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
MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS	HYDROLOGIC SERVICE AREA (HSA): **Tulsa, Oklahoma (TSA)** REPORT FOR: MONTH **October** 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 **November 4, 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)

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

Exceptional to moderate drought continued through October, though a few heavy rain events helped to improve the dryness across the eastern portion of the HSA. Normal rainfall for October ranges from 2.9 inches in Pawnee County to 4.4 inches in Sequoyah County. 3.7 inches is normal across the Ozark region of northwest Arkansas. West central Arkansas averages just under 4 inches, while southeast Oklahoma averages slightly higher amounts of 4.5 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.

Monthly Summary

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 1a), rainfall totals for October 2022 ranged from 1" to 8" across eastern OK and northwest AR, with much of the area receiving 2"-5". These rainfall totals correspond to 75% to 200% of the normal October rainfall along and southeast of a McAlester, OK to Rogers, AR line, and 25% to 90% for the remainder of eastern OK (Fig. 1b).

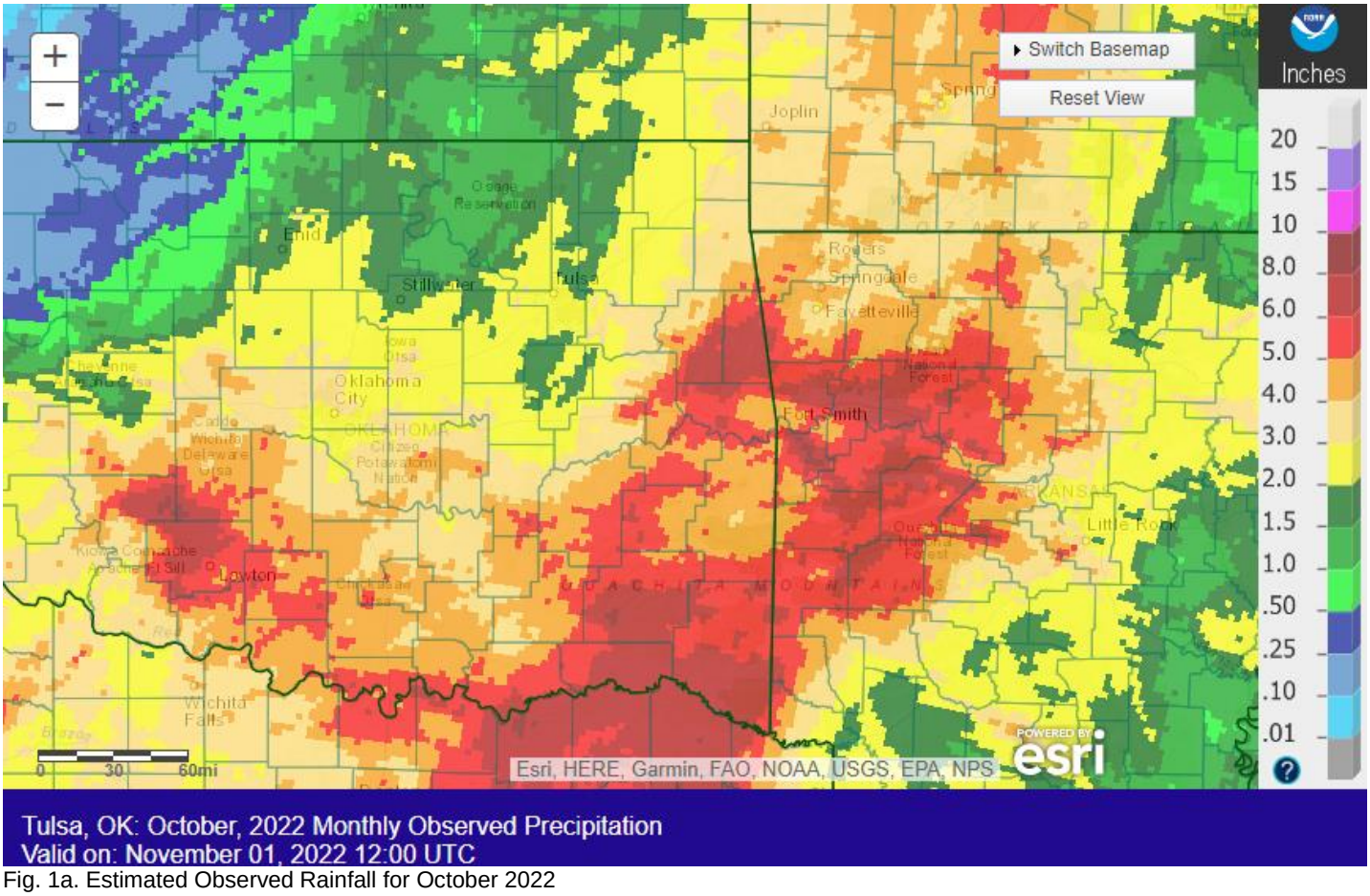


Fig. 1a. Estimated Observed Rainfall for October 2022

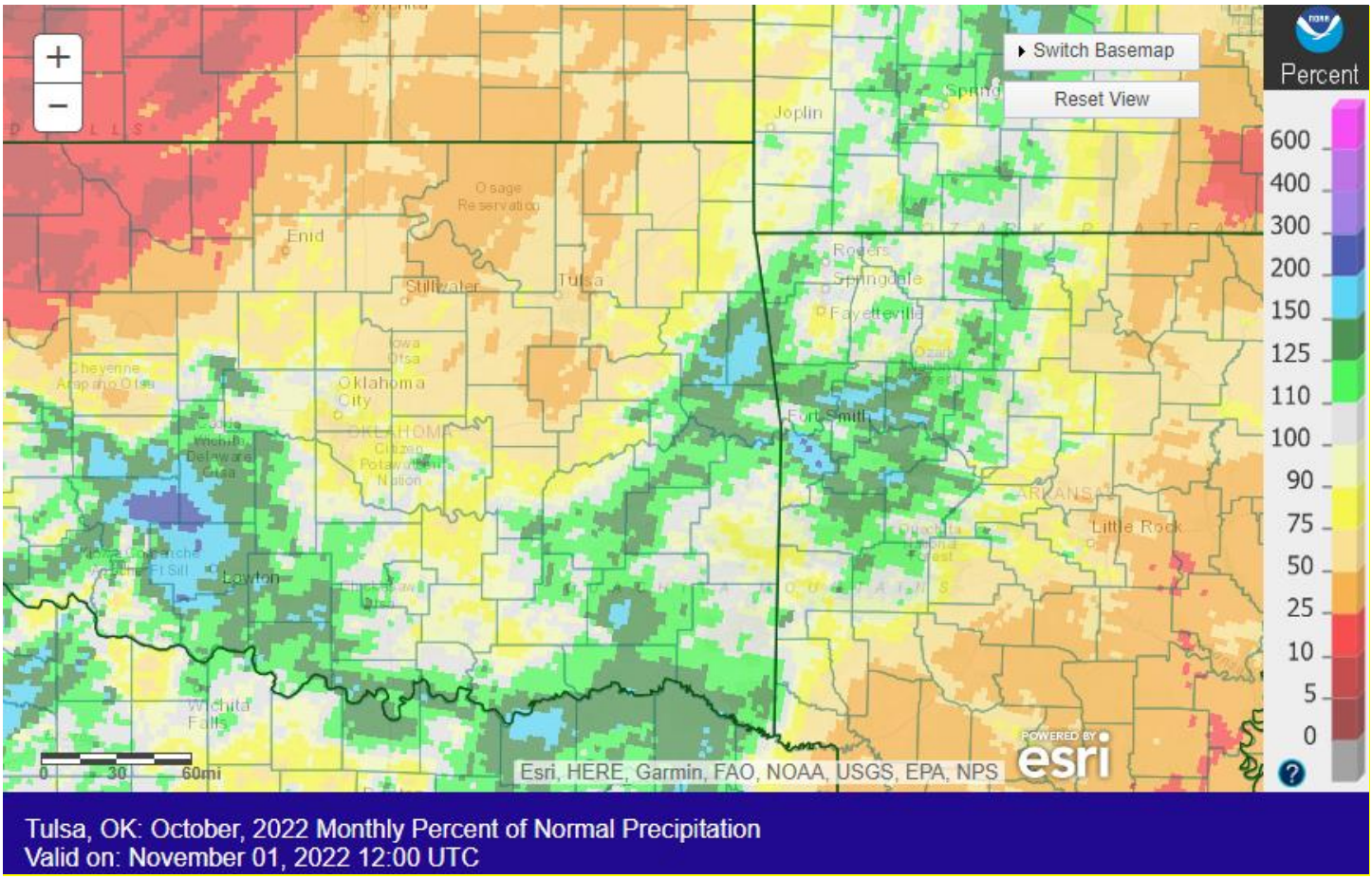


Fig. 1b. Estimated % of Normal Rainfall for October 2022

In Tulsa, OK, October 2022 ranked as the 58th warmest October (62.9°F; since records began in 1905) and the 45th driest October (1.92"; since records began in 1888). Fort Smith, AR had the 49th warmest October (64.2°F; since records began in 1882) and the 21st wettest October (6.28"; since records began in 1882). Fayetteville, AR had the 26th warmest (59.5°F) and the 33rd driest (3.21", tied 2006, 1960) October since records began in 1949.

