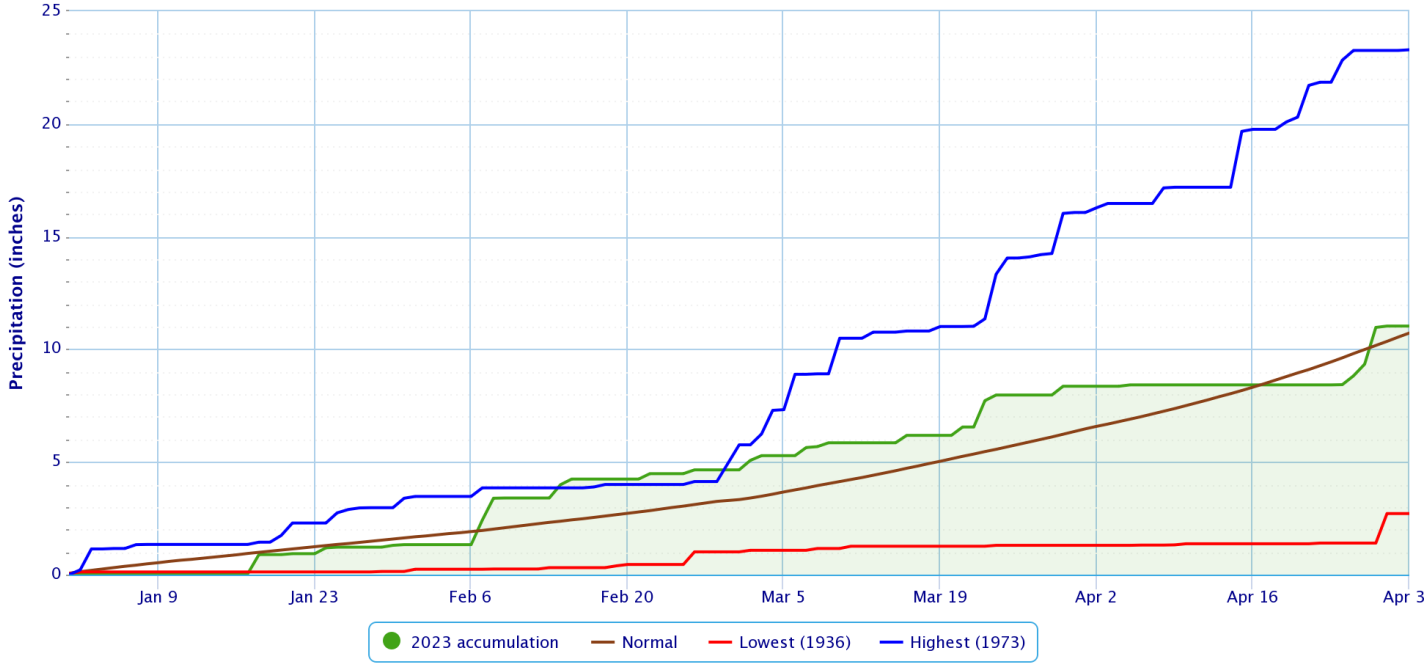
Period of Record – 1905-01-06 to 2023-05-07. Normals period: 1991-2020. Click and drag to zoom chart.



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



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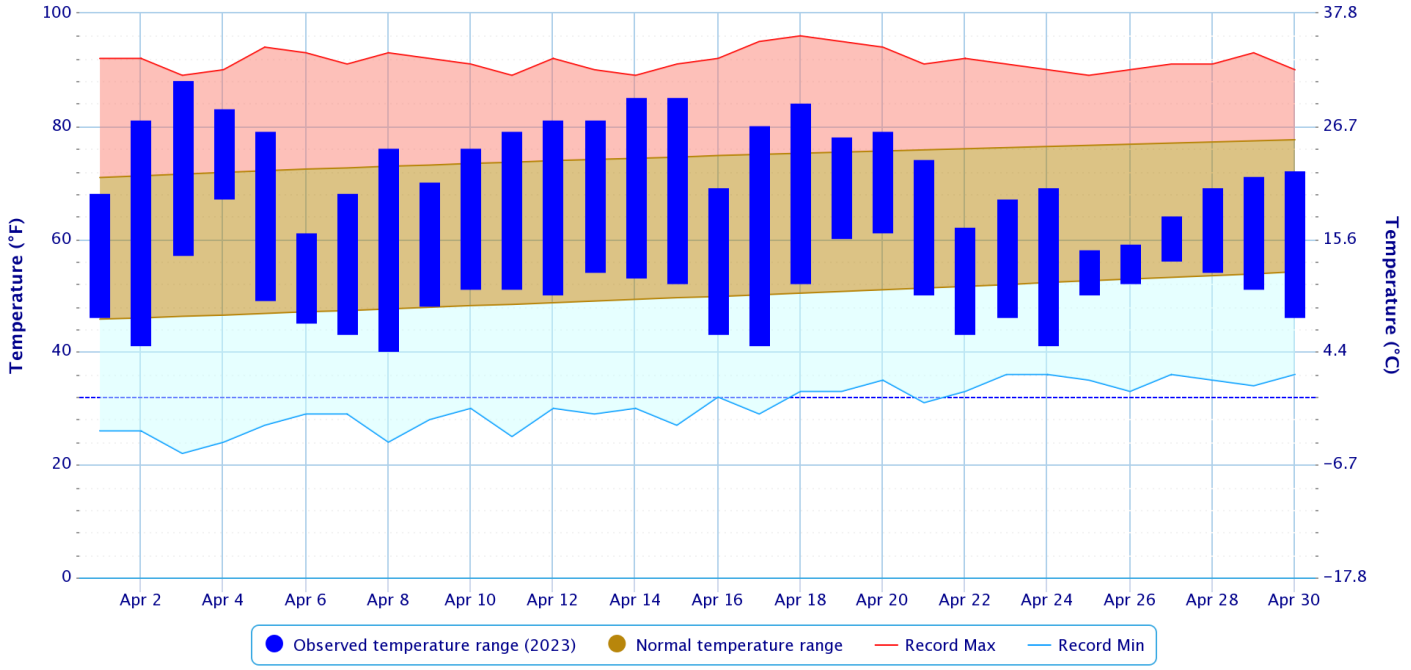
Daily Temperature Data – Fort Smith Area, AR (ThreadEx)

Period of Record – 1882-06-01 to 2023-05-07. Normals period: 1991-2020. Click and drag to zoom chart.



