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 **June** YEAR **2018**
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 **July 3, 2018**

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.

June 2018 was another hot month, with the monthly average temperatures 3°F-5°F above normal. Rainfall varied greatly across eastern OK and northwest AR this month. Normal rainfall in the month of June ranges from 3.9 inches in McIntosh County to 5.9 inches in Wagoner County. The Ozark region of northwest Arkansas averages 5.1 inches for the month. 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 June 2018 ranged from around 1" to isolated amounts around 10" across eastern OK and northwest AR. The lowest rainfall totals were across northeast OK and northwest AR and Choctaw County in southeast OK. This corresponds to 10-75% of the normal June rainfall for most of northeast OK, northwest AR, and far southeast OK, and 110% to around 200% of the June normal for portions of east central OK into southeast OK, Pawnee County, and Osage County (Fig. 1b).

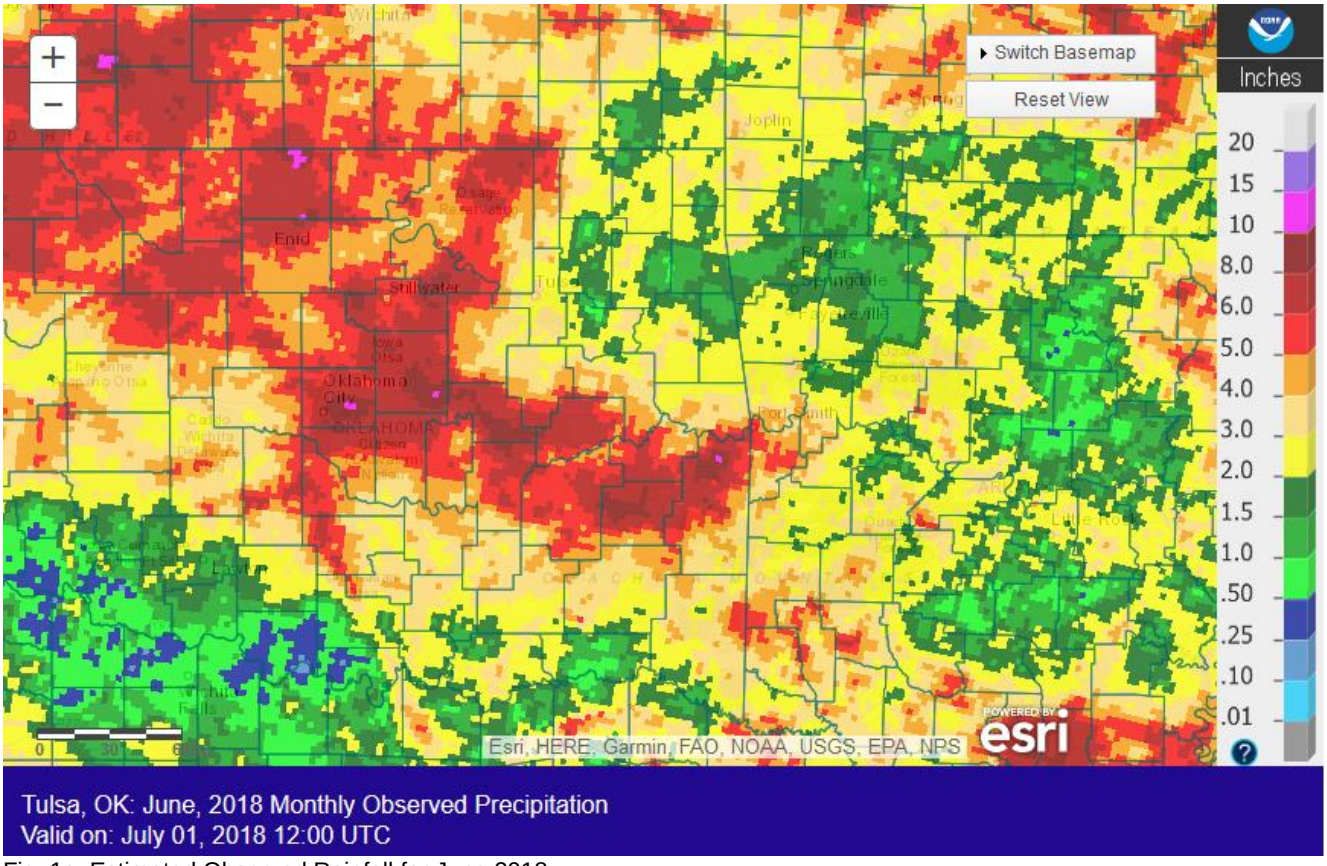


Fig. 1a. Estimated Observed Rainfall for June 2018

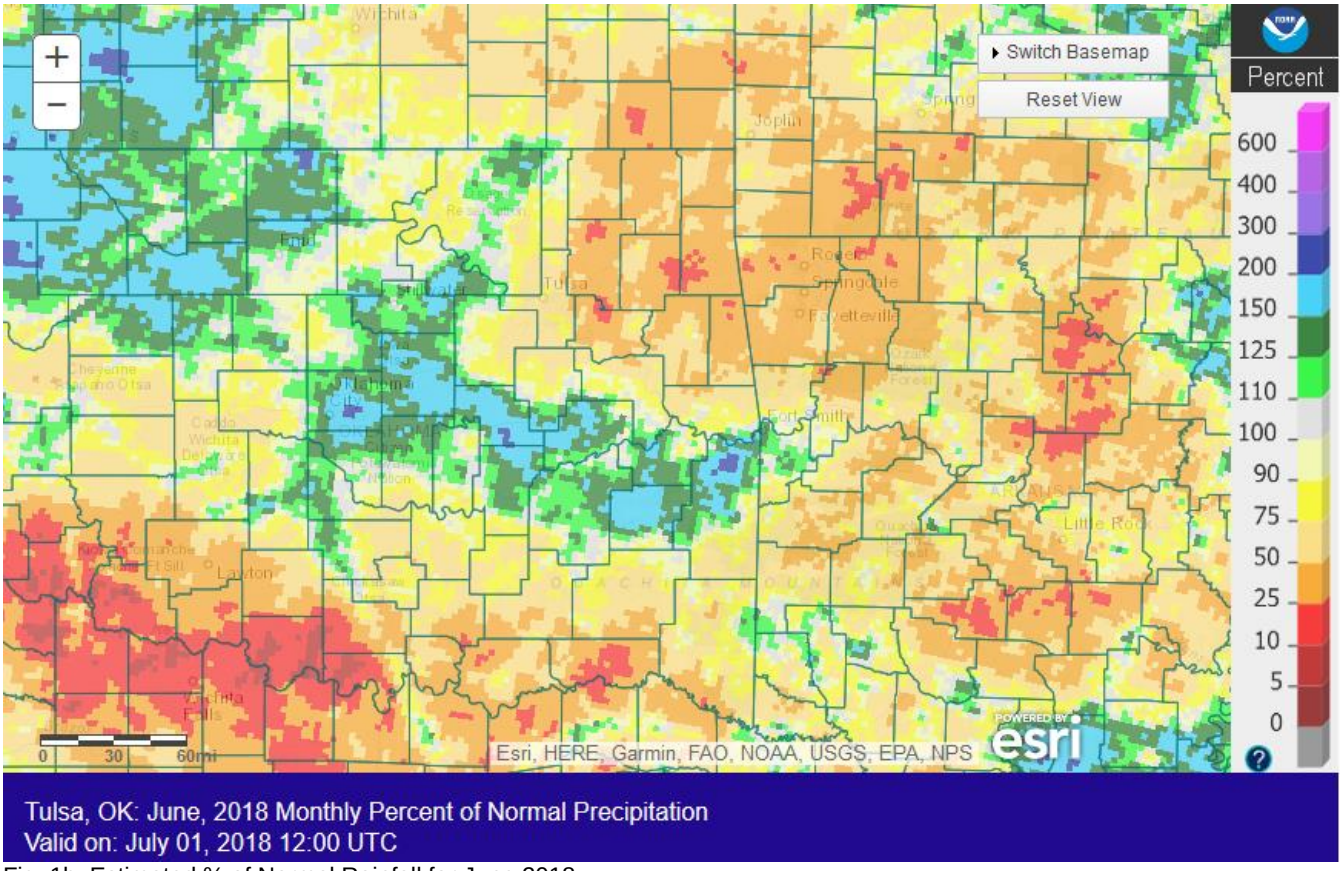


Fig. 1b. Estimated % of Normal Rainfall for June 2018

In Tulsa, OK, June 2018 ranked as the 14th warmest June (81.8°F, tied 1936; since records began in 1905) and the 26th driest June (2.09", tied 1888; since records began in 1888). Fort Smith, AR had the 10th warmest June (82.3°F; since records began in 1882) and the 44th wettest June (4.74"; since records began in 1882). Fayetteville, AR had the 10th warmest (76.5°F) and the 10th driest (2.08", tied 1971) June since records began in 1950.

