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 **October** YEAR **2015**
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 6, 2015**

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.

October 2015 was another dry month across eastern OK and northwest AR as torrential rains remained south in Texas. 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 http://www.srh.noaa.gov/tsa/?n=hydro-monthly-summary.

Monthly Summary

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 1a), rainfall totals for October 2015 ranged from around 0.50" to near 8". Most of the HSA received 1.5"-3" of rain this October. This corresponds to 25%-75% of the normal October rain across the majority of eastern OK and northwest AR (Fig. 1b). The exception was southern Pittsburg County, where heavy rain yielded 110% to near 200% of the normal October rainfall.

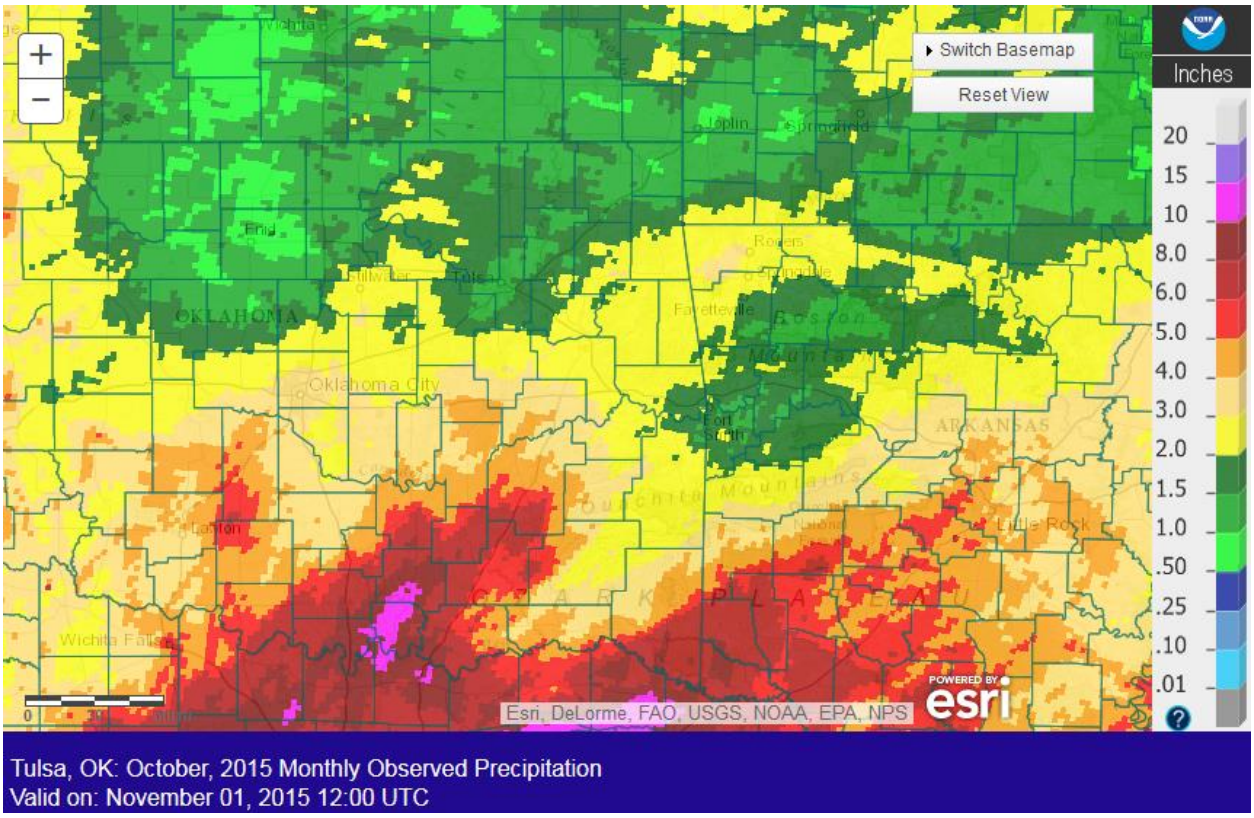


Fig. 1a. Estimated Observed Rainfall for October 2015

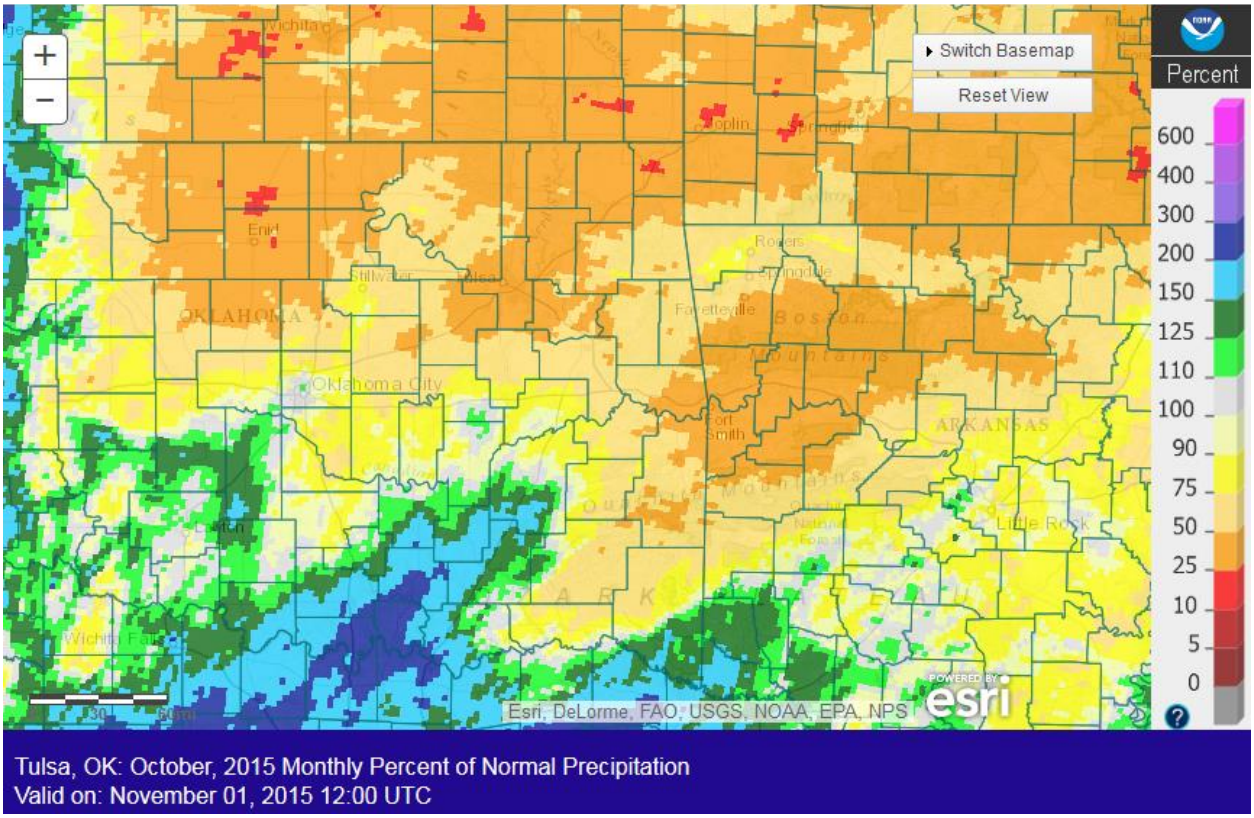


Fig. 1b. Estimated % of Normal Rainfall for October 2015

In Tulsa, OK, October 2015 ranked as the 43rd warmest October (63.4°F, tied 2011, 1982; since records began in 1905) and the 32nd driest October (1.50"; since records began in 1888). Fort Smith, AR had the 30th warmest October (65.5°F; since records began in 1882) and the 36th driest October (1.52"; since records began in 1882). Fayetteville, AR had the 25th warmest (59.2°F, tied 2003) and the 17th driest (1.90") October since records began in 1949.

Some of the larger precipitation reports (in inches) for October 2015 included:

McAlester, OK (meso)	4.70	Hartshorne 3.9NNE, OK (coco)	4.53	Eufaula, OK (meso)	4.18
Hugo, OK (meso)	4.05	Wilburton, OK (meso)	4.02	Clayton, OK (meso)	4.00
Krebs 0.3WNW, OK (coco)	3.96	McAlester, OK (ASOS)	3.87	Wilburton 9.4N, OK (coco)	3.75

Some of the lowest precipitation reports (in inches) for October 2015 included:

