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 **December** YEAR **2017**
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 **January 17, 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.

Despite very cold temperatures at the end of the month, December 2017 was above normal for temperatures and below normal rainfall. Normal precipitation for December ranges from 1.5 inches in Pawnee County to 3.2 inches in Haskell County. Normal precipitation for the Ozark region of northwest Arkansas averages 3.2 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 December 2017 ranged from around 0.10" to around 5" from northwest to southeast across eastern OK and northwest AR. This corresponds to less than 5% to 125% of the normal December rainfall (Fig. 1b) from northwest to southeast across eastern OK and northwest AR.

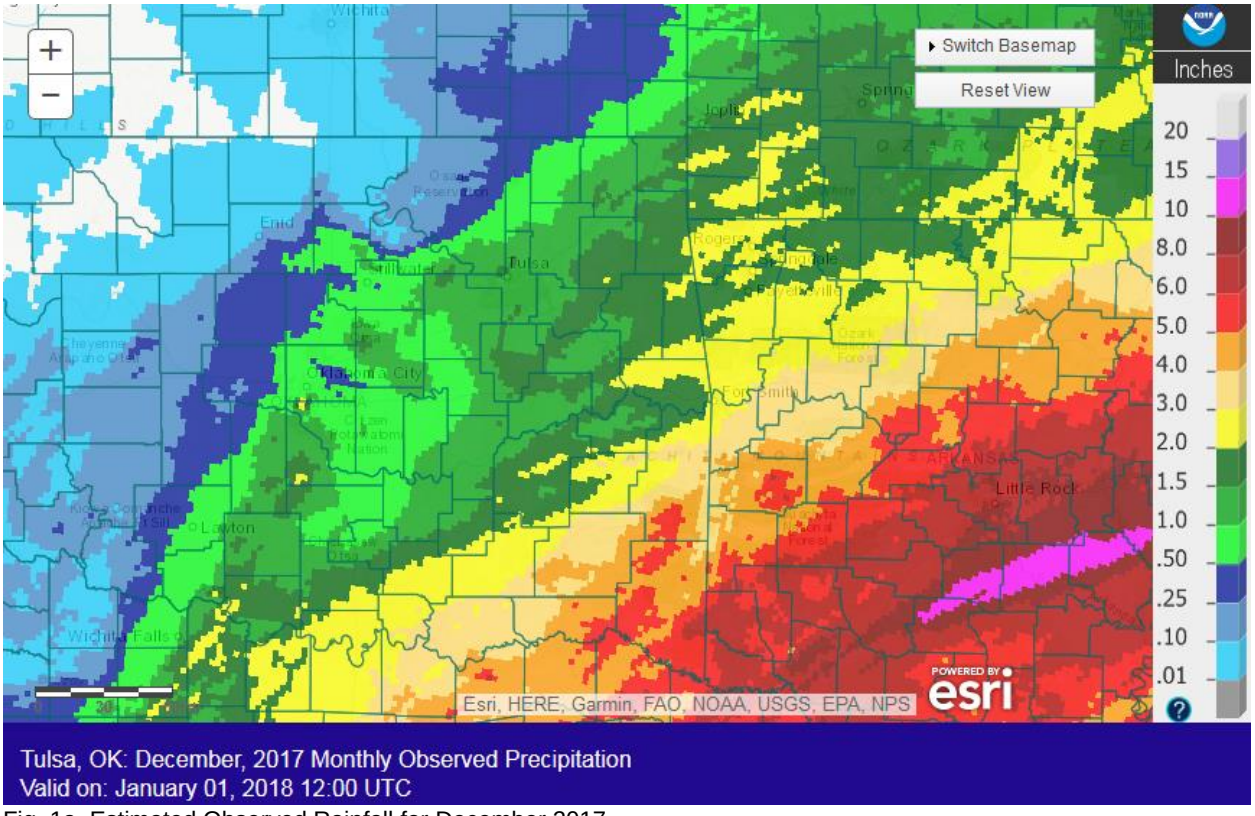


Fig. 1a. Estimated Observed Rainfall for December 2017

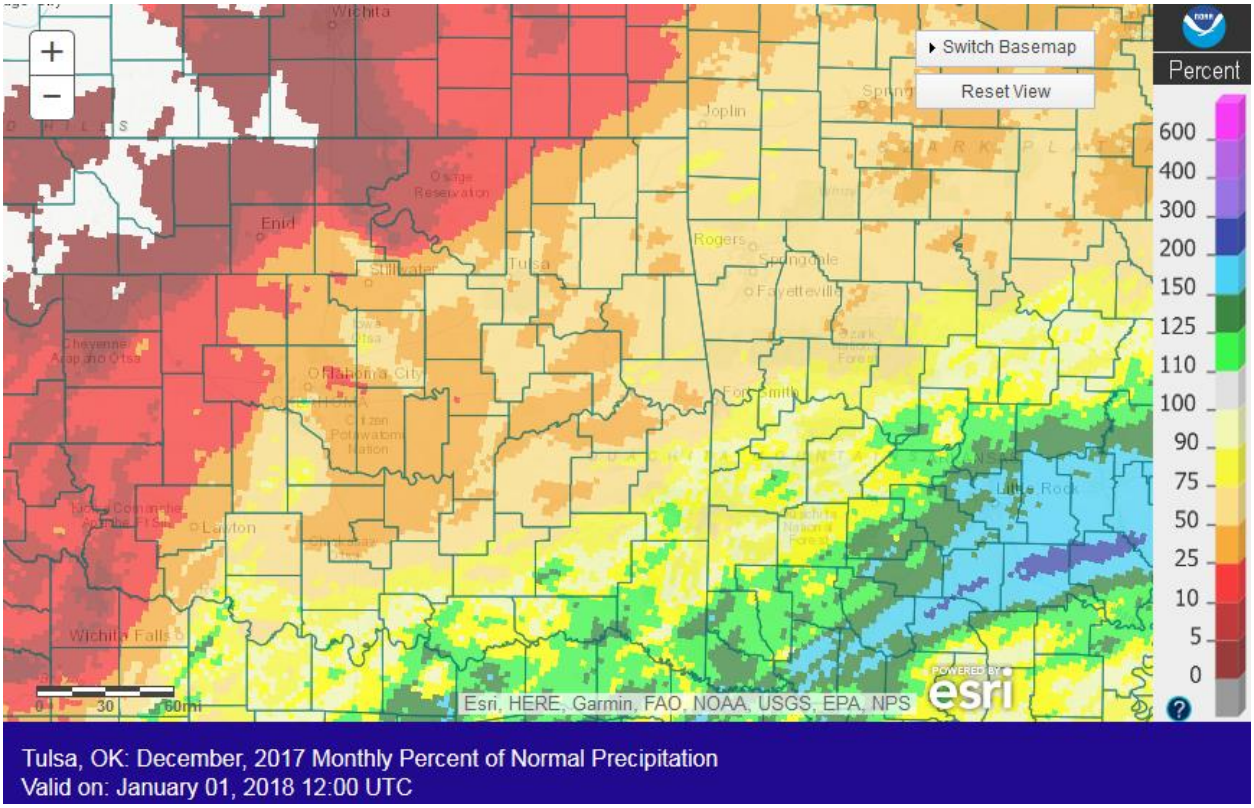


Fig. 1b. Estimated % of Normal Rainfall for December 2017

In Tulsa, OK, December 2017 ranked as the 46th warmest December (41.7°F, tied 1949, 1920; since records began in 1905), the 60th driest December (1.43", tied 1916; since records began in 1888), and the 30th snowiest December (2.0", tied 2014, 1989, 1961; since records began in 1900). Fort Smith, AR had the 55th warmest December (42.9°F, tied 1942; since records began in 1882) and the 60th driest December (2.28"; since records began in 1882). A trace of snow fell in December, tying several other years. Fayetteville, AR had the 26th coldest (37.9°F, tied 1990), the 25th driest (1.91"), and the 28th snowiest (0.4", tied 1996) December since records began in 1949.

Some of the larger precipitation reports (in inches) for December 2017 included:

Hugo, OK (meso)	4.40	Cloudy, OK (meso)	4.37	Antlers, OK (meso)	4.03
Antlers, OK (coop)	3.87	Ozark, AR (coop)	3.60	Charleston 1.7E, AR (coco)	3.38
Clayton, OK (meso)	3.35	Talihina, OK (meso)	3.31	Greenwood 1.4W, AR (coco)	3.26
				Wister, OK (meso)	3.26

Some of the lowest precipitation reports (in inches) for December 2017 included:

Ralston, OK (coop)	0.07	Pawnee, OK (meso)	0.09	Burbank, OK (meso)	0.09
Foraker, OK (meso)	0.17	Hulah 5.3WSW, OK (coco)	0.21	Wynona, OK (meso)	0.24
Bartlesville, OK (ASOS)	0.29	Copan, OK (meso)	0.36	Ochelata 5.6N, OK (coco)	0.41

Annual Summary

In Tulsa, OK, Year 2017 ranked as the 9th warmest year (63.0°F, tied 1990; since records began in 1905), the 25th wettest year (46.03"; since records began in 1888), and the 22nd least snowy year (2.2"; since records began in 1900). Fort Smith, AR had the 3rd warmest year (64.4°F, tied 2016, 2011; since records began in 1883), the 31st wettest year (47.96"; since records began in 1882), and the 40th least snowy (2.0", tied 1996, 1932, 1888; since records began in 1884). Fayetteville, AR had the 7th warmest (58.9°F), the 18th wettest (51.22"), and the 6th least snowy (1.1") year since records began in 1950.

