

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 November	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 December 8, 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)

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

All of eastern OK and northwest AR received above normal rainfall during November 2015 due to several rounds of heavy rain. Minor to moderate river flooding occurred at the end of the month. Normal precipitation for November ranges from 2.6 inches in Pawnee County to 4.4 inches in Haskell County. Normal precipitation for the Ozark region of northwest Arkansas averages 4.2 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 November 2015 ranged from around 3.5" to near 15". Most of the HSA received 6"-10" of rain this month. This corresponds to around 150% to around 300% of the normal November rain across eastern OK and northwest AR (Fig. 1b). Much of southeast OK and west central AR received 10"-14" of rain.

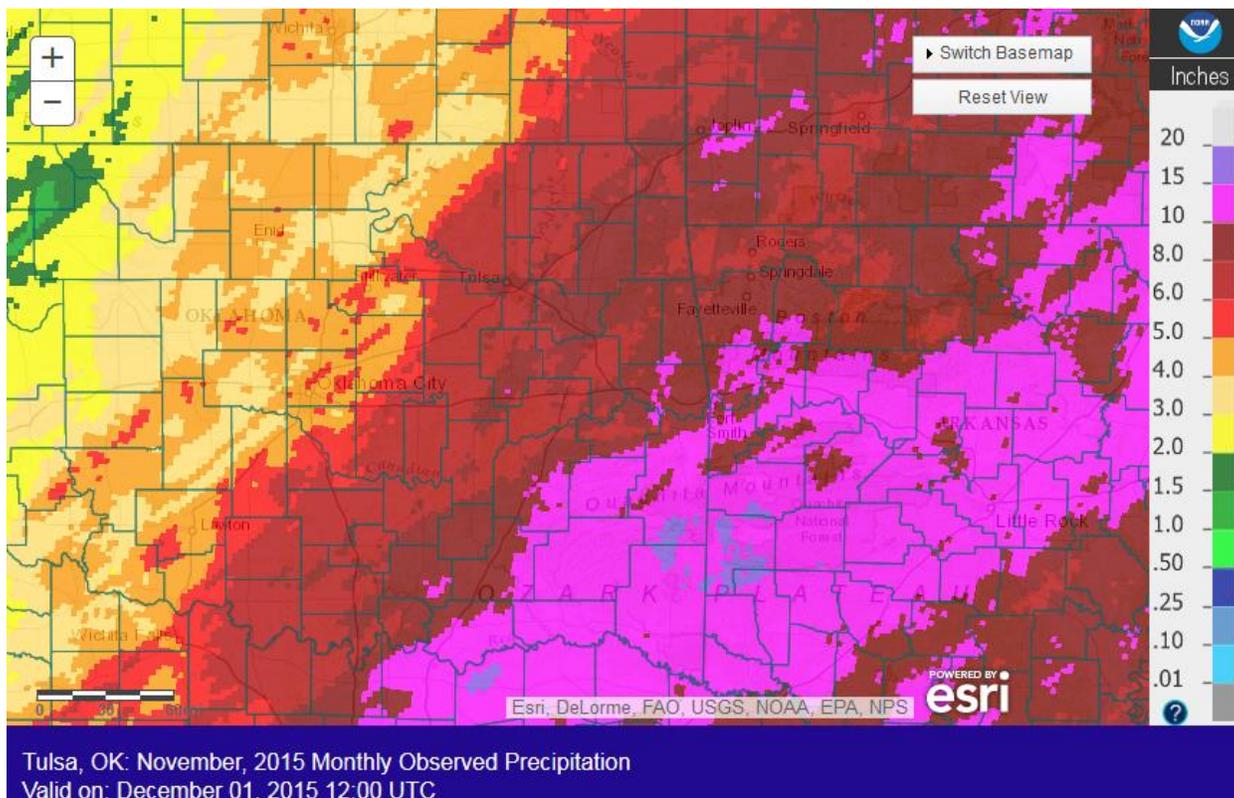


Fig. 1a. Estimated Observed Rainfall for November 2015

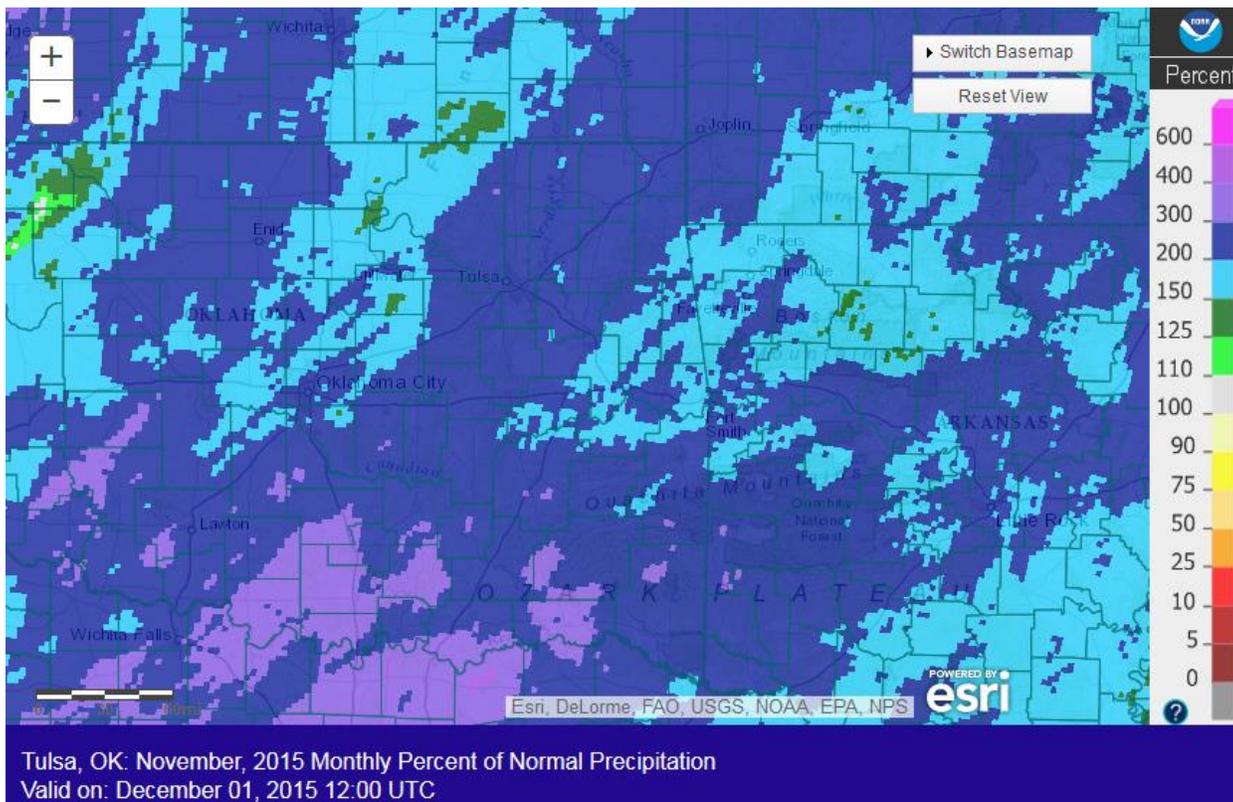


Fig. 1b. Estimated % of Normal Rainfall for November 2015

In Tulsa, OK, November 2015 ranked as the 23rd warmest November (52.6°F, tied 2012; since records began in 1905) and the 4th wettest November (7.21", tied 1996; since records began in 1888). Fort Smith, AR had the 12th warmest November (54.9°F; since records began in 1882) and the 5th wettest November (9.43"; since records began in 1882). Fayetteville, AR had the 18th warmest (49.8°F, tied 1981) and the 5th wettest (8.42") November since records began in 1949.

The temperature in Fayetteville, AR fell below freezing for the first time this season on the 8th. This resulted in the longest growing season on record for Fayetteville with 217 non-freezing days from April 4 to November 8, 2015 (records began in 1950). The previous record was 214 days from March 31 to November 1, 1991. The temperature in Tulsa, OK fell below freezing for the first time on the 21st, meaning 2015 was the longest growing season on record, with a season length of 259 non-freeze days from March 6 to November 21, 2015 (records began in 1906). The previous record was 257 days from March 6 to November 19, 1985.