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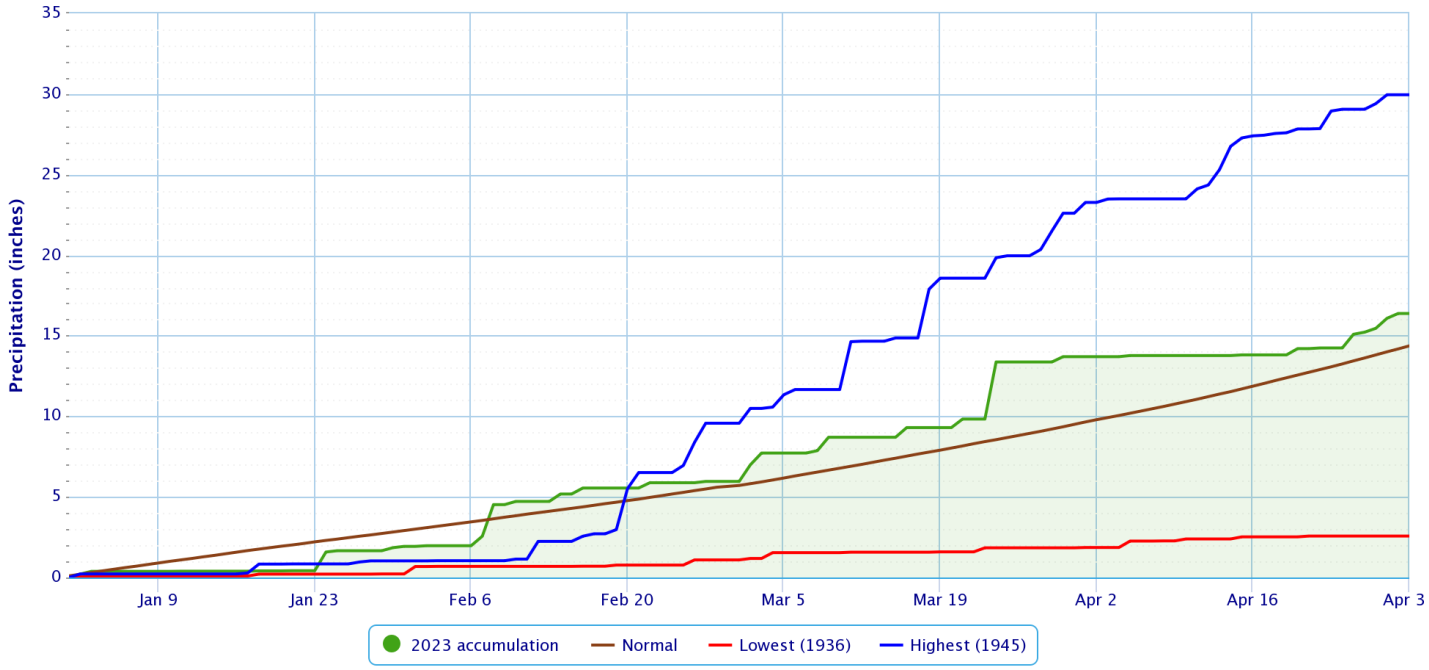
Accumulated Precipitation – Fort Smith Area, AR (ThreadEx)

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



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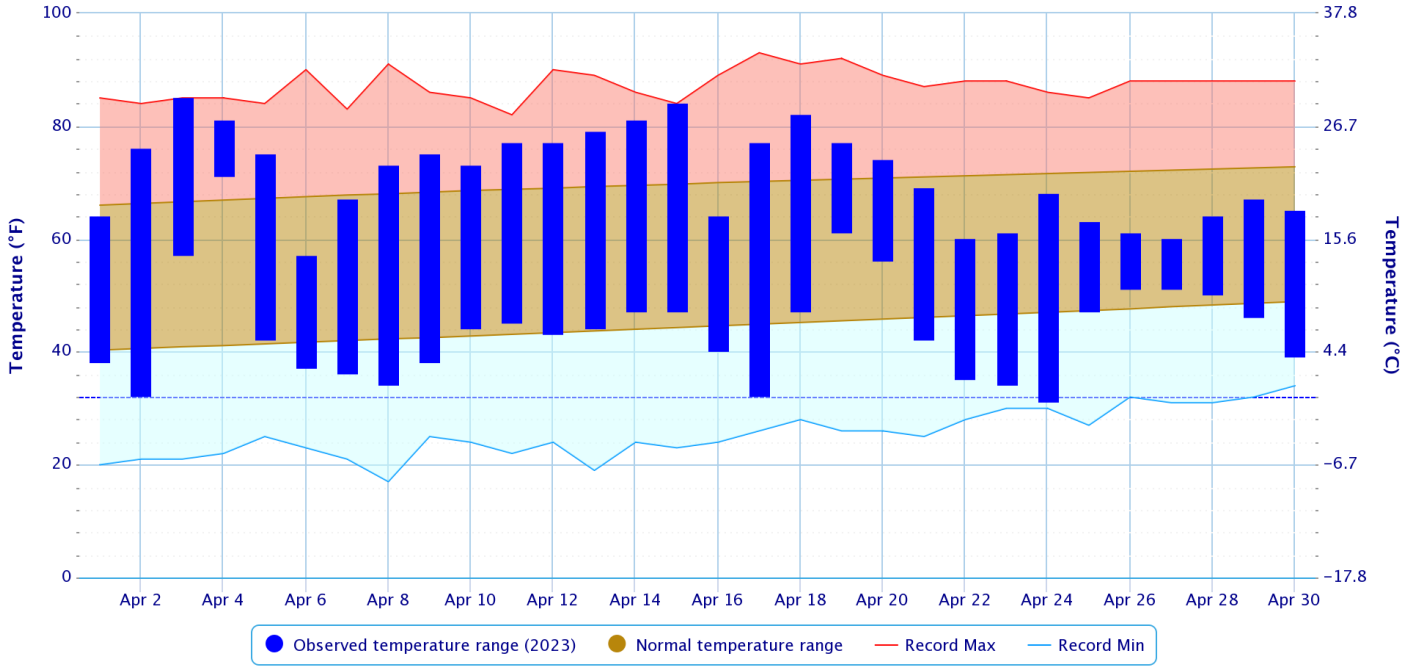
Daily Temperature Data – FAYETTEVILLE DRAKE FIELD, AR

Period of Record – 1949-07-14 to 2023-05-07. Normals period: 1991-2020. Click and drag to zoom chart.