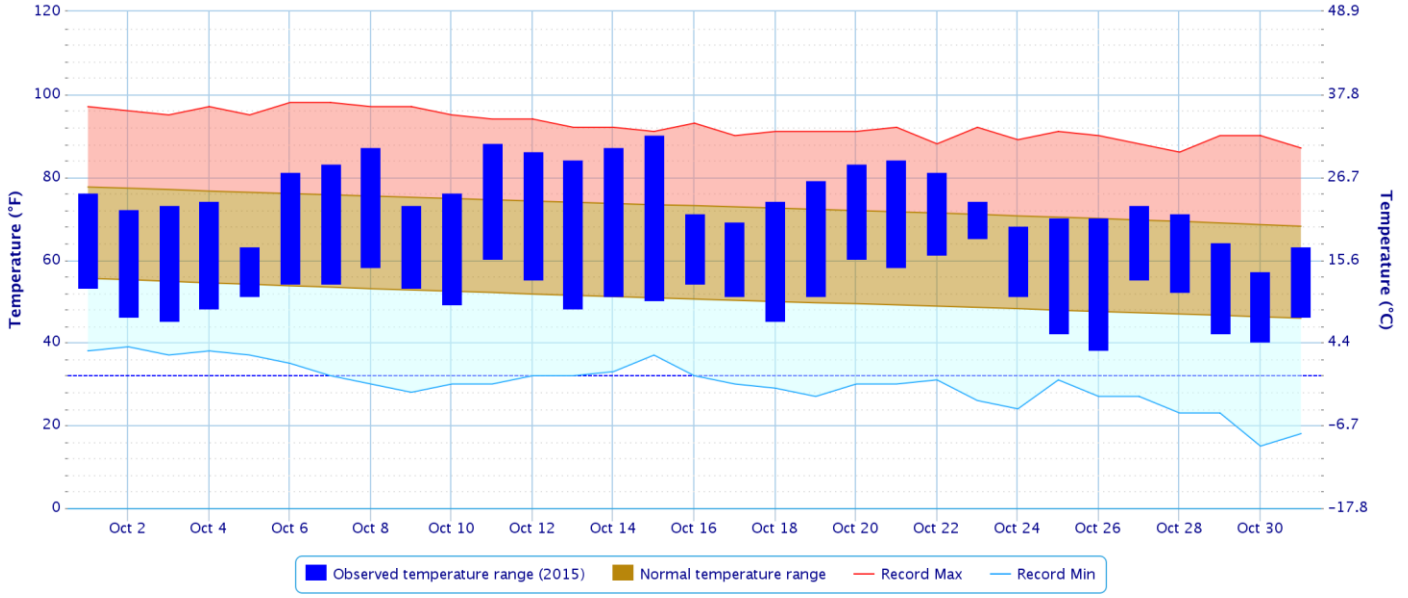
Hulah 5.3WSW, OK (coco)	1.25	Miami, OK (meso)	1.35	Jenks Riverside Arpt, OK (ASOS)	1.39
Vinita, OK (meso)	1.43	Bartlesville, OK (ASOS)	1.45	Tulsa, OK (ASOS)	1.50
Copan, OK (meso)	1.51	Fort Smith, AR (ASOS)	1.52	Tulsa, OK (meso)	1.53

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

Rank since 1921	October 2015	Cool Growing Season (Sep 1 – Oct 31)	Last 90 Days (Aug 3 – Oct 31)	Last 120 Days (Jul 4 – Oct 31)	Last 180 Days (May 5 – Oct 31)	Year-to-Date (Jan 1 – Oct 31)	Last 365 Days (Nov 1, 2014 – Oct 31, 2015)
Northeast OK	26th driest	16th driest	32nd driest	36th wettest	**9th wettest**	21st wettest	26th wettest
East Central OK	45th driest	41st Driest	39th driest	22nd wettest	**1st wettest**	**2nd wettest**	**2nd wettest**
Southeast OK	42nd wettest	37th driest	30th driest	22nd driest	**4th wettest**	11th wettest	21st wettest
Statewide	32nd wettest	34th driest	31st driest	33rd wettest	**1st wettest**	**3rd wettest**	**6th wettest**

Daily Temperature Data – Tulsa Area, OK (ThreadEx)

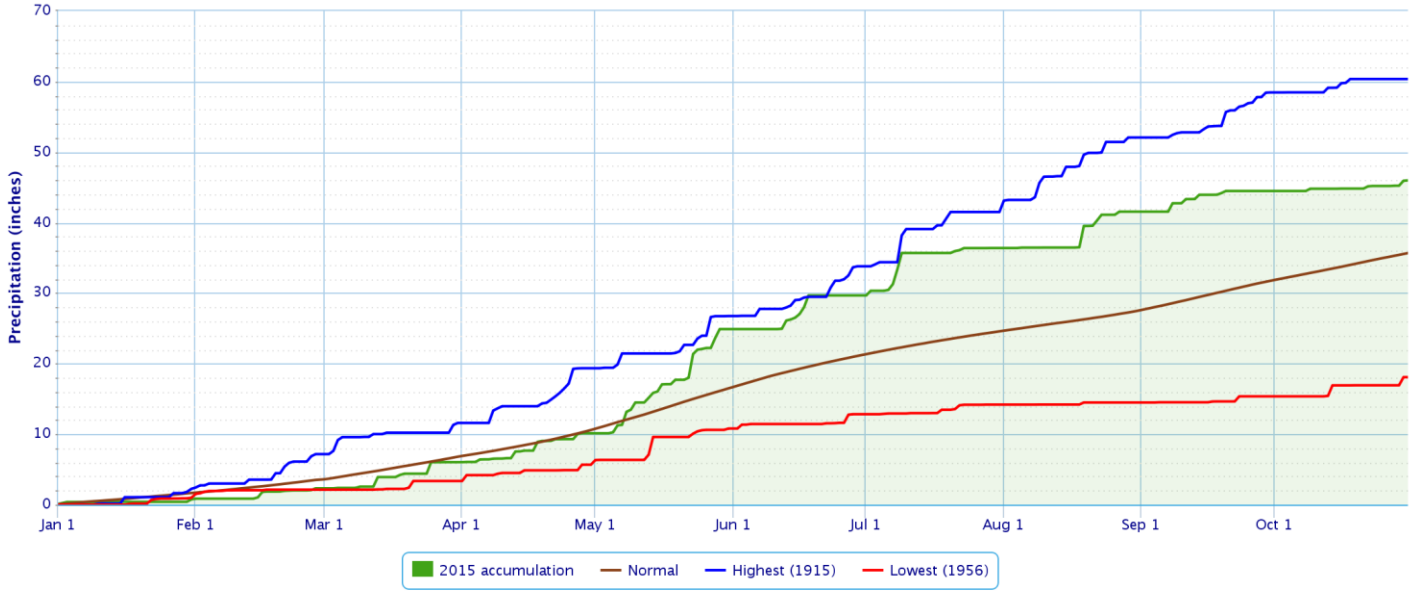
Period of Record – 1905-01-06 to 2015-11-05. Normals period: 1981-2010. Click and drag to zoom chart.



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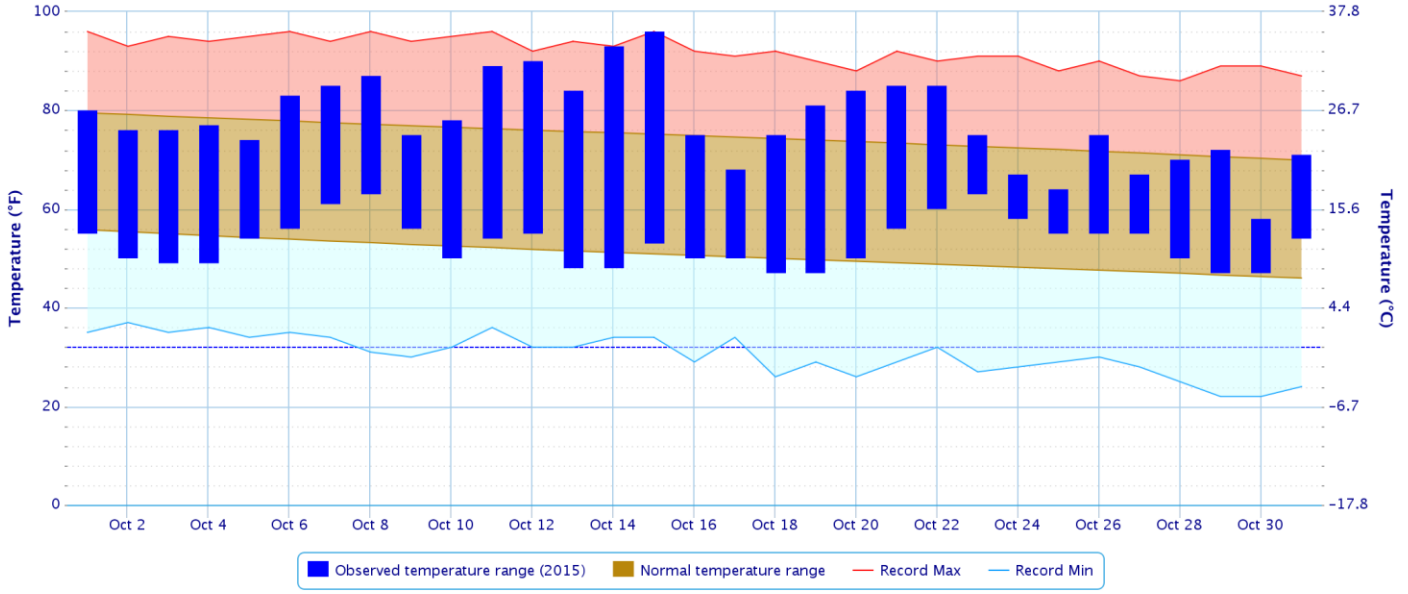
Daily Temperature Data – Fort Smith Area, AR (ThreadEx)

Period of Record – 1882-06-01 to 2015-11-05. Normals period: 1981-2010. Click and drag to zoom chart.