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

Hugo, OK (meso)	13.96	Cloudy, OK (meso)	13.27	Antlers, OK (coco)	13.18
Springdale 5.8 ENE, AR (coco)	13.18	Antlers, OK (meso)	12.88	Antlers 5NW, OK (coop)	12.79
Winslow 7NE, AR (coop)	12.58	Bengal, OK (coop)	12.30	Fanshawe, OK (coop)	11.97

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

Burbank, OK (meso)	3.85	Foraker, OK (meso)	3.96	Pawnee, OK (meso)	5.16
Drumright 0.6SW, OK (coco)	5.24	Bartlesville, OK (ASOS)	6.18	Sperry 6.7WNW, OK (coco)	6.52
Muskogee, OK (ASOS)	6.76	Copan, OK (meso)	6.97	Tulsa 5.9S, OK (coco)	7.04

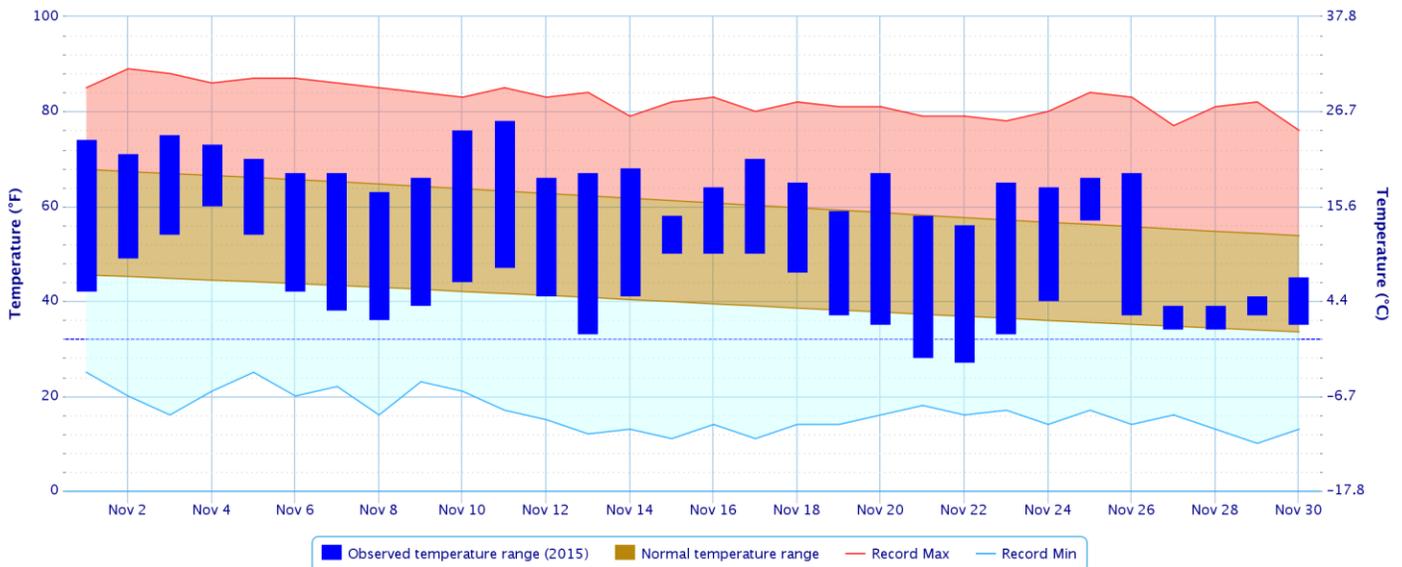
In Tulsa, OK, Autumn 2015 ranked as the 22nd warmest Autumn (64.1°F, tied 2007, 1933, 1924; since records began in 1905) and the 36th wettest Autumn (11.64"; since records began in 1888). Fort Smith, AR had the 11th warmest Autumn (65.7°F; since records began in 1882) and the 28th wettest Autumn (13.52"; since records began in 1882). Fayetteville, AR had the 16th warmest (59.8°F) and the 32nd wettest (12.07") Autumn since records began in 1949.

According to statistics from the [Oklahoma Climatological Survey \(OCS\) Mesonet](#):

Rank since 1921	November 2015	Cool Growing Season (Sep 1 – Nov 30)	Water Year-to-Date (Oct 1 – Nov 30)	Last 120 Days (Aug 3 – Nov 30)	Last 180 Days (Jun 4 – Nov 30)	Year-to-Date (Jan 1 – Nov 30)	Last 365 Days (Dec 1, 2014 – Nov 30, 2015)
Northeast OK	1 st wettest	37 th wettest	17 th wettest	26 th wettest	13 th wettest	10 th wettest	10 th wettest
East Central OK	3 rd wettest	21 st wettest	12 th wettest	22 nd wettest	1 st wettest	1 st wettest	1 st wettest
Southeast OK	2 nd wettest	10 th wettest	4 th wettest	11 th wettest	22 nd wettest	5 th wettest	4 th wettest
Statewide	2 nd wettest	18 th wettest	10 th wettest	23 rd wettest	7 th wettest	1 st wettest	1 st wettest