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

Cookson, OK (meso)	6.98	Hugo, OK (meso)	6.73	Hugo 1.9ENE, OK (coco)	6.50
Bunch 0.8N, OK (coco)	6.46	Greenwood 0.9S, AR (coco)	6.46	Cloudy, OK (meso)	6.40
Antlers 6.3SE, OK (coco)	6.29	Fort Smith, AR (ASOS)	6.28	Mountainburg 2NE, AR (coop)	6.20

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

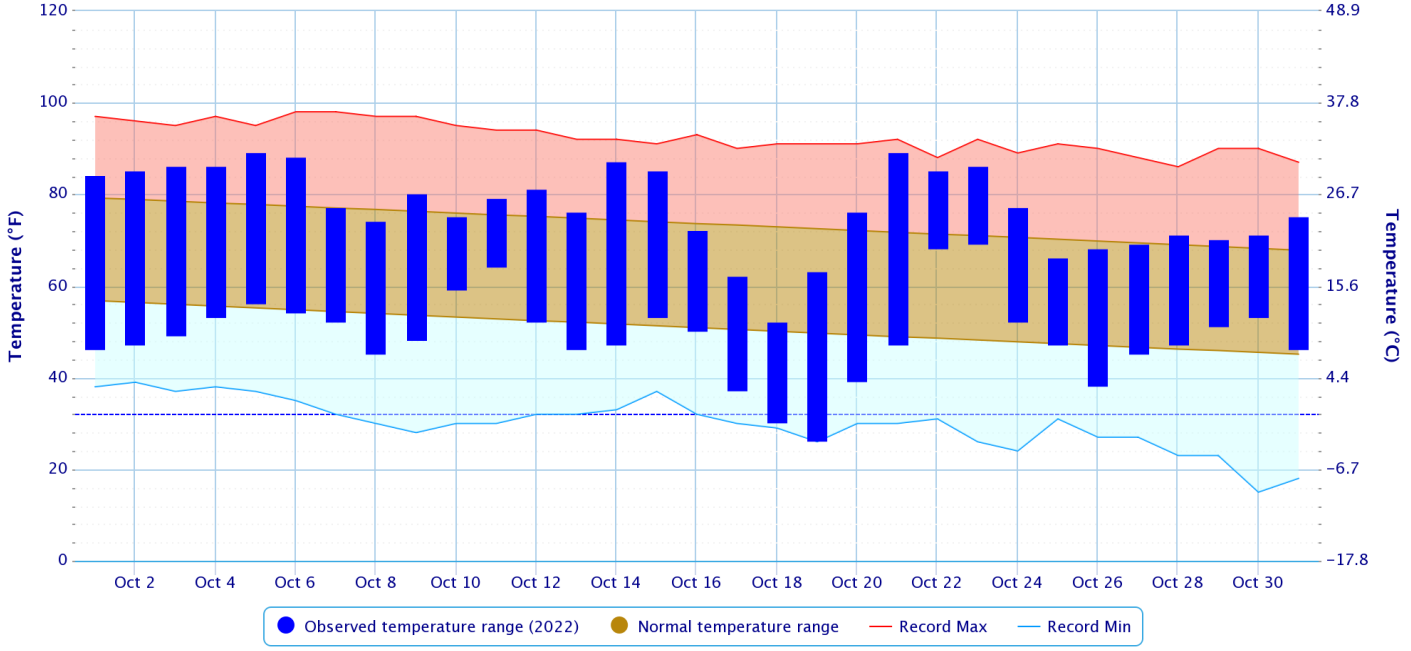
Pawnee, OK (meso)	1.17	Foraker, OK (meso)	1.41	Burbank, OK (meso)	1.41
Talala, OK (meso)	1.58	Hectorville, OK (meso)	1.65	Bartlesville, OK (coop)	1.64
Bartlesville, OK (ASOS)	1.71	Wynona, OK (meso)	1.83	Nowata, OK (meso)	1.90

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

Rank since 1921	October 2022	Autumn-to-Date (Sep 1 – Oct 31)	Last 90 Days (Aug 3 – Oct 31)	Last 120 Days (Ju1 4 – Oct 31)	Last 180 Days (May 5 – Oct 31)	Year-to-Date (Jan 1 – Oct 31)	Last 35 Days (Nov 1, 2021 – Oct 31, 2022)
Northeast OK	34th driest	**10th driest**	**5th driest**	**7th driest**	11th driest	15th driest	12th driest
East Central OK	44th wettest	19th driest	18th driest	18th driest	27th driest	46th driest	44th driest
Southeast OK	28th driest	33rd driest	37th driest	23rd driest	12th driest	26th driest	17th driest
Statewide	50th wettest	15th driest	12th driest	12th driest	16th driest	16th driest	11th driest

Daily Temperature Data – Tulsa Area, OK (ThreadEx)

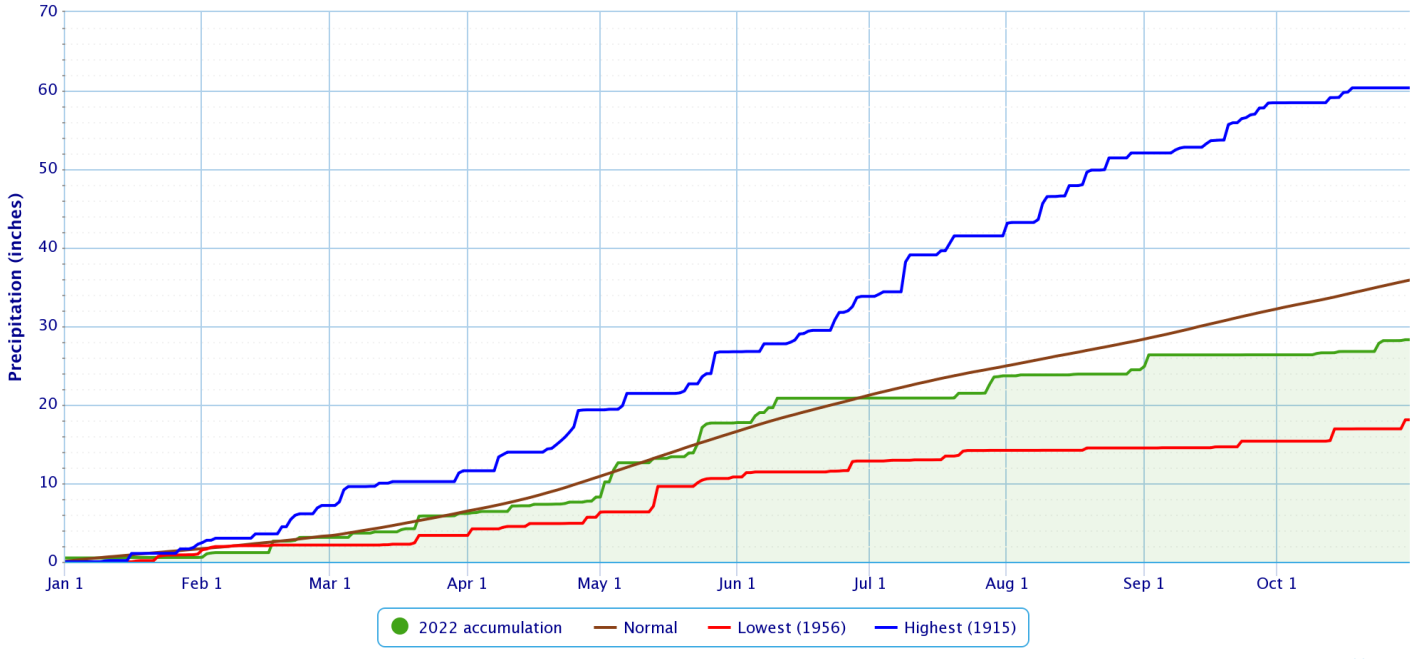
Period of Record – 1905-01-06 to 2022-10-31. Normals period: 1991-2020. Click and drag to zoom chart.



