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: **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: **November 3, 2017**

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.**

Heavy rain fell affected primarily northeast OK this month, leading to some rises along area rivers. Temperatures where near to a degree or two above normal this month across eastern OK and northwest AR. 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.weather.gov/tsa/hydro-monthly-summary.

Monthly Summary

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 1a), rainfall totals for October 2017 ranged from around 3" to around 12". The highest rainfall totals exceeding 5" occurred over northeast OK with isolated areas elsewhere. This corresponds to 100% to around 300% of the normal October rainfall for most of northeast OK, with the remainder of the area ranging from 75% to 110% (Fig. 1b). However, far southeast OK and Carroll County in northwest AR received 50%-75% of the normal rainfall.

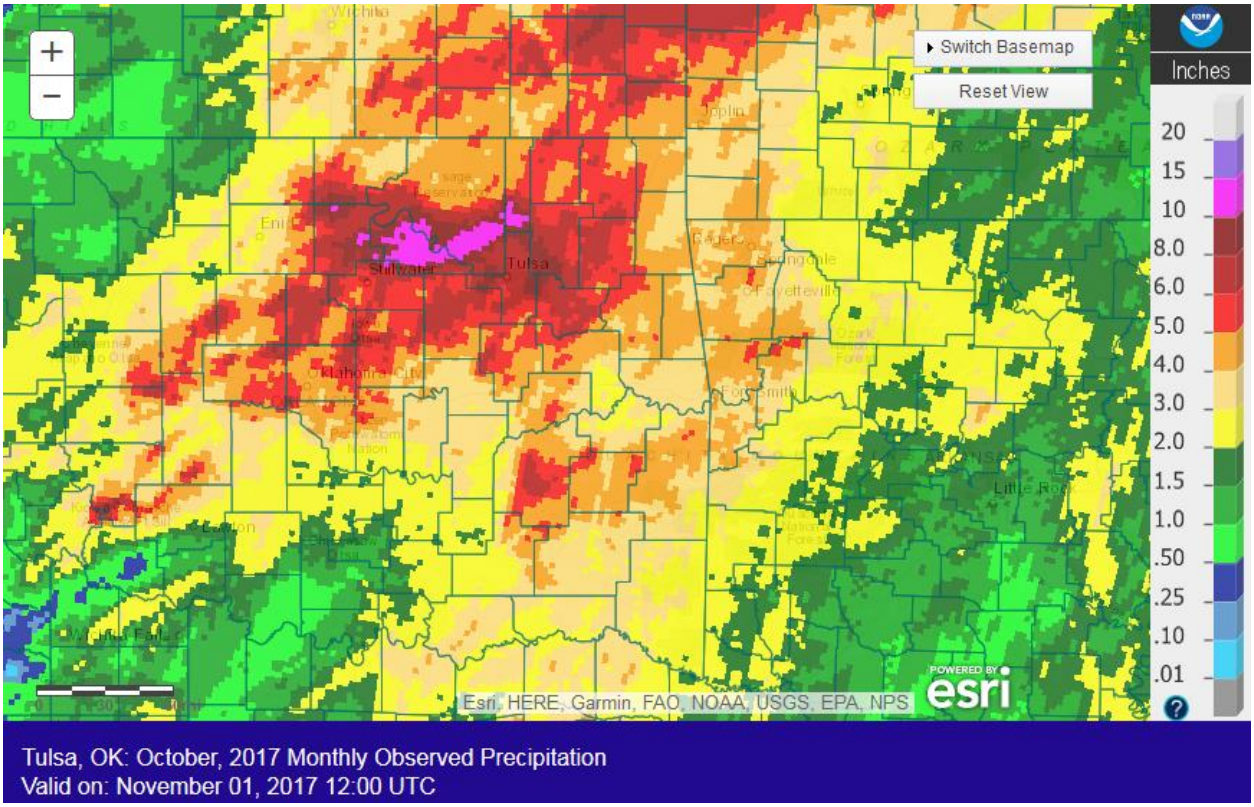


Fig. 1a. Estimated Observed Rainfall for October 2017

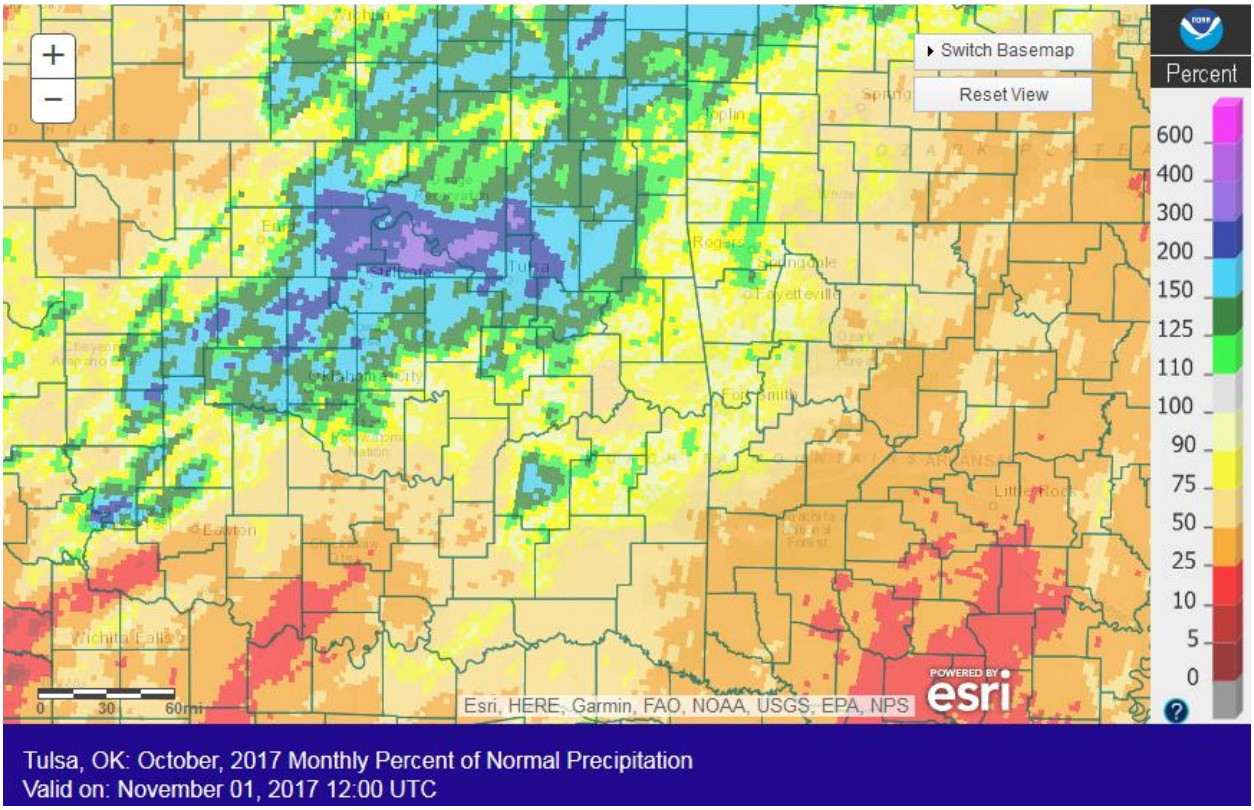


Fig. 1b. Estimated % of Normal Rainfall for October 2017

In Tulsa, OK, October 2017 ranked as the 47th warmest October (63.3°F, tied 1994, 1965; since records began in 1905) and the 13th wettest October (7.16"; since records began in 1888). Fort Smith, AR had the 42nd warmest October (64.4°F, tied 1984, 1915; since records began in 1882) and the 65th wettest October (3.29"; since records began in 1882). Fayetteville, AR had the 28th coldest (58.0°F, tied 2011, 1967) and the 31st wettest (3.86") October since records began in 1949.

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

Pawnee, OK (coop)	11.33	Pawnee, OK (meso)	10.95	Skiatook, OK (meso)	9.78
Sperry 6.7WNW, OK (coco)	9.07	Sand Springs 2.1ENE, OK (coco)	8.98	Broken Arrow 4.6NNW, OK (coco)	8.56
Tulsa 12.2SE, OK (coco)	8.32	Ralston, OK (coop)	8.25	Broken Arrow 3NNW, OK (coco)	8.07