Daily Temperature Data – Tulsa Area, OK (ThreadEx)

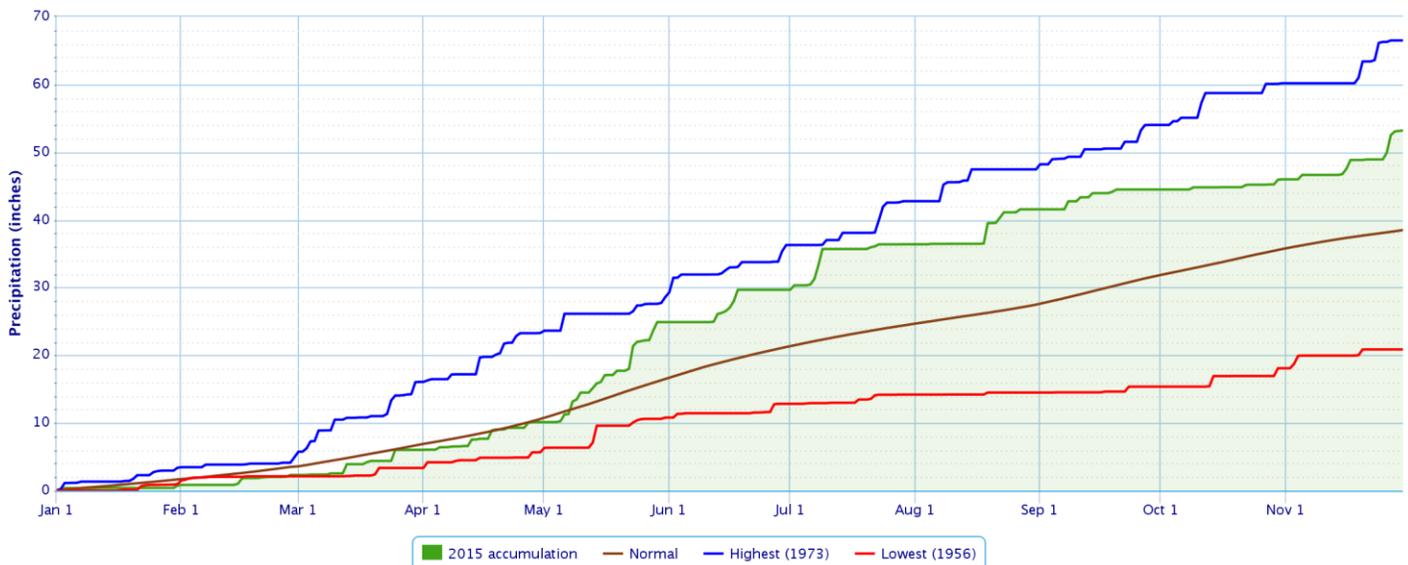
Period of Record – 1905-01-06 to 2015-12-02. Normals period: 1981-2010. Click and drag to zoom chart.



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Accumulated Precipitation – Tulsa Area, OK (ThreadEx)

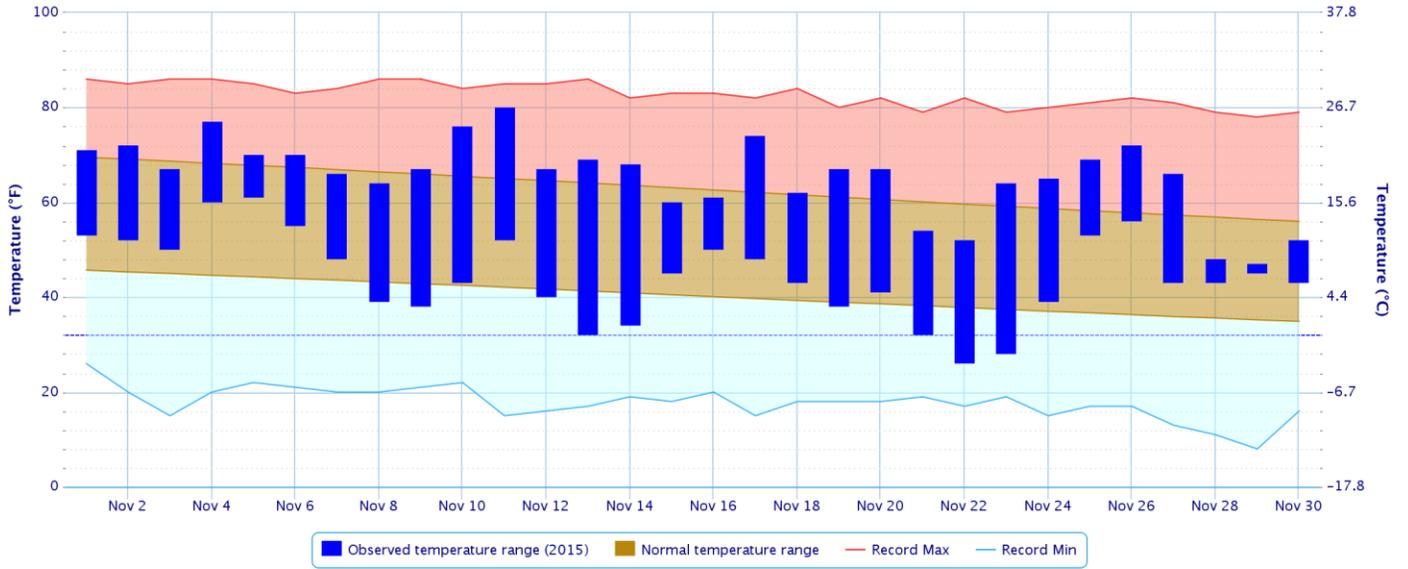
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