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



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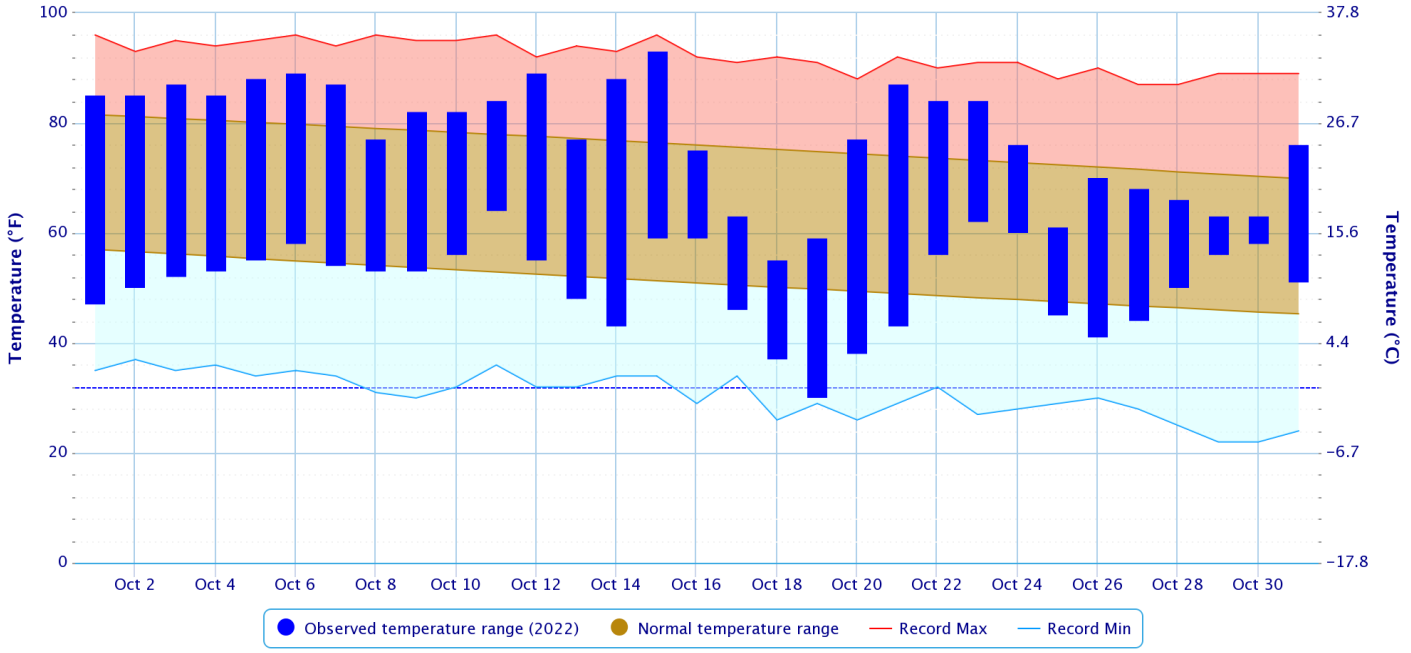
Daily Temperature Data – Fort Smith Area, AR (ThreadEx)

Period of Record – 1882-06-01 to 2022-10-31. Normals period: 1991-2020. Click and drag to zoom chart.



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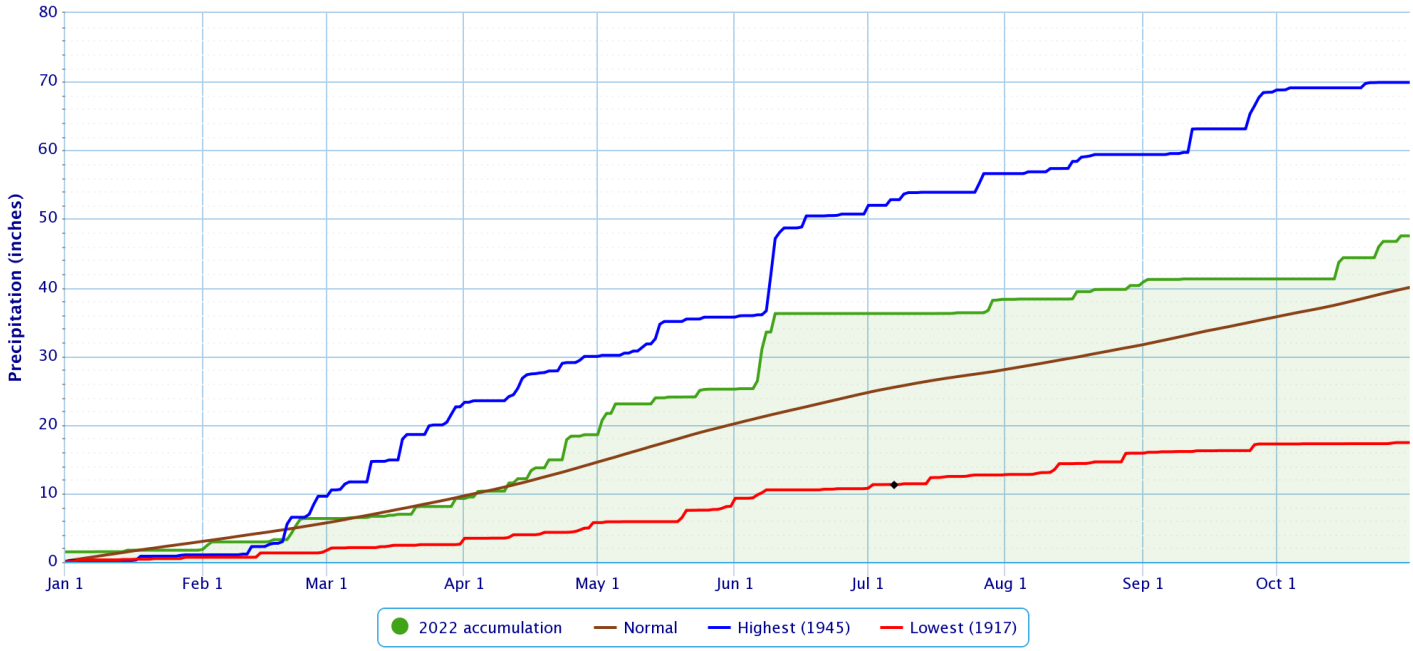
Accumulated Precipitation – Fort Smith Area, AR (ThreadEx)

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



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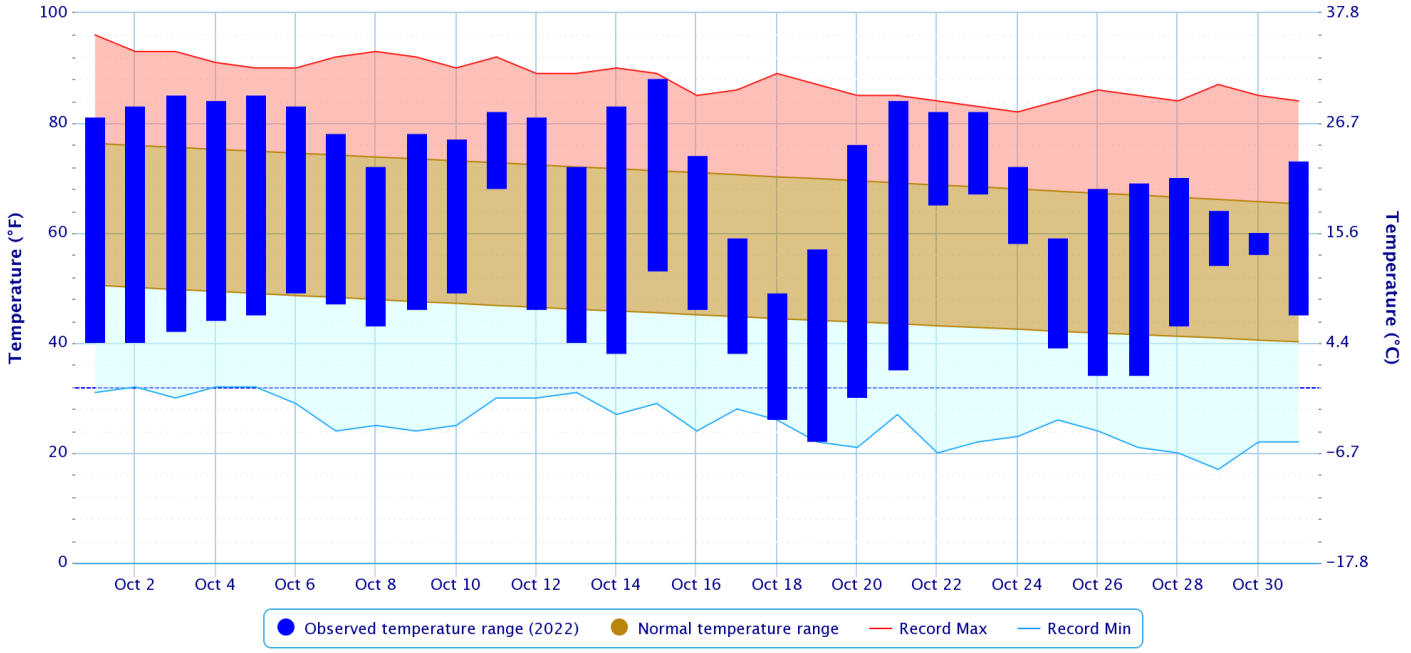
Daily Temperature Data – FAYETTEVILLE DRAKE FIELD, AR

Period of Record – 1949-07-14 to 2022-10-31. Normals period: 1991-2020. Click and drag to zoom chart.