Some of the larger precipitation reports (in inches) for Year 2017 included:

Springdale 6.4WSW, AR (coco)	62.88	Bentonville 6.6SSW, AR (coco)	61.16	Jay 3.3NNE, OK (coco)	59.87
Hindsville 10NNE, AR (coop)	59.58	Farmington 0.6WSW, AR (coco)	59.52	Winslow 7NE, AR (coop)	59.45
Hindsville 7.1NW, AR (coco)	58.76	Vian 5.3ENE, OK (coco)	58.33	Holiday Island 1.3SSW, AR (coco)	58.05

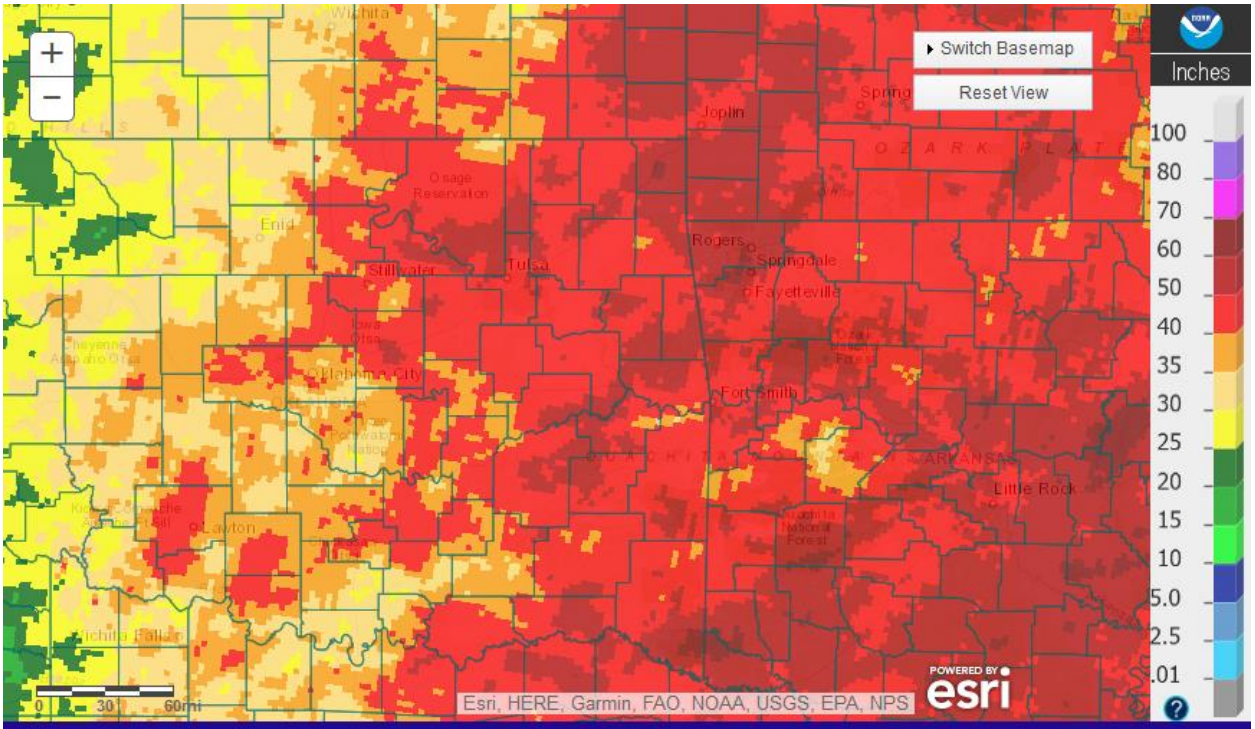


Fig. 2a. Estimated Observed Rainfall for Year 2017

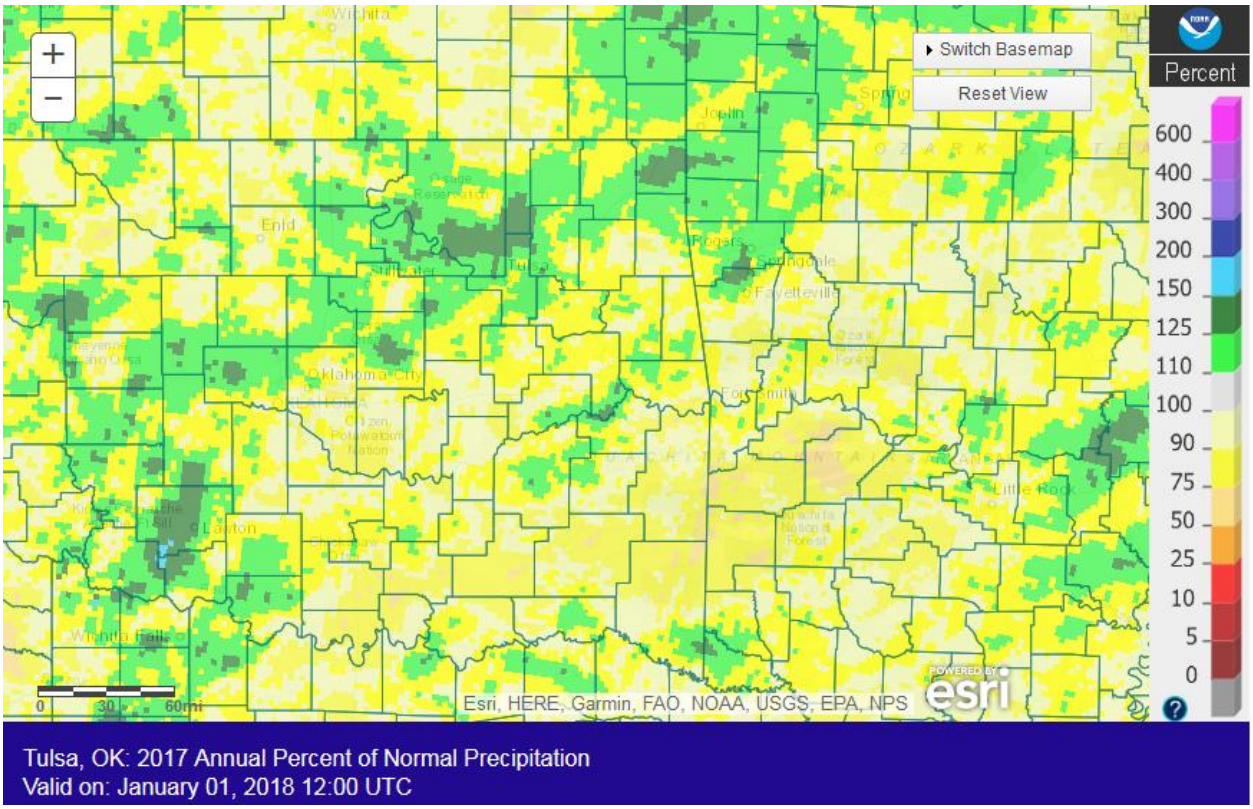
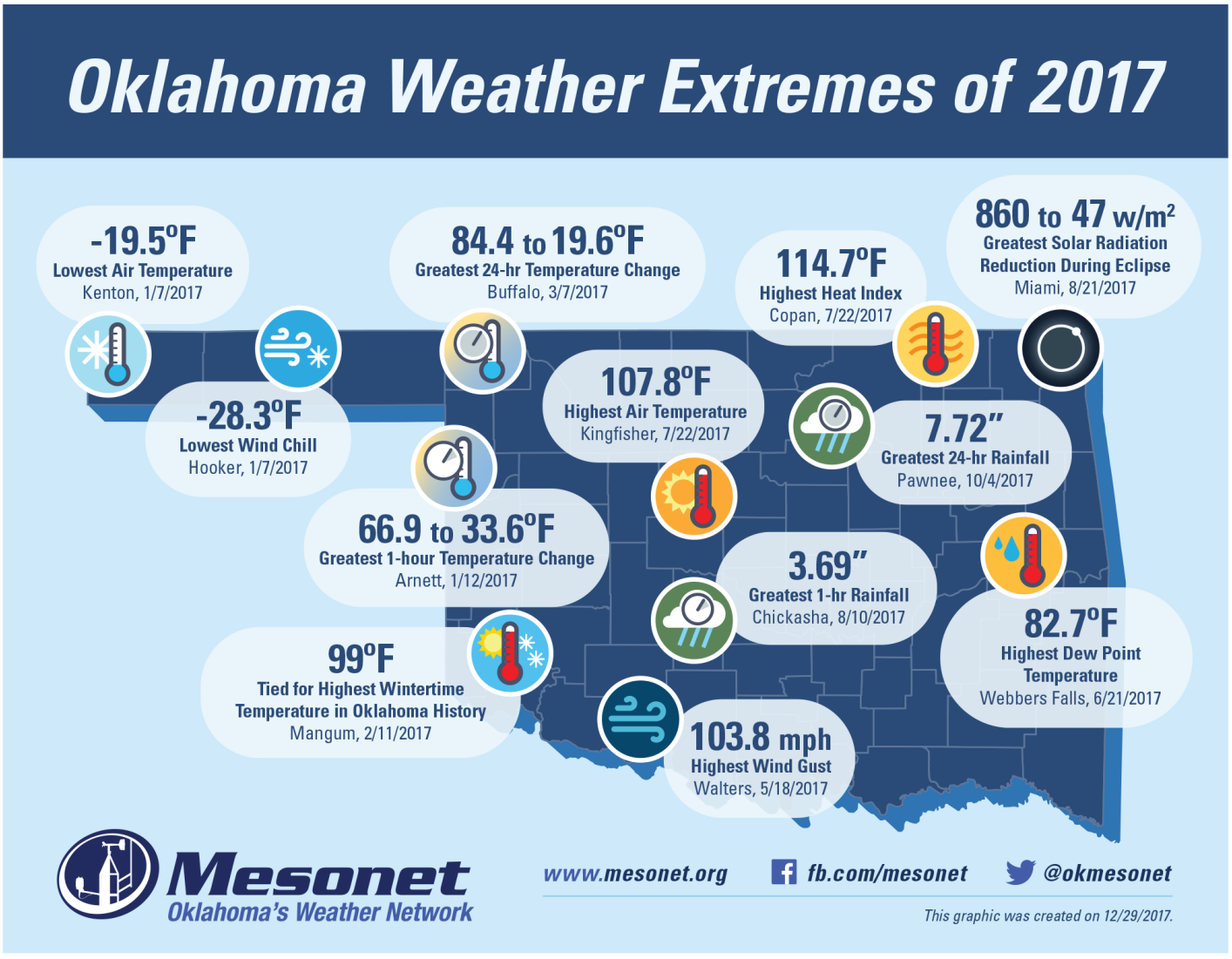