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

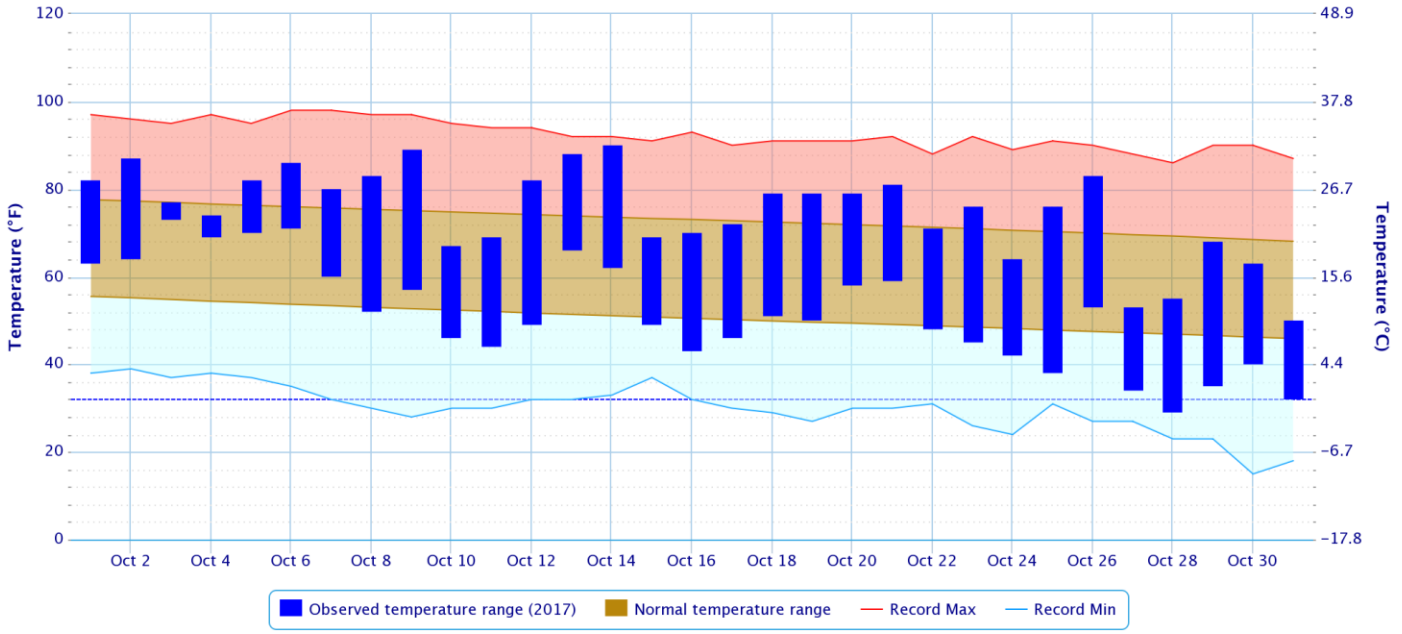
Stigler, OK (meso)	3.01	Antlers, OK (coop)	3.07	Stuart, OK (meso)	3.08
Webbers Falls, OK (meso)	3.15	Fort Smith, AR (ASOS)	3.29	Hugo, OK (meso)	3.30
Sallisaw, OK (meso)	3.41	Kingston 2S, AR (coop)	3.41	Okemah, OK (meso)	3.54

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

Rank since 1921	October 2017	Autumn (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, 2016 – Oct 31, 2017)
Northeast OK	**10th wettest**	37th wettest	18th wettest	29th wettest	33rd wettest	**8th wettest**	16th wettest
East Central OK	35th wettest	29th driest	24th wettest	32nd wettest	17th wettest	**9th wettest**	20th wettest
Southeast OK	45th driest	16th driest	40th wettest	31st wettest	29th wettest	31st wettest	48th driest
Statewide	32nd wettest	47th driest	15th wettest	21st wettest	28th wettest	**10th wettest**	17th wettest

Daily Temperature Data – Tulsa Area, OK (ThreadEx)

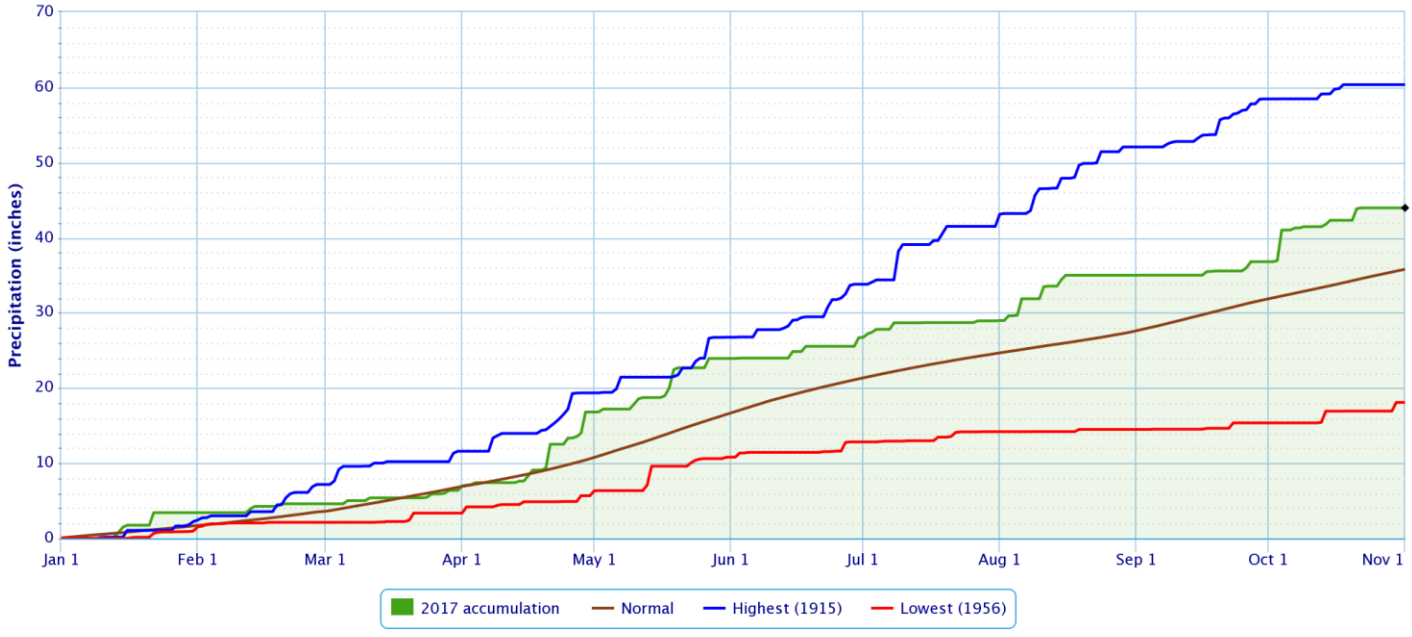
Period of Record – 1905-01-06 to 2017-10-31. Normals period: 1981-2010. Click and drag to zoom chart.



Powered by ACIS

Accumulated Precipitation – Tulsa Area, OK (ThreadEx)

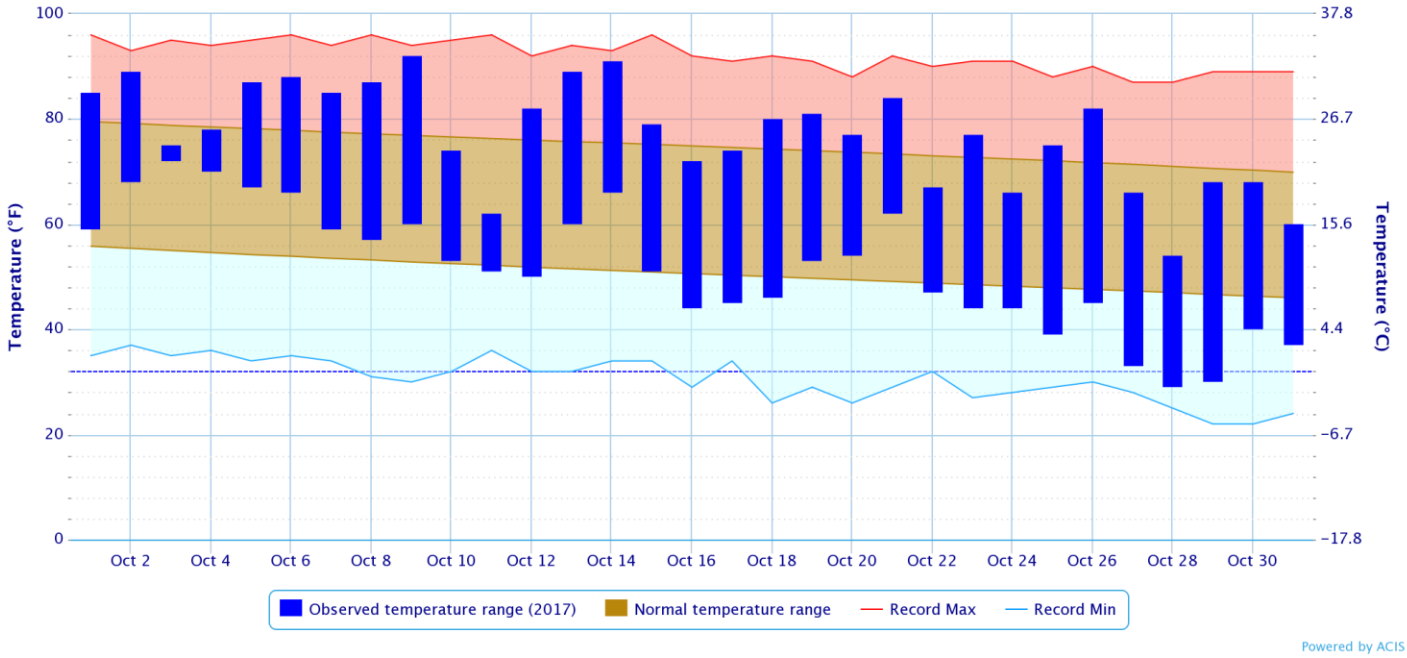
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