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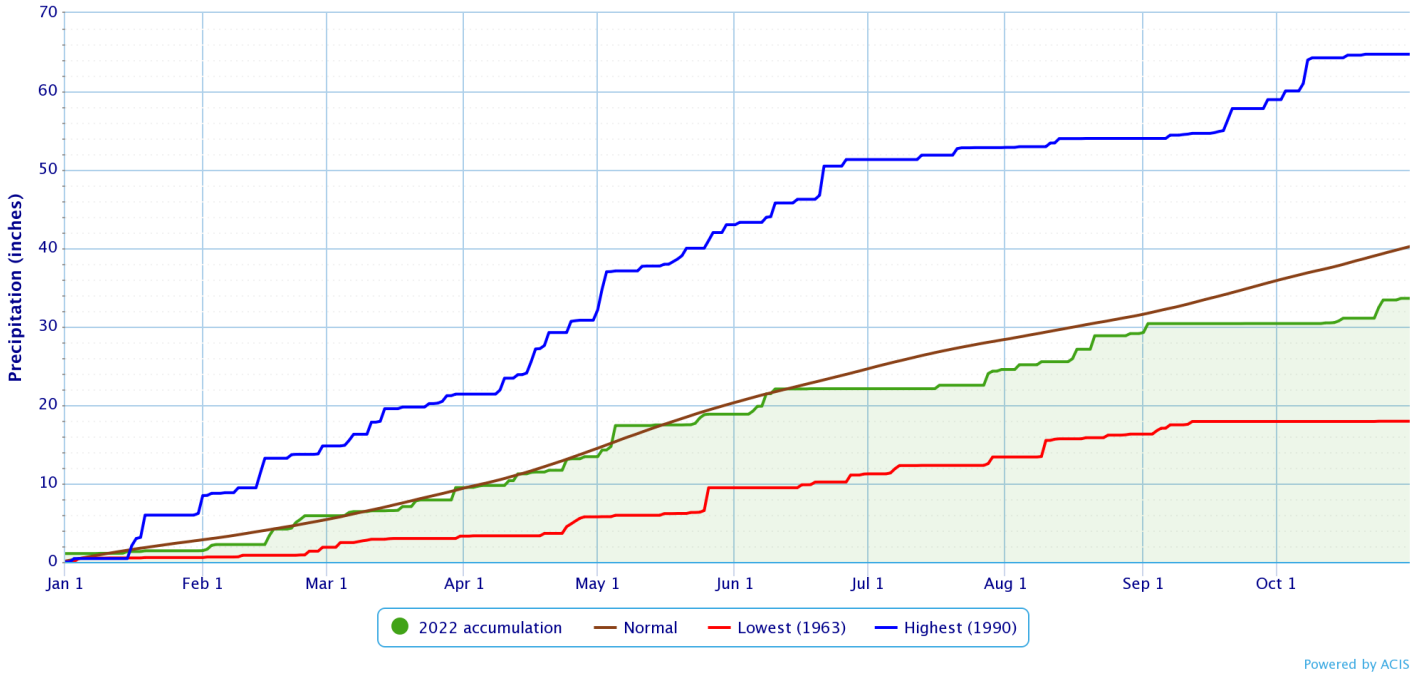
Accumulated Precipitation – FAYETTEVILLE DRAKE FIELD, AR

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



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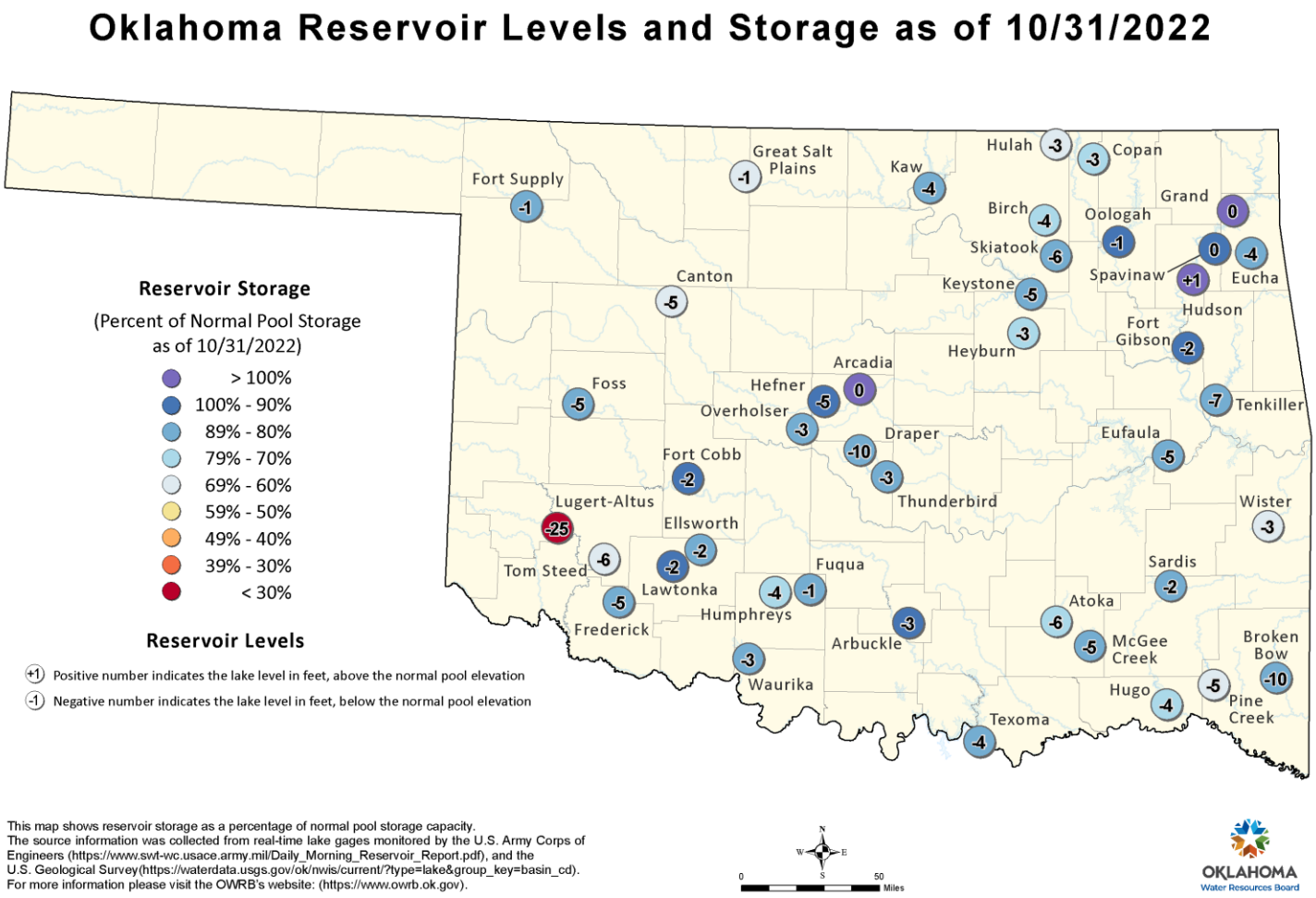
Reservoirs



According to the USACE, most of the lakes in the HSA were below 3% of top of their conservation pools as of 11/01/2022: Ft. Gibson Lake 32%, Heyburn Lake 50%, Hulah Lake 60%, Hugo Lake 64%, Wister Lake 64%, Keystone Lake 67%, Eufaula Lake 67%, Copan Lake 70%, Birch Lake 71%, Tenkiller 77%, Skiatook Lake 81%, Kaw Lake 83%, Beaver Lake 87%, Sardis Lake 90%, and Oologah Lake 93%. 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 November 1, 2022 (Figs. 2, 3), drought conditions were impacting the entire HSA. Exceptional (D4) Drought conditions had developed across portions of eastern Kay, Osage, Washington, Nowata, Craig, Ottawa, Okfuskee, Okmulgee, McIntosh, Pittsburg, Tulsa, Rogers, Mayes, Cherokee, and Wagoner Counties in eastern OK. Extreme (D3) Drought conditions were occurring in portions of Osage, Pawnee, Craig, Ottawa, Delaware, Mayes, Wagoner, Tulsa, Creek, Okfuskee, Okmulgee, Muskogee, Cherokee, McIntosh, Haskell, Latimer, Pushmataha, and Pittsburg Counties in eastern Oklahoma. Severe (D2) Drought conditions exist in portions of Muskogee, Cherokee, Delaware, Ottawa, Sequoyah, Haskell, Latimer, Pushmataha, Choctaw, and Le Flore Counties in eastern Oklahoma, and Sebastian County in northwest Arkansas. Moderate (D1) Drought conditions were present in portions of Delaware, Adair, Cherokee, and Sequoyah Counties in eastern OK and Benton, Washington, Crawford, Sebastian, Franklin, Carroll, and Madison Counties in northwest Arkansas.