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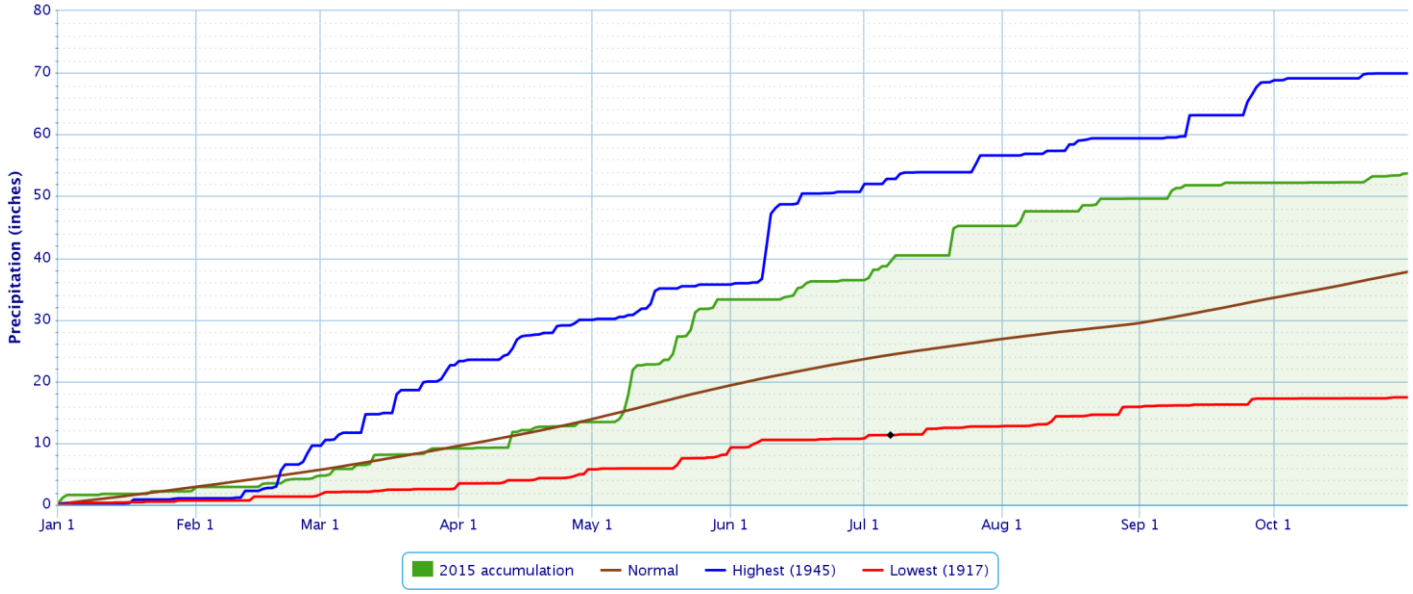
Accumulated Precipitation – Fort Smith Area, AR (ThreadEx)

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



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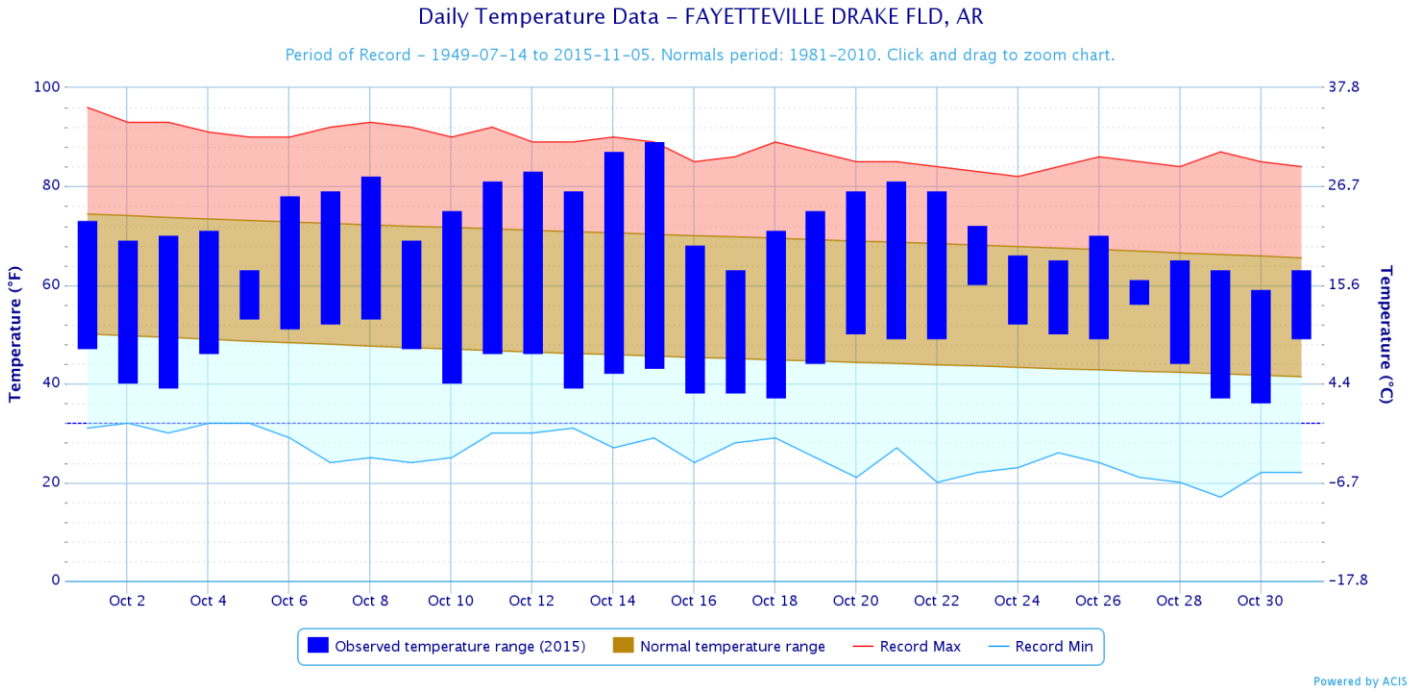
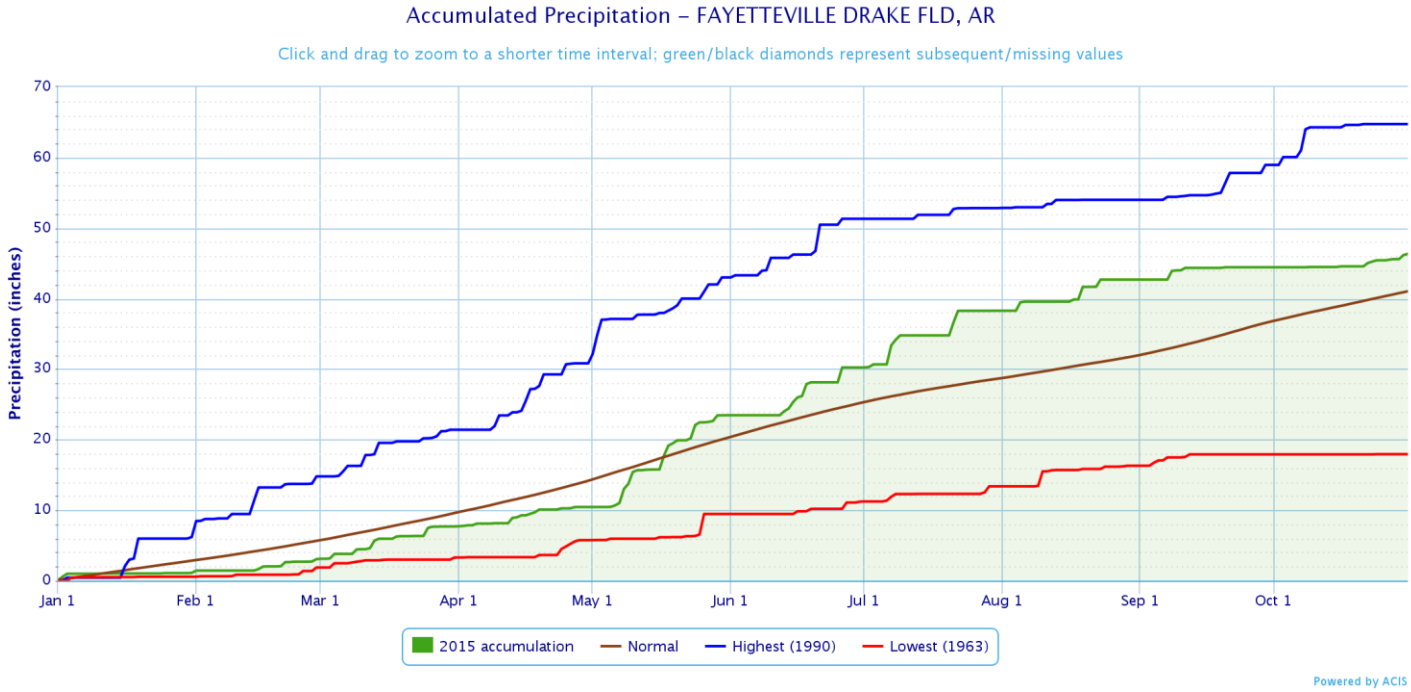




Drought

According to the U.S. Drought Monitor (USDM) from November 3, 2015 (Figs 2a, 2b), Moderate (D1) drought was occurring over a large part of Pushmataha and northeast Choctaw Counties in eastern OK and southern Madison County in northwest AR. Abnormally dry (D0), but not in drought, conditions were located across the remainder of Pushmataha and Choctaw Counties, as well as southern portion Le Flore, Adair, Delaware, Ottawa, Craig, Mayes, Rogers, Nowata, Washington OK, Osage, Pawnee, Tulsa, Creek, northwest Okmulgee, northwest Okfuskee, northwest Wagoner, northeast Cherokee, Benton, Washington AR, Madison, Carroll, Sebastian, and southern Franklin Counties.