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

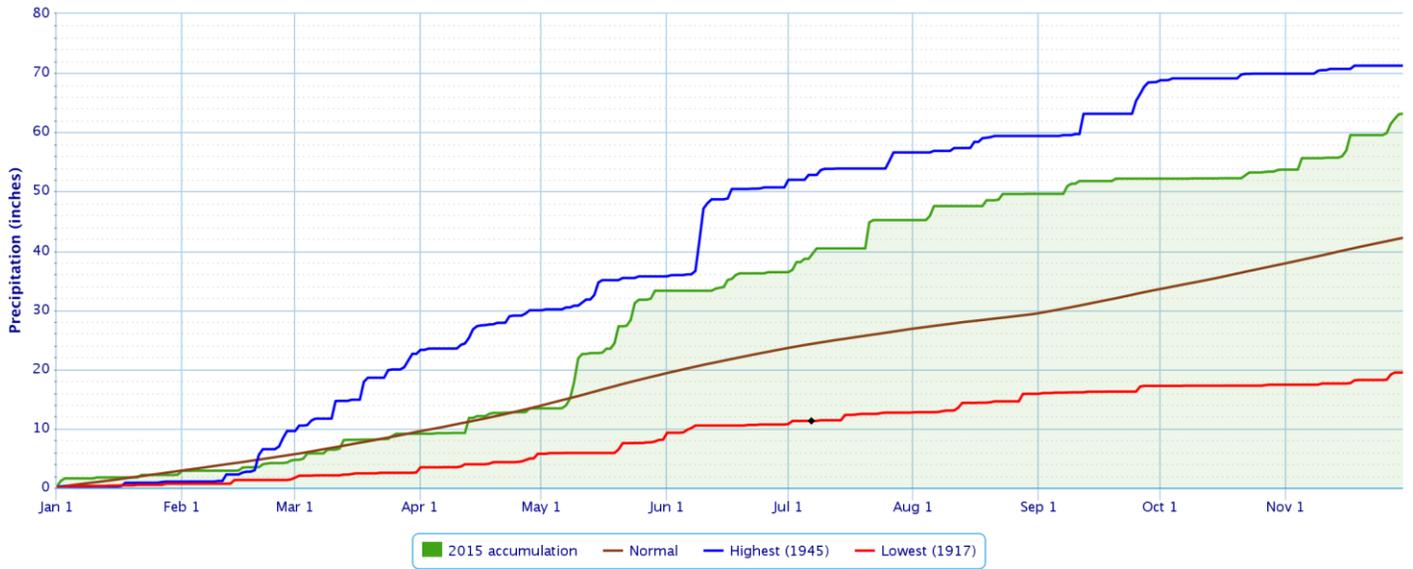
Period of Record – 1882-06-01 to 2015-12-02. Normals period: 1981-2010. Click and drag to zoom chart.