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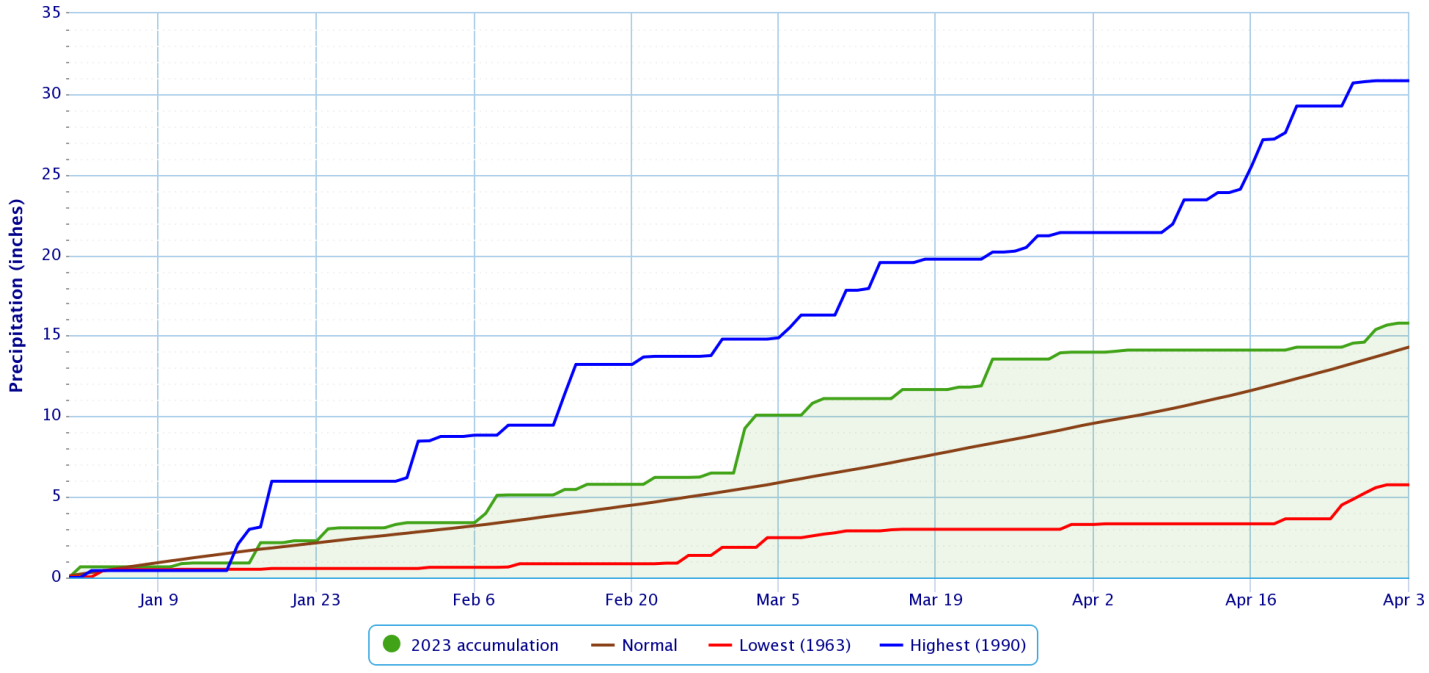
Accumulated Precipitation – FAYETTEVILLE DRAKE FIELD, AR

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



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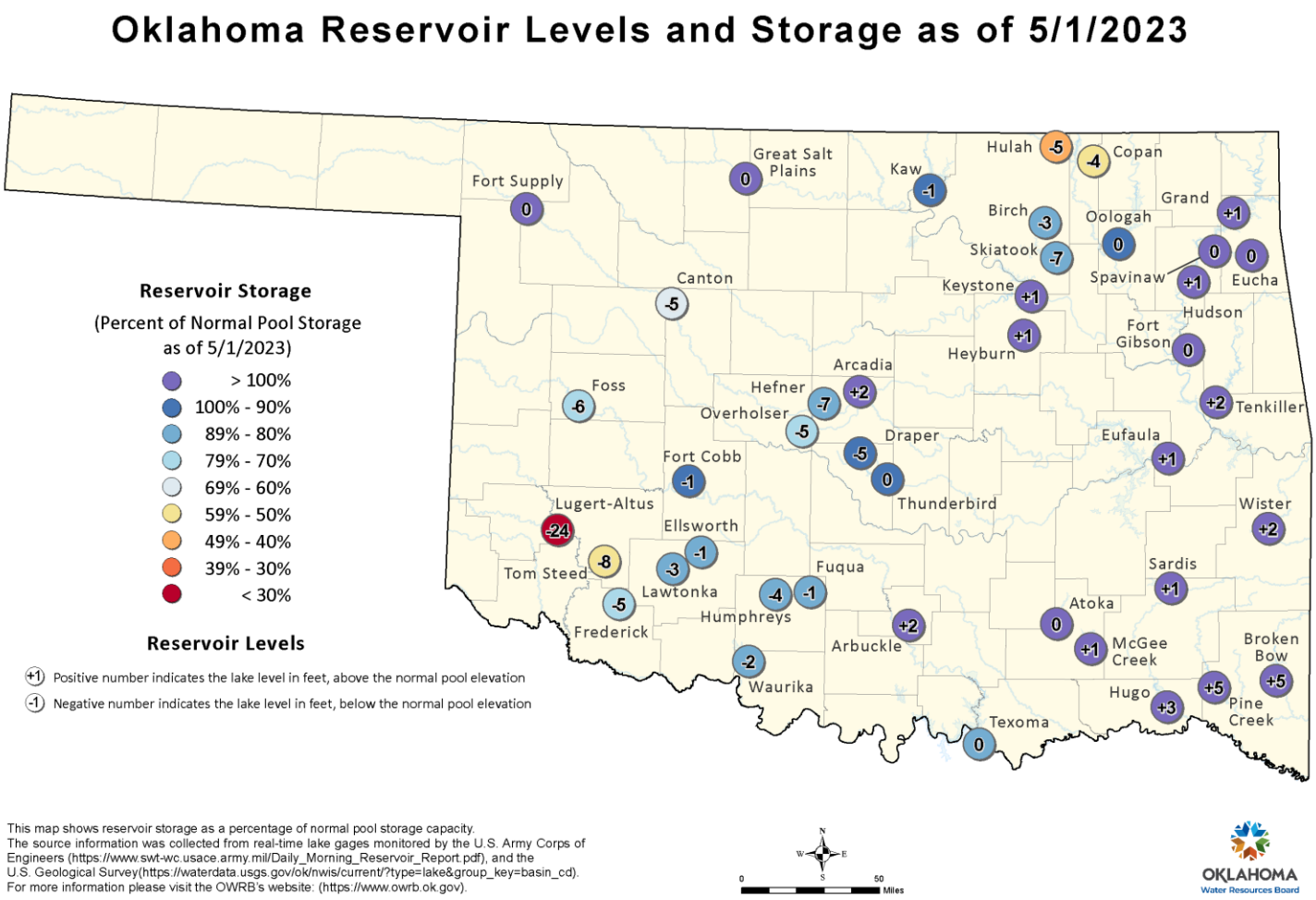
Reservoirs



According to the USACE, a few of the lakes in the HSA were below 3% of top of their conservation pools as of 05/01/2023: Beaver Lake 69%, Hulah Lake 40%, Copan Lake 54%, Skiatook Lake 79%, and Birch Lake 80%. Several lakes were above 3% of the top of their conservation pools: Wister Lake 8%, Sardis Lake 8%, Eufaula Lake 6%, Hudson Lake 6%, Grand Lake 4%, Tenkiller Lake 4%, and Hugo Lake 4%.