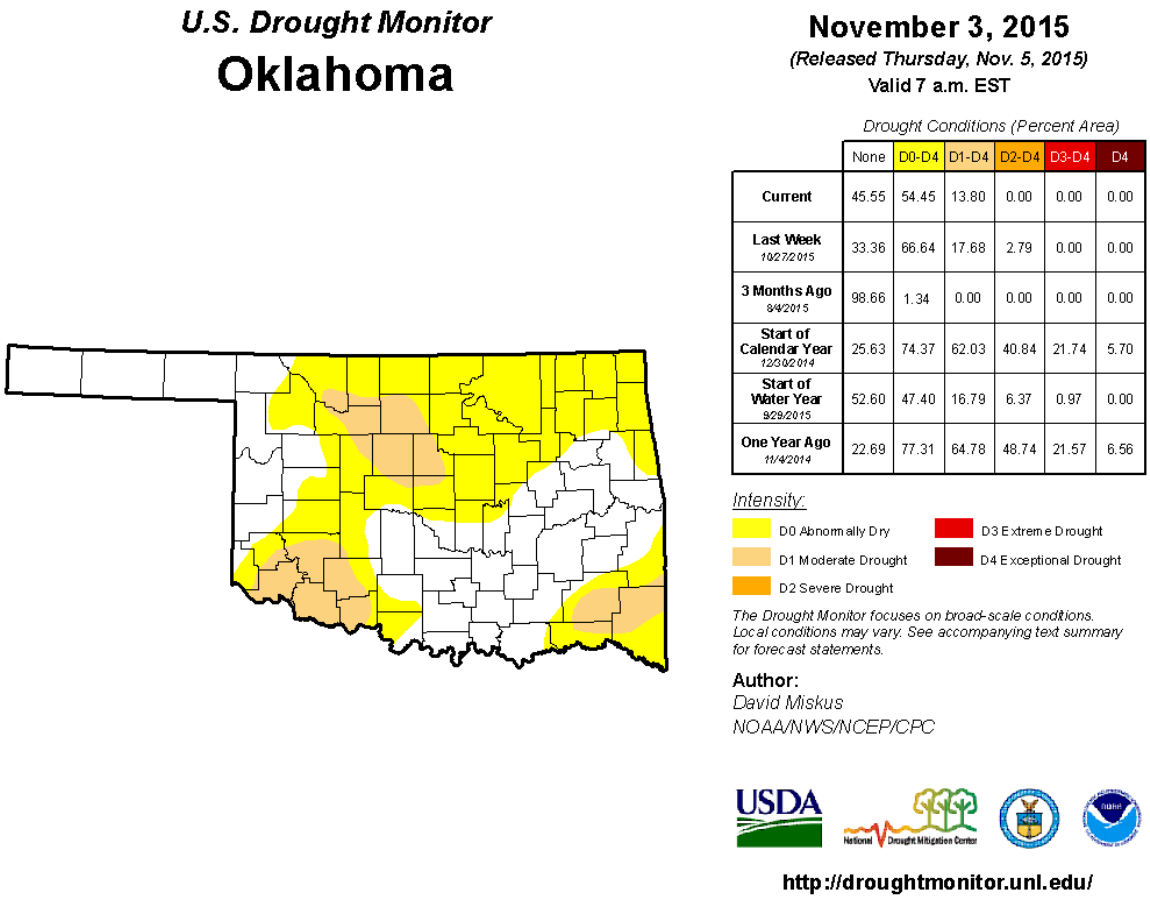


Fig. 2a. Drought Monitor for Oklahoma

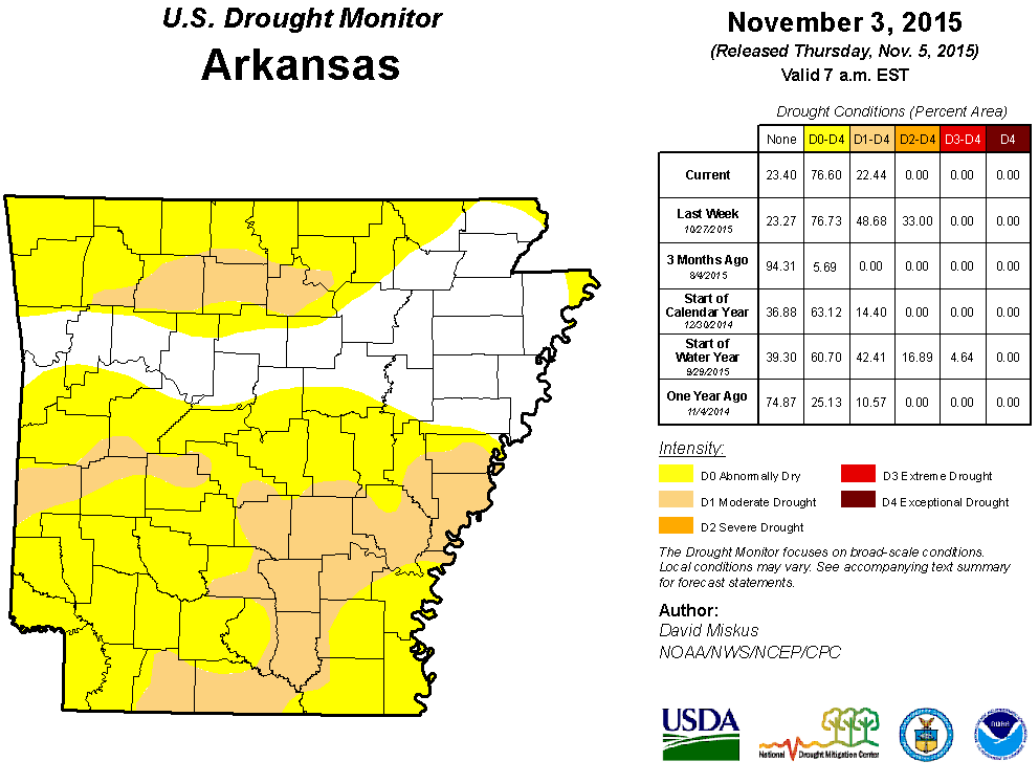
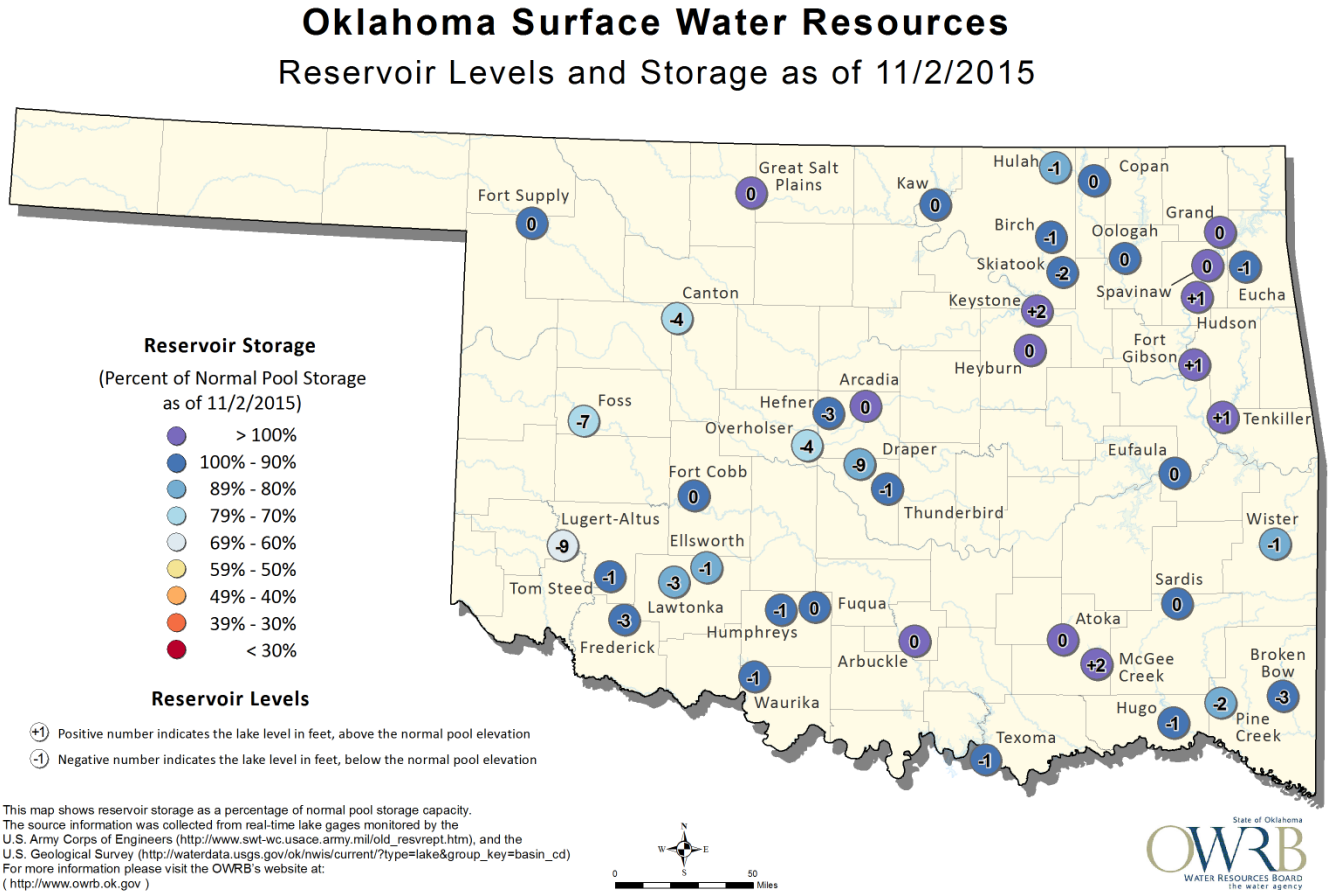