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Accumulated Precipitation – Fort Smith Area, AR (ThreadEx)

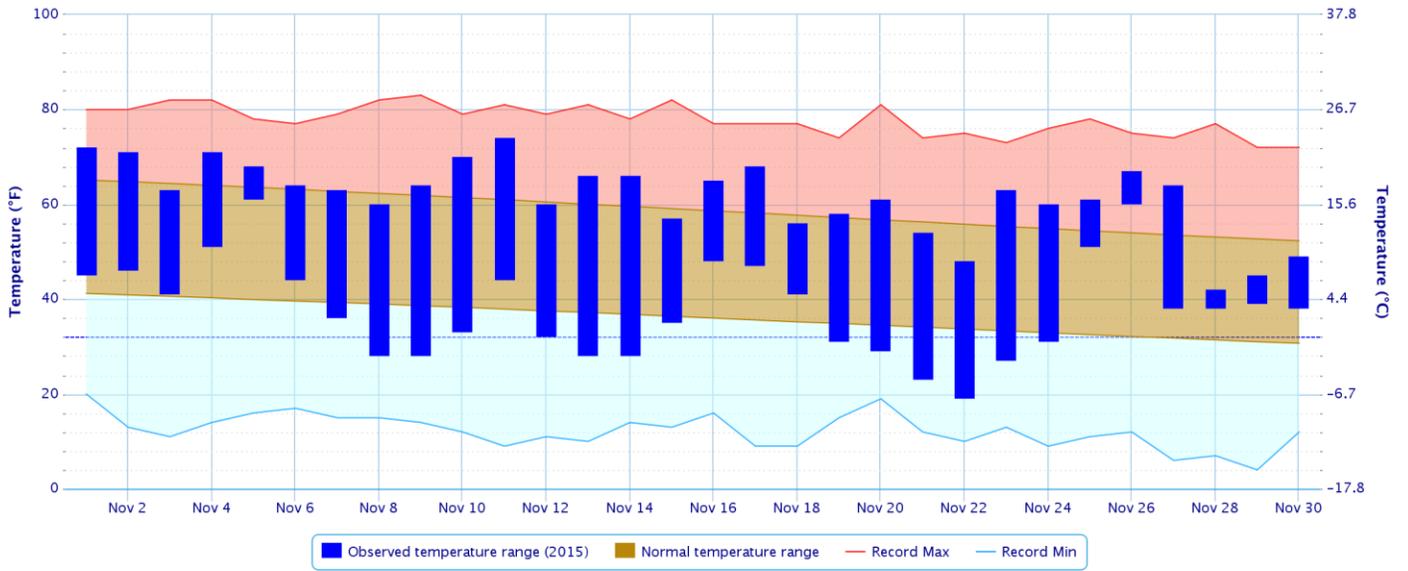
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



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Daily Temperature Data – FAYETTEVILLE DRAKE FLD, AR

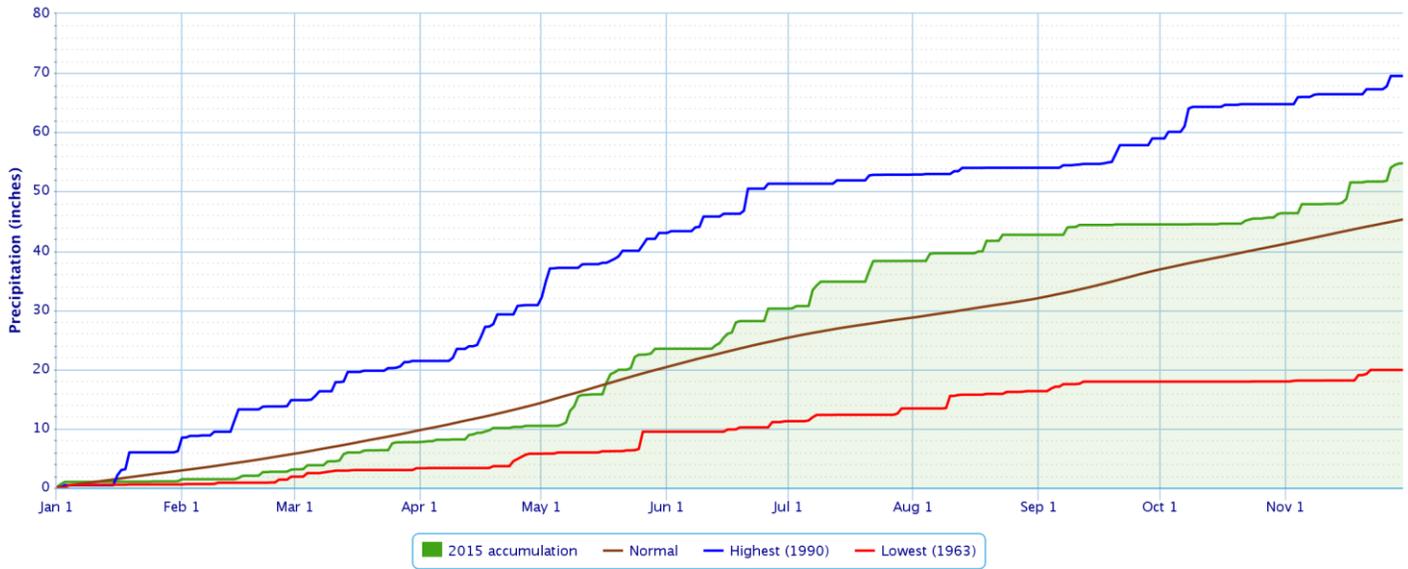
Period of Record – 1949-07-14 to 2015-12-02. Normals period: 1981-2010. Click and drag to zoom chart.