Fig. 2b. Estimated % of Normal Rainfall for Year 2017

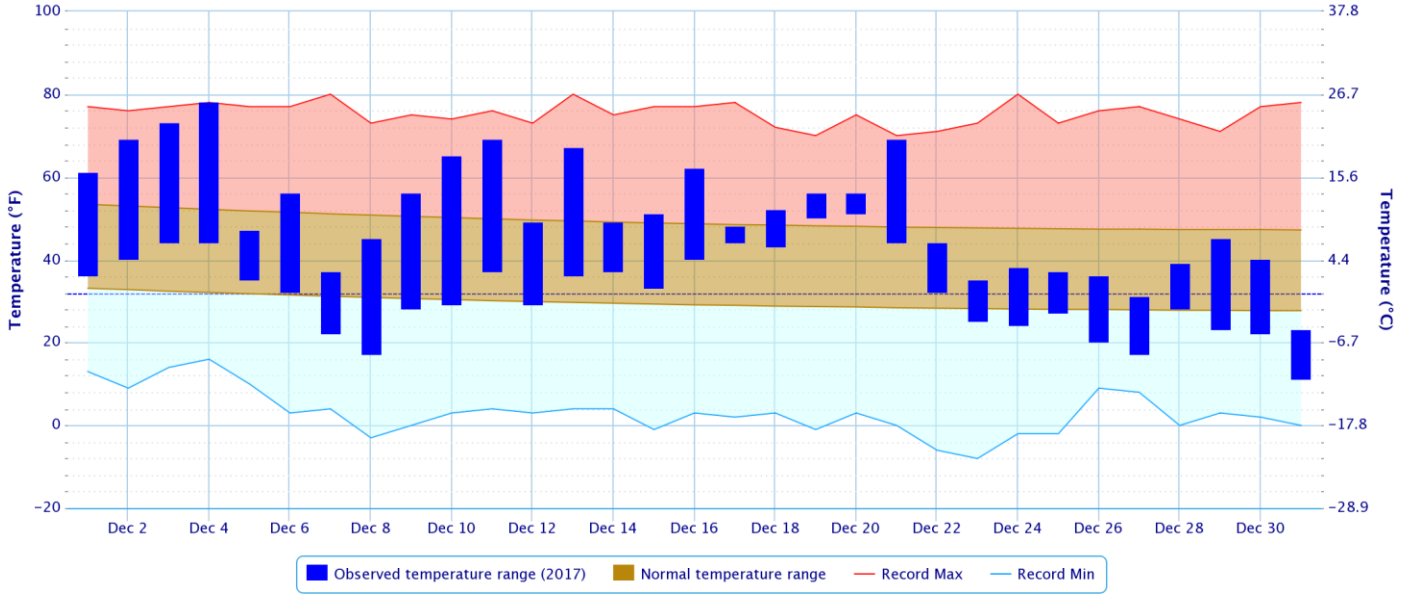
According to statistics from the Oklahoma Climatological Survey (OCS) Mesonet:

Rank since 1921	December 2017	Water-Year-to-Date (Oct 1–Dec 31)	Cool Growing Season (Sep 1 – Dec 31)	Last 60 Days (Nov 2 – Dec 31)	Last 180 Days (Jul 5 – Dec 31)	Year 2017 (Jan 1 – Dec 31)
Northeast OK	24th driest	46th driest	28th driest	**7th driest**	44th driest	14th wettest
East Central OK	35th driest	25th driest	13th driest	**8th driest**	34th driest	20th wettest
Southeast OK	38th wettest	23rd driest	**9th driest**	19th driest	38th driest	49th wettest
Statewide	29th driest	23rd driest	18th driest	**6th driest**	48th driest	25th wettest



Daily Temperature Data – Tulsa Area, OK (ThreadEx)

Period of Record – 1905-01-06 to 2018-01-03. Normals period: 1981-2010. Click and drag to zoom chart.



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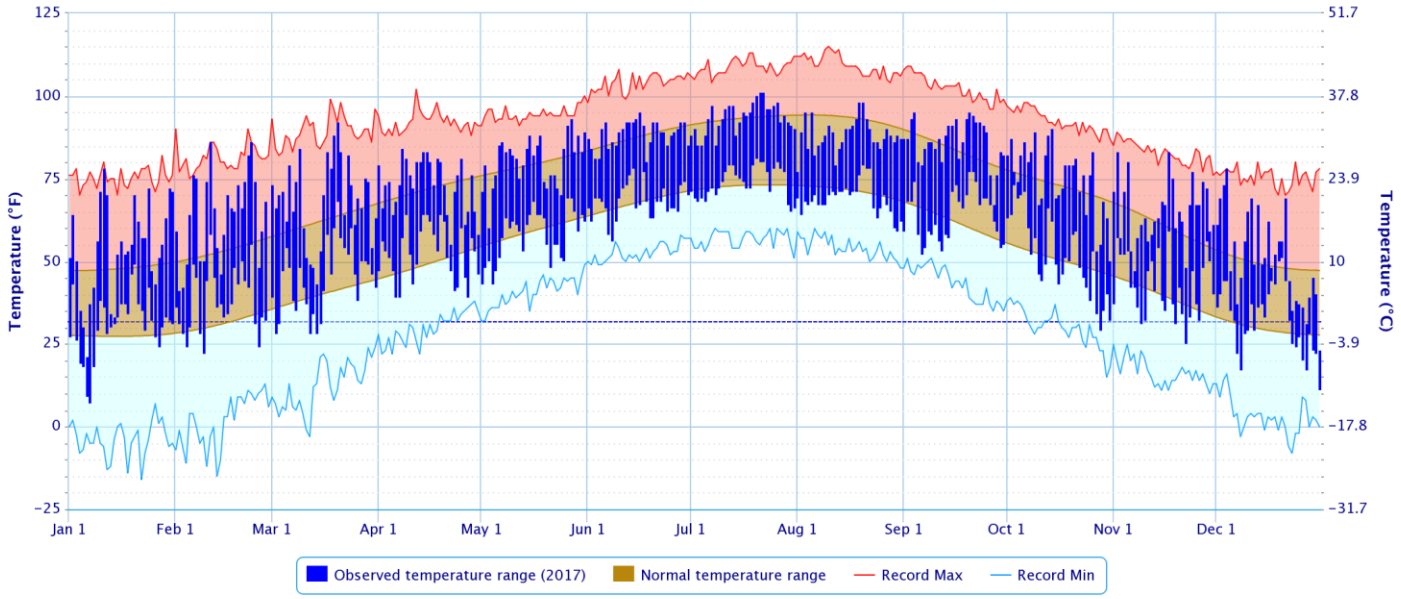
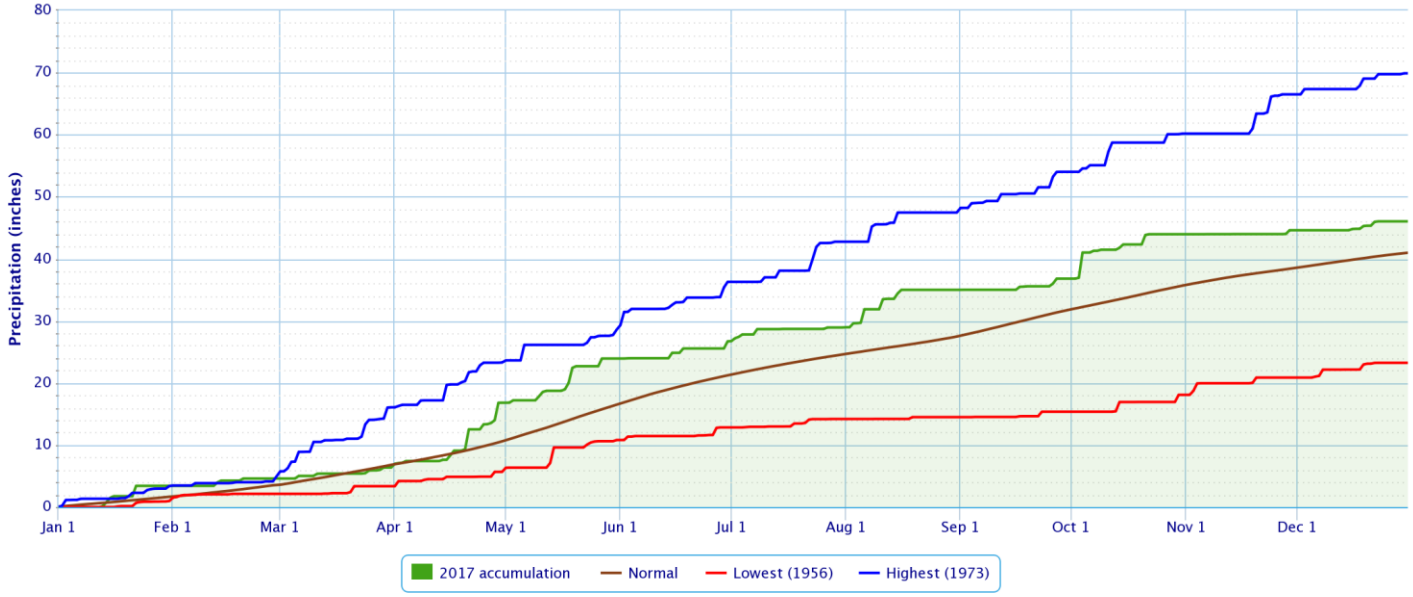