Some of the larger precipitation reports (in inches) for June 2018 included:

Eufaula 4.6ENE, OK (coco)	9.88	Wilburton, OK (meso)	8.27	Hulah 5.3WSW, OK (coco)	7.82
Okemah, OK (meso)	7.47	Eufaula, OK (meso)	7.11	Wister, OK (meso)	6.64
Wilburton 9.4N, OK (coco)	6.52	Stigler, OK (meso)	6.39	Greenwood 1.9WNW, AR (coco)	6.13

Some of the lowest precipitation reports (in inches) for June 2018 included:

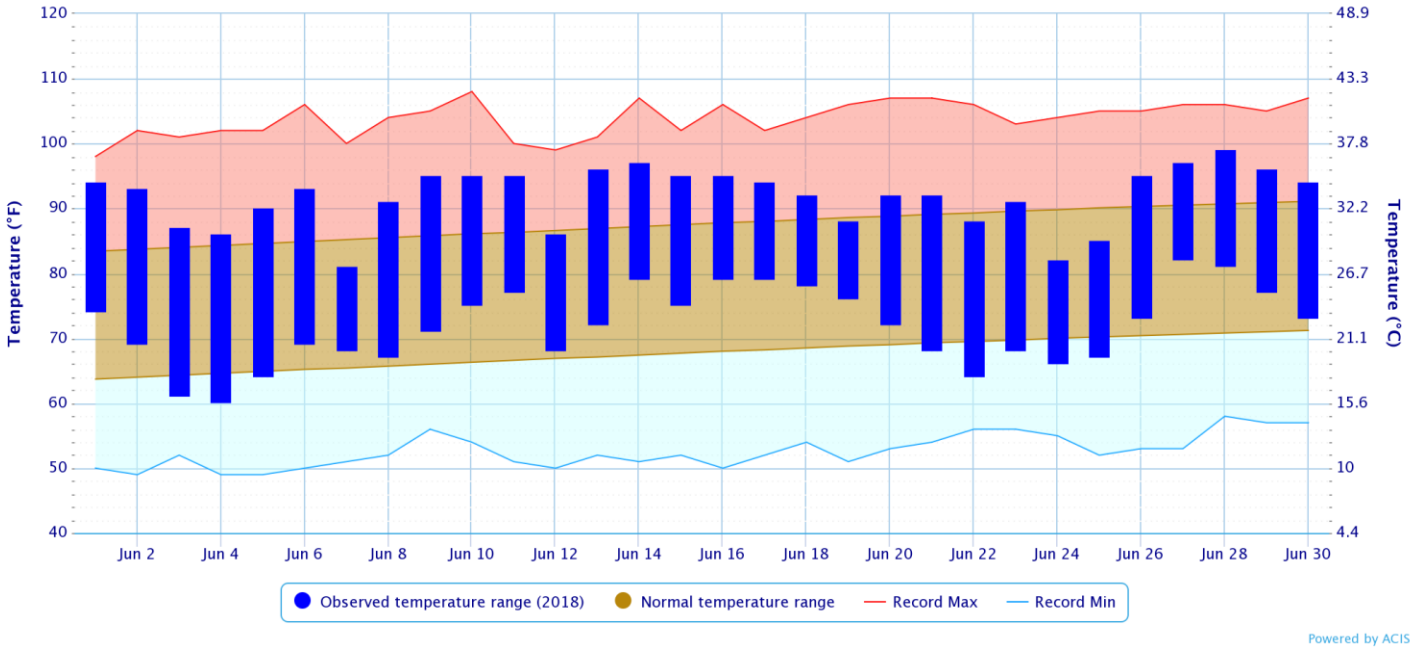
Berryville 0.8SSW, AR (coco)	0.93	NW AR Reg. Arpt (ASOS)	1.10	Kingston 2S, AR (coop)	1.22
Hugo, OK (meso)	1.23	Decatur 2.6ESE, AR (coco)	1.29	Westville, OK (meso)	1.29
Claremore 7.5W, OK (coco)	1.33	Tulsa 8.4ESE, OK (coco)	1.52	Muskogee 1.2NE, OK (coco)	1.58
				Berryville 6.6SSW, AR (coco)	1.58

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

Rank since 1921	June 2018	Last 60 Days (May 2-Jun 30)	Last 90 Days (Apr 2 – Jun 30)	Warm Growing Season (Mar 1 – Jun 30)	Year-to-Date (Jan 1 – Jun 30)	Water-Year-to-Date (Oct 1– June 30)	Last 365 Days (Jul 1, 2017 – Jun 30, 2018)
Northeast OK	34th driest	24th driest	10th driest	12th driest	20th driest	31st driest	37th driest
East Central OK	46th driest	40th driest	31st driest	45th driest	22nd wettest	44th wettest	38th wettest
Southeast OK	48th wettest	21st driest	14th driest	14th driest	27th wettest	48th driest	31st wettest
Statewide	47th wettest	39th driest	25th driest	19th driest	41st driest	29th driest	46th wettest

Daily Temperature Data – Tulsa Area, OK (ThreadEx)

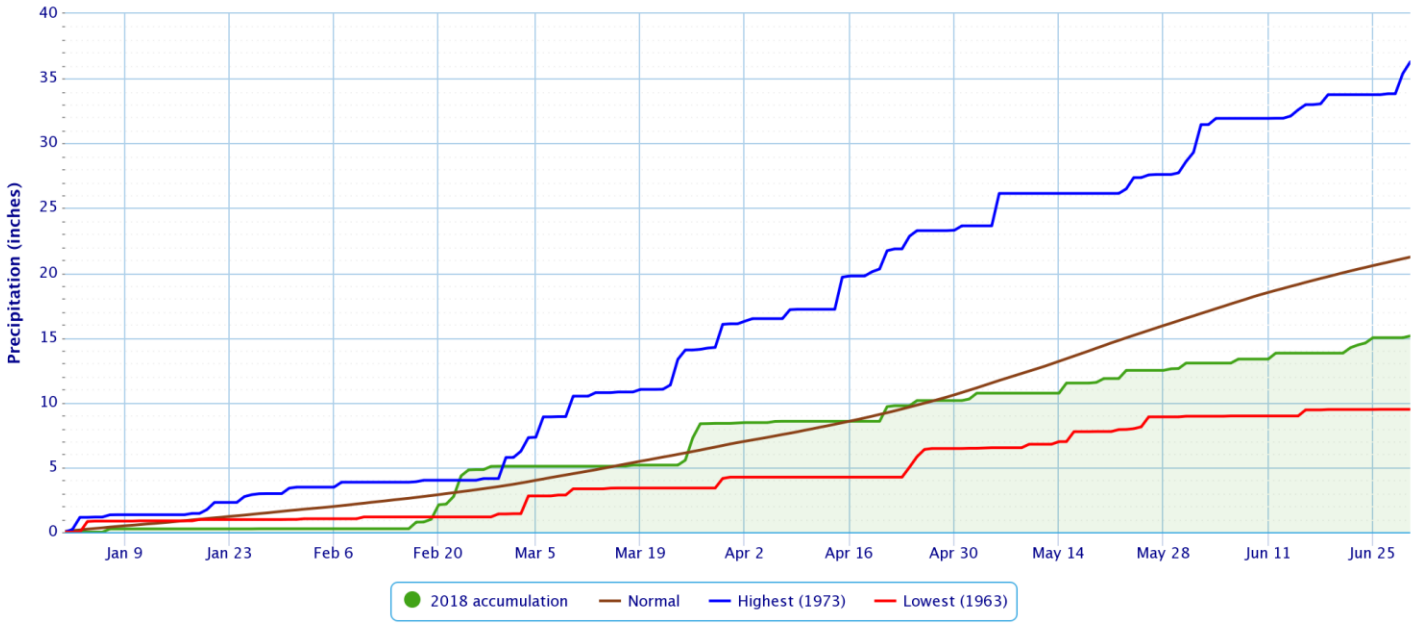
Period of Record – 1905-01-06 to 2018-07-01. Normals period: 1981-2010. Click and drag to zoom chart.



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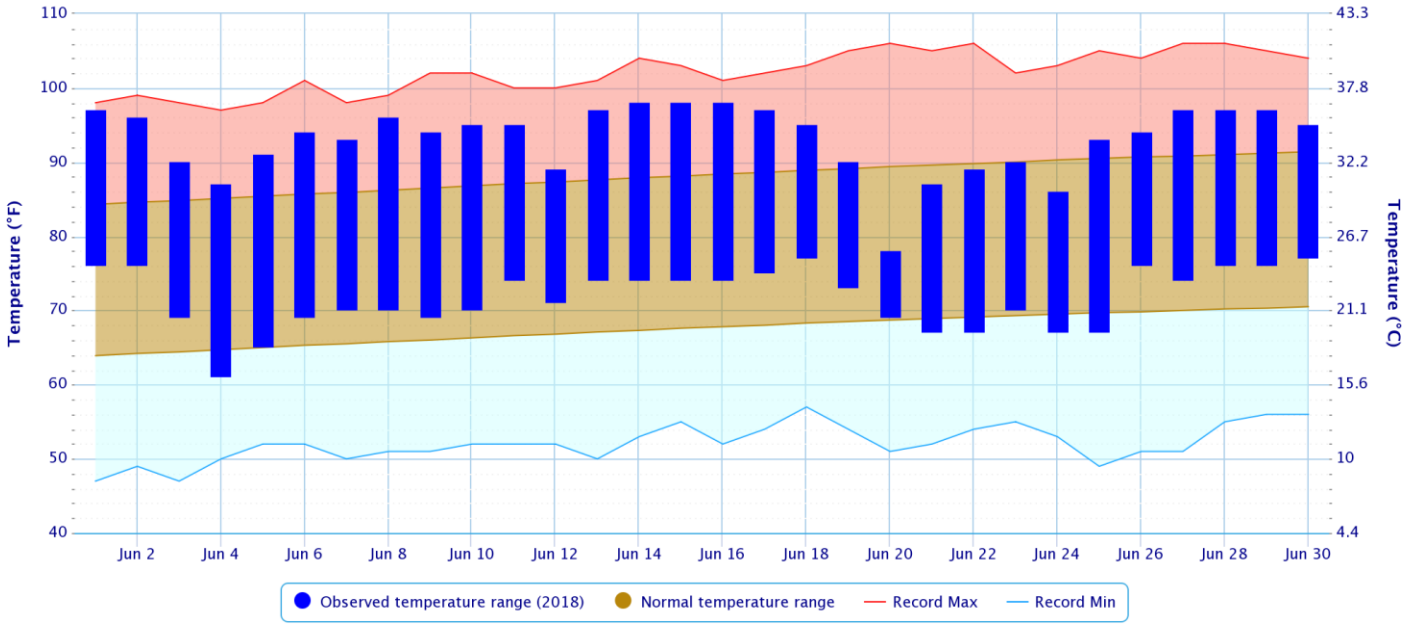
Daily Temperature Data – Fort Smith Area, AR (ThreadEx)

Period of Record – 1882-06-01 to 2018-07-01. Normals period: 1981-2010. Click and drag to zoom chart.