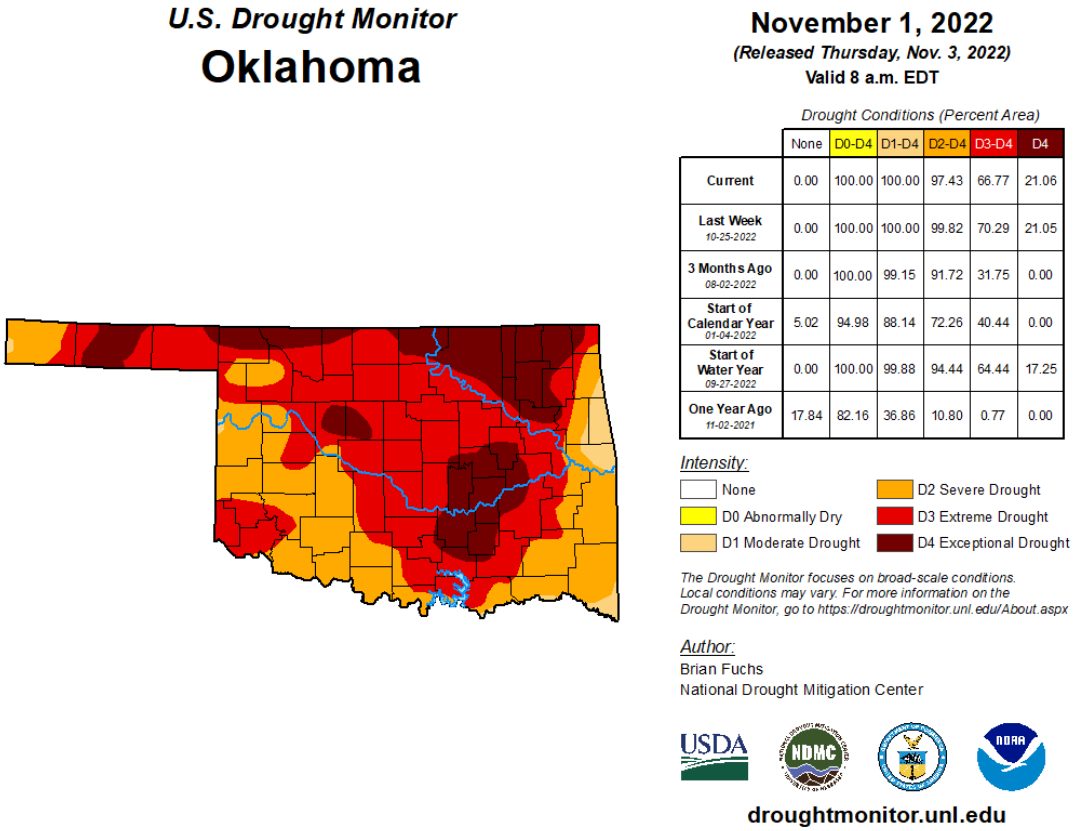


Fig. 2. Drought Monitor for Oklahoma

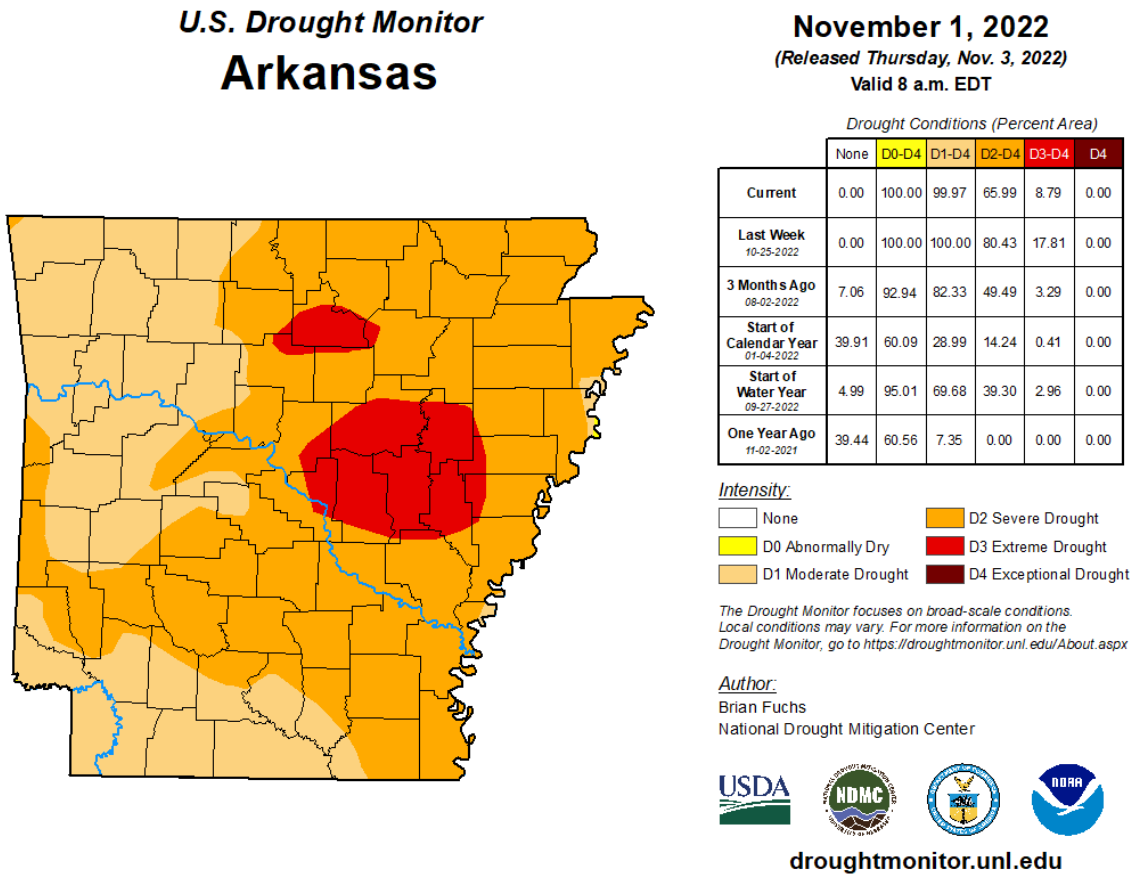


Fig. 3. Drought Monitor for Arkansas

Outlooks

The Climate Prediction Center (CPC) outlook for November 2022 (issued October 31, 2022) indicates an enhanced chance for above normal temperatures and a slightly enhanced chance for above median precipitation 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. A pattern of troughing over the western CONUS and ridging over the eastern CONUS is expected to persist through November. The rainfall forecast for the first week of November prompted the shift in the odds to above normal precipitation for eastern OK and northwest AR.

For the 3-month period November-December-January 2022-23, CPC is forecasting an enhanced chance for above normal temperatures across all of eastern OK and northwest AR. This outlook also indicates an enhanced chance for below median precipitation southwest of a Tulsa to Fort Smith line, with equal chances for above, near, and below median precipitation elsewhere across northeast OK and northwest AR (outlook issued October 20, 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. La Niña conditions are expected to continue through winter 2022-23 (75% chance), decreasing to a 54% chance of ENSO-neutral by early spring. 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

On the afternoon of the 15th, a diffuse front was located from just south of the Tulsa metro area east-northeast into southwest MO. Record and near-record high temperatures in the 90°Fs provided the impetus for thunderstorm initiation southeast of this boundary. Scattered showers and thunderstorms developed during the afternoon hours and continued to impact portions of primarily east central OK and west central AR through the evening. By late evening, a stronger cold front moved into the area from the northwest and interacted with a strong low-level jet, bringing more showers and thunderstorms to eastern OK and northwest AR. The precipitable water (PWAT) values ahead of the front were around two standard deviations above normal, allowing for efficient rain production. The scattered storms eventually developed into a broad line of storms during the night, moving southeastward through the overnight and morning hours. This activity moved southeast of the region by mid-morning of the 16th. Rainfall totals from the two rounds of precipitation ranged from a few hundredths of an inch to near 6", with much of west central AR receiving 1.5"-4" of rain (Figs. 4, 5).

During the early morning hours of the 24th, showers and isolated thunderstorms began to move into and overspread eastern OK and northwest AR as a strong upper-level system was moving across the desert southwest. This system was tapping into abundant moisture from the Gulf of Mexico in the lower levels of the atmosphere and from a sub-tropical plume off the Pacific Ocean associated with Hurricane Roslyn in the mid- to upper-levels. This combination resulted in PWAT values of 1.5" to almost 2", which is near the climatological maximum for this time of year, and made for efficient rain production. The showers and isolated thunderstorms continued to expand across the area during the morning and became a broad line of rain focused near a cold front. This band of rain slowly progressed eastward across eastern OK and western AR from the late morning through mid-evening hours. Just as this area of rain was exiting the HSA, another round of showers and isolated thunderstorms began to quickly overspread the area as the anomalously strong upper-level low moved into north TX. Widespread showers and isolated thunderstorms continued during the overnight hours and into the morning of the 25th, and a surface low deepened over western AR. The pressure gradient created strong to damaging non-thunderstorm winds. The final round of rain fell during the morning through early afternoon hours as the main upper-level low passed across the area, with the rain coming to an end from west to east. Nearly all of eastern OK and northwest AR received at least 1" of rain from this event, with widespread 2"-4" across much of eastern OK and northwest AR (Figs. 6-9). A corridor of 4"-5" fell from Latimer County OK into Benton County AR, including the Illinois River and Lee Creek basins. However, due to the extreme drought conditions in place, no river flooding occurred from this rainfall.