Fig. 2b. Drought Monitor for Arkansas

Reservoirs

According to the USACE, most of the major reservoirs in the HSA were operating within ±5% of the top of their conservation pools as of 11/06/2015. A few lakes had fallen below 5% of their conservation pool: Hulah Lake 81%, Birch Lake 92%, Wister Lake 92%, Skiatook Lake 93%, and Hugo Lake 94%.



Outlooks

The Climate Prediction Center (CPC) outlook for November 2015 (issued October 31, 2015) indicates an enhanced chance for above normal temperatures and above median precipitation across eastern OK and northwest AR. This outlook is based on both short- and extended range weather forecasts as well as strong El Niño influences.

For the 3-month period November-December-January 2015-16, CPC is forecasting an equal chance for above, near, and below normal temperatures across all of eastern OK and northwest AR except for far southeast OK, where the odds favor below normal temperatures. This outlook also indicates an enhanced chance for above median precipitation across all of eastern OK and northwest AR (outlook issued October 15, 2015). According to CPC, strong El Niño conditions remain in place. The ongoing El Niño is expected to peak in strength in the late autumn or early winter. There are indications that this event could peak as a very strong (sometimes referred to as a "super") El Niño, with sea surface temperature anomalies near or exceeding +2.0°C. There is a 95% chance for El Niño to continue through the upcoming winter and it is expected to persist through spring 2016. El Niño impacts are generally most significant in the Southern Plains during the cold season. Therefore, this outlook is based primarily on both statistical and dynamical forecast tools, as well as typical impacts resulting from El Niño conditions.

Summary of Precipitation Events Daily quality controlled rainfall maps can be found at: http://water.weather.gov/precip/index.php?location_type=wfo&location_name=tsa

October 1-16

Showers and thunderstorms that developed within a zone of isentropic lift near a mid-level front moved into north central OK during the early, pre-dawn hours of the 1st and progressed south during the day. The rain remained west of a Pawhuska to McAlester line. Most of this area received 0.10" to around 0.50" of rain, with western Creek and most of Okfuskee Counties getting 0.50" to around 1" (Fig. 3).

A cold front traversed the area late on the 9th and through the morning of the 10th. Scattered showers and isolated thunderstorms developed behind the front, bringing around 0.10" to around 0.25" of rain to a large portion of eastern OK and northwest AR (Fig. 4). A small area of central Osage Co. got around 0.50".

A band of elevated showers and thunderstorms developed behind a cold front during the evening hours of the 15th and moved south across most of the HSA during the overnight and morning hours of the 16th. The showers weakened through the morning and dissipated by early afternoon. Rainfall totals were generally light, with 0.10" to around 0.50" near and north of a Ponca City to Fayetteville line. The highest totals of 0.50" to around 1" occurred across far northwest AR, especially Carroll Co. (Fig. 5). The remainder of the HSA saw only sprinkles to a few hundredths of an inch of rain.

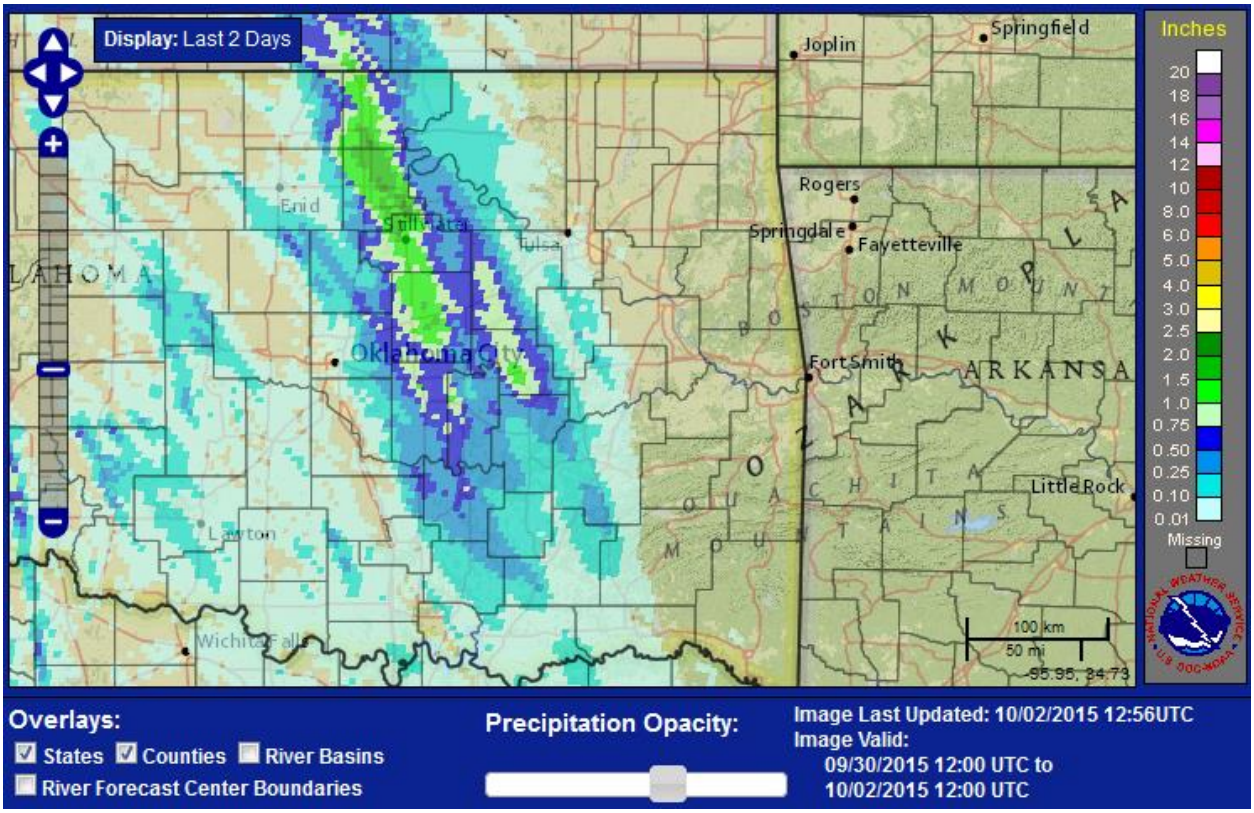


Fig. 3. 48-hr Estimated Observed Rainfall ending at 7am CDT 10/02/2015.

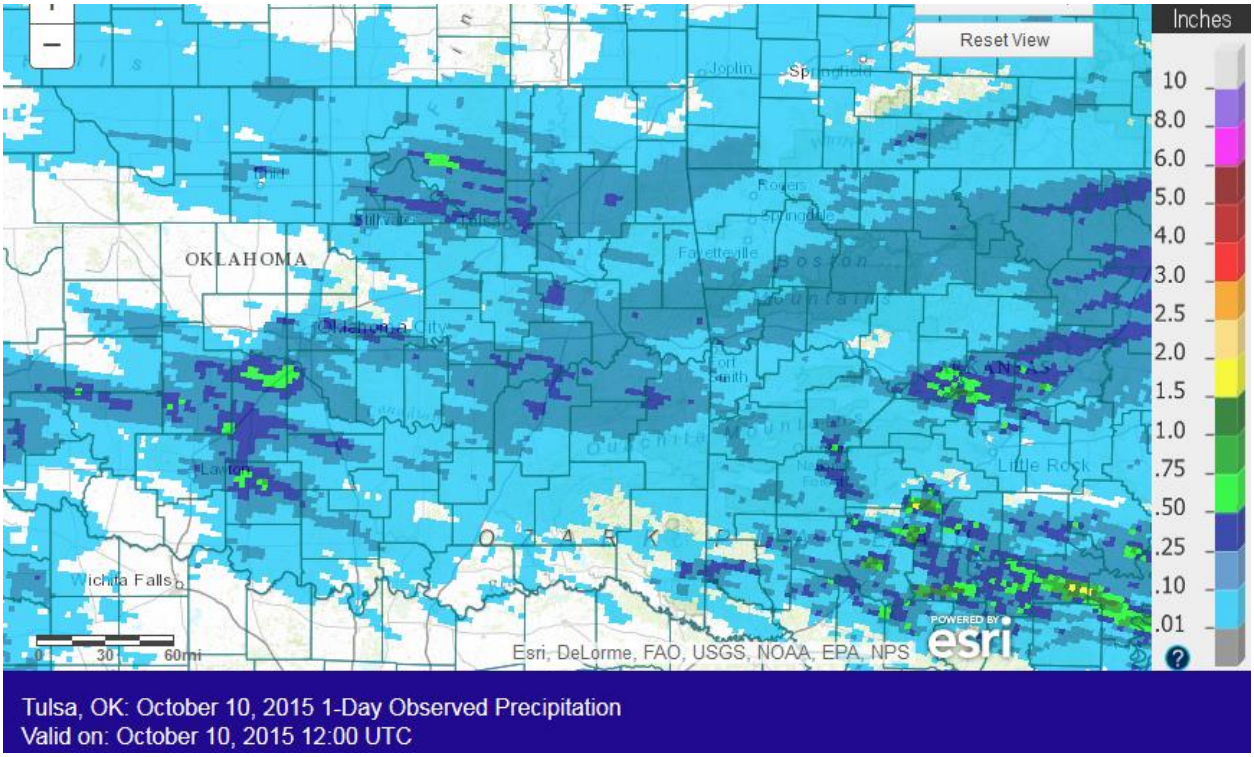


Fig. 4. 24-hr Estimated Observed Rainfall ending at 12pm CDT 10/10/2015.