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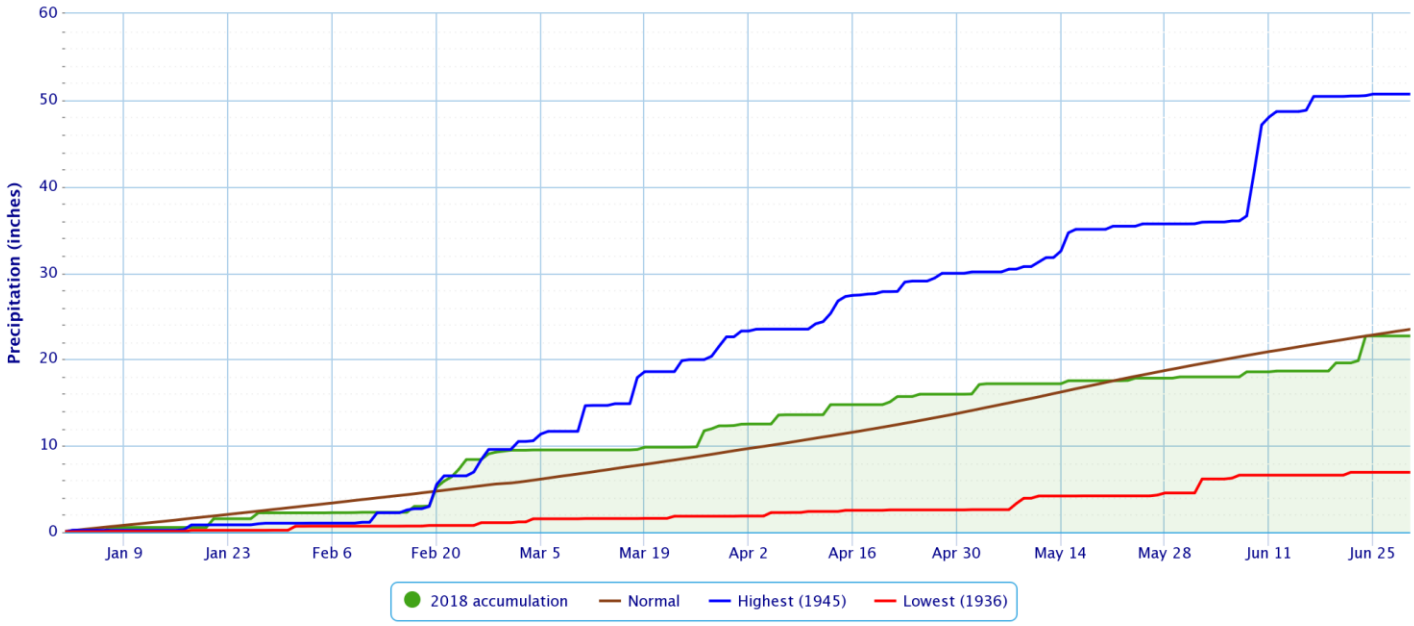
Accumulated Precipitation – Fort Smith Area, AR (ThreadEx)

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



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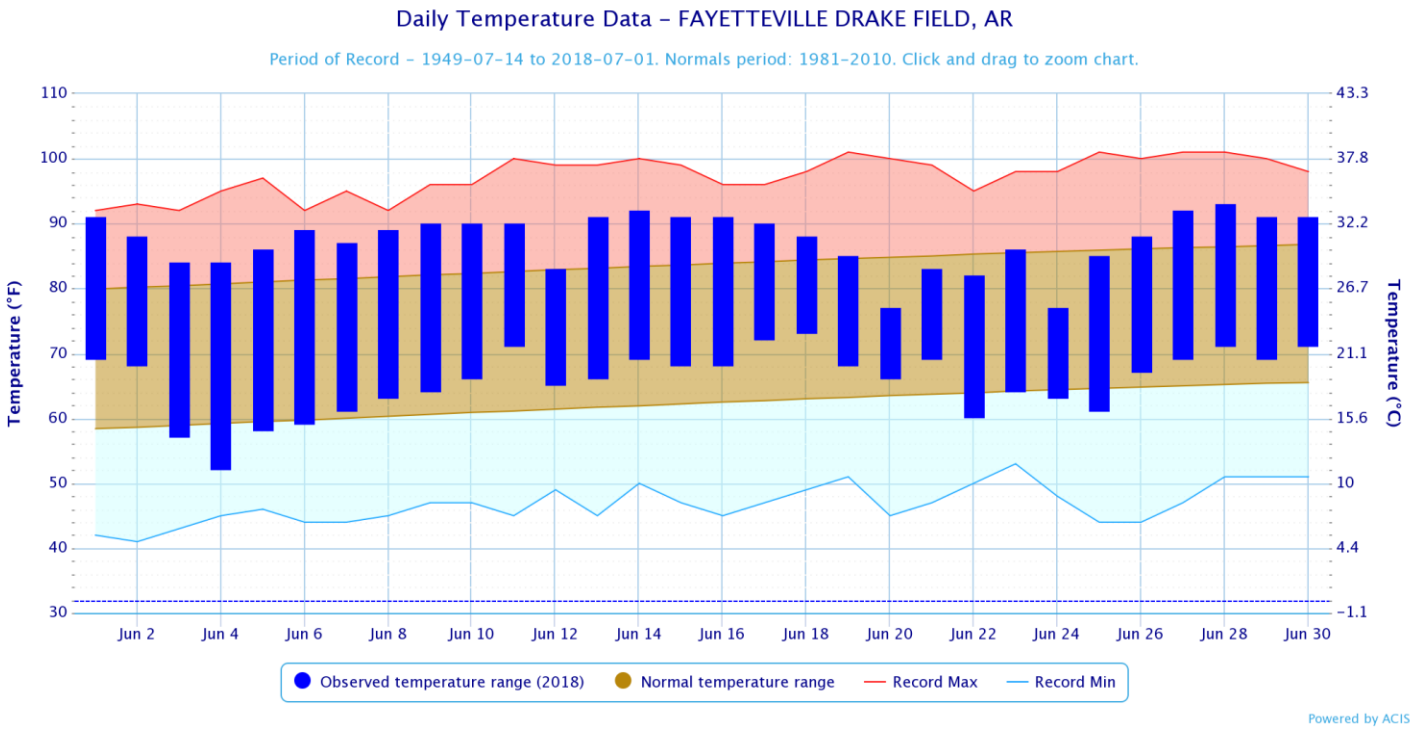
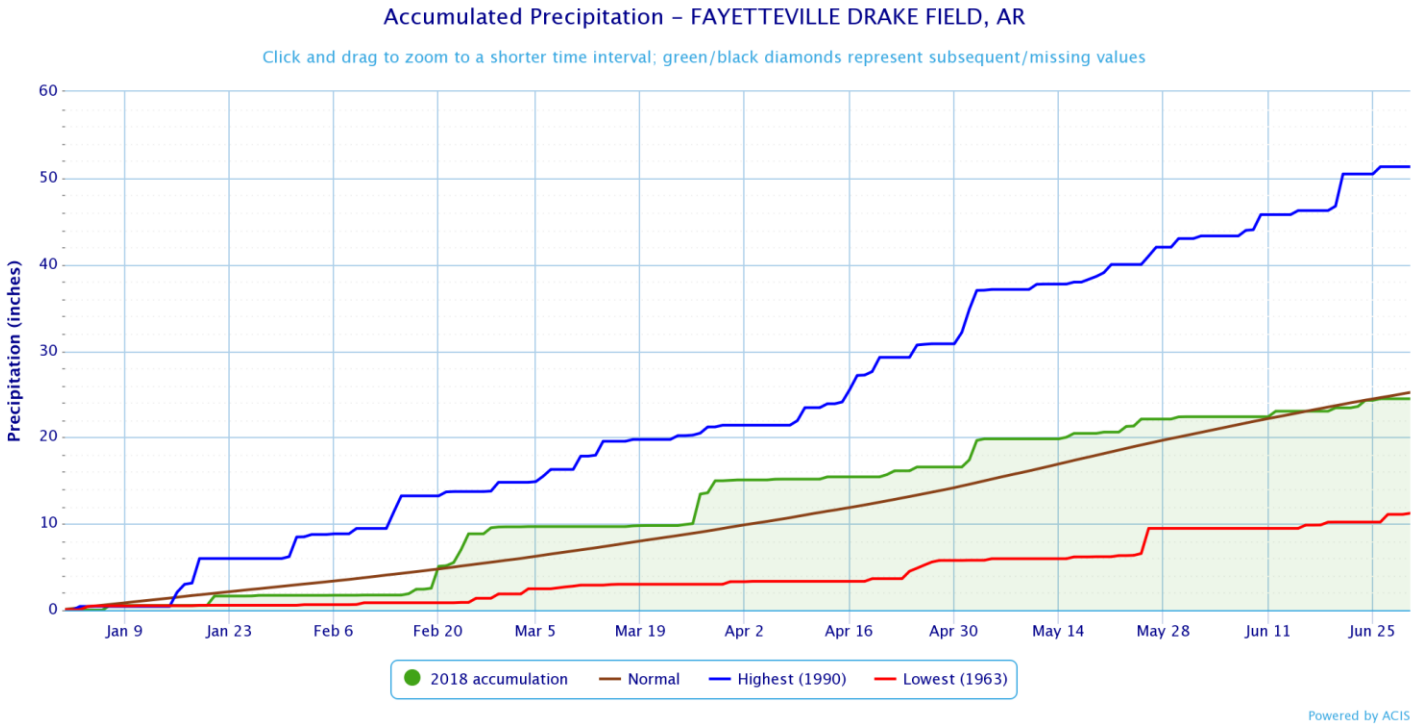