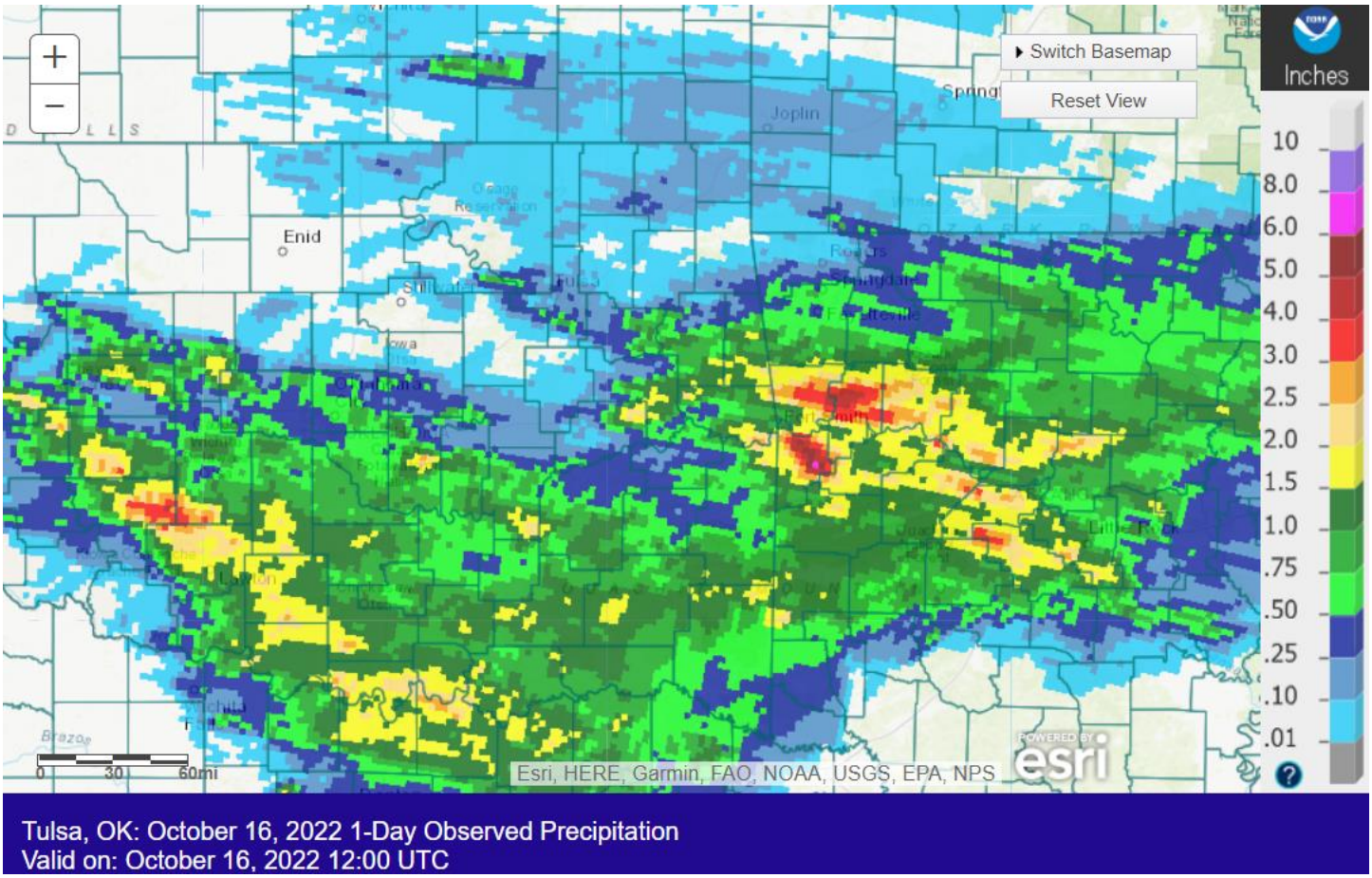


Fig. 4. 24-hour Estimated Observed Rainfall ending at 7am CDT 10/16/2022.

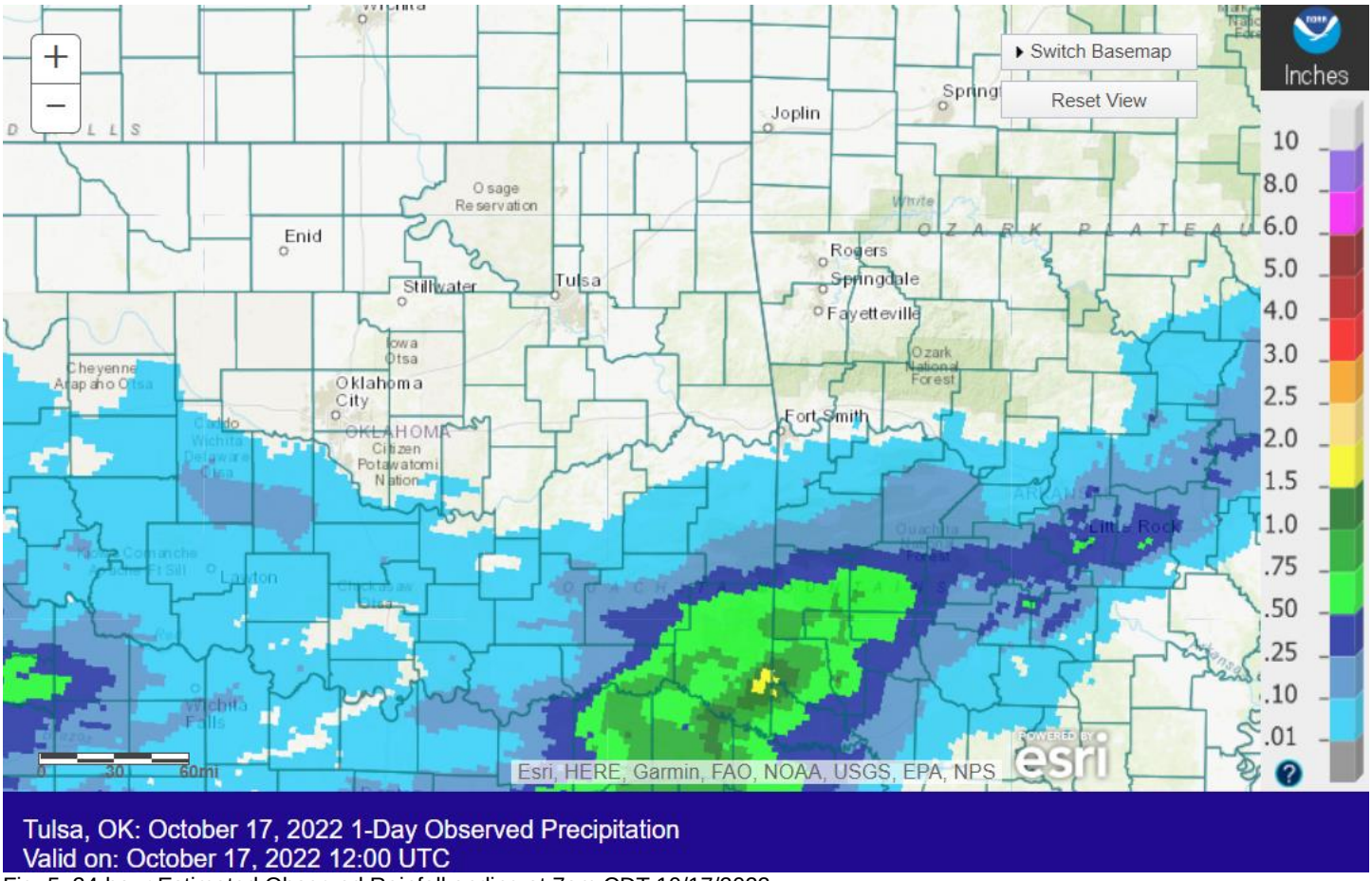


Fig. 5. 24-hour Estimated Observed Rainfall ending at 7am CDT 10/17/2022.