Powered by ACIS

Accumulated Precipitation – Tulsa Area, OK (ThreadEx)

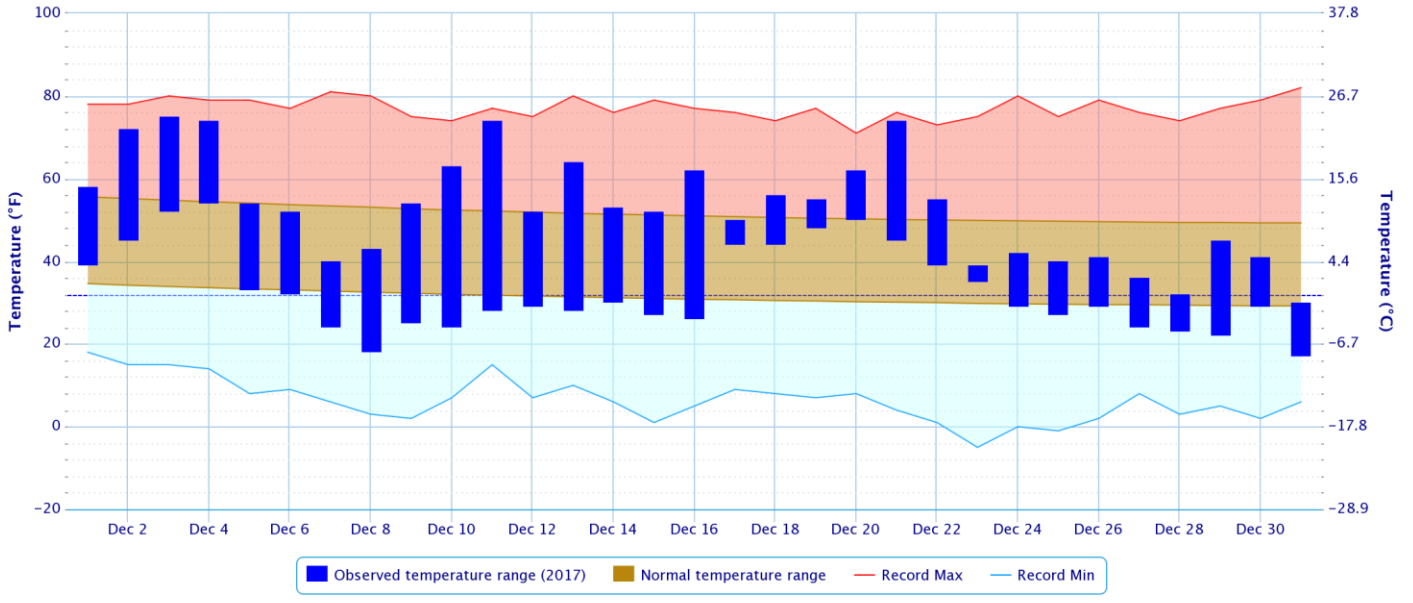
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

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

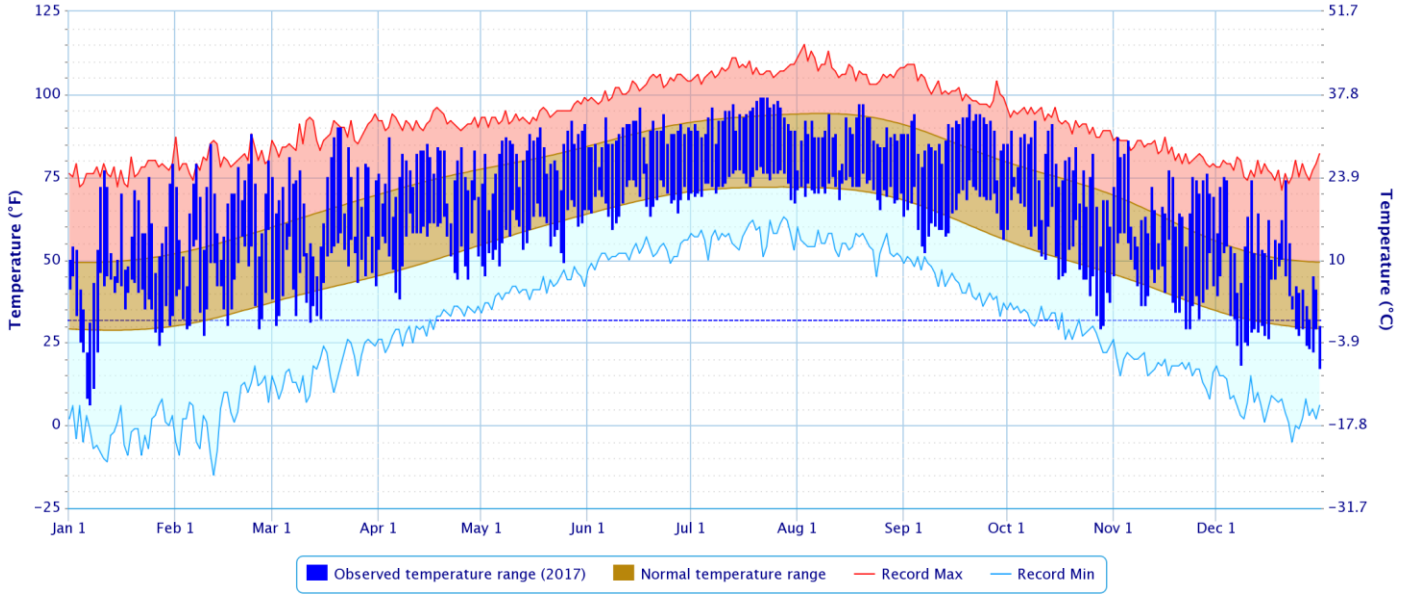
Period of Record – 1882-06-01 to 2018-01-03. Normals period: 1981-2010. Click and drag to zoom chart.



Powered by ACIS

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

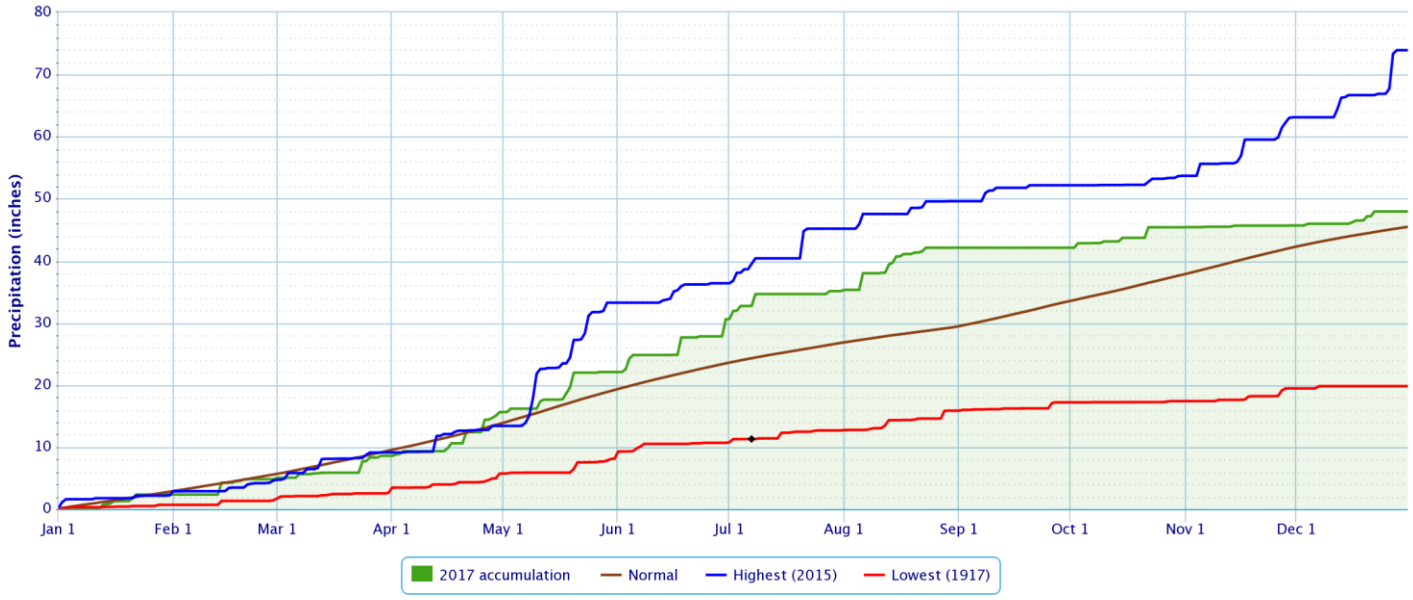
Period of Record – 1882-06-01 to 2018-01-03. Normals period: 1981-2010. Click and drag to zoom chart.