Drought

According to the U.S. Drought Monitor (USDM) from June 26, 2018 (Figs. 2, 3), Severe (D2) Drought conditions were impacting western Osage, far northwest Pawnee, southern Pushmataha, and Choctaw Counties in eastern OK. Moderate (D1) drought conditions were present across portions of Osage, Pawnee, eastern Kay, Washington, Tulsa, Nowata, Craig, Ottawa, Rogers, Mayes, Delaware, Pushmataha, Choctaw, and Le Flore Counties in eastern OK, and Benton County in northwest Arkansas. Abnormally Dry (D0) but not in drought conditions encompassed portions of Pawnee, Creek, Tulsa, Mayes, Wagoner, Cherokee, Adair, Sequoyah, Haskell, Pittsburg, Latimer, Le Flore, Pushmataha, and Choctaw Counties in eastern Oklahoma and Carroll, Washington, Crawford, Madison, Franklin, and Sebastian County in west central Arkansas.

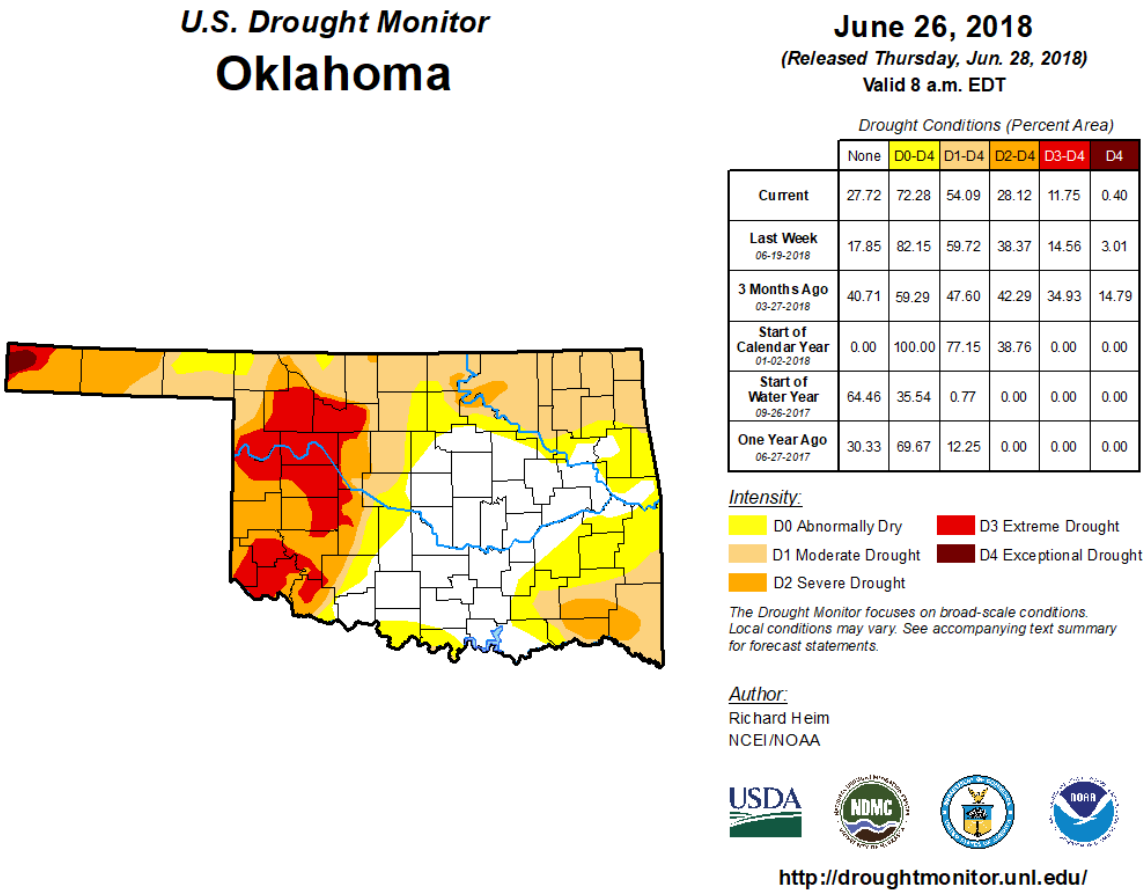


Fig. 2. Drought Monitor for Oklahoma

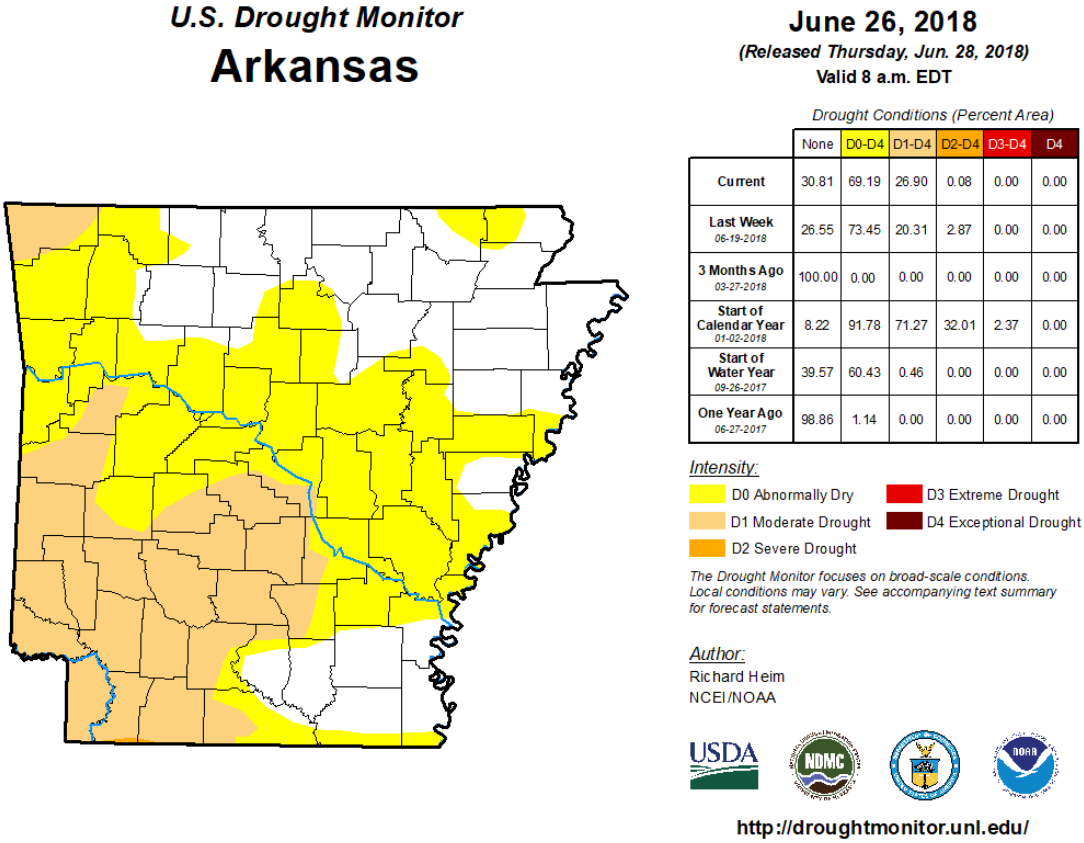
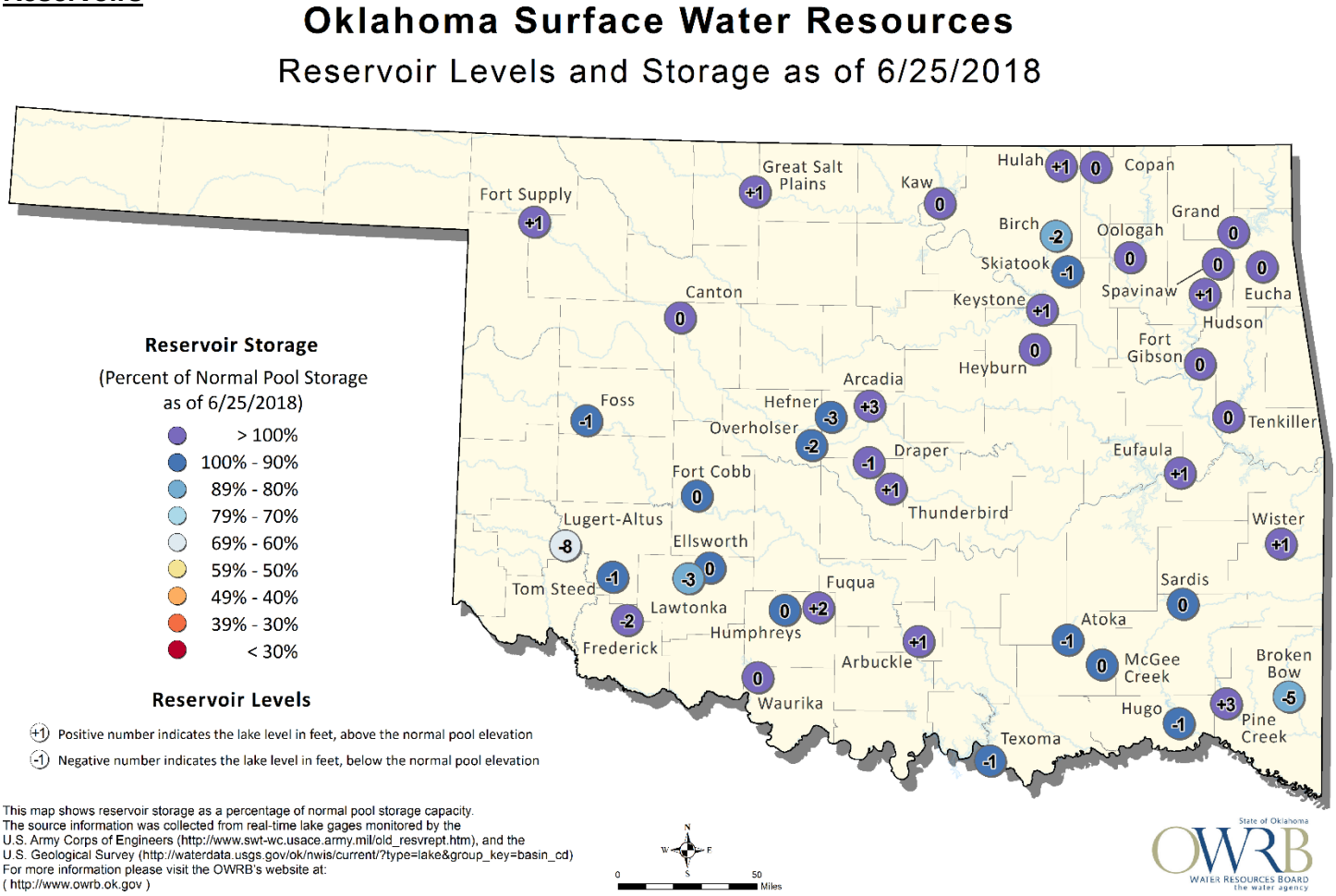