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

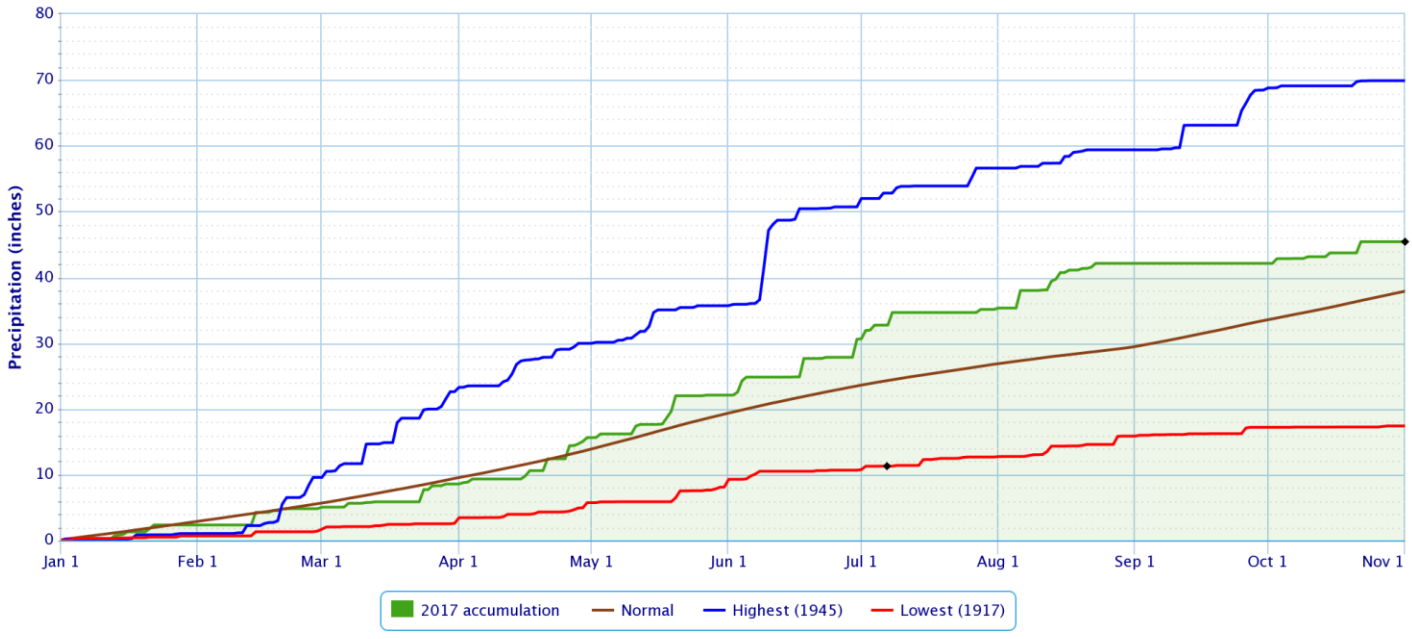
Period of Record – 1882-06-01 to 2017-10-31. Normals period: 1981-2010. Click and drag to zoom chart.



Powered by ACIS

Accumulated Precipitation – Fort Smith Area, AR (ThreadEx)

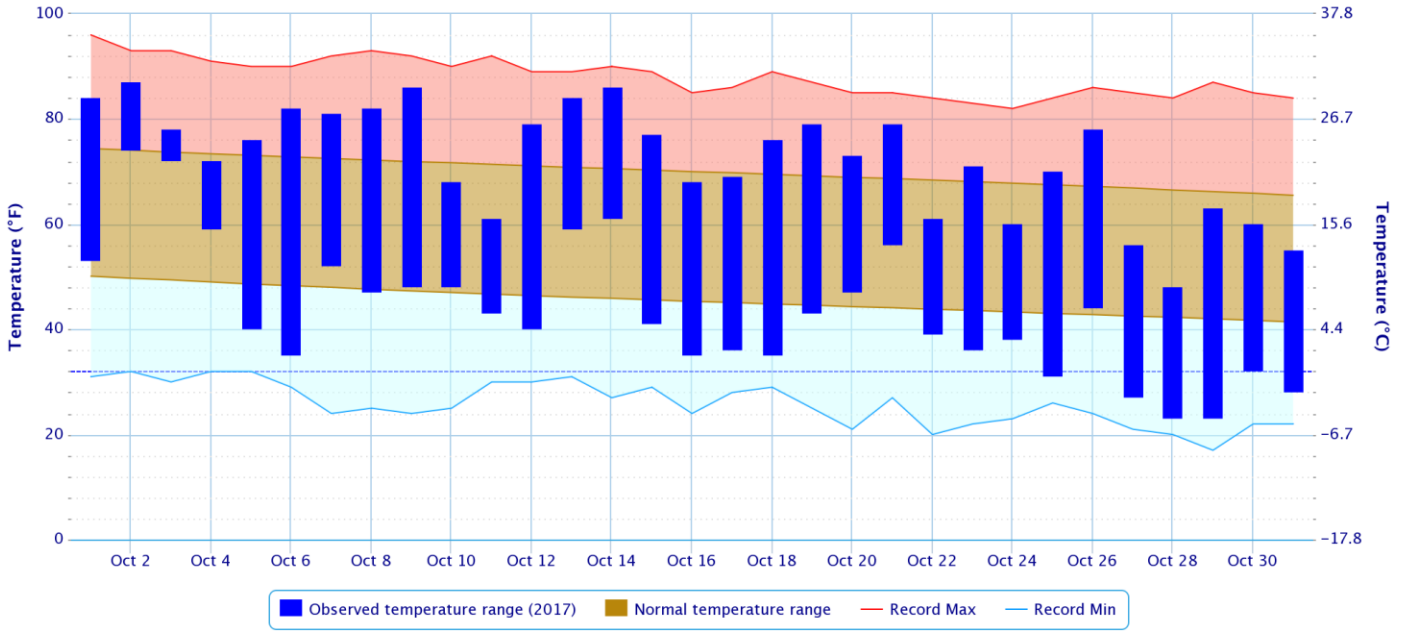
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

Daily Temperature Data – FAYETTEVILLE DRAKE FLD, AR

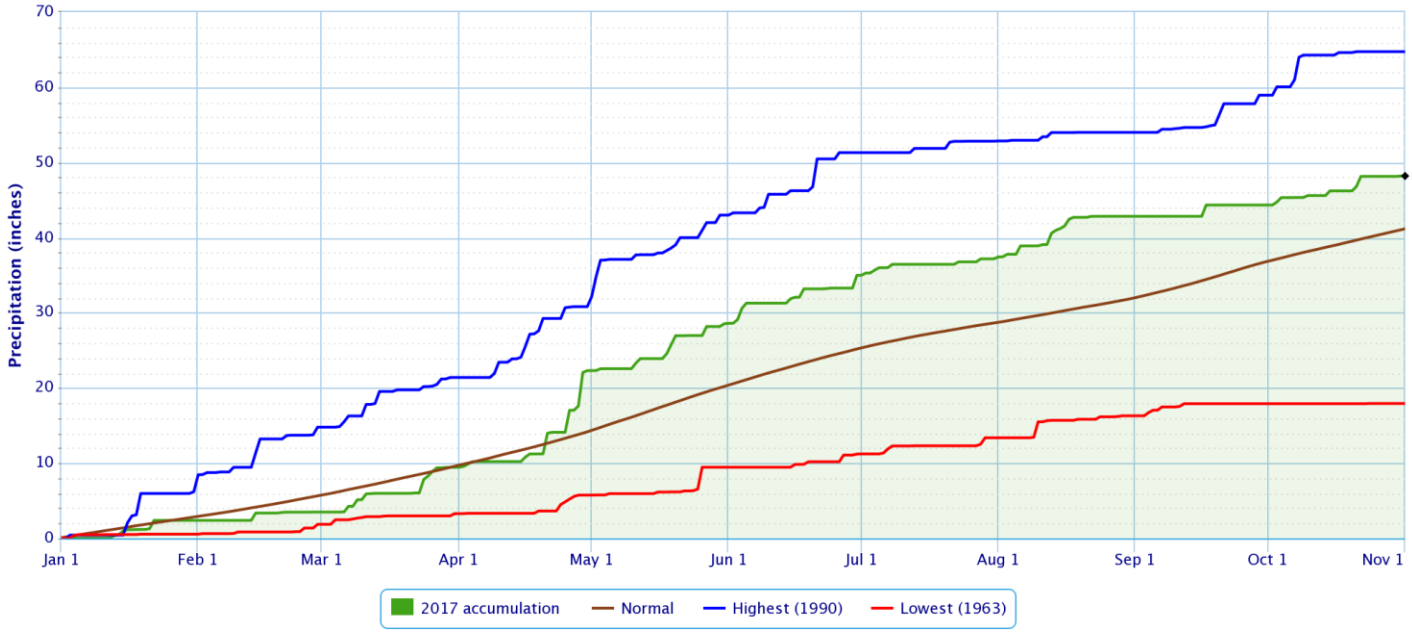
Period of Record – 1949-07-14 to 2017-10-31. Normals period: 1981-2010. Click and drag to zoom chart.