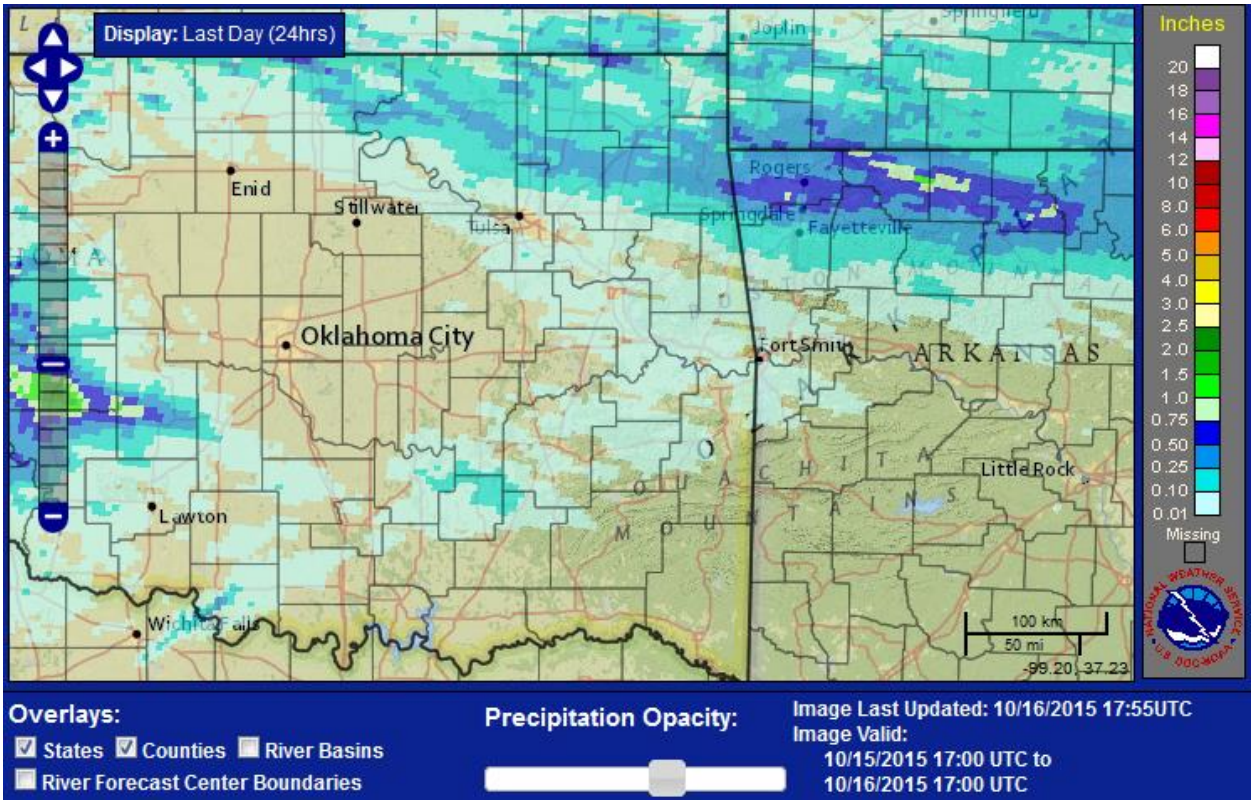


Fig. 5. 24-hr Estimated Observed Rainfall ending at 12pm CDT 10/16/2015.

October 17-31

An upper low moving into the Plains provided good lift in a very moist atmosphere on the 22nd. This led to widespread showers and thunderstorms developing over western OK, which pushed east into eastern OK and northwest AR during the late afternoon hours. The rain continued through the night and into the early morning of the 23rd. Along and north of I-44, rainfall totals were lightest, with this area receiving around 0.50" or less. Southeast of I-44, rainfall totals ranged from 0.50" to around 4.5", with the highest totals in southern Pittsburg,

western Latimer, and western Pushmataha Counties (Fig. 6). Additional showers and thunderstorms moved across southeast OK and west central AR during the late morning and afternoon hours of the 23rd.

Some of the larger precipitation reports (in inches) ending at 7am CDT 10/23/2015 included:

Hartshorne 3.9NNE, OK	3.09	Daisy 4ENE, OK	3.05	Stuart 3SE, OK	2.88
Wilburton 2SW, OK	2.84	McAlester 4S, OK	2.80	Clayton 4NNE, OK	2.76

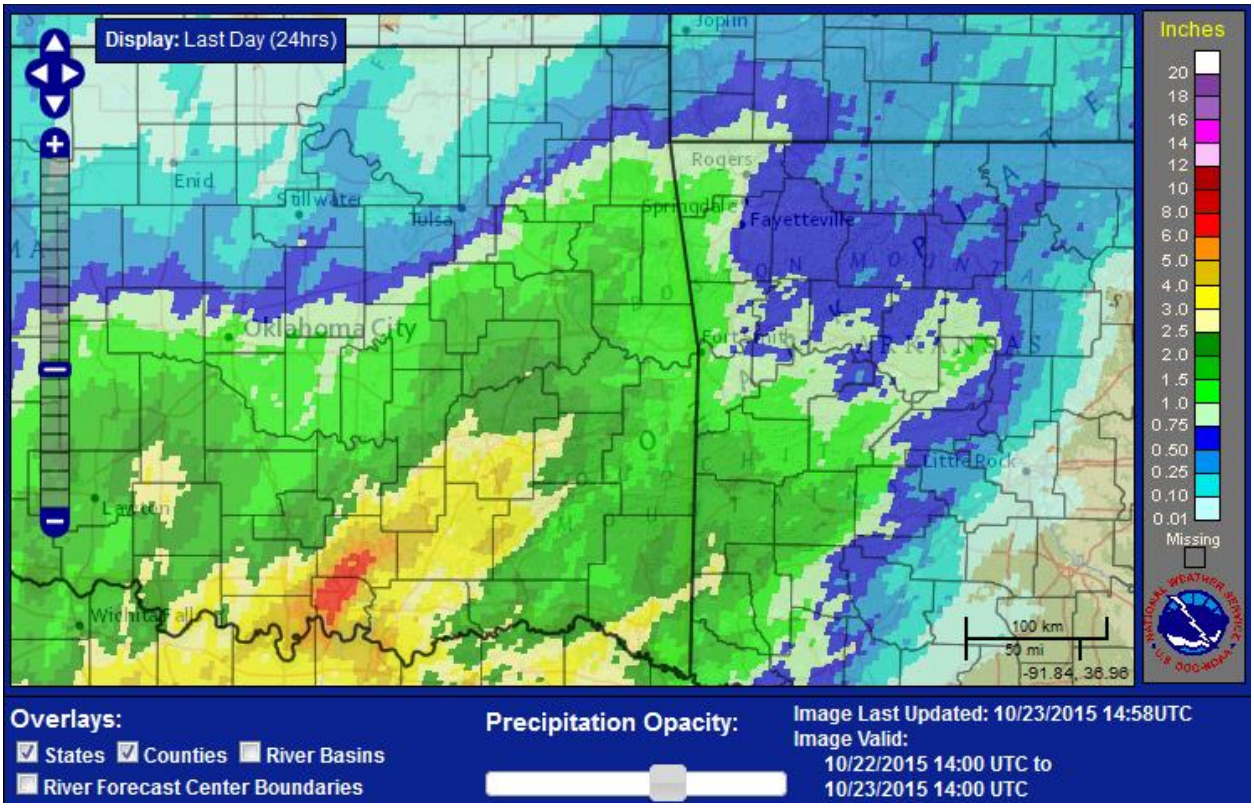


Fig. 6. 24-hr Estimated Observed Rainfall ending at 9am CDT 10/23/2015.