Fig.3. Drought Monitor for Arkansas

Reservoirs



According to the USACE, most lakes in the HSA were within ±3% of their conservation pool level. Reservoirs below 3% of their conservation pool storage as of 6/29/2018: Ft. Gibson Lake 80%, Birch Lake 87%, Hugo Lake 91%, and Skiatook 96%. Reservoirs above 3% of their conservation pool storage as of 6/29/2018: Eufaula Lake 111%, Beaver Lake 109%, and Keystone Lake 106%.

Outlooks

The Climate Prediction Center (CPC) outlook for July 2018 (issued June 30, 2018) indicates an enhanced chance for above normal temperatures and an enhanced chance for below median precipitation across all of eastern OK and northwest AR. This outlook takes into account weather conditions forecast over the next 1-2 weeks, soil moisture conditions, and sub-seasonal climate signals. The current and predicted dry conditions are likely to contribute to above normal temperatures across the Southern Plains.

For the 3-month period July-August-September 2018, CPC is forecasting an enhanced chance for above normal temperatures across all of eastern OK and northwest AR (outlook issued June 21, 2018). This outlook also calls for an enhanced chance for below median precipitation across most of eastern OK and northwest AR and an equal chance for above, near, and below median precipitation across northeast OK primarily northwest of I-44. This outlook is based on both statistical and dynamical forecast tools and decadal timescale climate trends, as well as impacts from the dry soil moisture. According to CPC, ENSO neutral conditions were present through May, though positive sea surface temperature anomalies were observed in mid-June. ENSO neutral conditions are favored to persist through the summer, with the onset of El Niño conditions by fall (50% chance) and ~65% chance of El Niño conditions during winter 2018-19. An El Niño Watch has been issued by CPC.

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 mesoscale convective system (MCS) moved south out of KS and into eastern OK and northwestern AR during the early morning hours of the 12th, dissipating by late morning as it reached southeast OK and west central AR. 60-70 mph winds associated with the leading edge of the complex occurred across portions of northeast OK and northwest, resulting in tree and power line damage. Rainfall totals were generally around 0.50" to around 1.5", with isolated areas of 1.5"-4" (Figs. 4-6).

Scattered showers and thunderstorms from southeast OK into northwest AR on the 20th as tropical moisture streamed into the region combined with an upper-level wave. Additional storm development occurred near I-44 during the afternoon along an outflow boundary (from earlier convection in KS). These storms propagated southeast through the evening hours. Rainfall totals ranged from 0.25" to around 3" along and south of I-44 and east of a Tulsa to Ada line (Fig. 7).

An MCS moved into northeast OK during the late evening hours of the 22nd and moved quickly across eastern OK and western AR during the early morning hours of the 23rd. Some rain lingered into the mid-morning hours. Showers and thunderstorms then reignited late on the 23rd along a surface boundary that stretched from west central OK east southeast into southeast OK. A strengthening low level jet during the overnight hours sustained the convection over east central OK, leading to heavy rainfall. Meanwhile, another MCS moved southeast out of KS and into eastern OK, bringing damaging winds and rainfall to eastern OK and northwest AR through the mid-morning hours. A second MCS moved across northwest OK and into eastern OK during the afternoon of the 24th, again with damaging winds. These storms affected all but far northeast OK and far northwest AR through the afternoon and evening. The 24-hour rainfall ending at 7am CDT on the 24th was 0.50" to 6" across the affected areas of eastern OK and west central AR (Fig. 8). Most of Okfuskee, McIntosh, and southern Okmulgee received 3"-6" of rain. The 24-hour rainfall ending at 7am CDT on the 25th was around 0.50" to around 3" across much of the region, with the exception of the area of northeast OK and northwest AR south of I-44 and north of I-40 where rainfall totals were only a few hundredths to around 0.50" (Figs. 9, 10). Over the 2-day period a large portion of eastern OK and western AR west and south of a Nowata to Tulsa to Fort Smith line received 1"-3" of rain, with 4"-7" across Okfuskee, southern Okmulgee, McIntosh, and northern Le Flore Counties (Fig. 11).

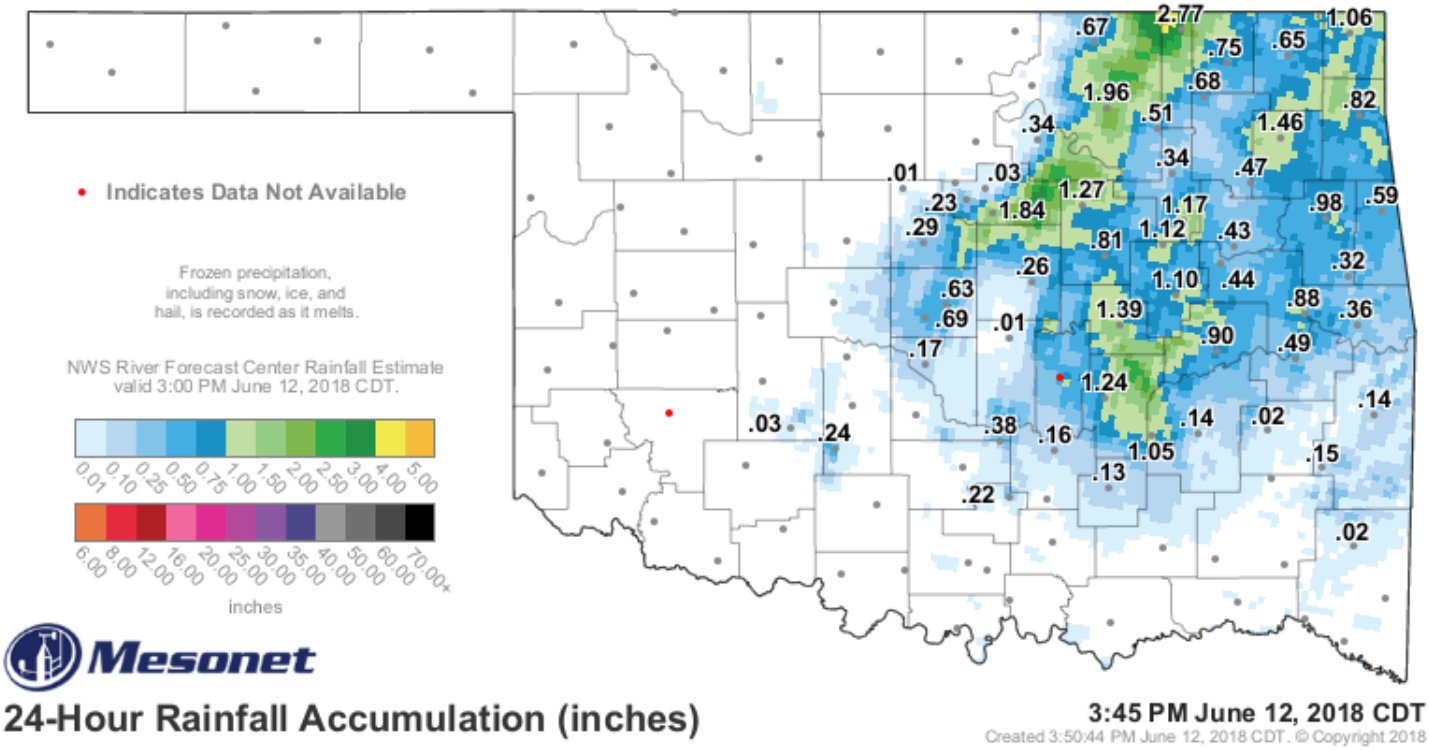


Fig. 4. 24-hour Estimated Observed Rainfall (image) and OK Mesonet measurements ending at 3:45 pm CDT 6/12/2018.