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



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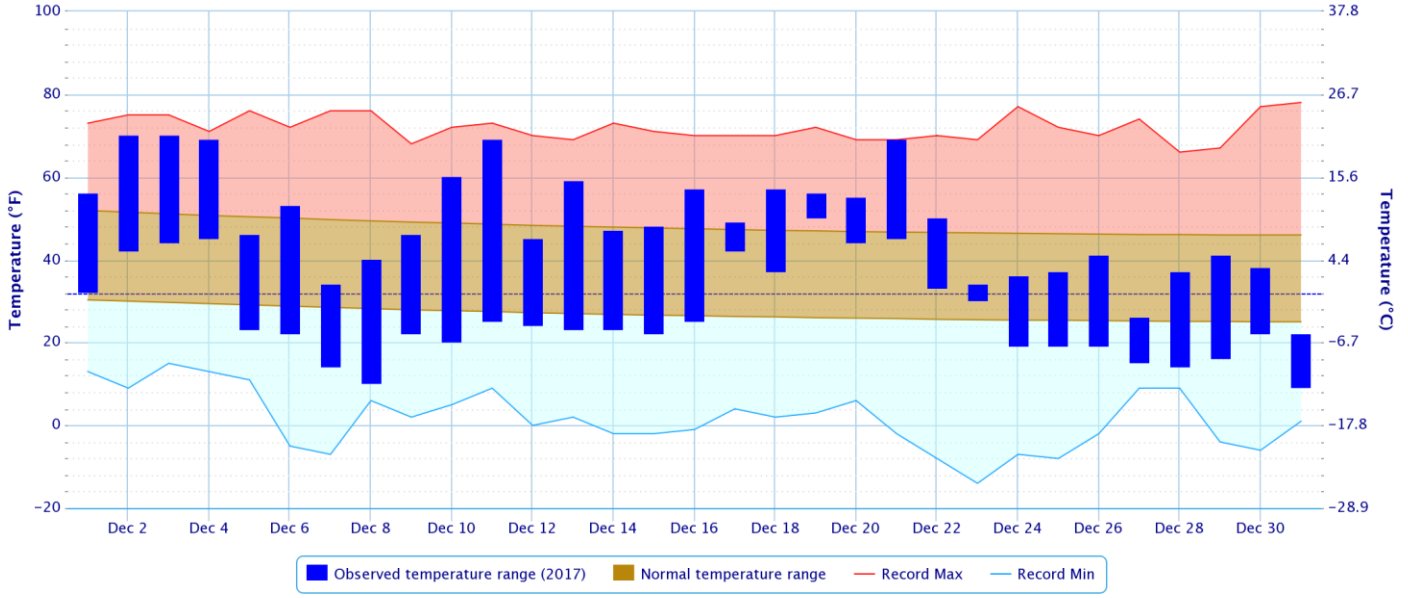
Daily Temperature Data – FAYETTEVILLE DRAKE FIELD, AR

Period of Record – 1949-07-14 to 2018-01-03. Normals period: 1981-2010. Click and drag to zoom chart.



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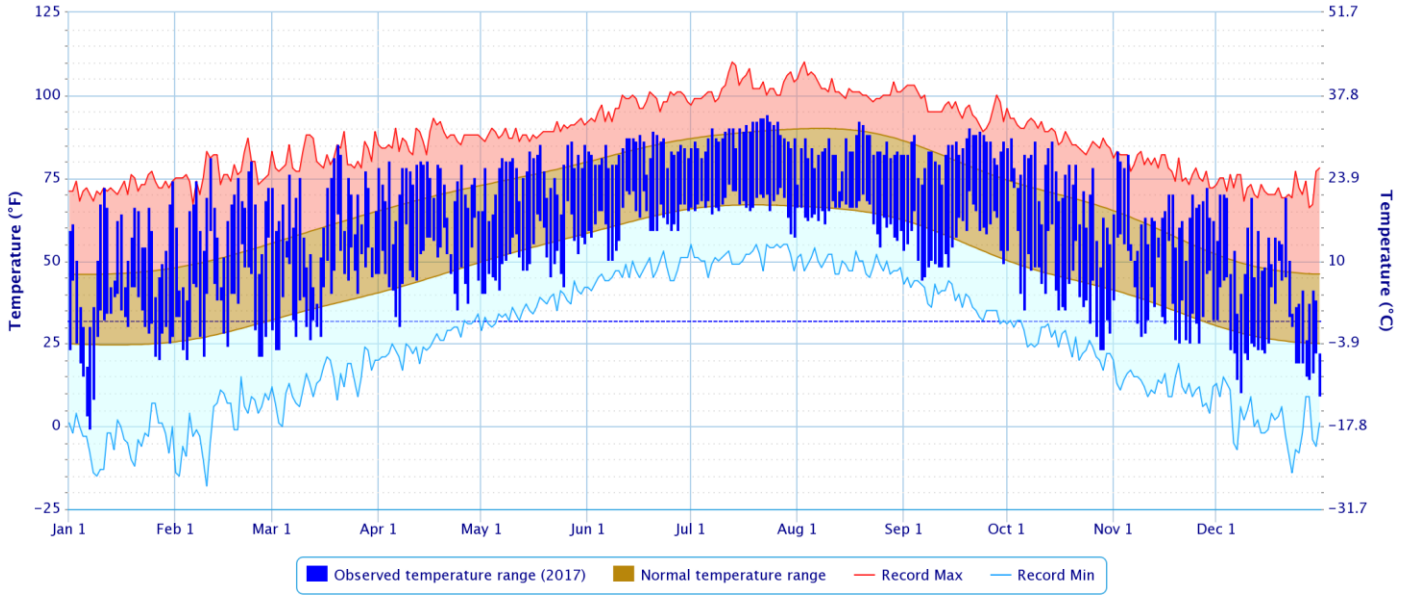
Daily Temperature Data – FAYETTEVILLE DRAKE FIELD, AR

Period of Record – 1949-07-14 to 2018-01-03. Normals period: 1981-2010. Click and drag to zoom chart.



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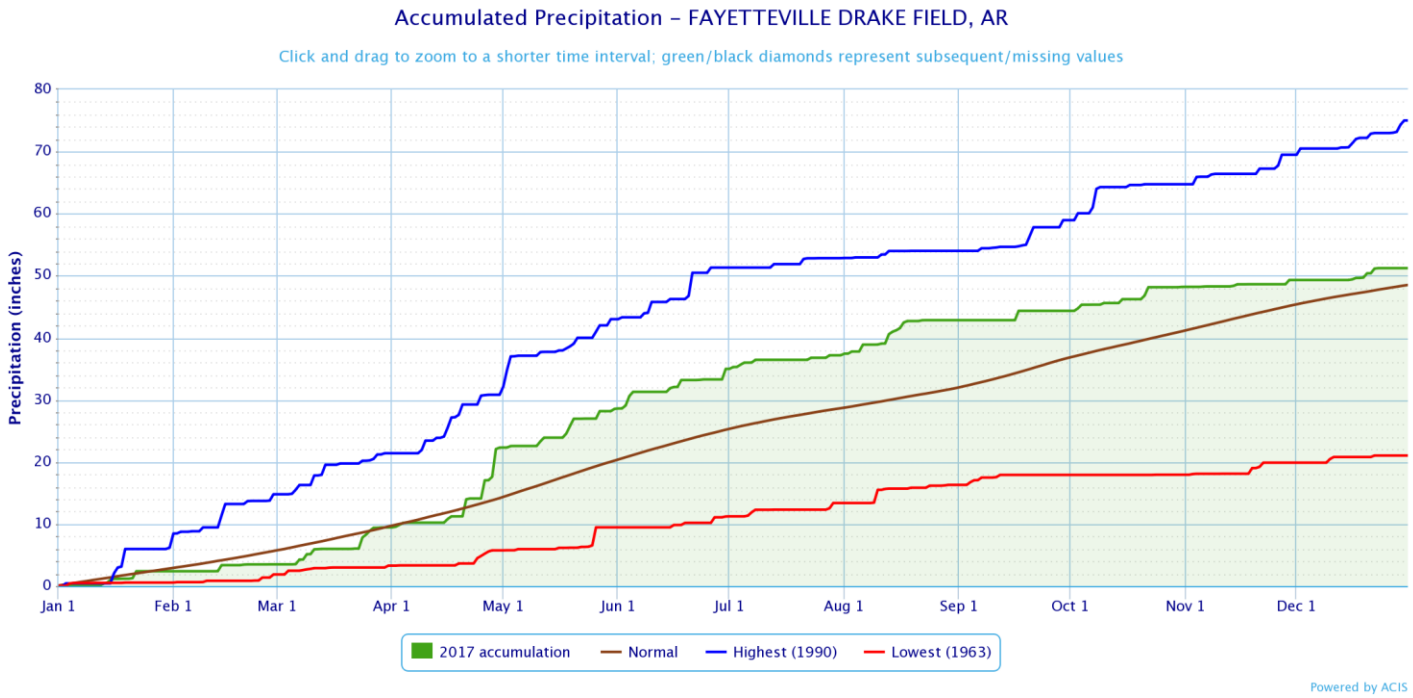


Drought

According to the U.S. Drought Monitor (USDM) from January 2, 2018 (Figs. 3, 4), Severe Drought (D2) impacted parts of Cherokee, Adair, Muskogee, Sequoyah, Haskell, Le Flore, Latimer, Pittsburg, McIntosh, and Okfuskee Counties in eastern OK and Washington, Madison, Crawford, Sebastian, and Franklin Counties in northwest AR. Moderate (D1) drought conditions were present across portions of Delaware, Mayes, Cherokee, Adair, Muskogee, Wagoner, Okmulgee, Creek, Okfuskee, Le Flore, Pushmataha, and Choctaw Counties in eastern OK and Benton, Carroll, Madison, and Washington Counties in northwest AR. Abnormally dry, but not in drought, (D0) conditions were occurring over portions of Ottawa, Delaware, Craig, Mayes, Wagoner, Rogers, Nowata, Washington, Tulsa, Creek, Pawnee, and Osage Counties in eastern Oklahoma, and Benton County in northwest AR.