A wave over the central Rockies lifted northeast, pushing a cold front into northeast OK during the evening of the 23rd. A period of stronger lift allowed for additional precipitation along the front as it moved southeast across the HSA through the evening and overnight hours. Most of the HSA received very little rain as the front with through. However, heavier rain occurred across southeast OK. Some light shower activity lingered across southeast OK behind the boundary during the day of the 24th. Locations south of a McAlester to Poteau line generally received 0.3" to around 1.5" of rain (Fig. 7). The rainfall totals from the 22nd-24th ranged from less than 0.10" near the OK/KS border to near 5" in southeast OK (Figs. 8, 9).

A storm system lifting northeast from the Gulf Coast and a shortwave moving across the area led to light showers across far eastern OK and northwest AR late on the 26th and on the 27th. Most of the affected area received less than 0.10" of rain, though some locales received 0.10" to near 0.30".

A compact yet strong shortwave moved into the region during the morning of the 28th, bringing light showers to portions of eastern OK and most of northwest AR. A pocket of instability led to thunderstorms from southern Mayes Co. east through Carroll Co. and across Sequoyah and Crawford Counties. The thunderstorms brought 0.50" to near 1.5" to the affected locations, with around 0.25" or less elsewhere (Fig. 10).

An upper-level low moved out of the desert southwest, causing widespread showers and thunderstorms to move into eastern OK and northwest AR during the afternoon of the 30th. The heaviest rain occurred during the evening and overnight hours. Significant rainfall occurred just west and south of the HSA, while rainfall totals across eastern OK and northwest AR ranged from 0.25" to near 2" (Fig. 11). Lingering areas of light rain continued through the morning of the 31st, and all of the rain had shifted east of the area by later in the day – just in time for trick-or-treating.

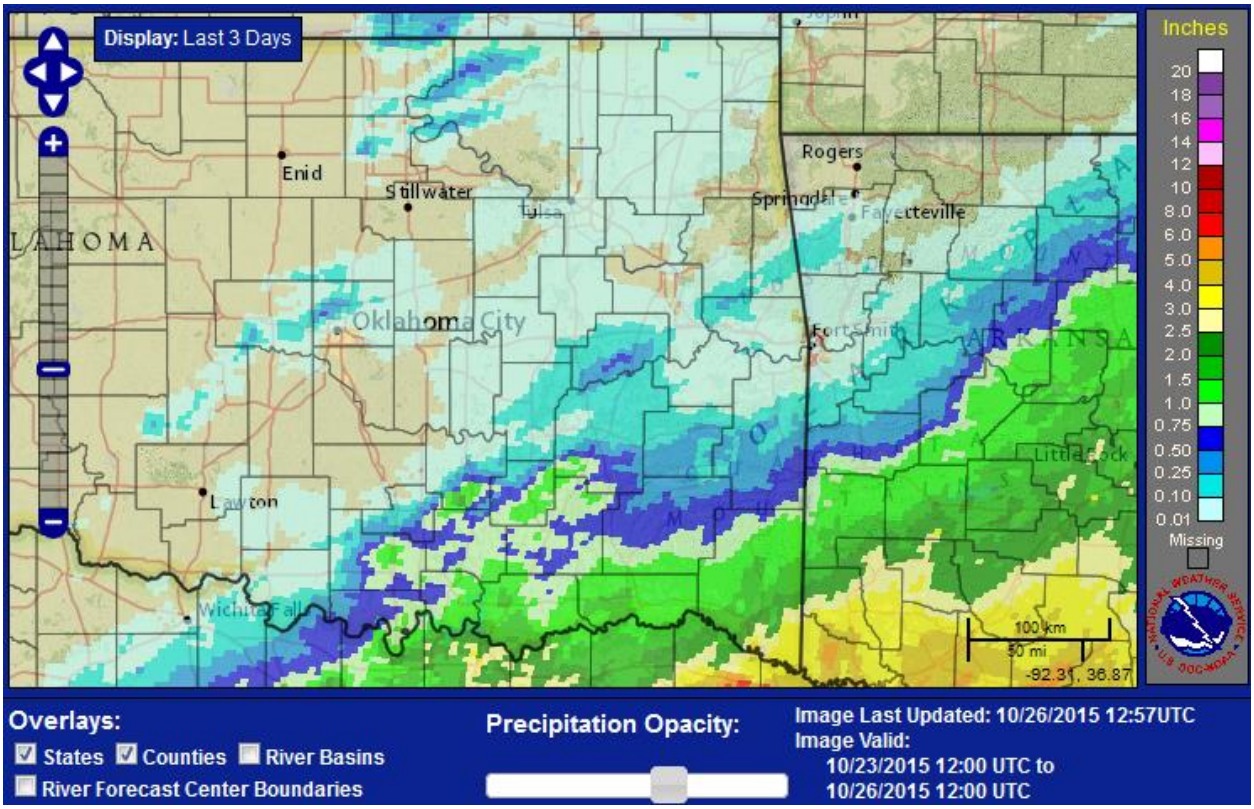


Fig. 7. 3-day Estimated Observed Rainfall ending at 7am CDT 10/26/2015.

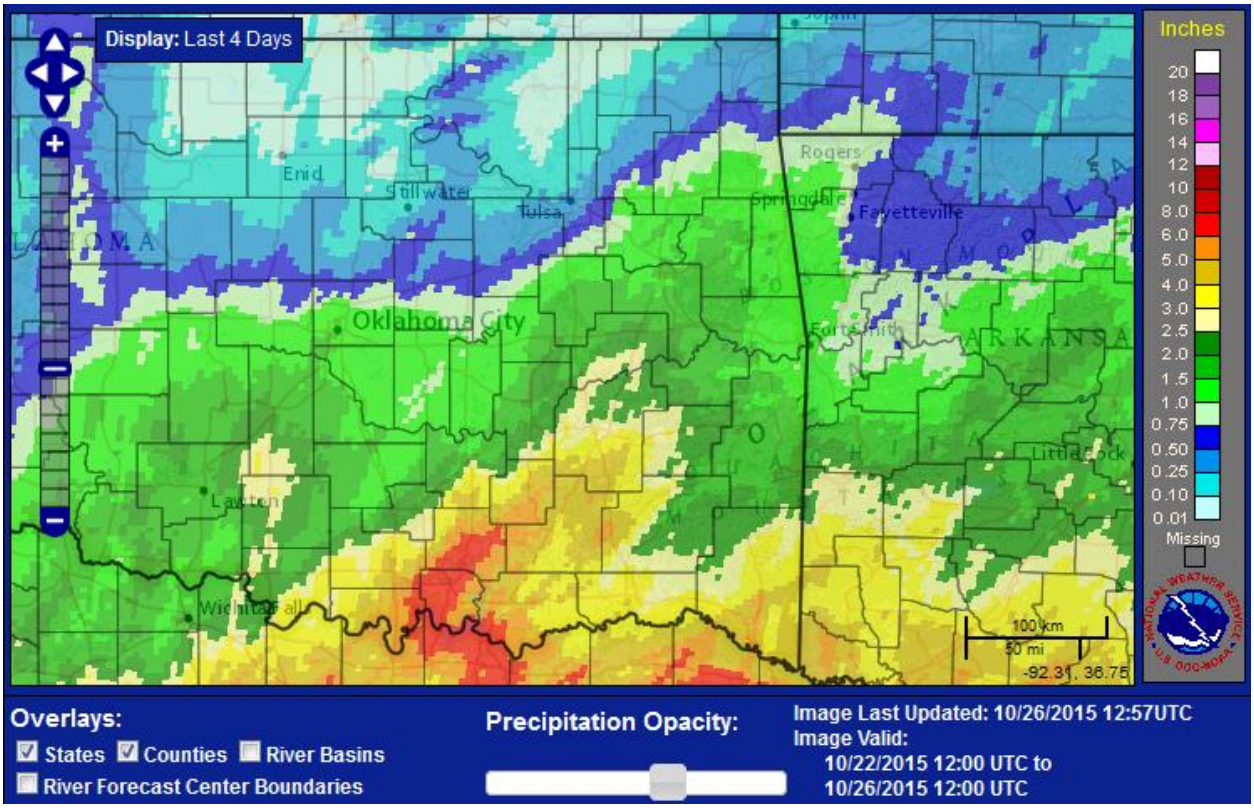


Fig. 8. 4-day Estimated Observed Rainfall ending at 7am CDT 10/26/2015.