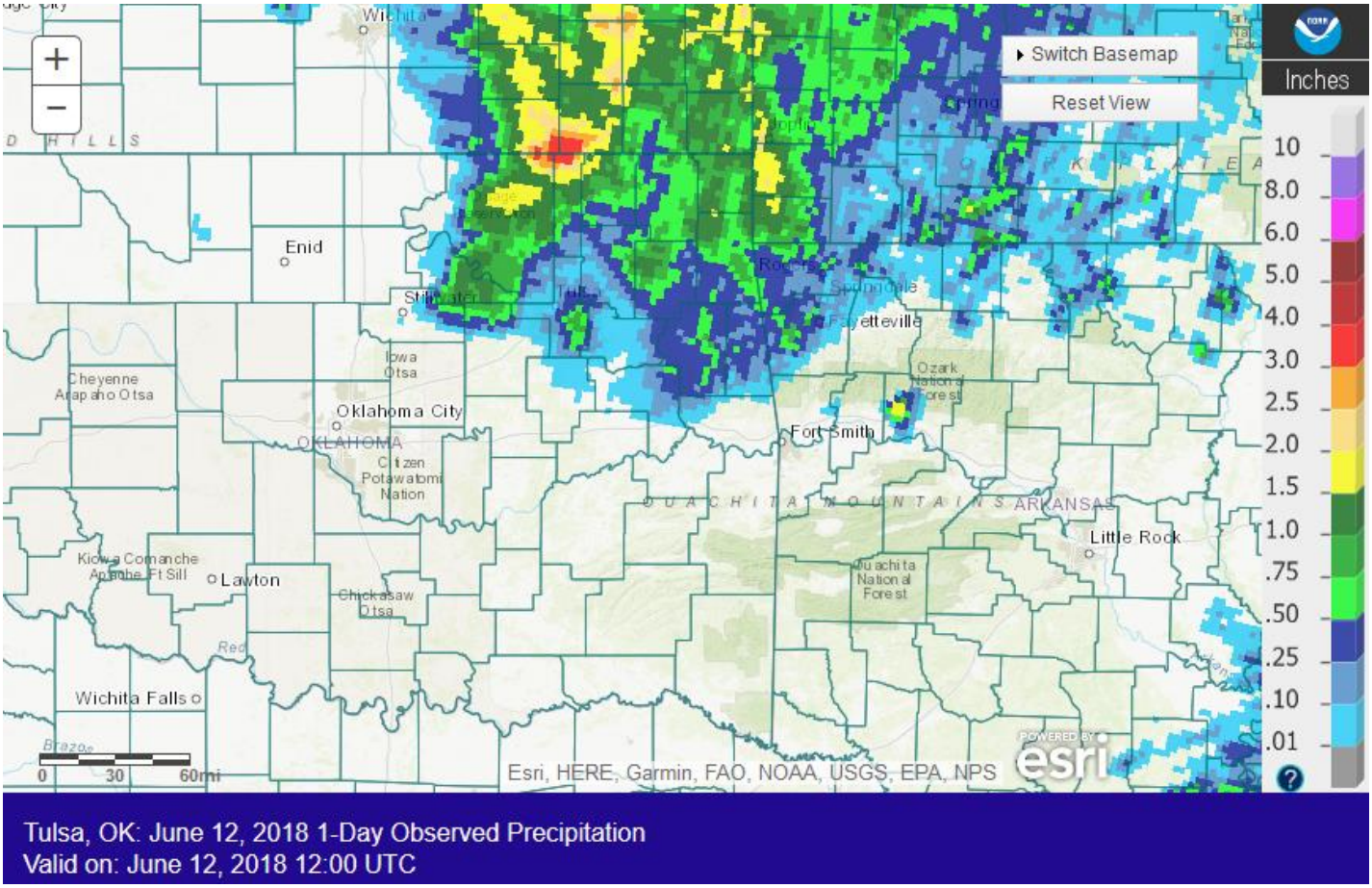


Fig. 5. 24-hour Estimated Observed Rainfall ending at 7am CDT 6/12/2018.

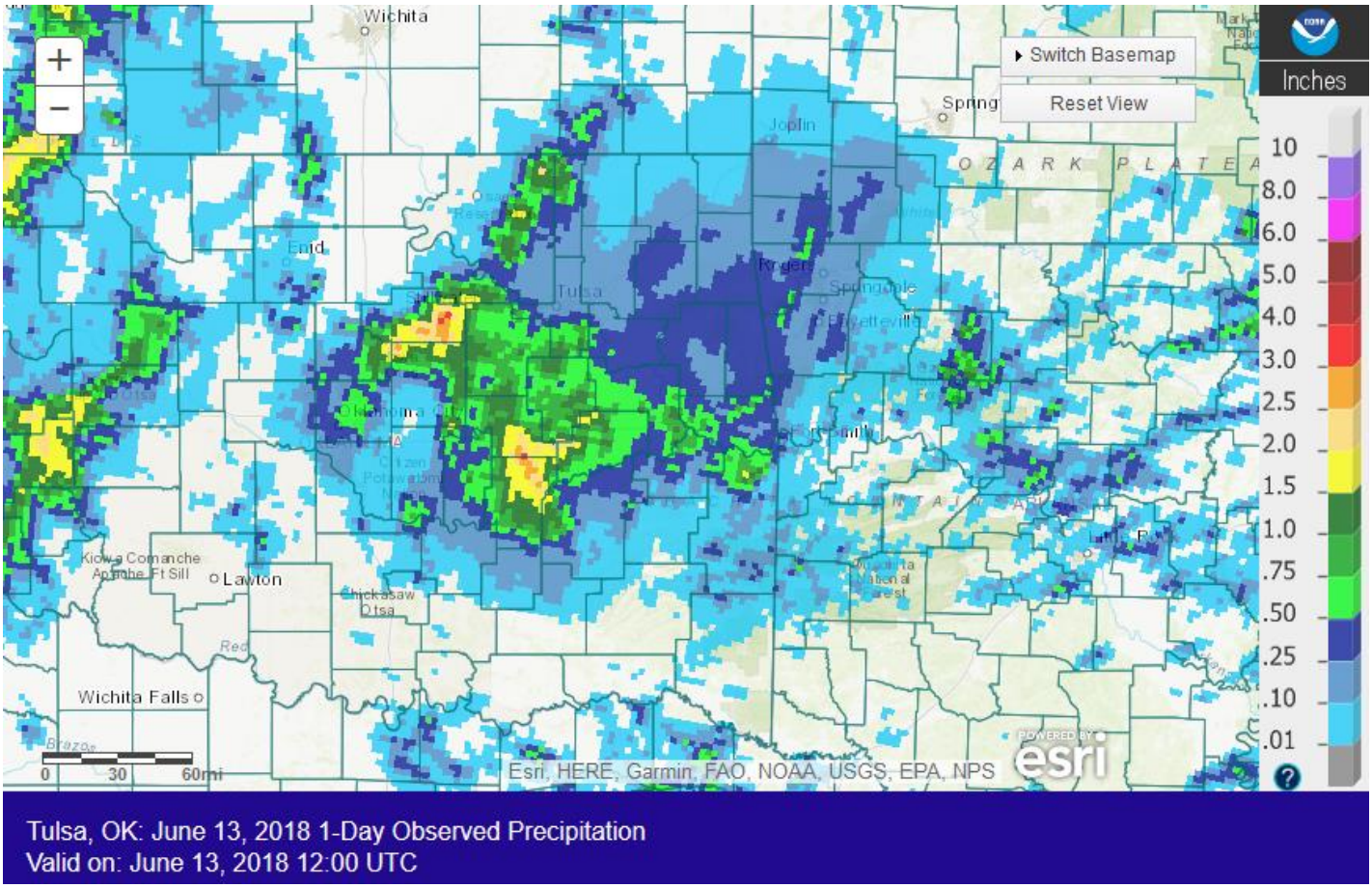


Fig. 6. 24-hour Estimated Observed Rainfall ending at 7am CDT 6/13/2018.