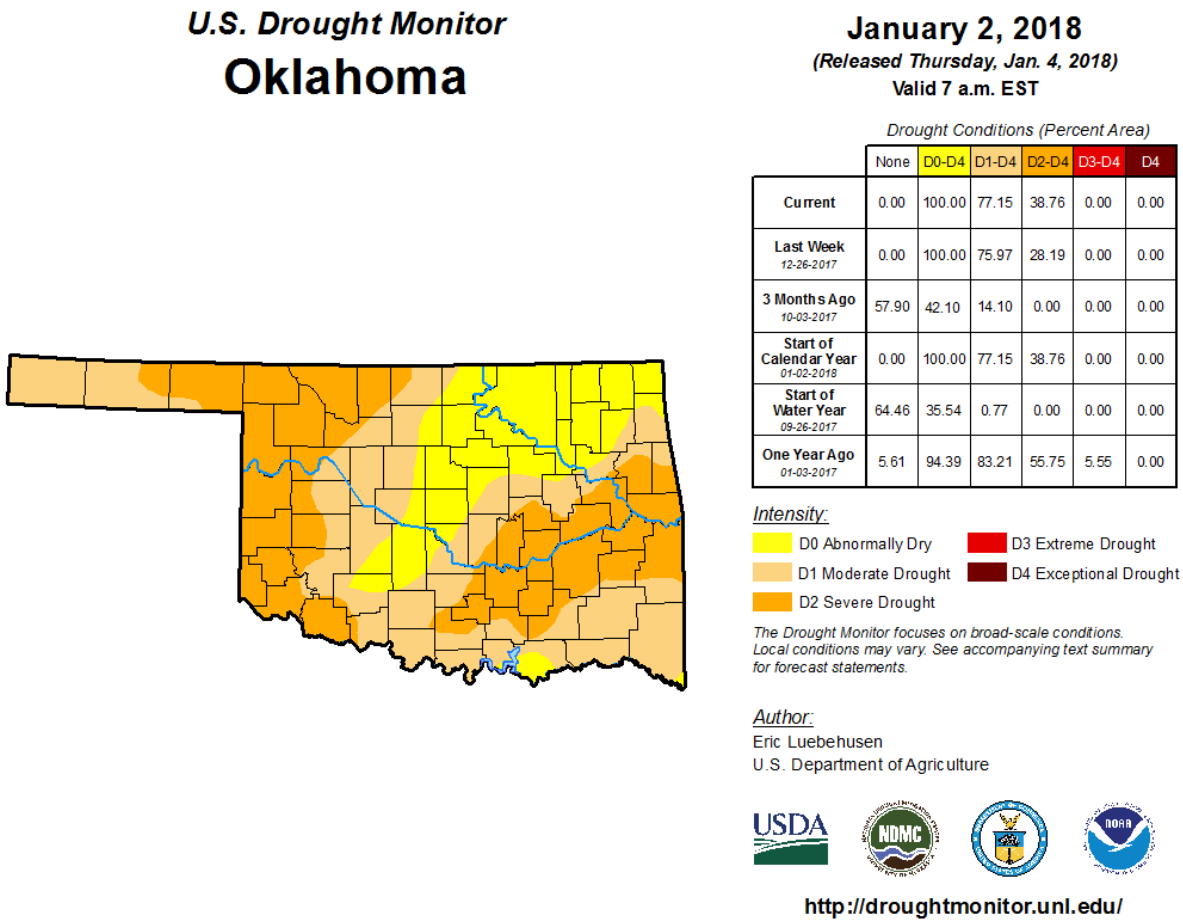


Fig. 3. Drought Monitor for Oklahoma

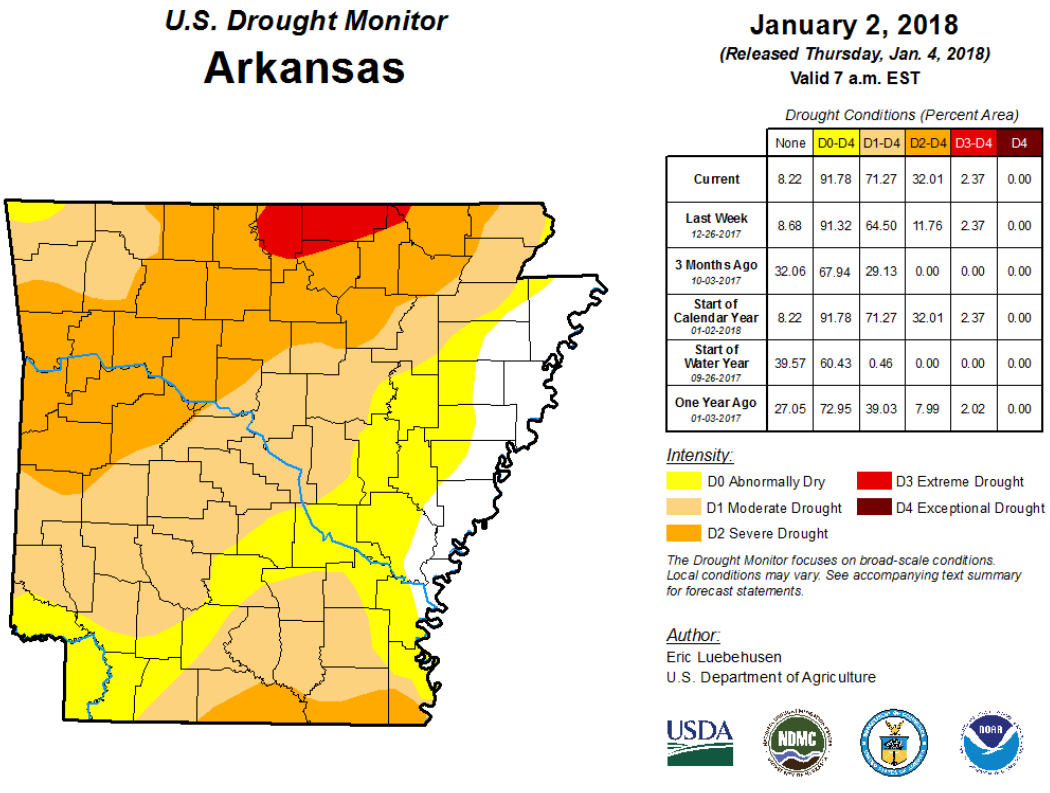
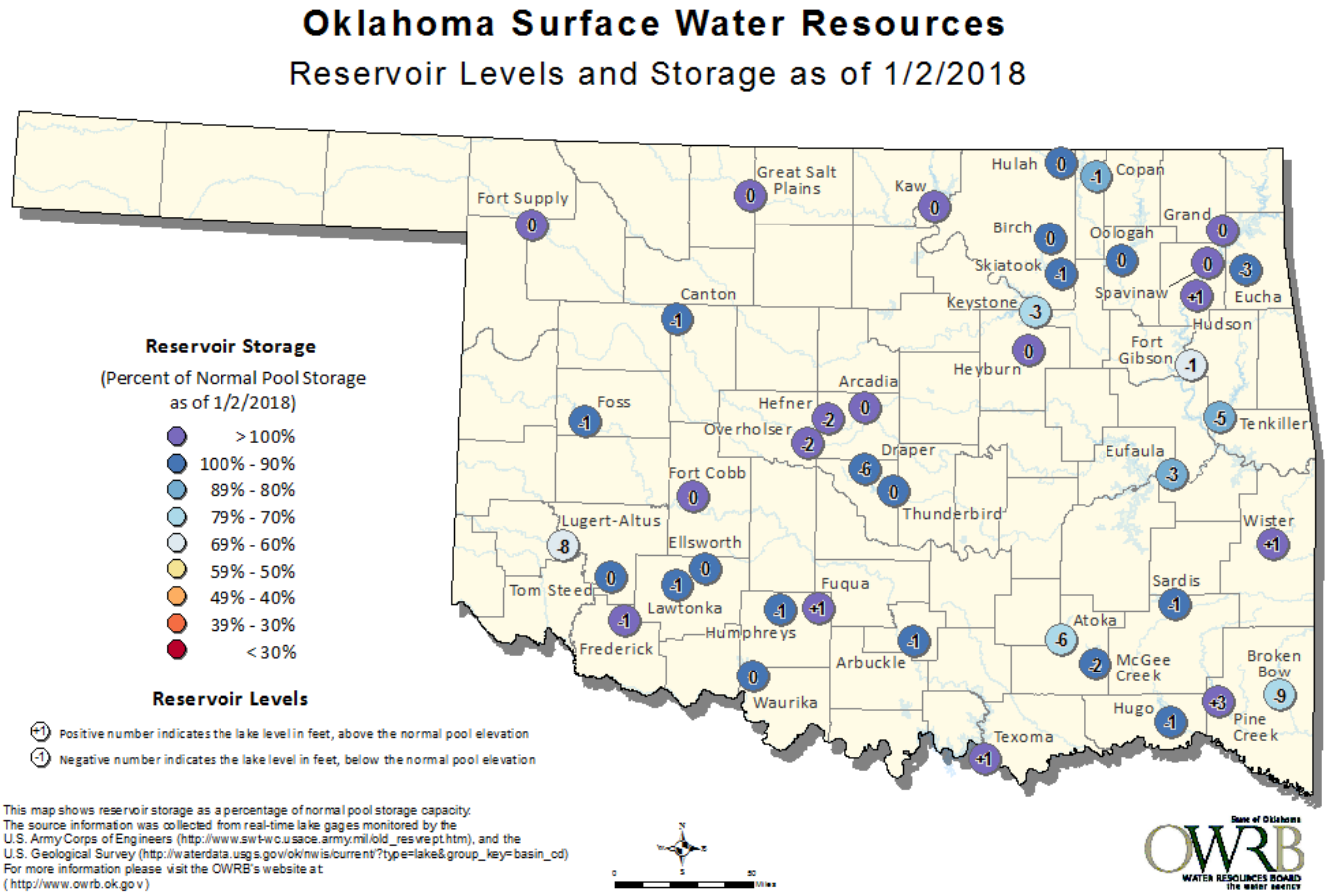