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Accumulated Precipitation – FAYETTEVILLE DRAKE FLD, AR

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



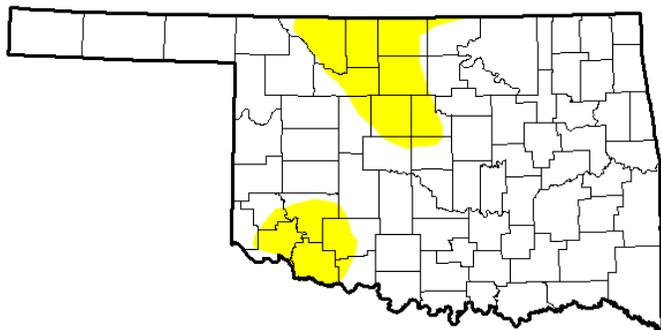
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Drought

According to the [U.S. Drought Monitor](#) (USDM) from December 1, 2015 (Figs 2a, 2b), there were not drought or abnormally dry conditions present in eastern OK and northwest AR.

U.S. Drought Monitor Oklahoma

December 1, 2015
(Released Thursday, Dec. 3, 2015)
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	85.81	14.19	0.00	0.00	0.00	0.00
Last Week 11/24/2015	64.47	35.53	13.44	0.00	0.00	0.00
3 Months Ago 9/1/2015	79.57	20.43	8.84	2.83	0.00	0.00
Start of Calendar Year 12/30/2014	25.63	74.37	62.03	40.84	21.74	5.70
Start of Water Year 9/29/2015	52.60	47.40	16.79	6.37	0.97	0.00
One Year Ago 12/2/2014	24.48	75.52	60.29	40.85	18.33	5.04

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
David Simeral
Western Regional Climate Center

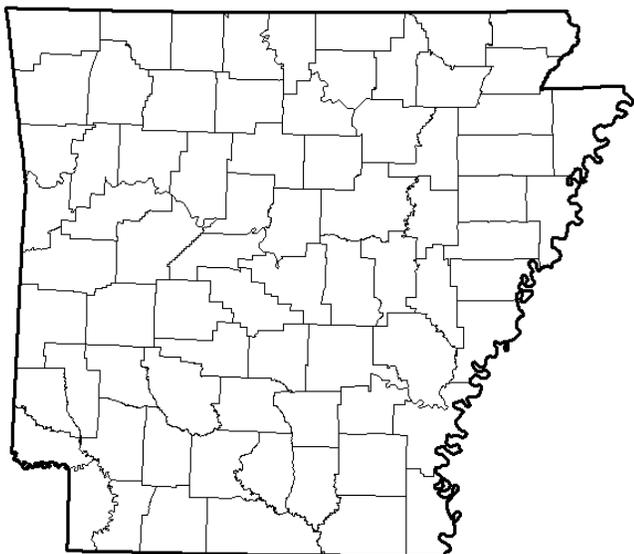


<http://droughtmonitor.unl.edu/>

Fig. 2a. Drought Monitor for Oklahoma

U.S. Drought Monitor Arkansas

December 1, 2015
(Released Thursday, Dec. 3, 2015)
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	100.00	0.00	0.00	0.00	0.00	0.00
Last Week 11/24/2015	100.00	0.00	0.00	0.00	0.00	0.00
3 Months Ago 9/1/2015	55.08	44.92	14.49	4.45	0.00	0.00
Start of Calendar Year 12/30/2014	36.88	63.12	14.40	0.00	0.00	0.00
Start of Water Year 9/29/2015	39.30	60.70	42.41	16.89	4.64	0.00
One Year Ago 12/2/2014	57.78	42.22	10.54	0.00	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