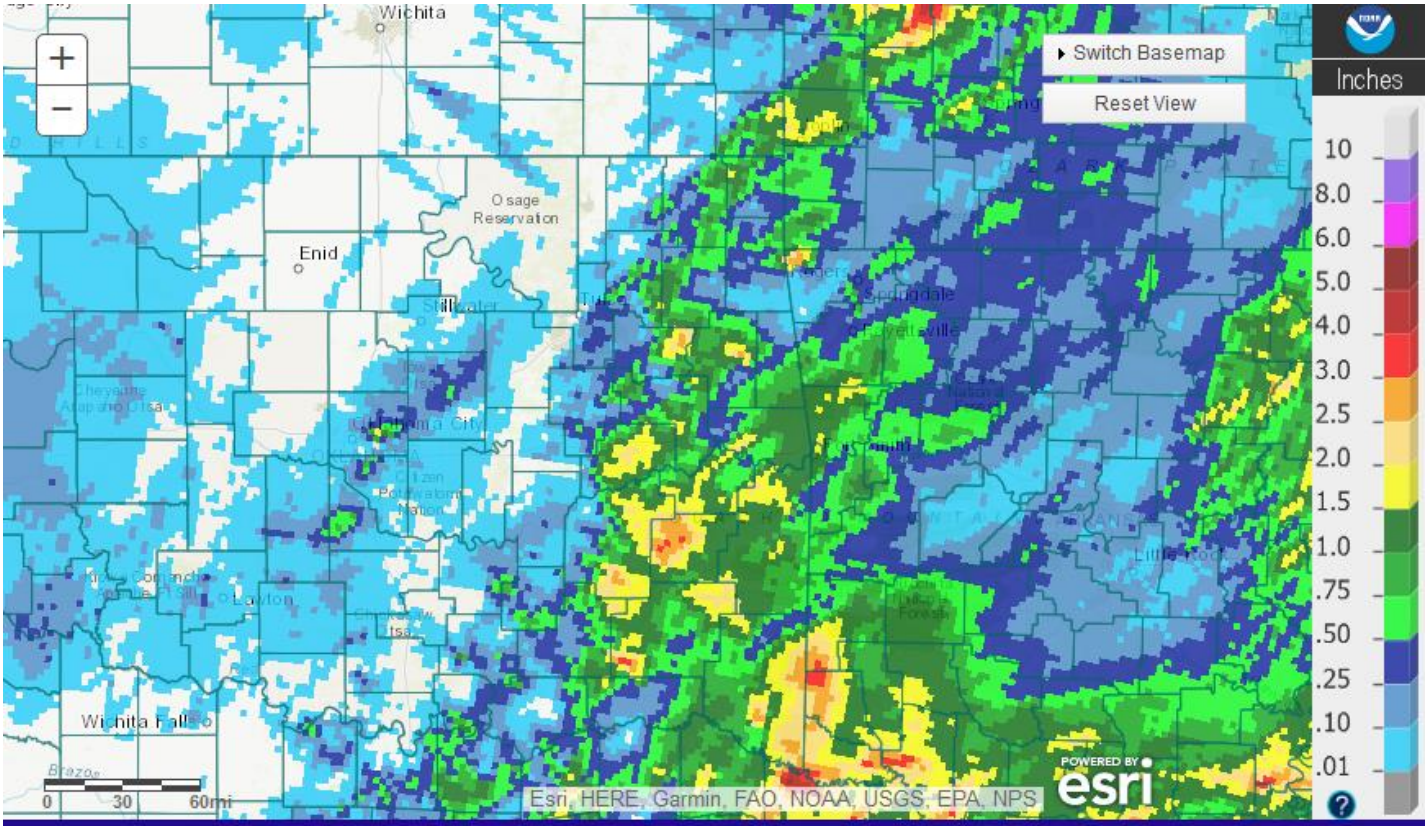


Fig. 7. 24-hour Estimated Observed Rainfall ending at 7am CDT 6/21/2018.

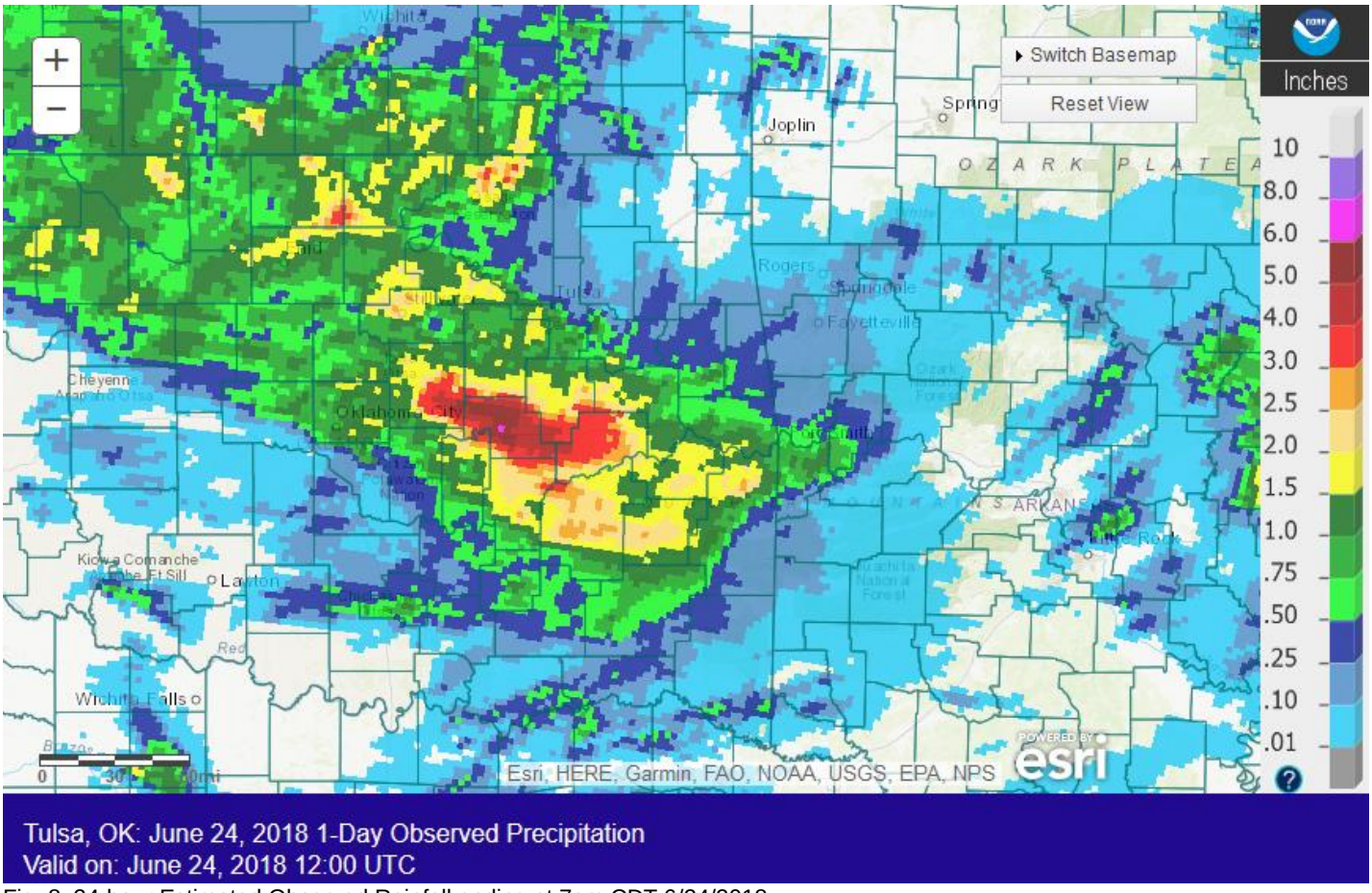


Fig. 8. 24-hour Estimated Observed Rainfall ending at 7am CDT 6/24/2018.