Powered by ACIS

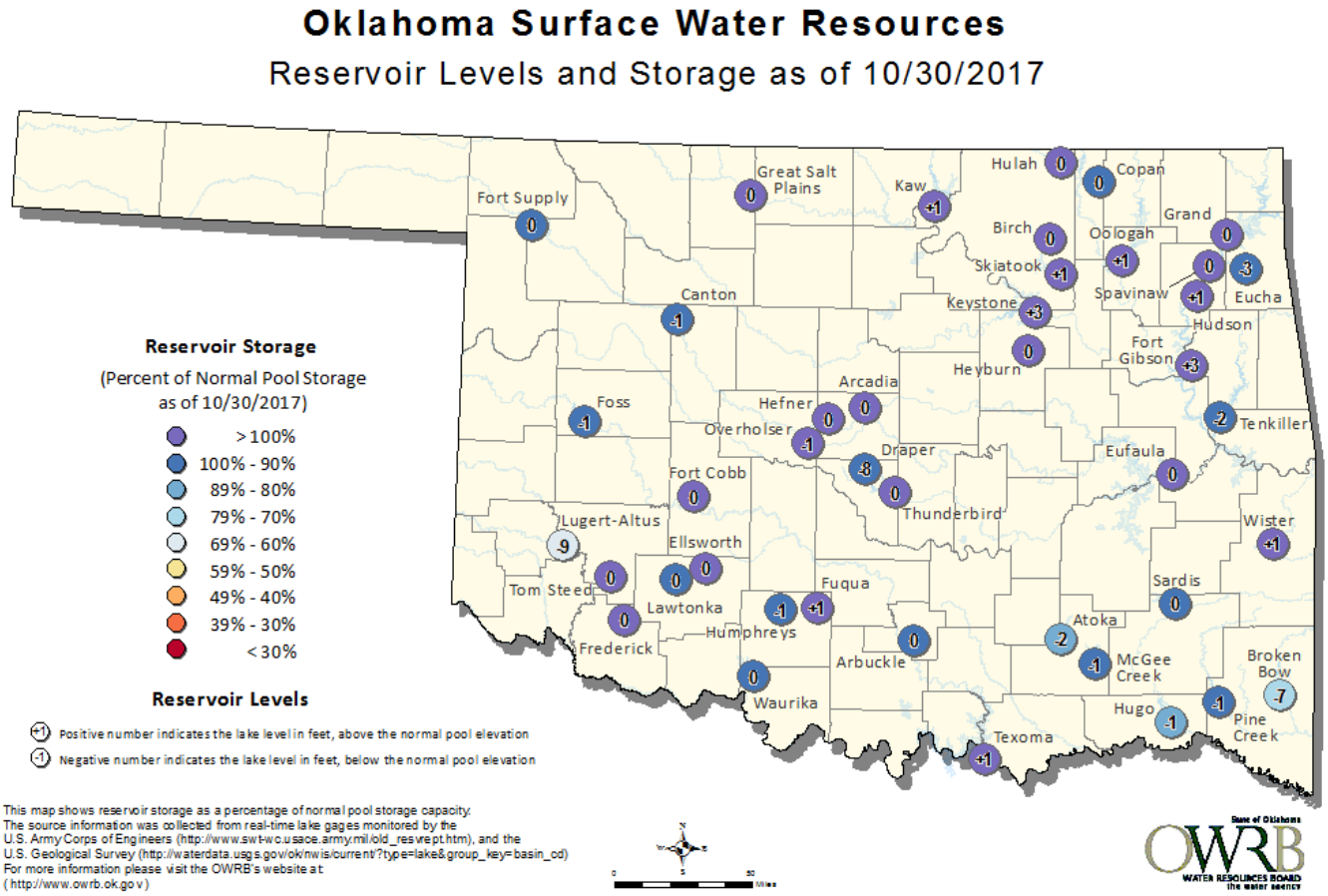
Accumulated Precipitation – FAYETTEVILLE DRAKE FLD, AR

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



Powered by ACIS

Reservoirs



According to the USACE, the most of the lakes in the HSA were at near normal levels as of 11/01/2017. Hudson Lake was operating at 104% of its conservation pool and both Tenkiller and Oologah Lakes were operating at 104% of their conservation pools. A few reservoirs were operating at more than 3% below the top of their conservation pools: Hugo Lake 86%, Copan Lake 94%, and Beaver Lake 96%.

Drought

According to the U.S. Drought Monitor (USDM) from October 31, 2017 (Figs. 2, 3), Moderate (D1) drought conditions were present across portions of Le Flore County in eastern OK and Carroll, Madison, Washington, Crawford, Sebastian, and Franklin Counties in northwest AR. Abnormally dry, but not in drought, (D0) conditions were occurring over portions of Ottawa, Delaware, Mayes, Cherokee, Adair, Le Flore, Pushmataha, and Choctaw Counties in eastern OK and Benton, Washington, Crawford, and Sebastian Counties in northwest AR.