Fig. 4. Drought Monitor for Arkansas

Reservoirs



According to the USACE, most of the lakes in the HSA were ±3% of their conservation pool levels as of 1/03/2018. However, a few reservoirs were operating at more than 3% below the top of their conservation pools: Ft. Gibson Lake 62%, Keystone Lake 78%, Eufaula Lake 80%, Tenkiller Lake 84%, Beaver Lake 85%, Copan Lake 89%, Hugo Lake 94%, and Hulah Lake 96%. Hudson Lake, at 104%, was the only reservoir more than 3% above its conservation pool.

Outlooks

The Climate Prediction Center (CPC) outlook for January 2018 (issued December 31, 2017) indicates an enhanced chance for below normal temperatures across all of eastern OK and northwest AR. This outlook also indicates equal chances for above, near, and below median precipitation across far southeast OK, with a slightly enhanced chance for above median precipitation across the remainder of eastern OK and northwest AR. This outlook takes into account weather conditions forecast over the next 1-2 weeks, sub-seasonal climate signals, including the Madden-Julian Oscillation that in its current phase introduces a significant amount of uncertainty in the outlook, and influence from the weak La Niña. Of note, extratropical conditions/modes are influencing the weather over North America, so the La Niña response is not as clear.

For the 3-month period January-February-March 2018, CPC is forecasting a slightly enhanced chance for above normal temperatures across all of eastern OK and northwest AR, except along the OK/KS and AR/MO borders, where there is an equal chance for above, near, and below normal temperatures (outlook issued December 21, 2017). This outlook also indicates a slightly enhanced chance for below median precipitation across most of eastern OK and equal chances for above, near, and below median precipitation near the

OK/AR border and across northwest and west central AR. This outlook is based on both statistical and dynamical forecast tools and decadal timescale climate trends, as well as impacts from La Niña and the MJO. According to CPC, Pacific sea surface temperatures along the equator indicate La Niña conditions continue. La Niña conditions are predicted to continue through winter 2017-18, with a transition to ENSO neutral conditions during the mid- to late-spring. CPC has issued a 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

Showers and thunderstorms moved north across the Red River into southeast OK and southern AR on the 19th as a strong, compact upper-level wave moved across the region. Widespread areas of light to moderate rain moved north and continued through the evening and overnight hours, before shifting east of the region on the morning of the 20th. Southeast OK and west central AR received 1"-2" of rainfall, with less than 1" elsewhere across eastern OK and northwest AR (Figs. 5, 6).

A broad region of warm advection precipitation spread over much of eastern OK and northwest AR on the 22nd. This precipitation continued through the evening in response to a vorticity maximum lifting northeast from New Mexico, with the low pressure center then moving over central OK into northern AR. A band of frontogenetic forcing set up over northeast OK and northwest AR, allowing for dynamic cooling of the atmosphere. As the temperatures cooled, the rain transitioned to sleet and snow. Snowfall totals were generally ½" to 2" across northeast OK and northwest AR (Fig. 8). Rainfall and liquid equivalent totals ranged from 0.25"-2" for most of eastern OK and northwest AR (Fig. 7).

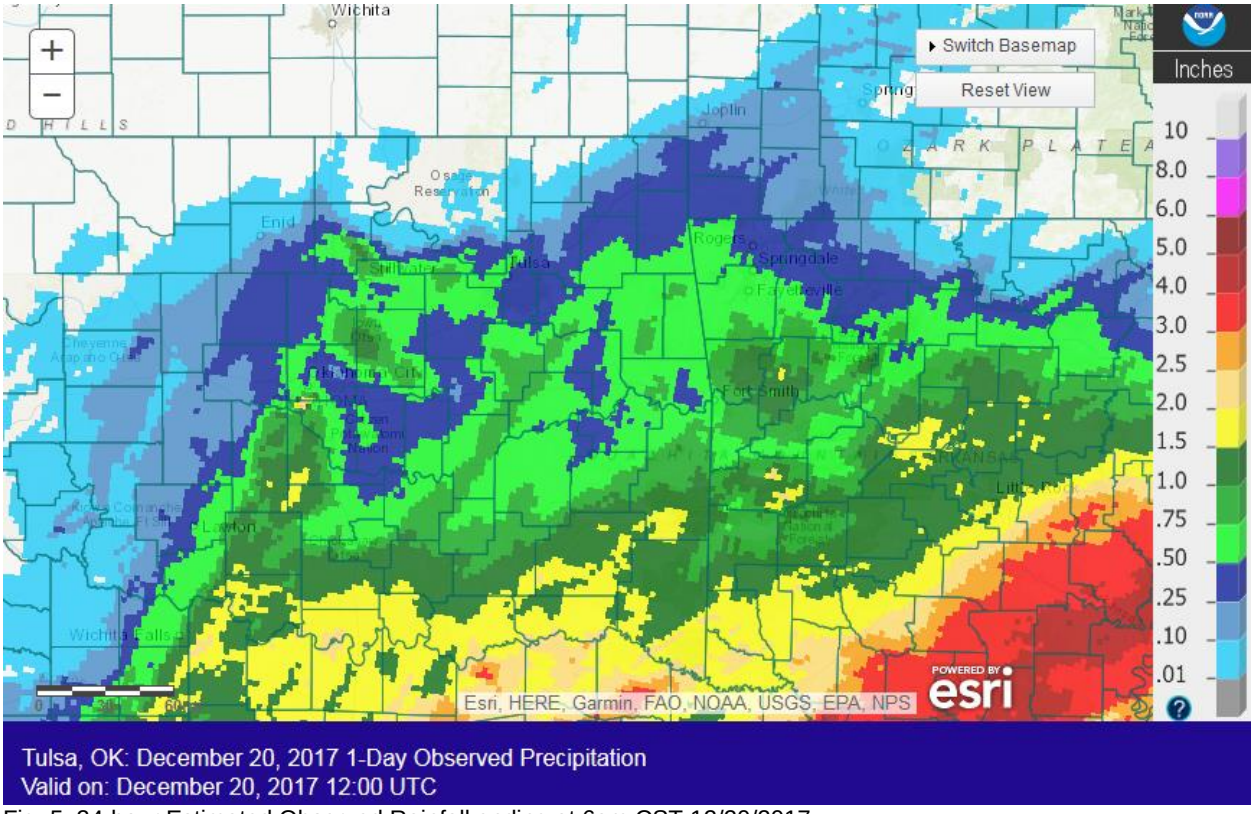


Fig. 5. 24-hour Estimated Observed Rainfall ending at 6am CST 12/20/2017.