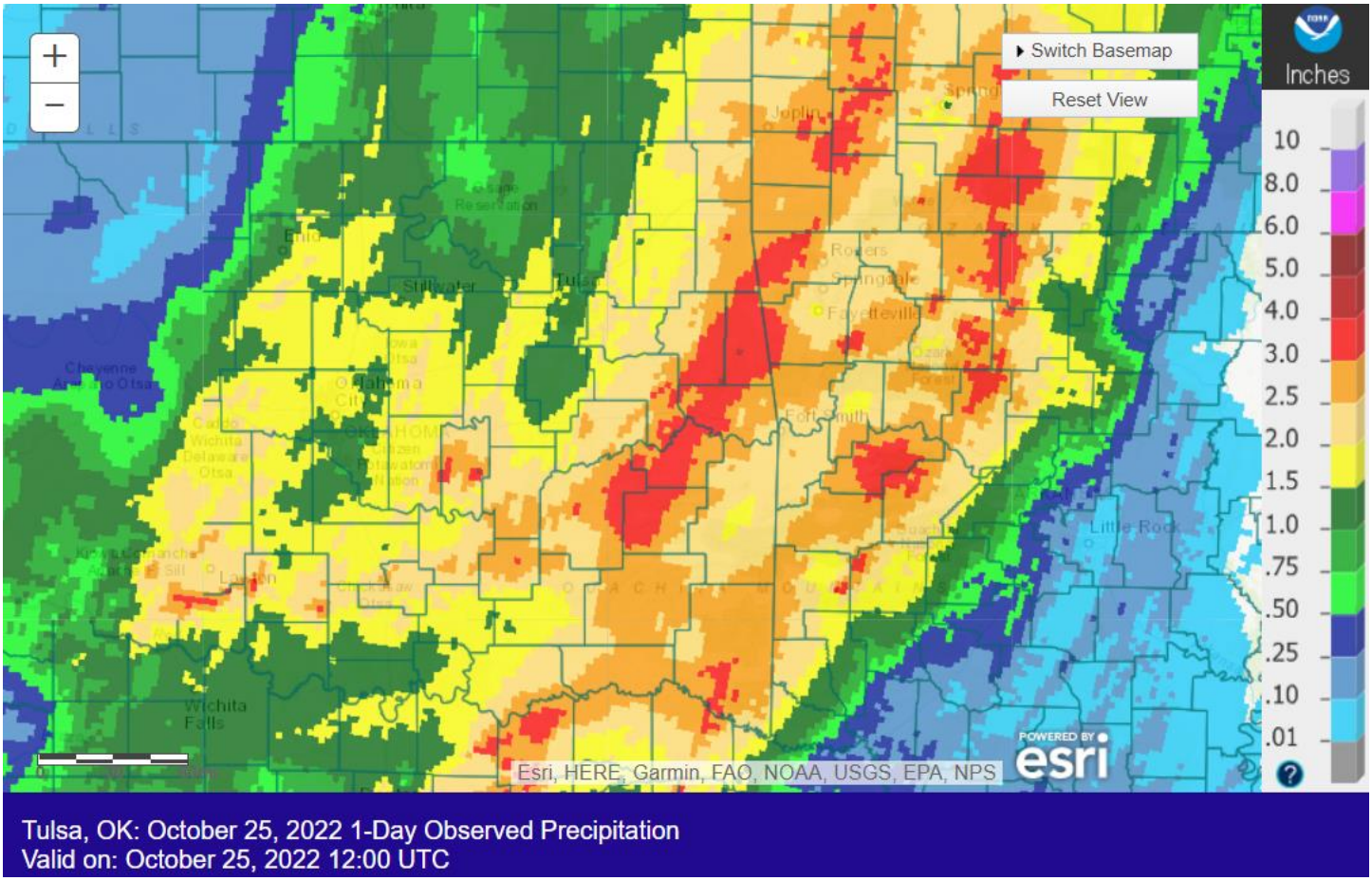


Fig. 6. 24-hour Estimated Observed Rainfall ending at 7am CDT 10/25/2022.

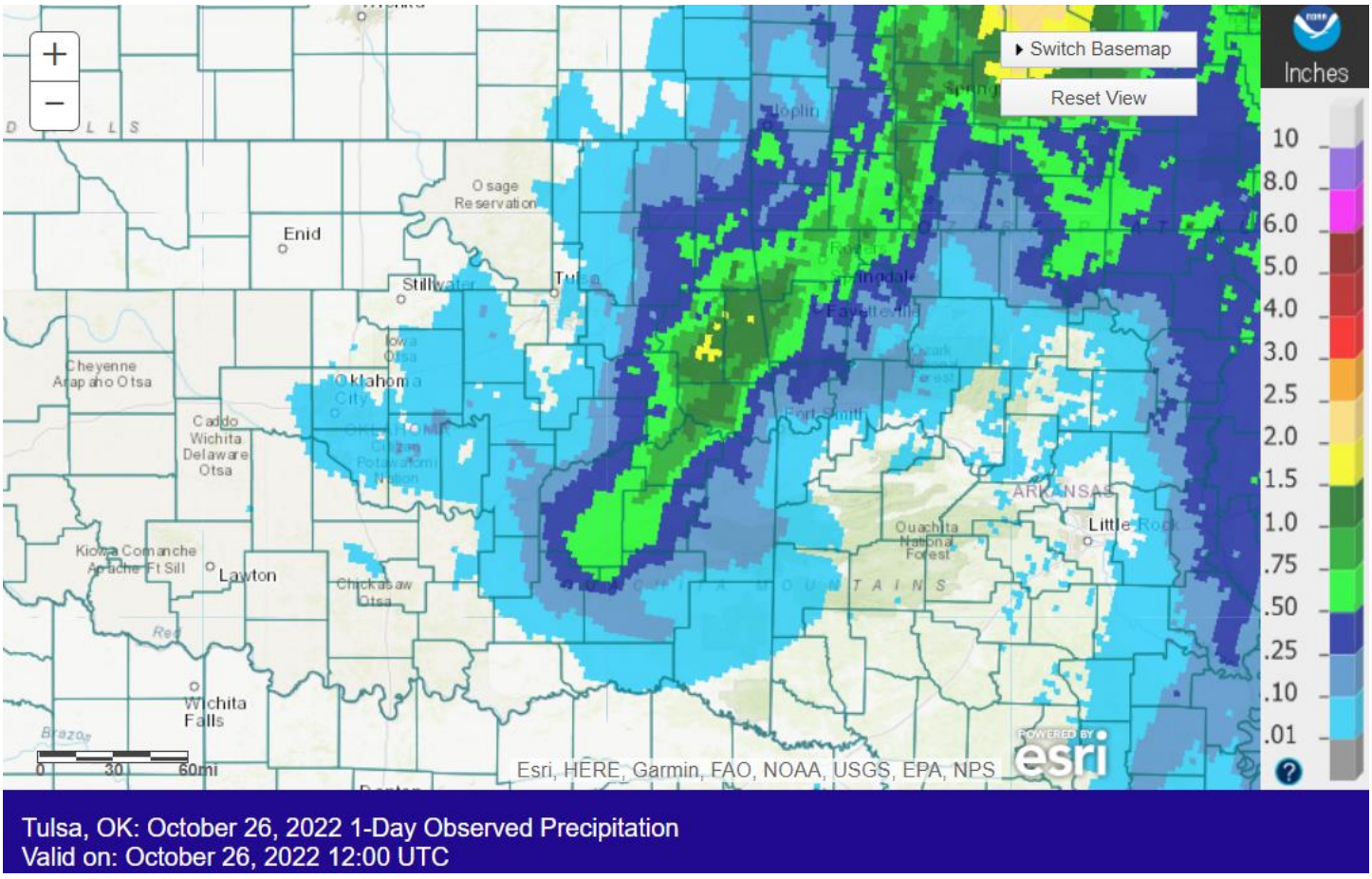


Fig. 7. 24-hour Estimated Observed Rainfall ending at 7am CDT 10/26/2022.

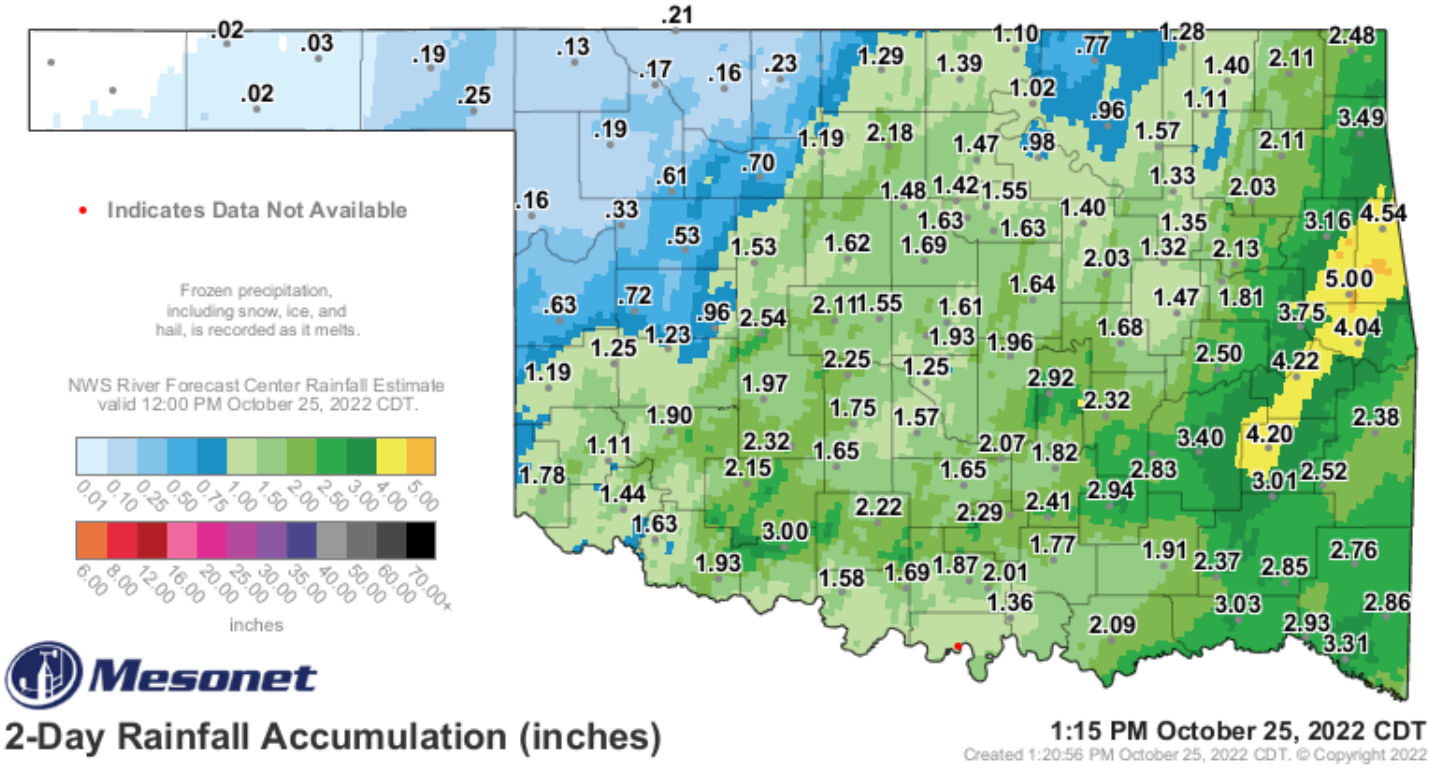


Fig. 8. OK Mesonet (values) and NWS RFC rainfall estimate (image) 48-hour rainfall ending at 1:15 pm CDT 10/25/2022.