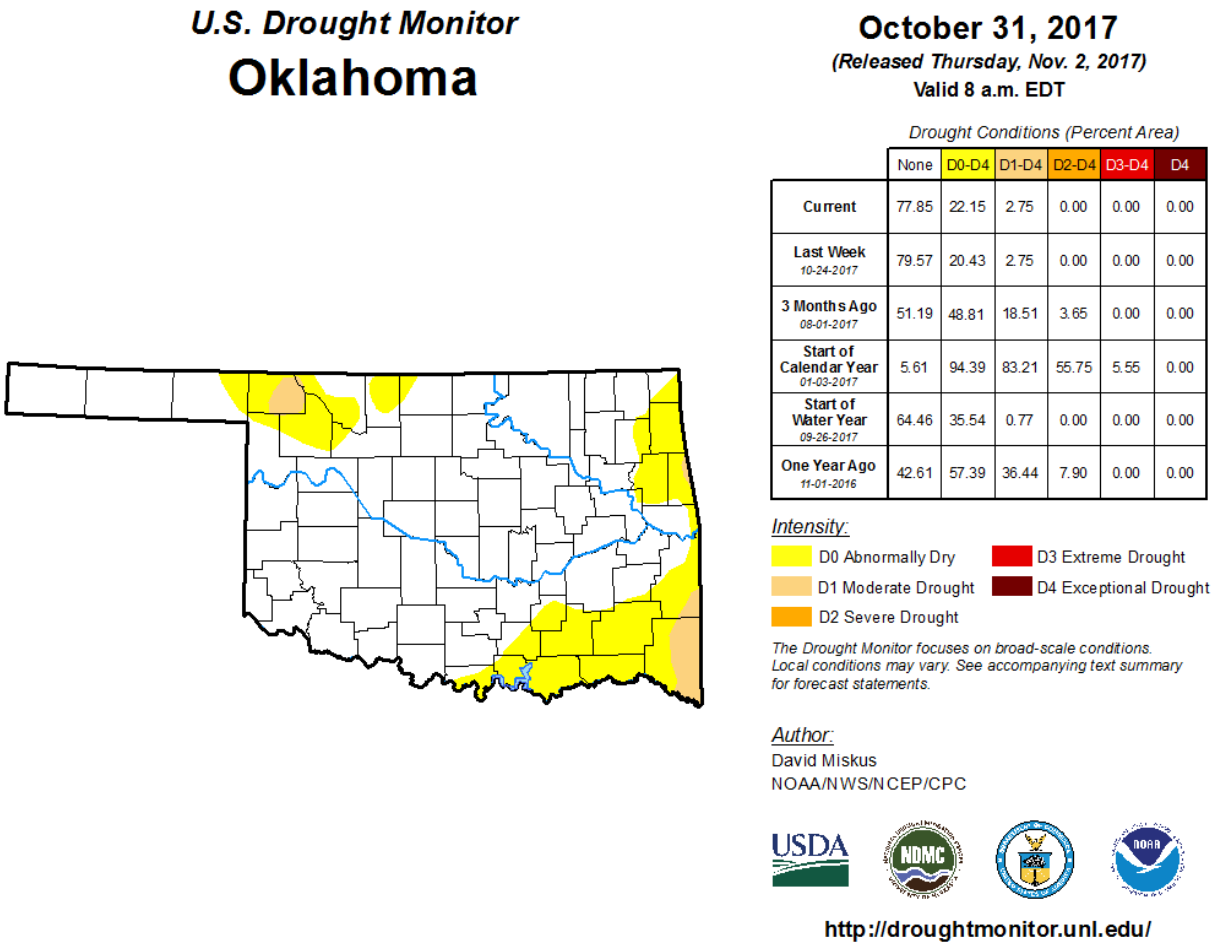


Fig. 2. Drought Monitor for Oklahoma

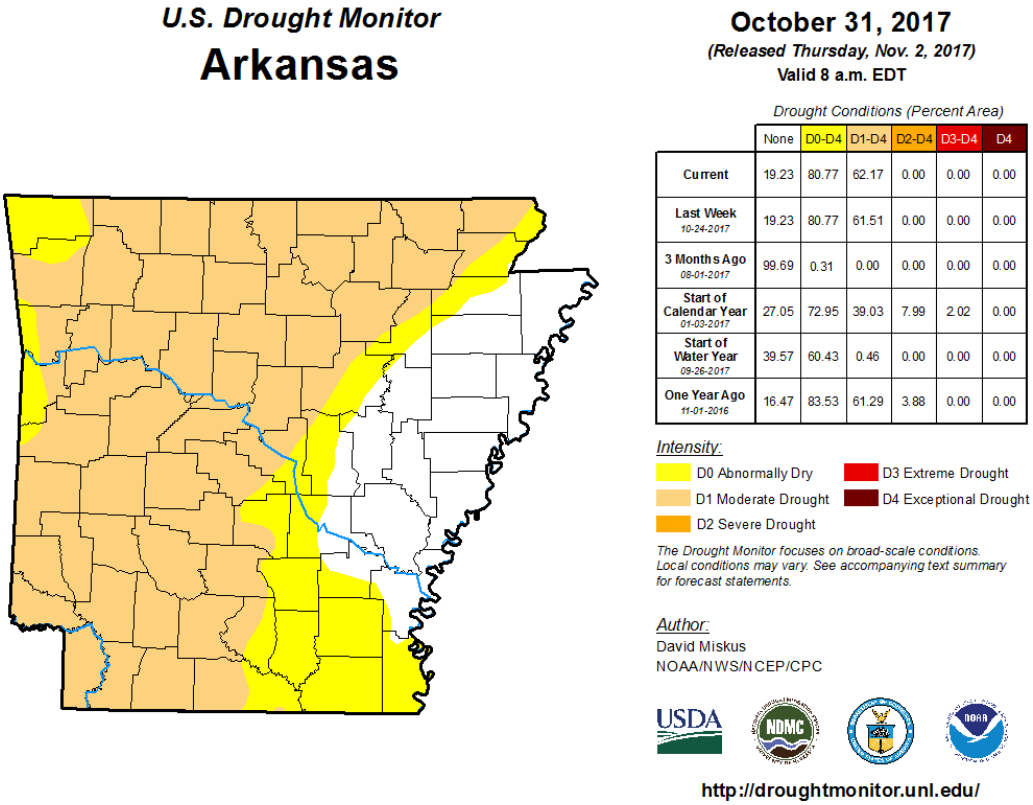


Fig. 3. Drought Monitor for Arkansas

Outlooks

The Climate Prediction Center (CPC) outlook for November 2017 (issued October 31, 2017) indicates an enhanced chance for above normal temperatures across all of eastern OK and northwest AR. This outlook also indicates equal chances for above, near, and below median precipitation northeast of a Tulsa to Fort Smith line and an enhanced chance for below median precipitation southwest of this line. This outlook takes into account weather conditions forecast over the next 1-2 weeks and subseasonal climate signals in the weeks 3-4 time frame, as well as minor influence from the expected La Niña.

For the 3-month period November-December-January 2017-18, CPC is forecasting an enhanced chance for above normal temperatures across all of eastern OK and northwest AR (outlook issued October 19, 2017). This outlook also indicates equal chances for above, near, and below median precipitation for far northeast OK and far northwest AR, with an enhanced chance for below median precipitation elsewhere. This outlook is based on both statistical and dynamical forecast tools and decadal timescale climate trends, as well as impacts from La Niña. According to CPC, Pacific sea surface temperatures along the equator continue to indicate ENSO-neutral conditions through early October. La Niña conditions are favored at 55-65% during the autumn and winter 2017-18. CPC has continued the La Niña 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

An area of showers with embedded thunderstorms increased in coverage during the early morning hours of the 4th, developing within a very moist airmass south of a stalled frontal boundary that stretched from southeast KS into northwest OK. This activity spread across primarily northeast and east central OK and northwest AR during the day. The convection was very efficient in producing rainfall due to precipitable water values near 2", which is about 200% of normal for this time of year. 1.50" to near 2" of rain was measured in an hour within the heavier rain bands. Training storms over Pawnee, Osage, and southern Washington Counties resulted in a total 5"-10" of rain (Figs. 4, 5). This lead to flash flooding, with numerous roads closed and a water rescue. Black Bear Creek at Pawnee reached moderate flood stage and Bird Creek near Sperry exceeded minor flood stage due to this rain (see preliminary hydrographs at the end of this report; refer to E3 for specific information).

Some of the 48-hr precipitation reports >4.5" ending 7am CDT 10/05/2017 included:

Pawnee 3ENE, OK	7.72	Pawnee, OK	7.60	Skiatook 4NW, OK	6.93
Skiatook 6WSW, OK	6.81	Skiatook 4W, OK	6.64	Ralston, OK	6.41
Sand Springs 2.1ENE, OK	6.32	Ramona 5SE, OK	5.66	Tulsa 12.2SE, OK	5.43
Broken Arrow 4.6NNW, OK	5.43	Broken Arrow 3NNW, OK	5.27	Collinsville 3NE, OK	5.02
Hominy 4NNE, OK	4.87	Sand Springs 3NW, OK	4.62	Broken Arrow 1.5SW, OK	4.57

Showers and thunderstorms developed along a cold front as it moved through southeast KS during the afternoon and evening of the 14th. This activity continued south into eastern OK and northwest AR during the evening and overnight hours. Rainfall totals were only around 0.10" to around 1" in the Tulsa HSA; however, further north, 1.5"-3.5" fell over southeast KS (Fig. 6). This impacted the Neosho River basin, resulting in the river rising to just below minor flood stage along the Neosho River near Commerce (see preliminary hydrograph at the end of this report).

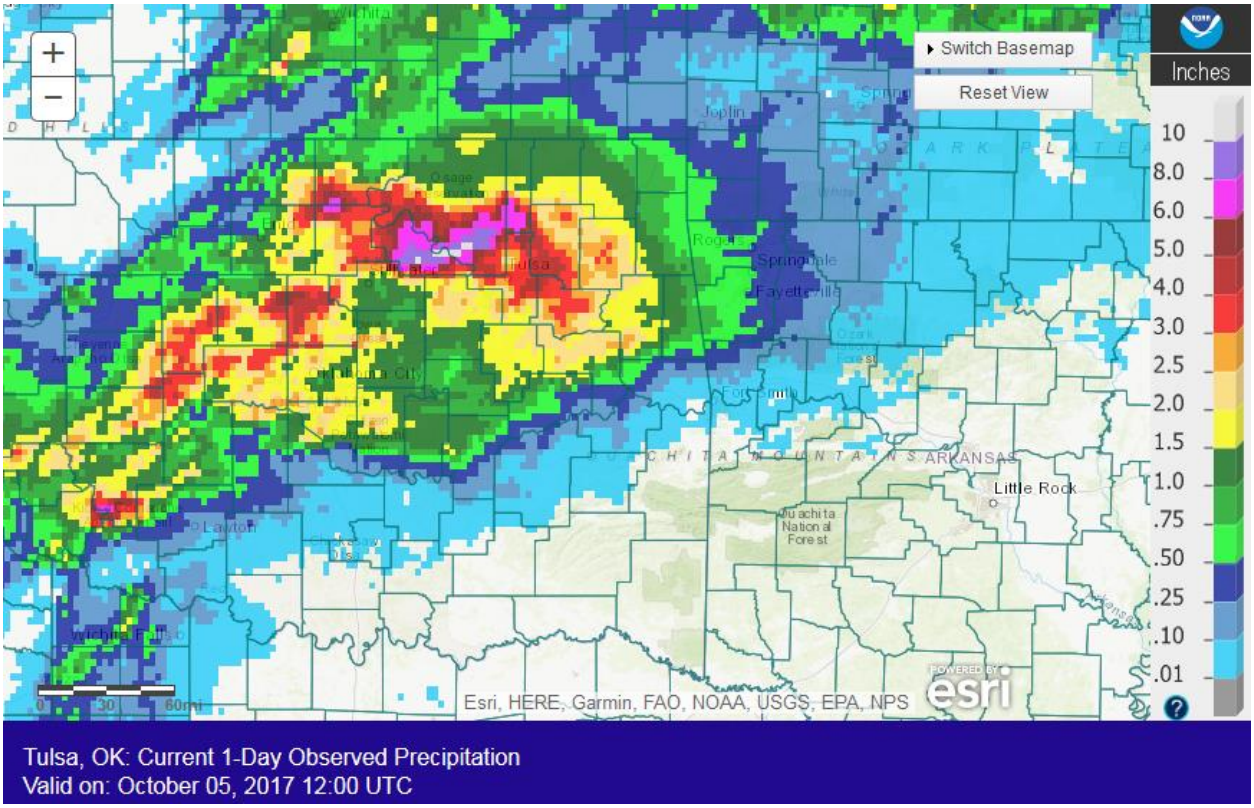


Fig. 4. 24-hour Estimated Observed Rainfall ending at 7am CDT 10/05/2017.