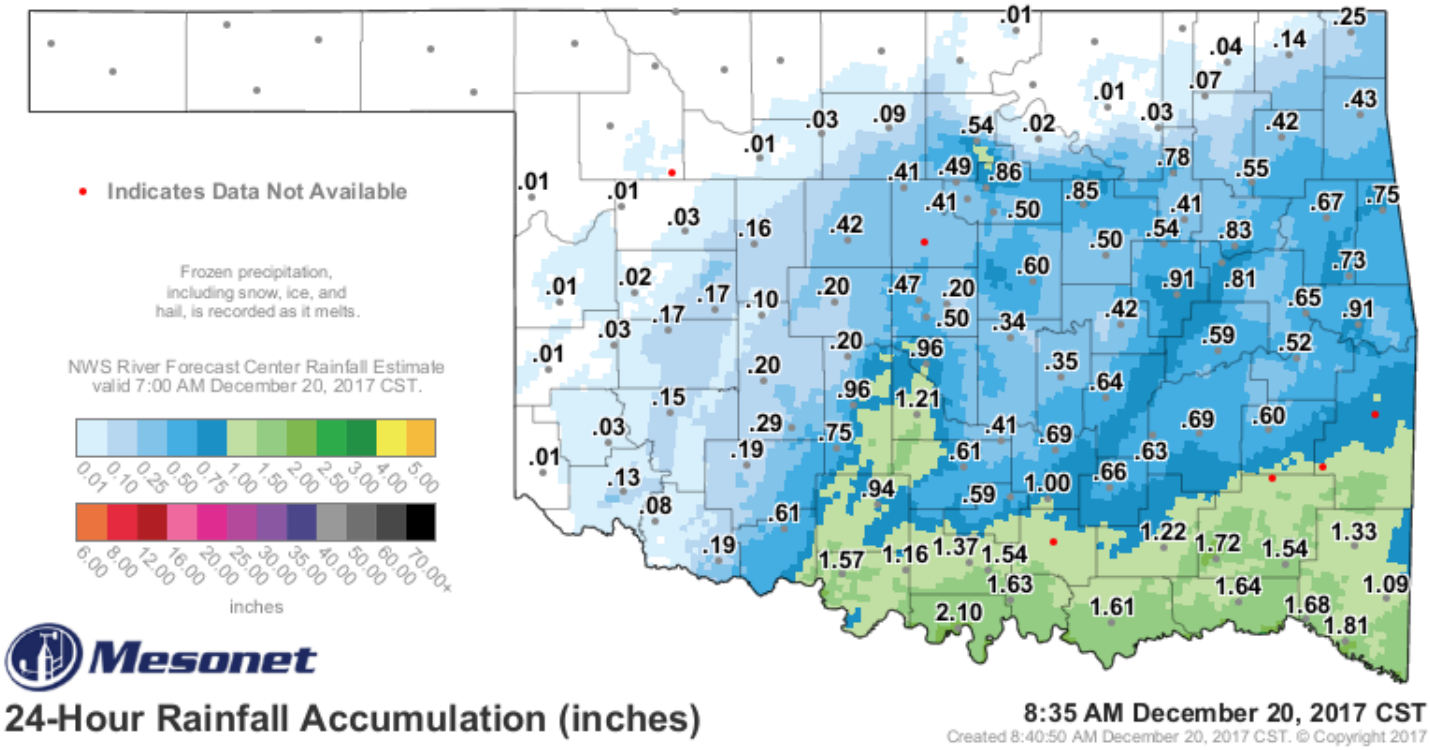


Fig. 6. 24-hour Estimated Observed Rainfall (image) and OK Mesonet measurements ending at 8:35 am CST 12/20/2017.

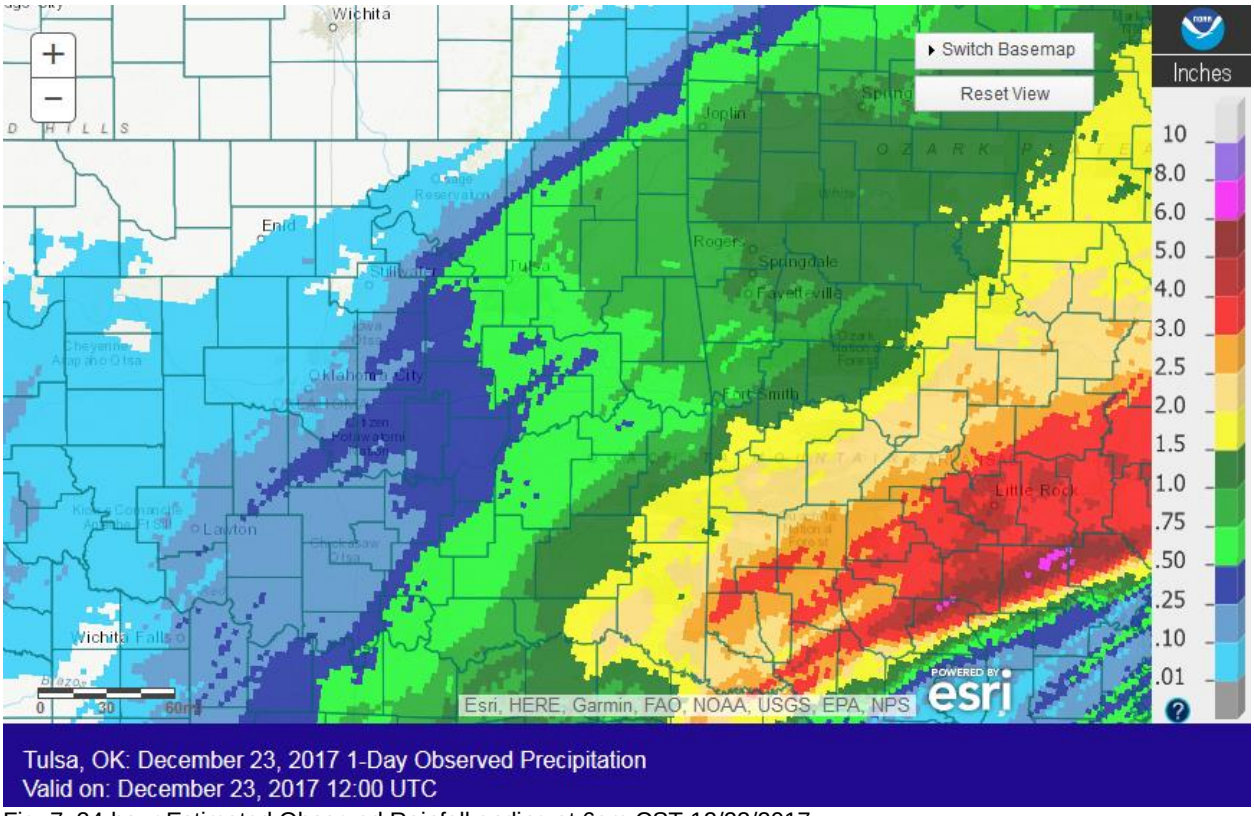


Fig. 7. 24-hour Estimated Observed Rainfall ending at 6am CST 12/23/2017.

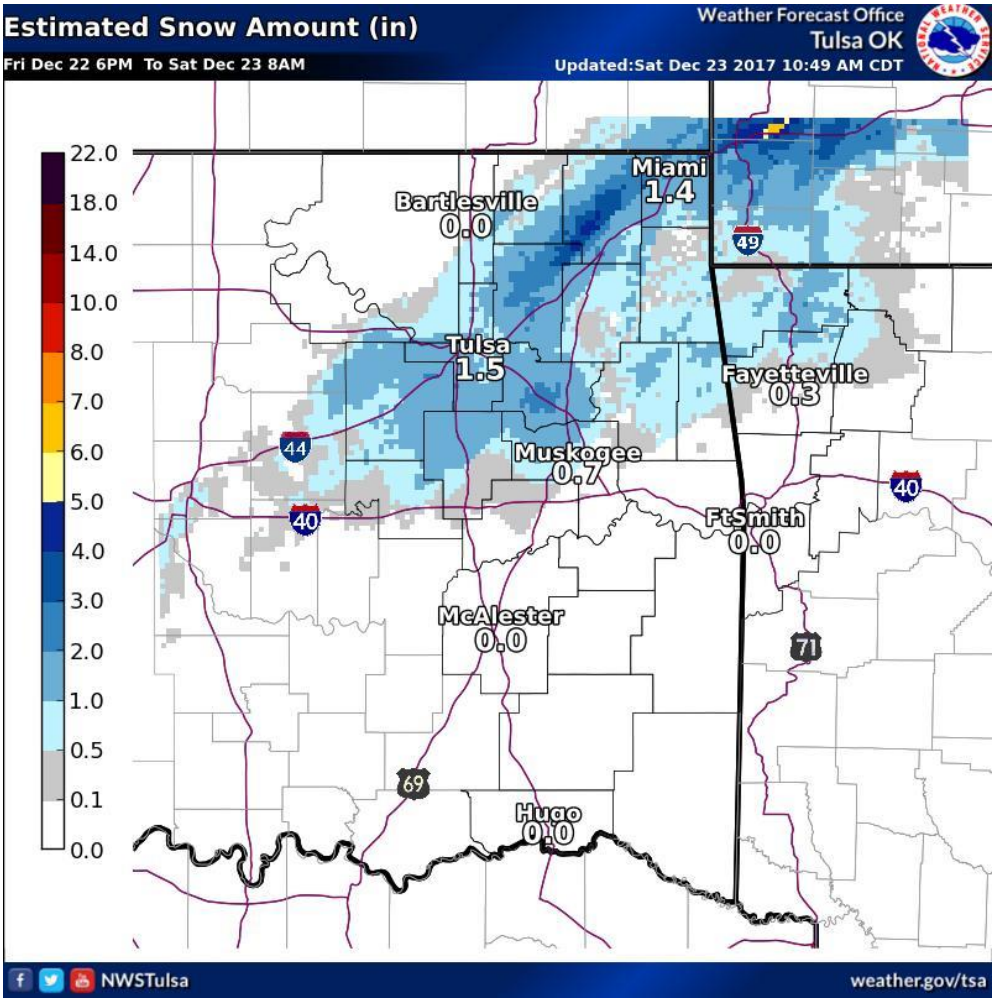


Fig. 8. Estimated snowfall total from 6pm December 22-8am December 23, 2017.

Written by:

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WFO Tulsa

Products issued in December 2017:

*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