Drought

According to the U.S. Drought Monitor (USDM) from May 2, 2023 (Figs. 2, 3), Exceptional (D4) Drought conditions persisted across portions of eastern Kay and Osage Counties in eastern OK. Extreme (D3) Drought conditions were occurring in portions of eastern Kay, Osage, Pawnee, Washington, and Nowata Counties in eastern Oklahoma. Severe (D2) Drought conditions exist in portions of Craig, Nowata, Washington, Osage, and Pawnee Counties in eastern Oklahoma. Moderate (D1) Drought conditions were present in portions of Ottawa, Craig, Nowata, Washington, Osage, Pawnee, and Creek Counties in eastern OK. Abnormally Dry (D0) but not in drought conditions were occurring in Ottawa, Craig, Nowata, Washington, Rogers, Tulsa, Osage, Pawnee, and Creek Counties in eastern OK. No drought conditions were present in northwest AR.

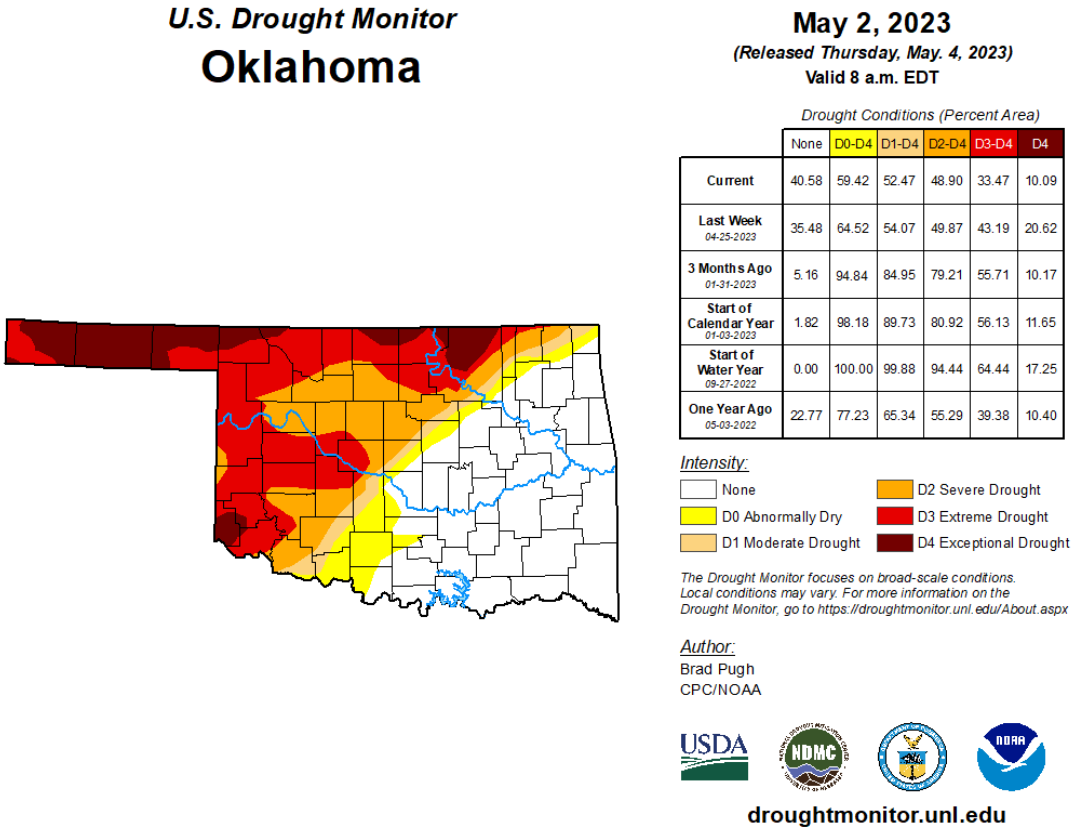


Fig. 2. Drought Monitor for Oklahoma

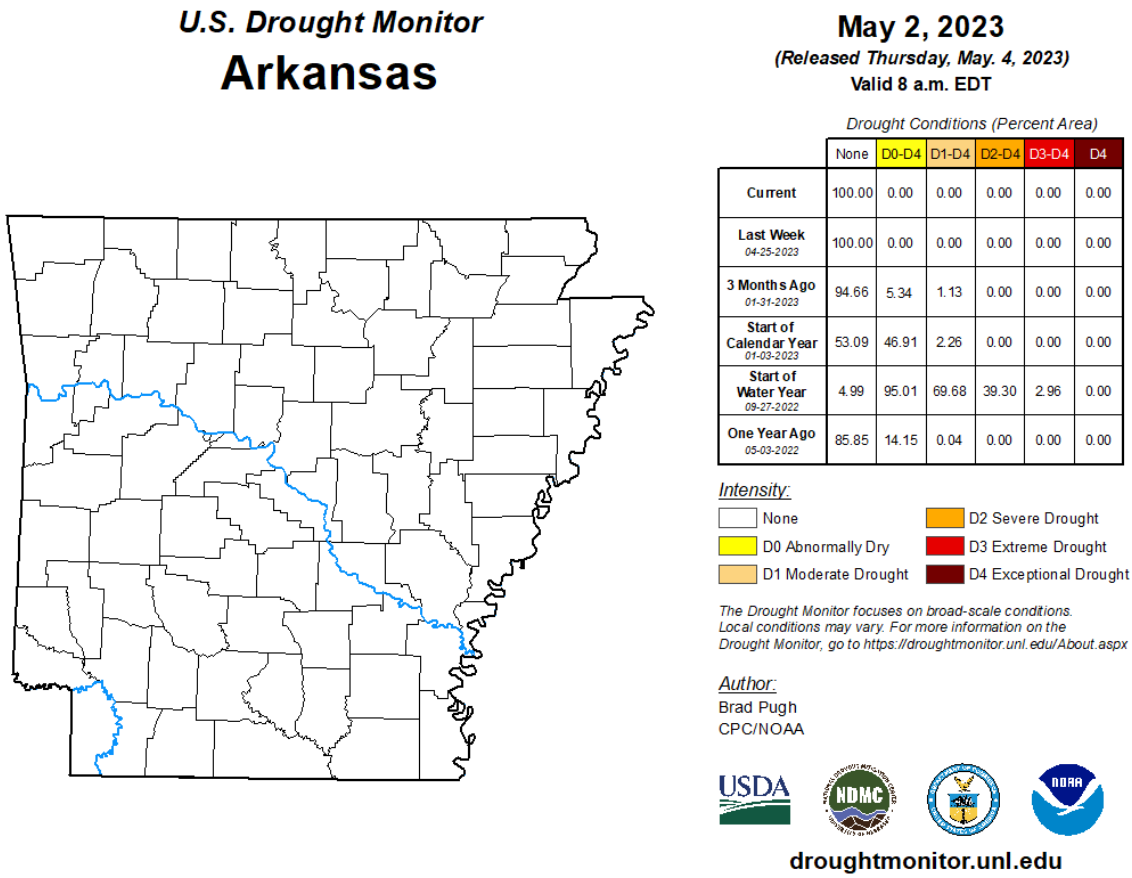


Fig. 3. Drought Monitor for Arkansas

Outlooks

The Climate Prediction Center (CPC) outlook for May 2023 (issued April 30, 2023) indicates an equal chance for above, near, and below normal temperatures across all of eastern OK and northwest AR. This outlook also calls for an enhanced chance for above normal precipitation across southeast OK, with an equal chance for above, near, and below median precipitation across the remainder of eastern OK and northwest AR. This outlook was largely based on dynamical model output, soil moisture, waning residual atmospheric La Niña influence, and Madden-Julian Oscillation (MJO) influence.