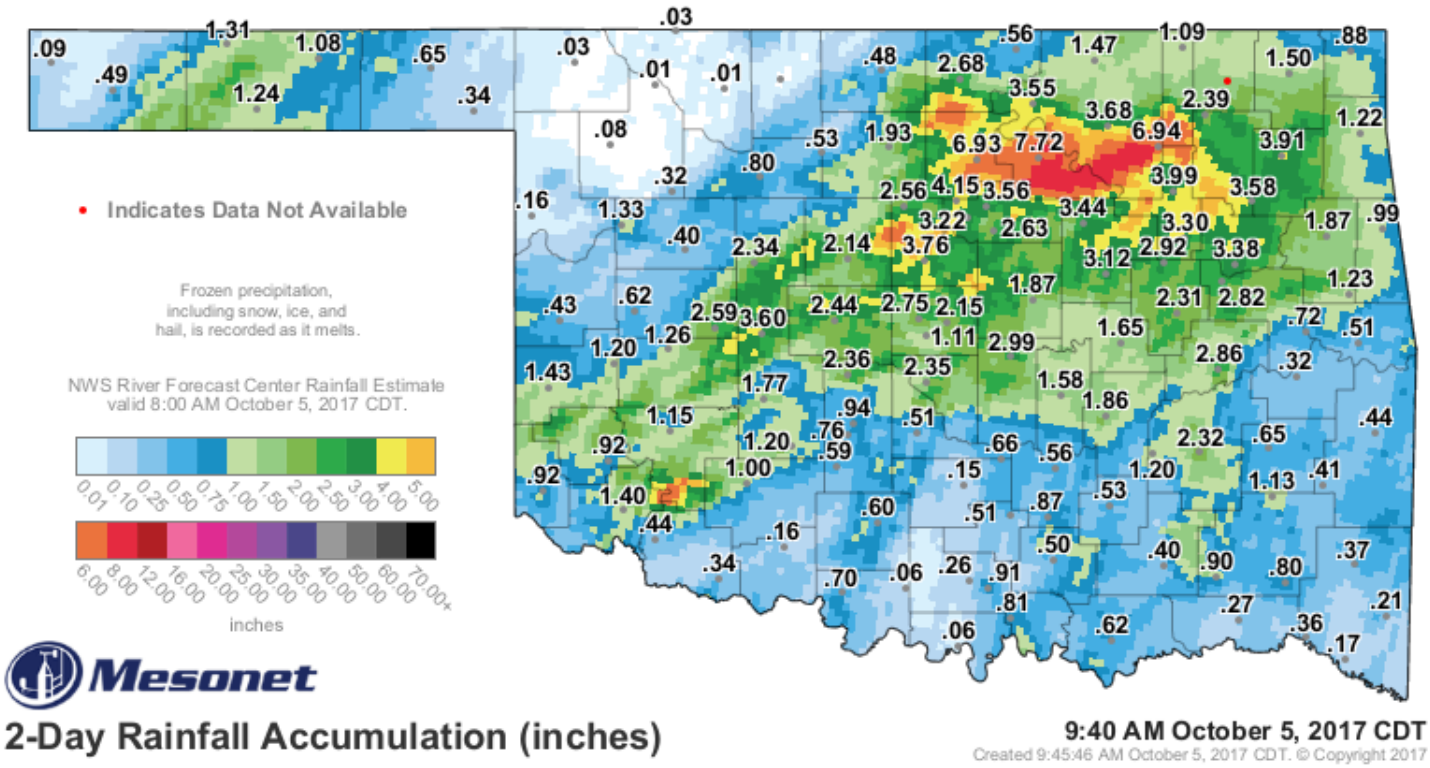


Fig. 5. 2-day Estimated observed rainfall (image) and OK Mesonet measurements ending at 9:40 am CDT 10/05/2017.

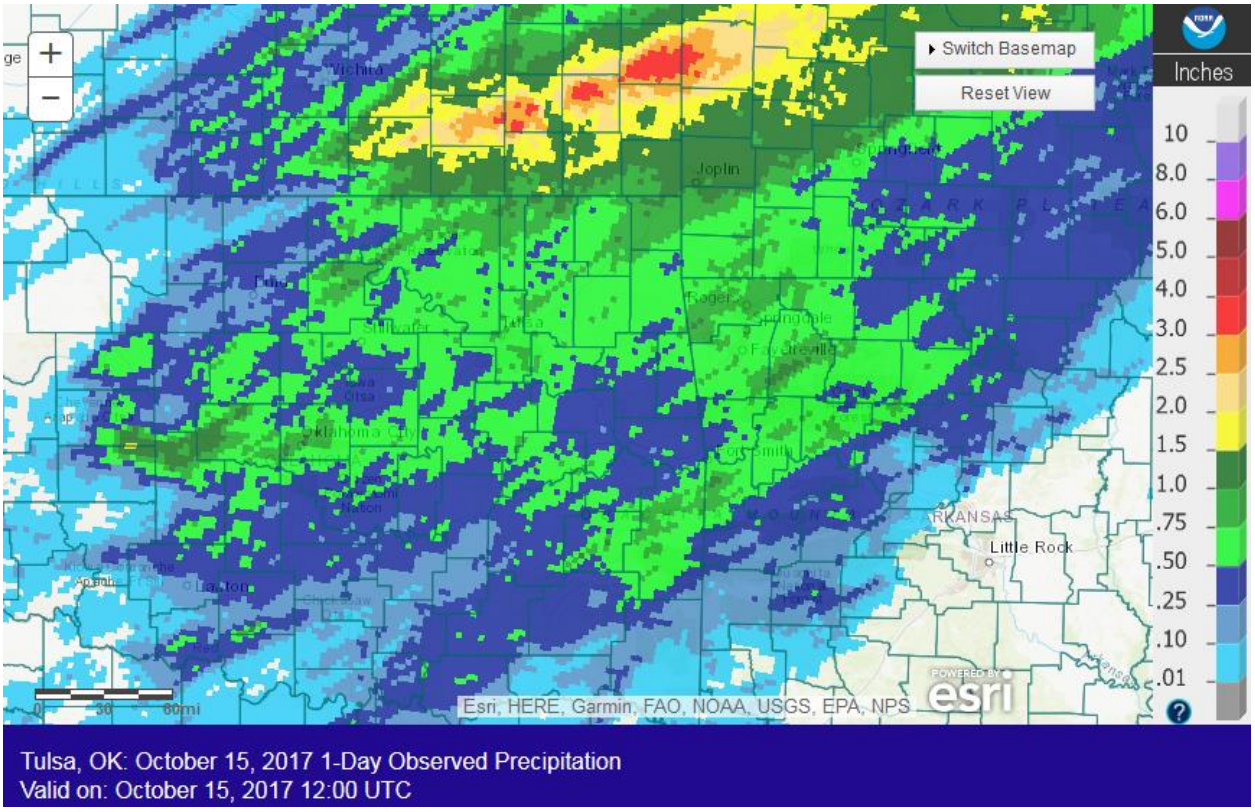


Fig. 6. 24-hour Estimated Observed Rainfall ending at 7am CDT 10/15/2017.

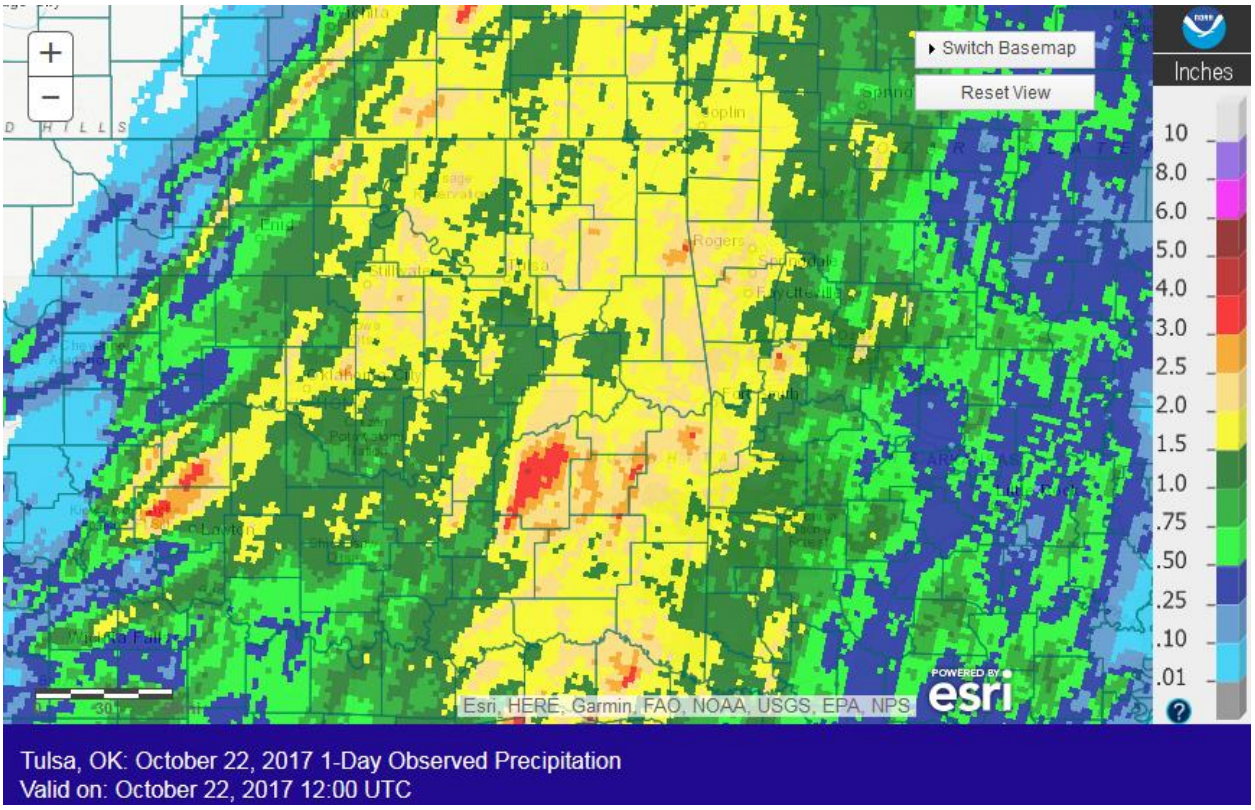


Fig. 7. 24-hour Estimated Observed Rainfall ending at 7am CDT 10/22/2017.