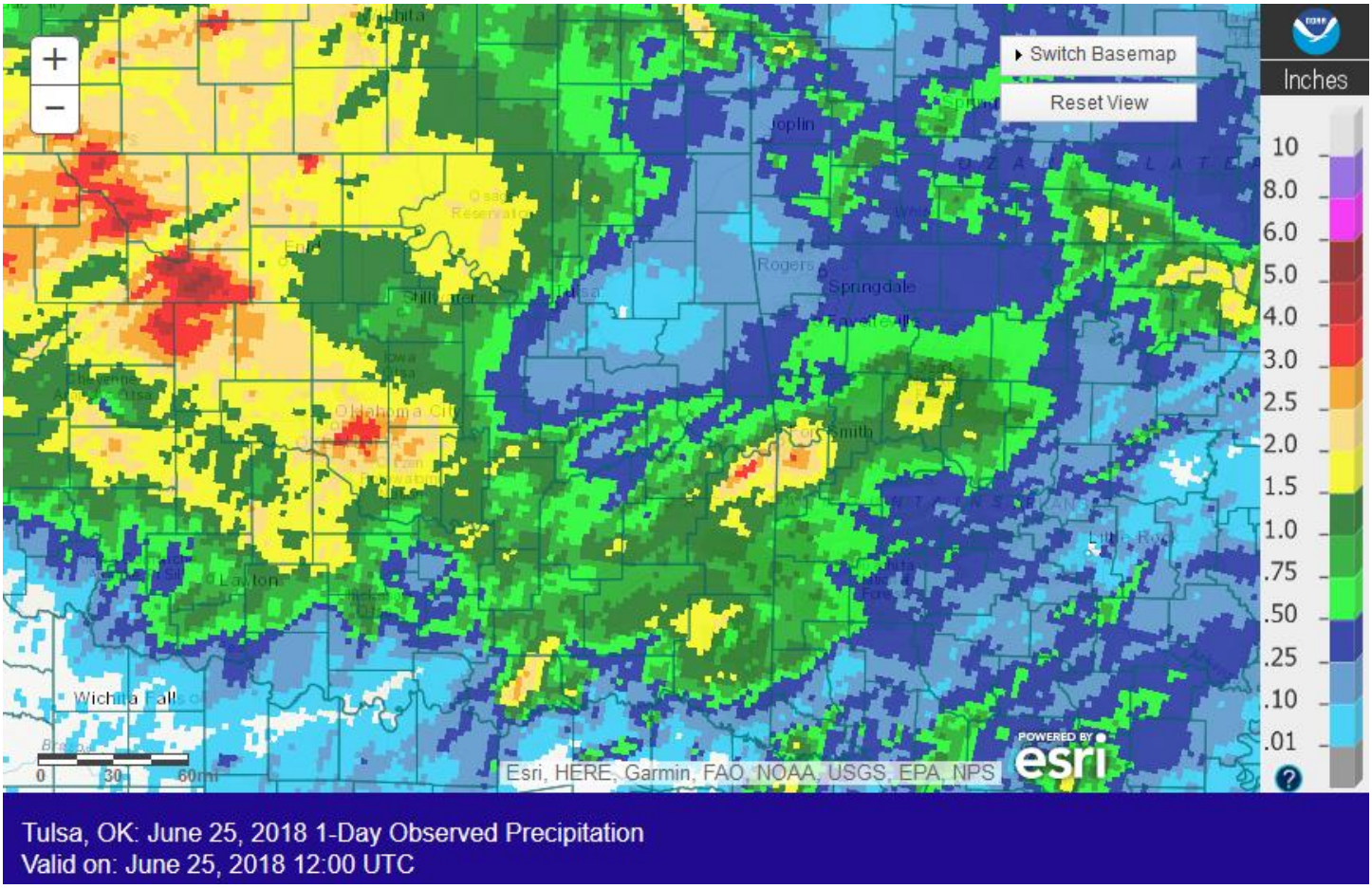


Fig. 9. 24-hour Estimated Observed Rainfall ending at 7am CDT 6/25/2018.

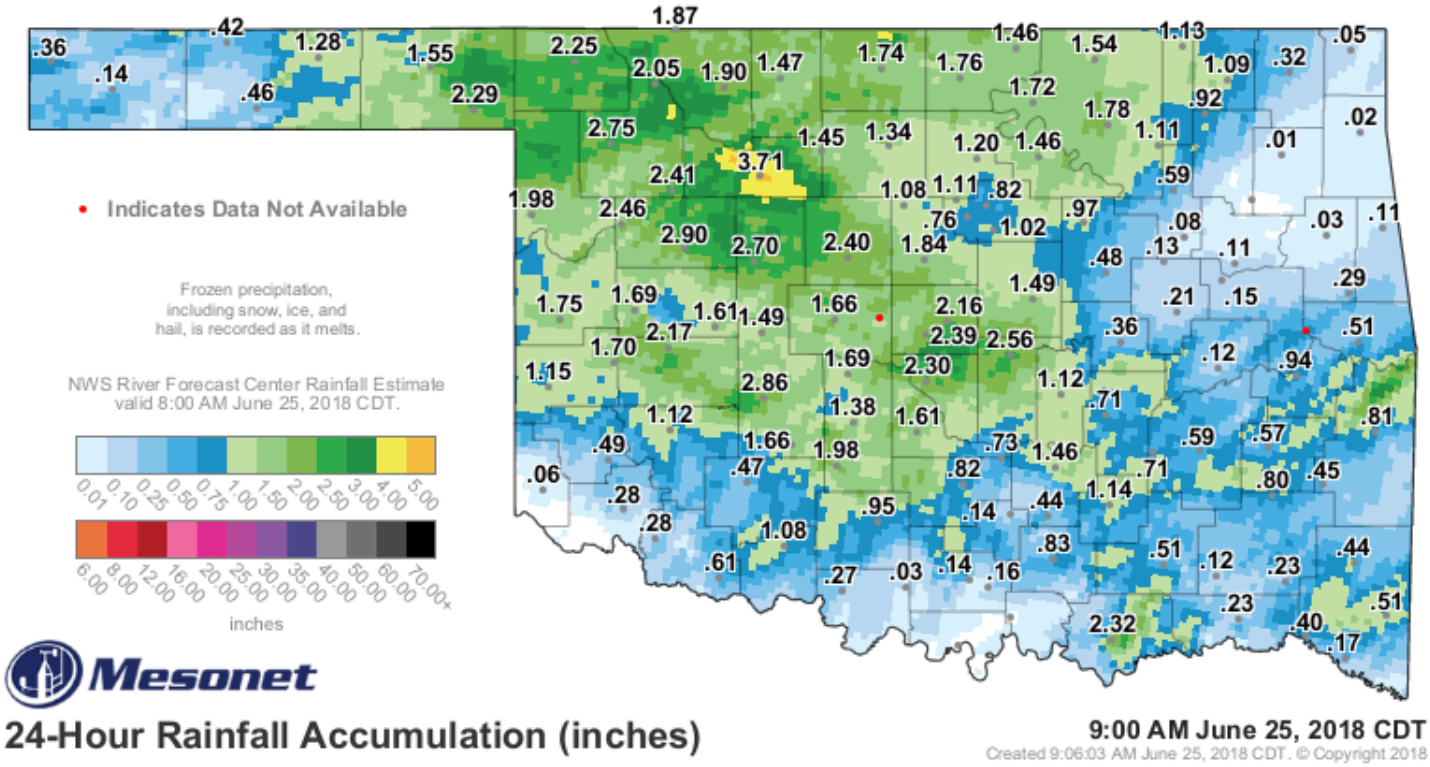


Fig. 10. 24-hour Estimated Observed Rainfall (image) and OK Mesonet measurements ending at 9:00 am CDT 6/25/2018.

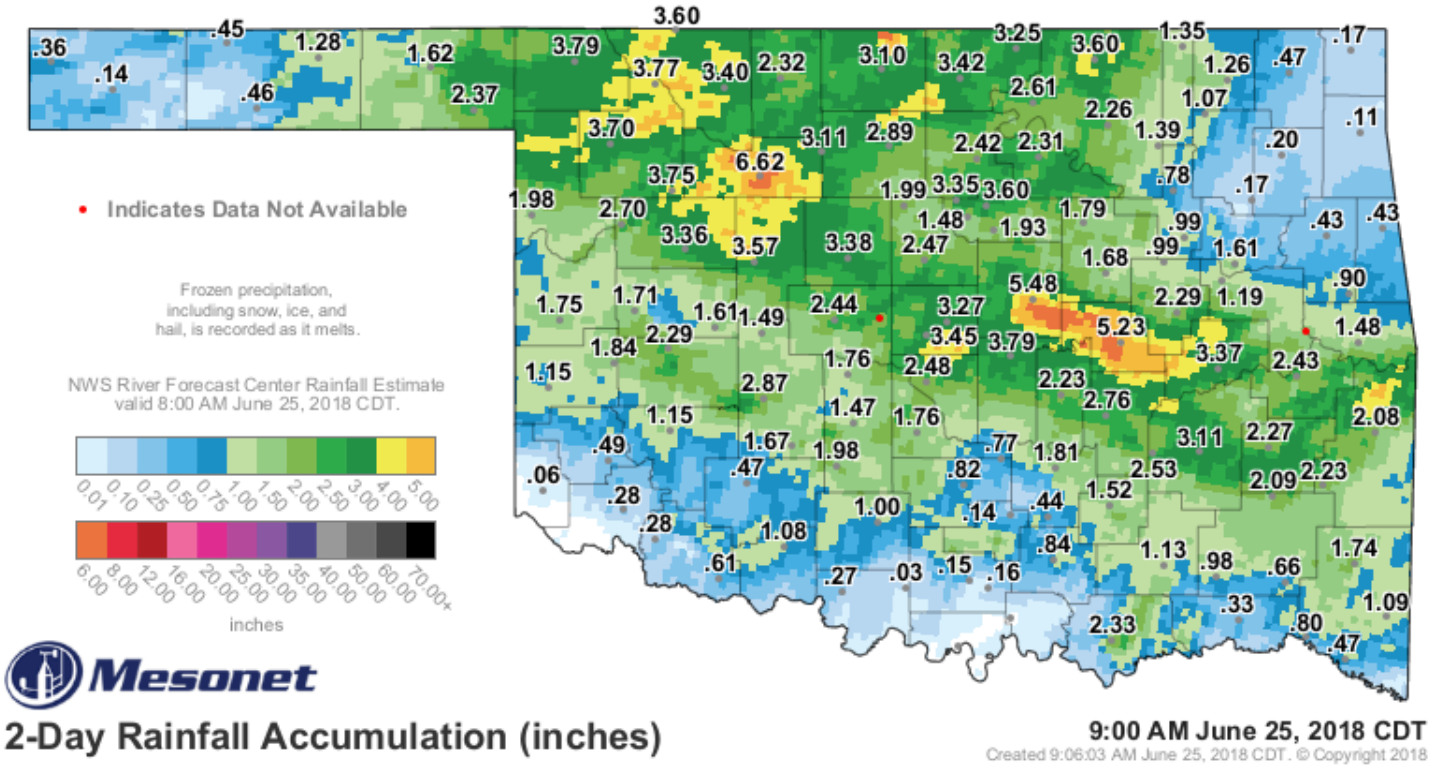


Fig. 11. 2-Day Estimated Observed Rainfall (image) and OK Mesonet measurements ending at 9:00 am CDT 6/25/2018.

Written by:

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WFO Tulsa

Products issued in June 2018:

*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

2 Flash Flood Warnings (FFW)
1 Flash Flood Statements (FFS)
0 Flash/Areal Flood Watches (FFA) (0 Watch FFA CON/EXT/EXA/EXB/CAN)
11 Urban and Small Stream Advisories (FLS)
1 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