For the 3-month period May-June-July 2023, CPC is forecasting an enhanced chance for above normal temperatures and an equal chance for above, near, and below median precipitation across eastern OK and northwest AR (outlook issued April 20, 2023). This outlook is based on long-term trends, ENSO state, soil moisture, and incorporates both statistical and dynamical forecast tools. According to CPC, ENSO-neutral conditions are present in the equatorial Pacific Ocean. There is a 62% chance of El Niño developing during May-July and a greater than 80% chance of El Niño by this fall. Therefore, CPC has issued an El Niño Watch.

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

There was a brief EF-0 tornado near Weathers, AR on the morning of the 5th as an upper low tracked across the forecast area and cooler air aloft acted to modestly increase the elevated instability toward sunrise (see https://arcg.is/8jKjj for details).

A cold front moved southeast across eastern OK and northwest AR on the 20th. By noon, thunderstorms began to develop along the front from southeast OK into northwest AR. Scattered showers and thunderstorms continued through the afternoon and evening hours before shifting east of the area by midnight. Rainfall totals ranged from around 0.10” to near 3” (Fig. 4).

An unsettled weather pattern developed on the 25th and continued through the 27th. Multiple rounds of showers and thunderstorms impacted eastern OK and northwest AR during this time. Isentropic lift strengthened and a mid-level shortwave moved through the region, resulting in widely scattered showers and isolated thunderstorms during the morning hours of the 25th. The showers and thunderstorms became more widespread from north central OK into west central AR during the afternoon. By midnight, the more widespread shower and thunderstorm activity had shifted further south across southeast OK. This activity continued through the overnight hours, becoming widely scattered around sunrise. At 7am, rainfall totals were around 0.10” to around 1.75” across eastern OK and northwest AR (Figs. 5, 6). Just as the rain was moving out of southeast OK mid-morning of the 26th, the next round of widespread showers and thunderstorms over central OK moved east into eastern OK as a mid-level low over southern CO shifted into the TX panhandle. This created diffluent flow aloft, enhancing the ongoing isentropic lift. The large band of showers and thunderstorms continued to move east across eastern OK and western Arkansas through the remainder of the morning and afternoon hours before moving east of the area by early evening. Shortly after midnight of the 27th, convection developed again along and northwest of I-44 in northeast OK in response to the low over central OK. As this low shifted into east central OK, the shower and thunderstorm activity also shifted east across northeast OK and northwest AR through the morning hours, finally exiting the area shortly after noon. Rainfall totals ranged from 0.50” to 1.5” across all of eastern OK and northwest AR, with an area of 1.5”-3” from northern Creek County into western Rogers County and included a portion of the Tulsa metro area (Figs. 7, 8).

This rainy period brought a total of 0.50” to 4” to eastern OK and northwest AR, with much of the area receiving a much needed 1”-2” of rain (Fig. 9).