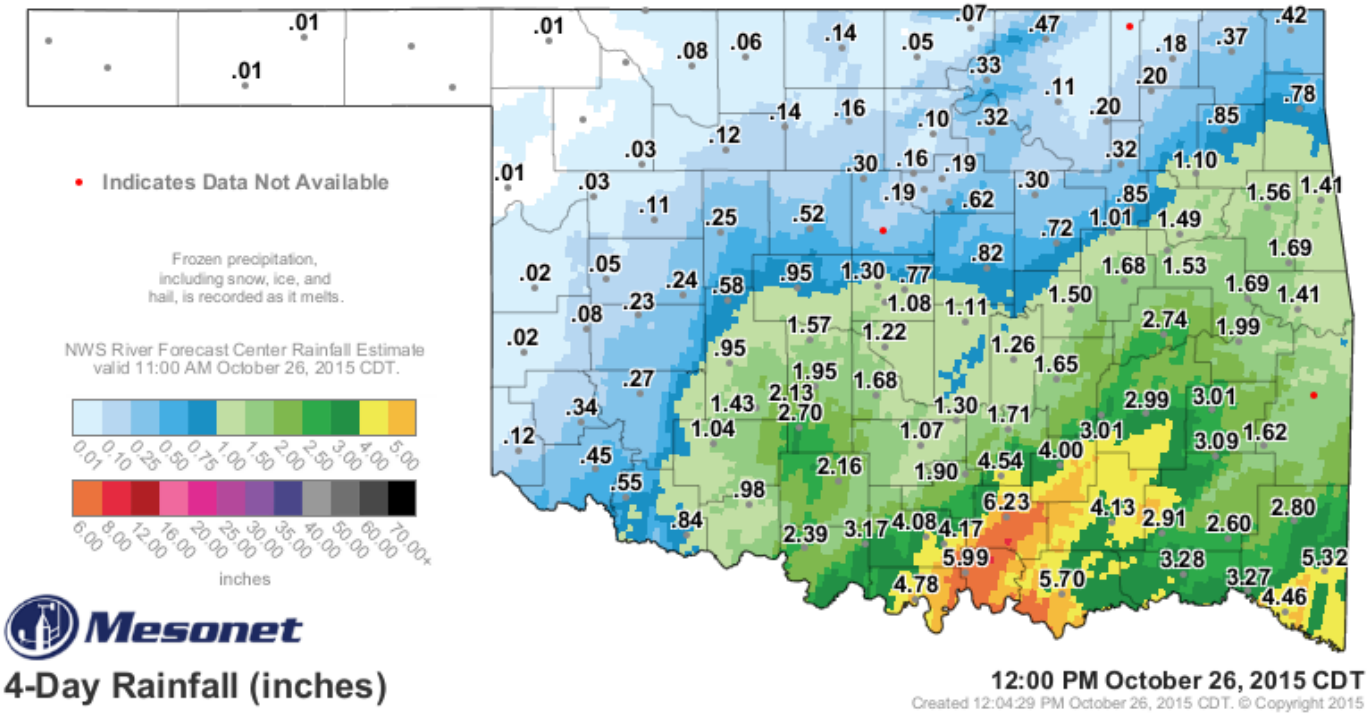


Fig. 9. 4-day Estimated Observed Rainfall ending at 12pm CDT 10/26/2015.

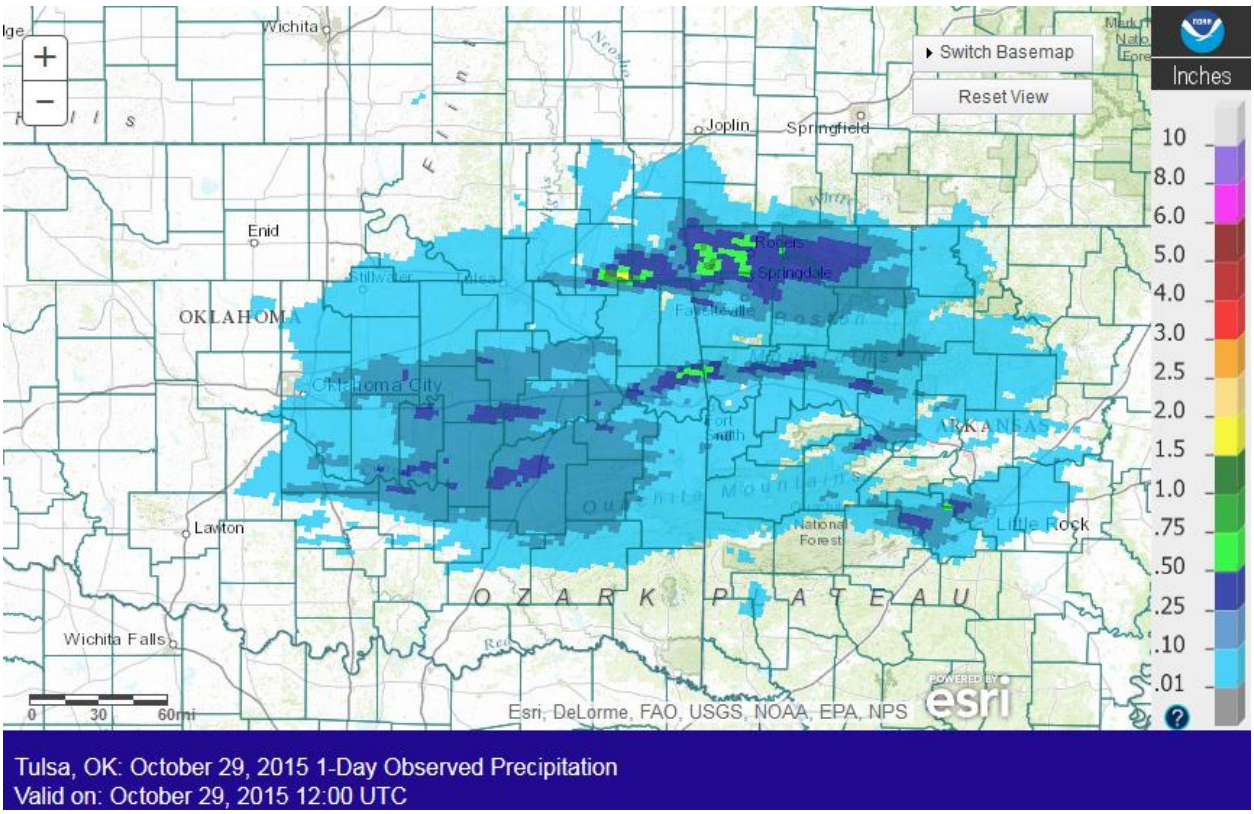


Fig. 10. 24-hour Estimated Observed Rainfall ending at 7am CDT 10/29/2015.

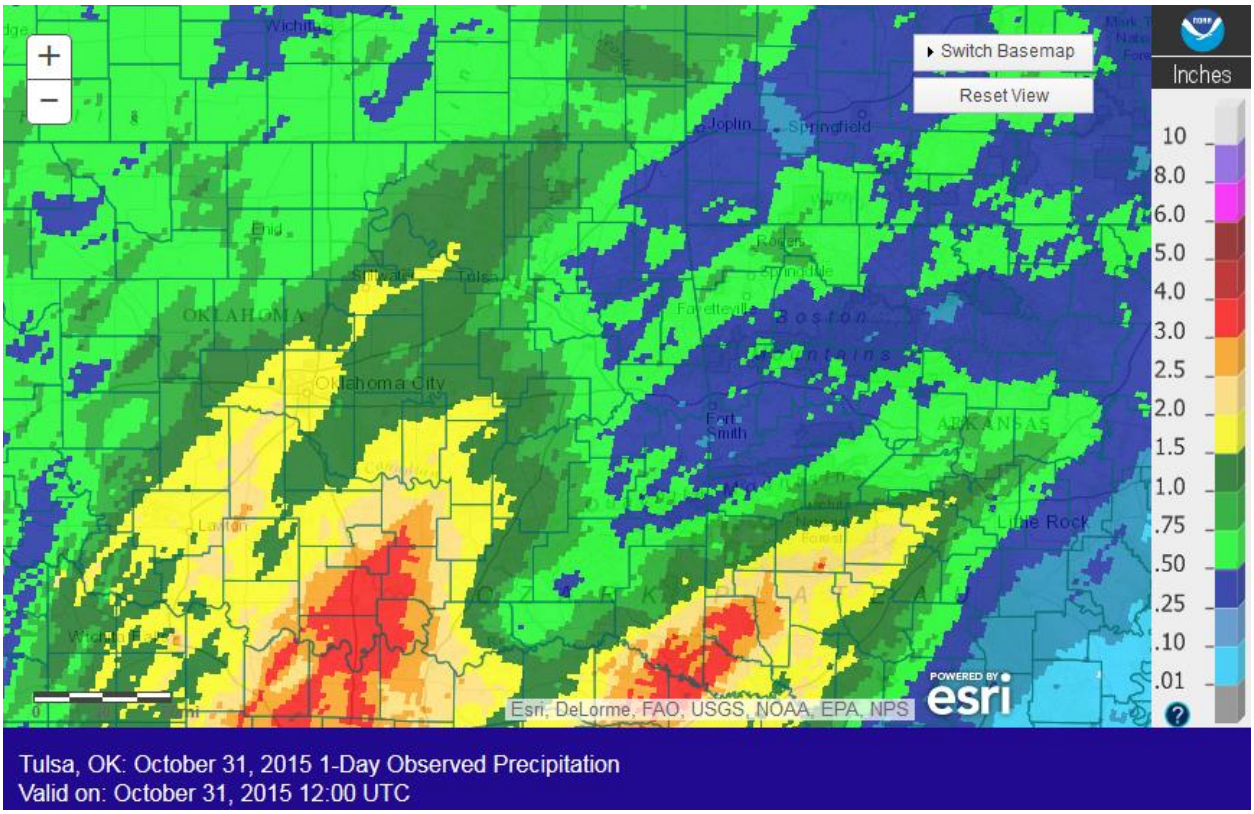


Fig. 11. 24-hour Estimated Observed Rainfall ending at 7am CDT 10/31/2015.

Written by:
Nicole McGavock
Service Hydrologist
WFO Tulsa

Products issued in October 2015:

*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)
0 Urban and Small Stream Advisories (FLS)
0 Areal Flood Warnings (FLW)
0 Areal Flood Statements (FLS)
0 River Flood Warnings (FLW)
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