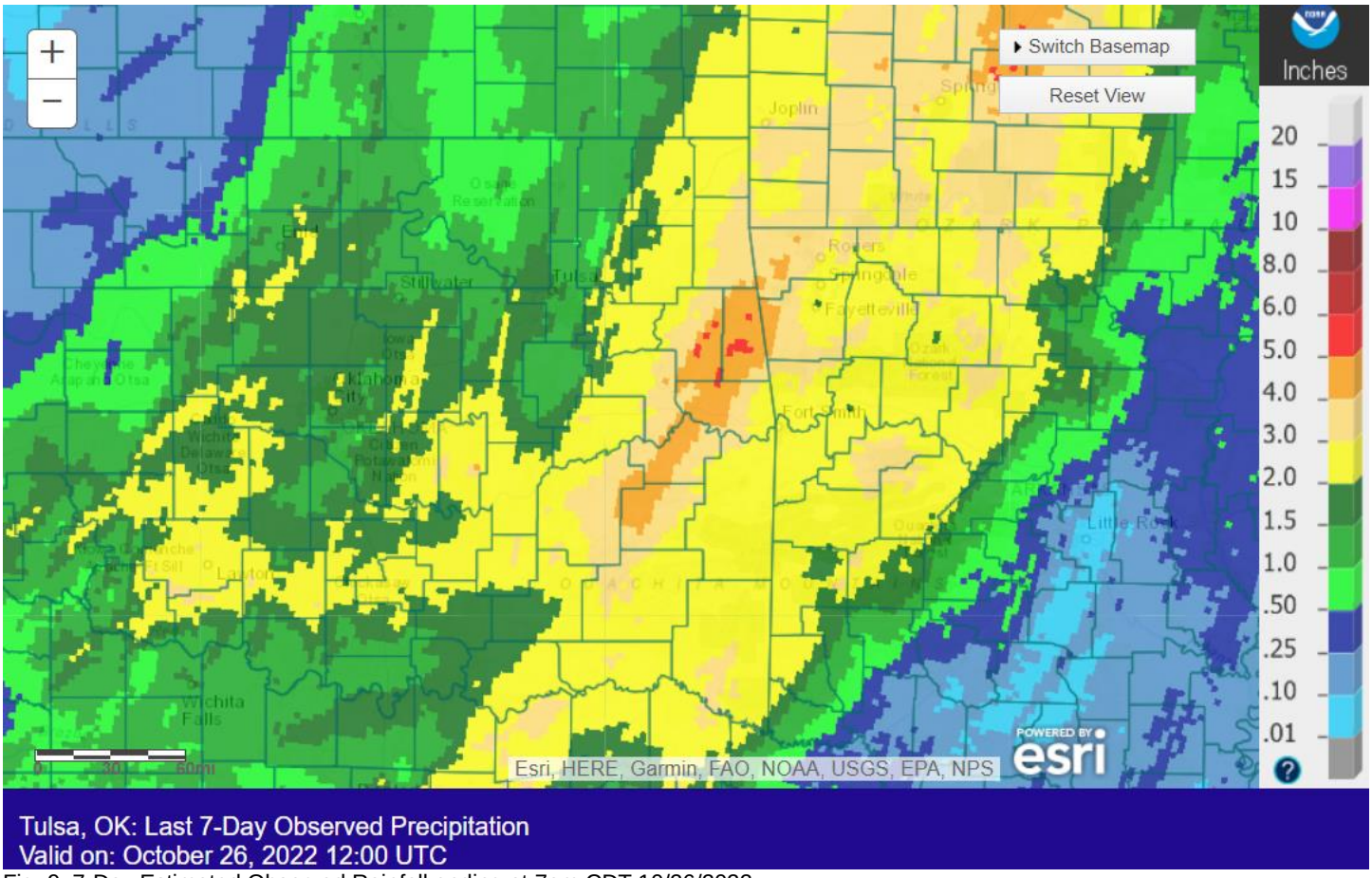


Fig. 9. 7-Day Estimated Observed Rainfall ending at 7am CDT 10/26/2022.

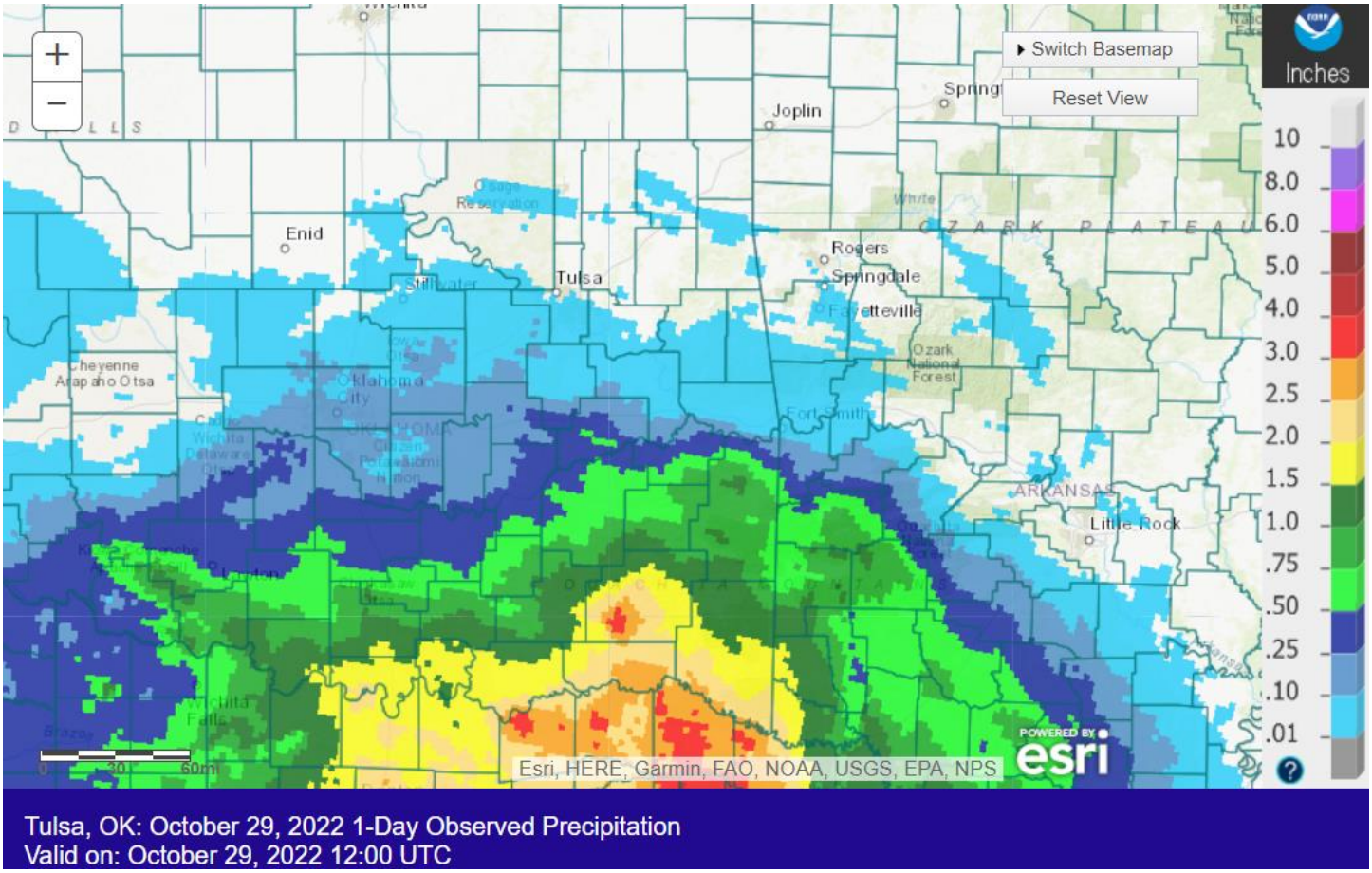


Fig. 10. 24-hour Estimated Observed Rainfall ending at 7am CDT 10/29/2022.

Showers and isolated thunderstorms moved into southeast OK from the west by early afternoon on the 28th as a low-pressure system moved across TX. Widespread rainfall continued through the evening hours. While some scattered showers moved further north into eastern OK and northwest AR, the more intense and persistent showers and thunderstorms remained over southeast OK closer to the center of the low. Widespread rain continued through the overnight hours before dissipating and shifting east of the region by mid-morning on the 29th. Rainfall totals were 0.50" to around 3" across southeast OK south of I-40 (Fig. 10). Some additional wrap-around showers and thunderstorms did linger through the day across northwest AR and far eastern OK.

Written by:

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WFO Tulsa

Products issued in October 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)
2 Flash Flood Statements (FFS)
0 Flash/Areal Flood Watches (FFA) (0 Watch FFA CON/EXT/EXA/EXB/CAN)
5 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