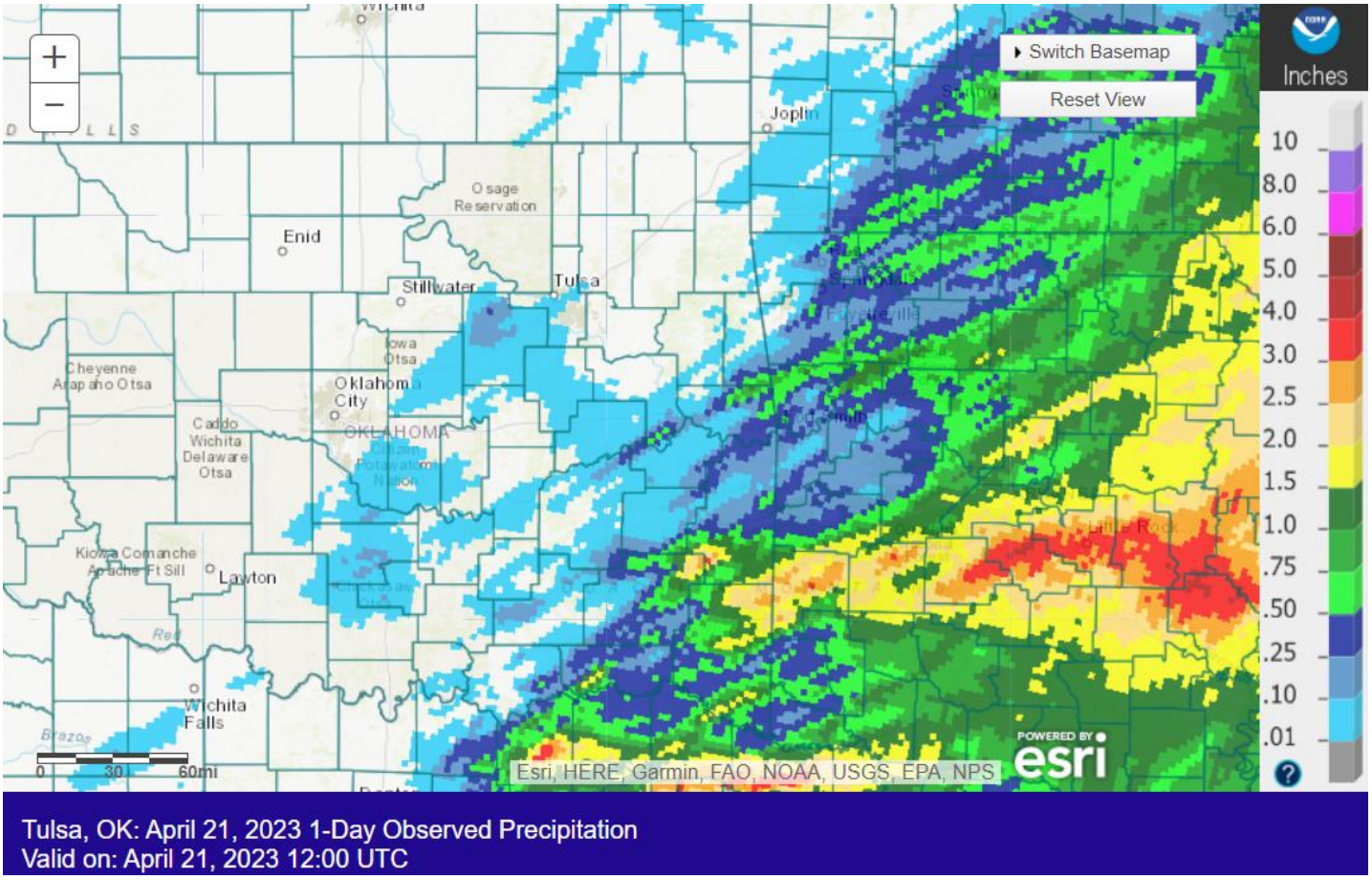


Fig. 4. 24-hour Estimated Observed Rainfall ending at 7am CDT 4/21/2023

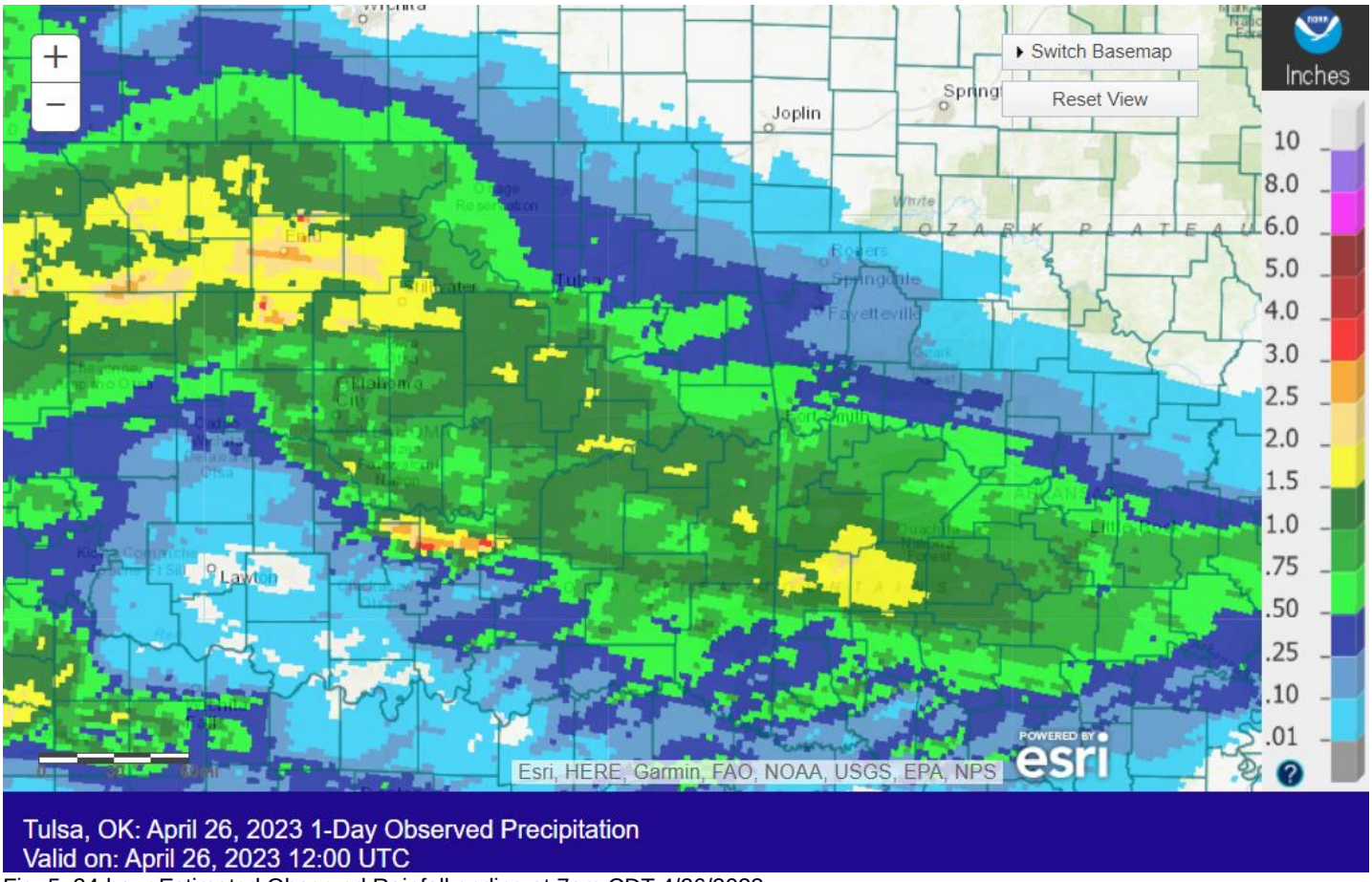


Fig. 5. 24-hour Estimated Observed Rainfall ending at 7am CDT 4/26/2023

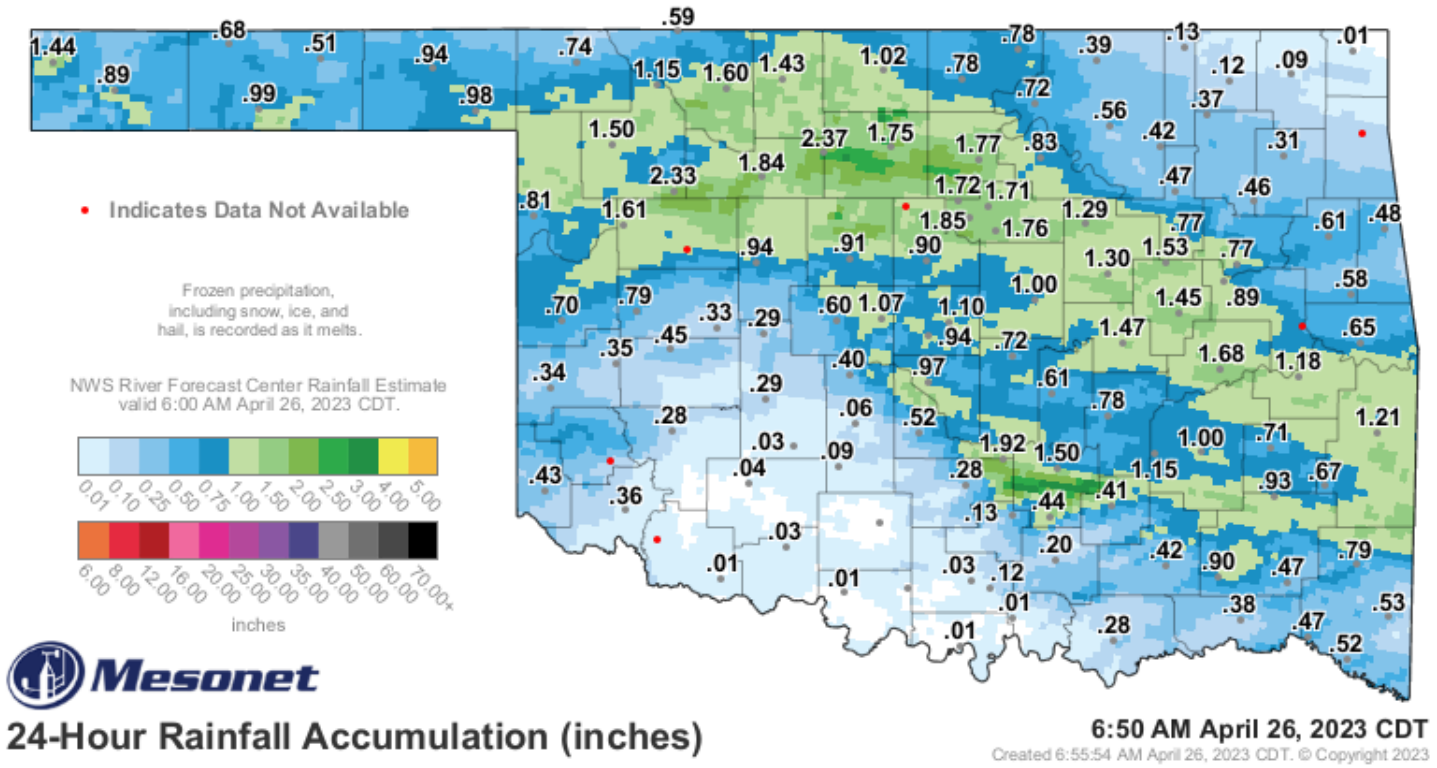


Fig. 6. OK Mesonet (values) and NWS RFC rainfall estimate (image) 24-hour rainfall ending at 6:50 am CDT 4/26/2023.