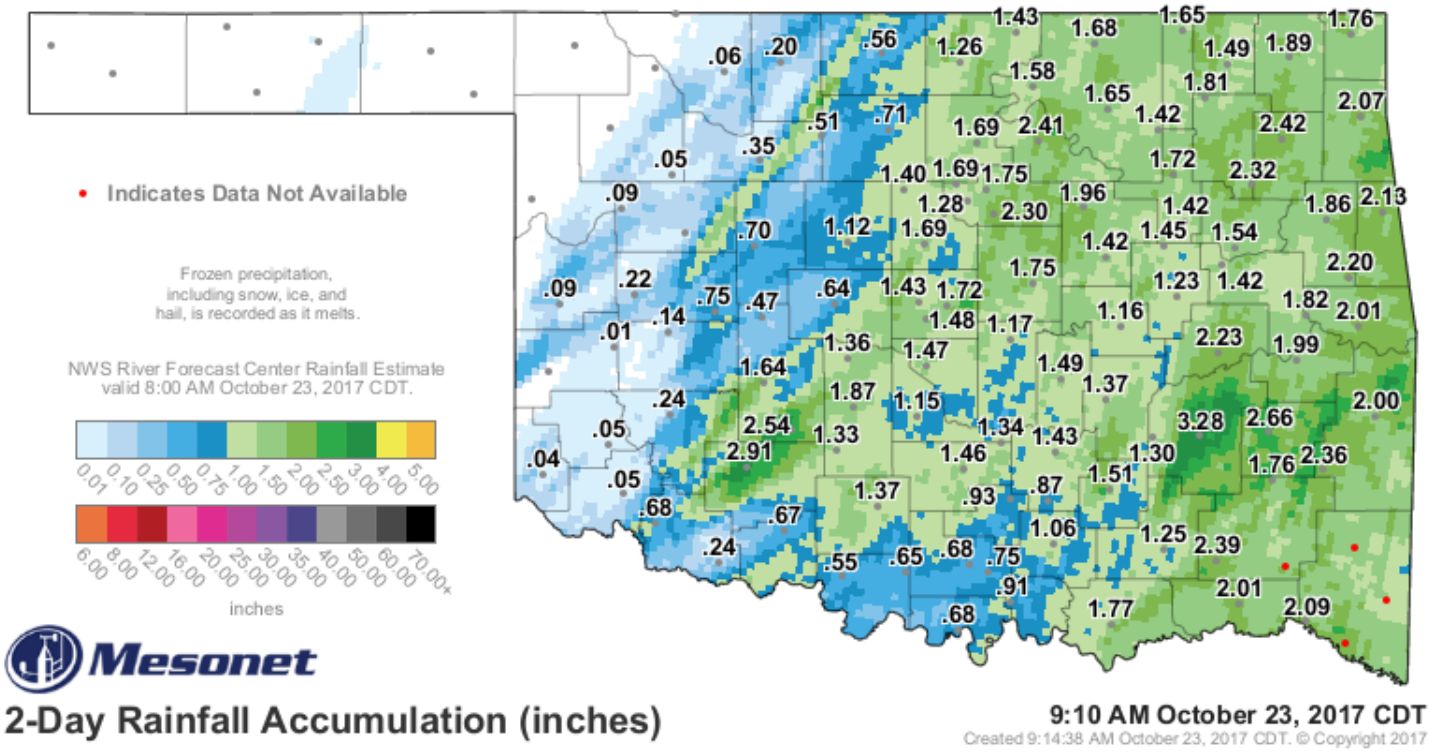


Fig. 8. 2-day Estimated observed rainfall (image) and OK Mesonet measurements ending at 9:10 am CDT 10/23/2017.

A pacific cold front moved across eastern OK and western AR on the evening of the 21st. Showers and thunderstorms developed into a line, and swept across the region during the evening and late night hours. Damaging winds were reported in far east central OK and west central AR. All of eastern OK and northwest AR received 1" to 3.5" of rain (Figs. 7, 8).

Written by:

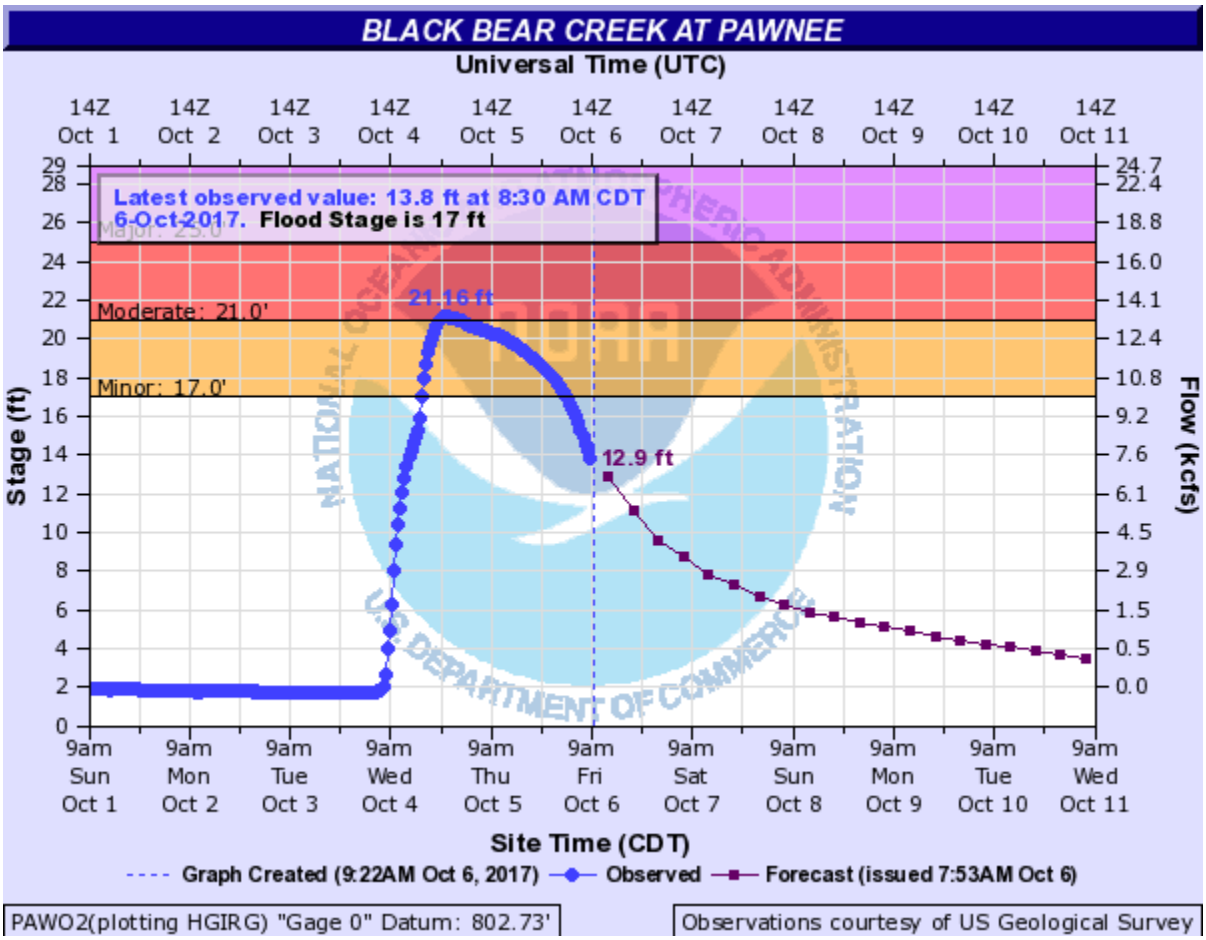
Nicole McGavock
Service Hydrologist
WFO Tulsa