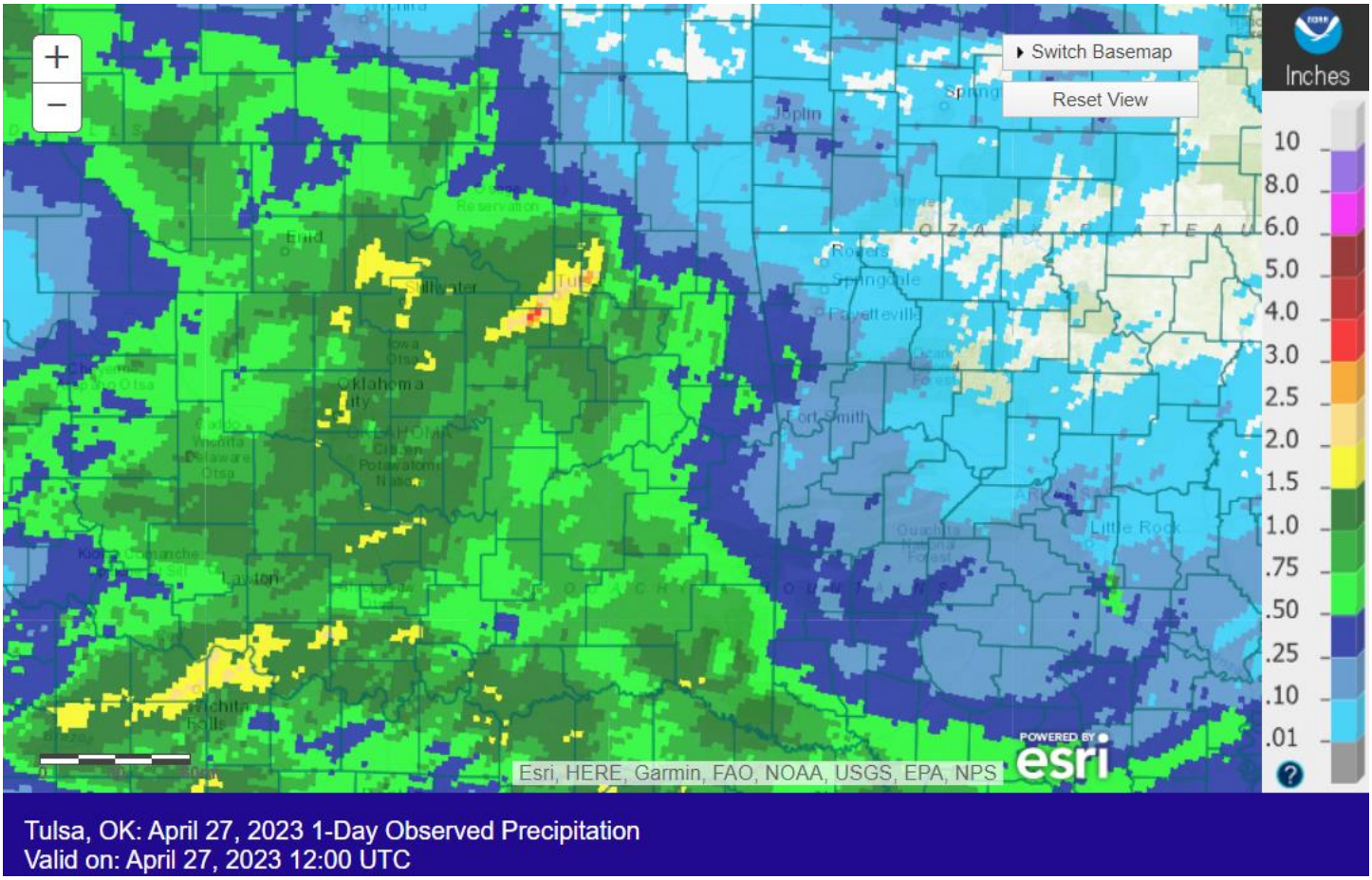


Fig. 7. 24-hour Estimated Observed Rainfall ending at 7am CDT 4/27/2023

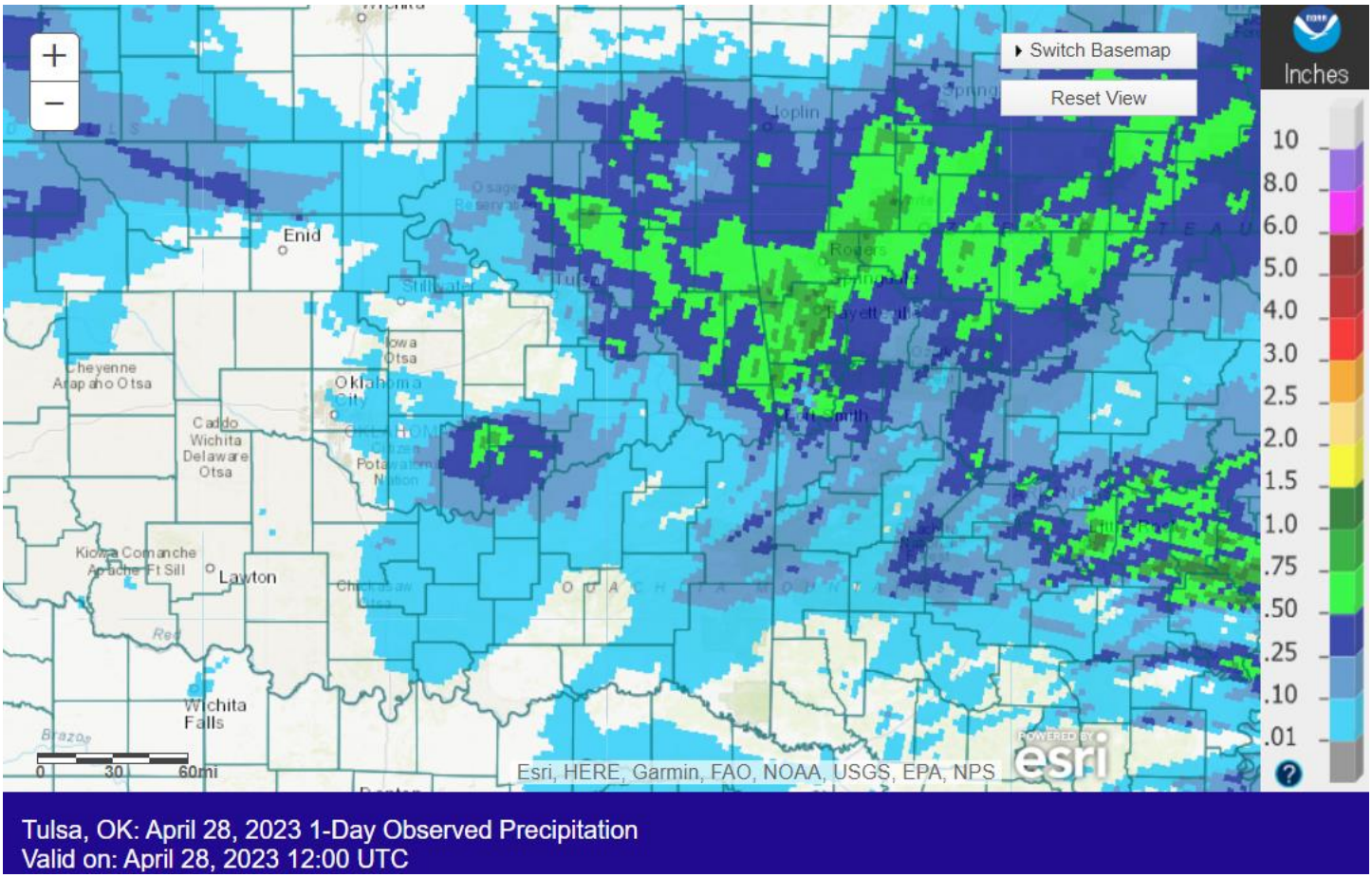


Fig. 8. 24-hour Estimated Observed Rainfall ending at 7am CDT 4/28/2023

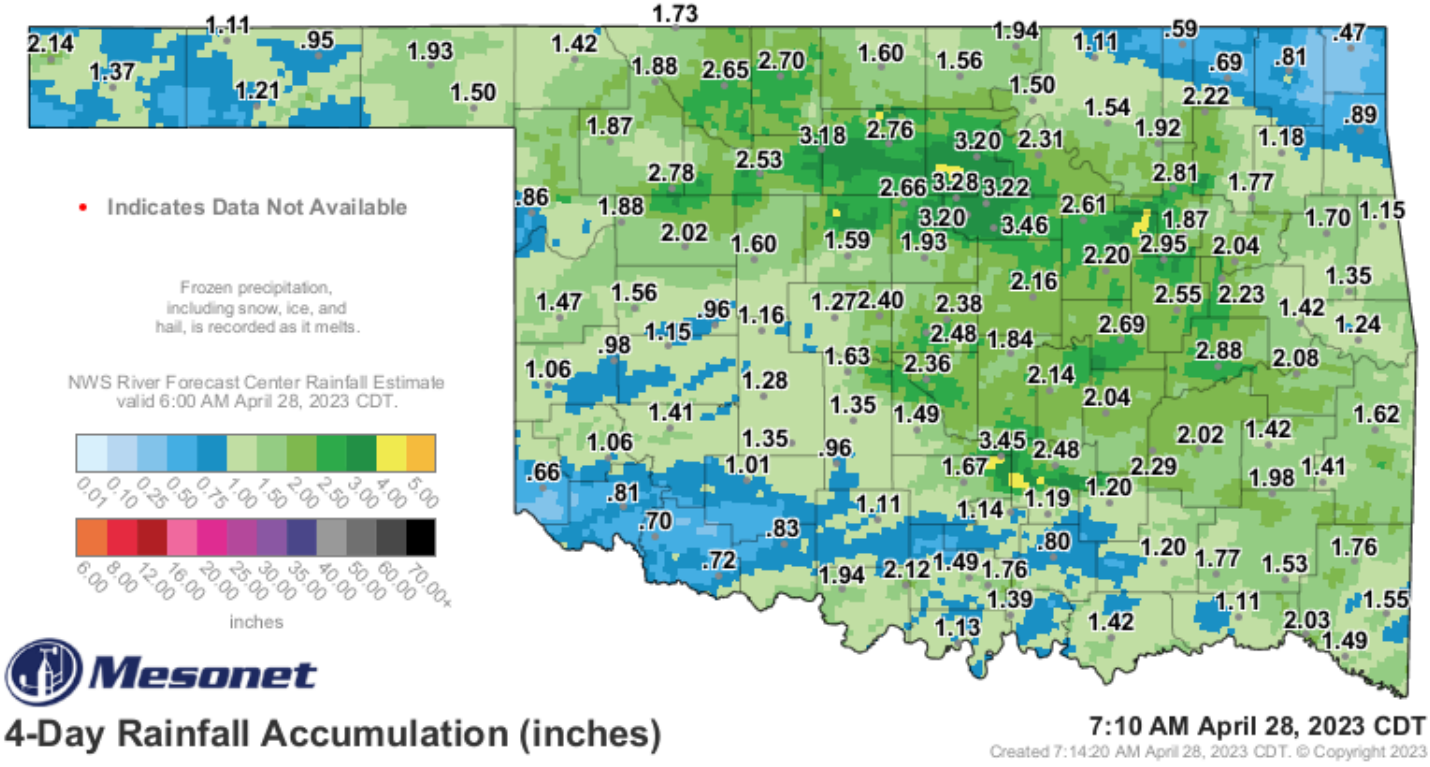


Fig. 9. 4-Day Estimated Observed Rainfall ending at 7:10 am CDT 4/28/2023.

Written by:
Nicole McGavock
Service Hydrologist
WFO Tulsa

Products issued in April 2023:

*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)
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)
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