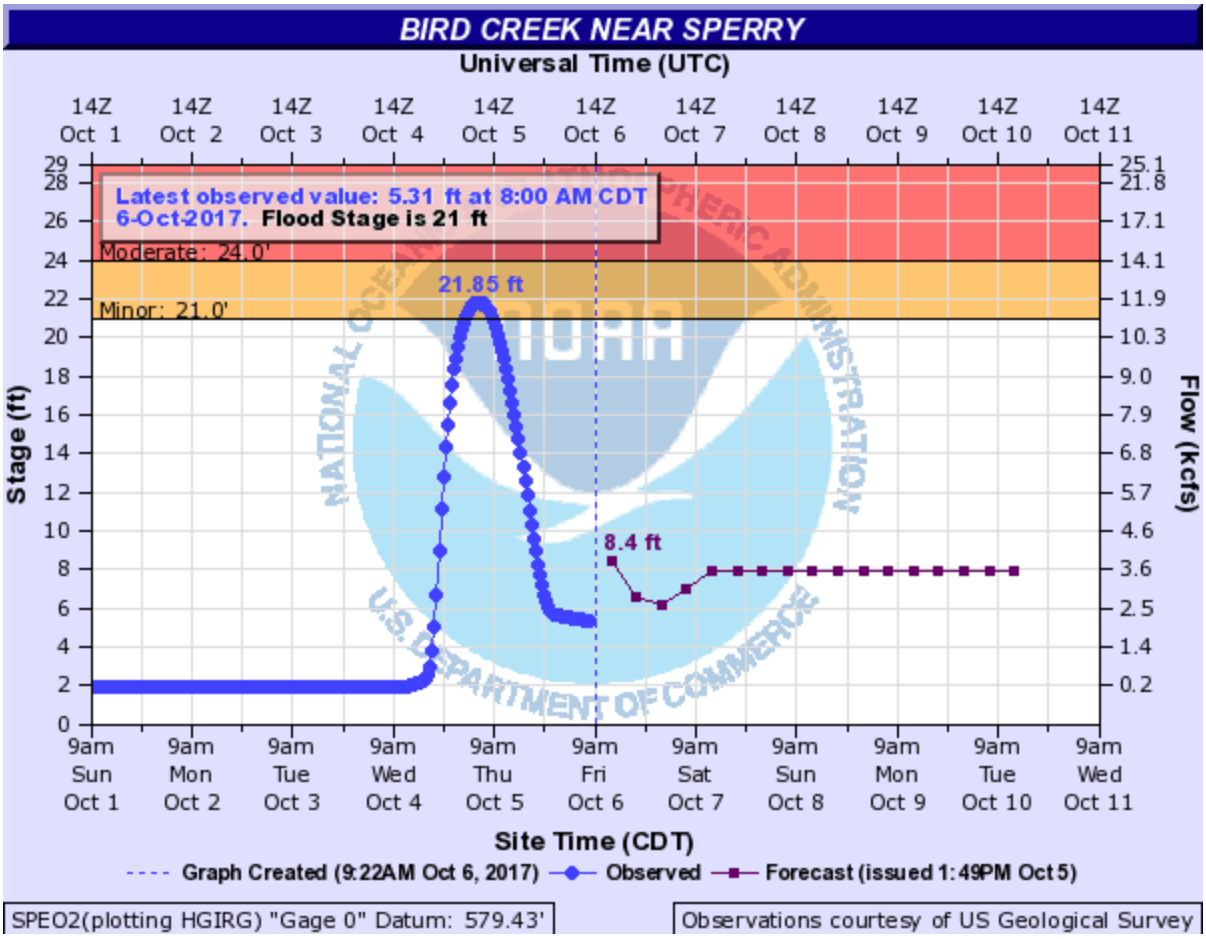
Products issued in October 2017:

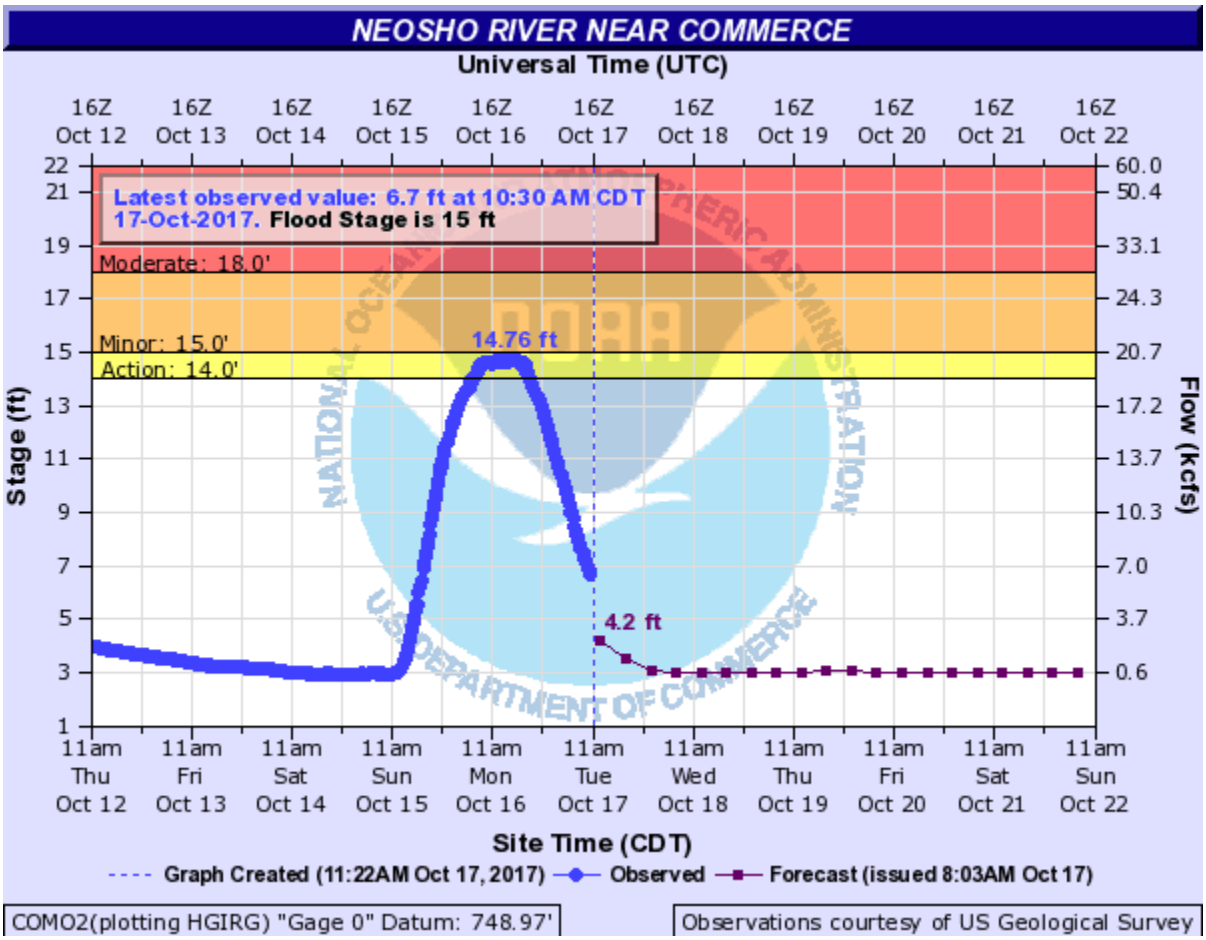
*CWYO2 became a daily river forecast point September 7, 2016
*MLBA4 and OZGA4 transferred to NWS Tulsa HSA February 5, 2014
*Mixed case River Flood products began July 31, 2013

4 Flash Flood Warnings (FFW)
5 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)
1 Areal Flood Warnings (FLW)
0 Areal Flood Statements (FLS)
8 River Flood Warnings (FLW) (includes category increases)
18 River Flood Statements (FLS)
1 River Flood Advisories (FLS) (4 Advisory FLS CON/EXT/CAN)
0 River Flood Watches (FFA) (0 Watch FFA CON/EXT/CAN)
0 River Statements (RVS)
0 Hydrologic Outlooks (ESF)
0 Drought Information Statements (DGT)

Preliminary Hydrographs:




BIRD CREEK NEAR SPERRY
Universal Time (UTC)
14Z Oct 1
14Z Oct 2
14Z Oct 3
14Z Oct 4
14Z Oct 5
14Z Oct 6
14Z Oct 7
14Z Oct 8
14Z Oct 9
14Z Oct 10
14Z Oct 11
Latest observed value: 5.31 ft at 8:00 AM CDT 6-Oct-2017. Flood Stage is 21 ft
Moderate: 24.0'
Minor: 21.0'
21.85 ft
8.4 ft
Stage (ft)
Flow (kcfs)
9am Sun Oct 1
9am Mon Oct 2
9am Tue Oct 3
9am Wed Oct 4
9am Thu Oct 5
9am Fri Oct 6
9am Sat Oct 7
9am Sun Oct 8
9am Mon Oct 9
9am Tue Oct 10
9am Wed Oct 11
Site Time (CDT)
Graph Created (9:22AM Oct 6, 2017)
Observed
Forecast (issued 1:49PM Oct 5)
SPEO2(plotting HGIRG) "Gage 0" Datum: 579.43'
Observations courtesy of US Geological Survey


NEOSHO RIVER NEAR COMMERCE
Universal Time (UTC)
16Z Oct 12
16Z Oct 13
16Z Oct 14
16Z Oct 15
16Z Oct 16
16Z Oct 17
16Z Oct 18
16Z Oct 19
16Z Oct 20
16Z Oct 21
16Z Oct 22
Latest observed value: 6.7 ft at 10:30 AM CDT 17-Oct-2017. Flood Stage is 15 ft
Moderate: 18.0'
Minor: 15.0'
Action: 14.0'
14.76 ft
4.2 ft
Stage (ft)
Flow (kcfs)
11am Thu Oct 12
11am Fri Oct 13
11am Sat Oct 14
11am Sun Oct 15
11am Mon Oct 16
11am Tue Oct 17
11am Wed Oct 18
11am Thu Oct 19
11am Fri Oct 20
11am Sat Oct 21
11am Sun Oct 22
Site Time (CDT)
Graph Created (11:22AM Oct 17, 2017)
Observed
Forecast (issued 8:03AM Oct 17)
COMO2(plotting HGIRG) "Gage 0" Datum: 748.97'
Observations courtesy of US Geological Survey