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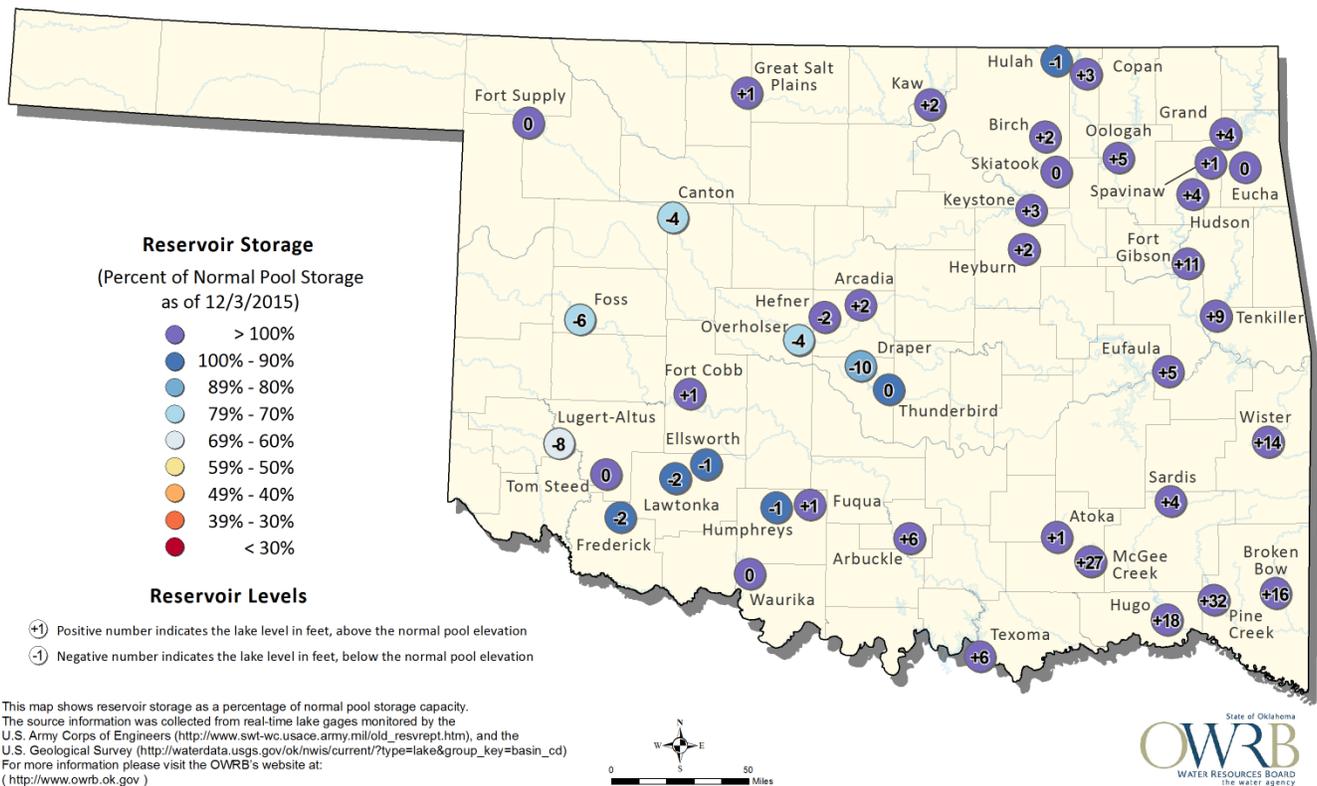
<http://droughtmonitor.unl.edu/>

Fig. 2b. Drought Monitor for Arkansas

Reservoirs

According to the USACE, most of the major reservoirs in the HSA were operating within their flood control pools due to the heavy rain at the end of the month. As of 12/02/2015, the following reservoirs were operating above 5% of the top of their conservation pools: Sardis Lake 149%, Hugo Lake 144%, Eufaula Lake 141%, Wister Lake 141%, Ft. Gibson Lake 128%, Grand Lake 126%, Tenkiller Lake 122%, Beaver Lake 121%, Hudson Lake 119%, Oologah Lake 115%, Copan Lake 107%, and Keystone Lake 106%. Only one lake remained below the top of its conservation pool: Hulah Lake 89%.

Oklahoma Surface Water Resources Reservoir Levels and Storage as of 12/3/2015



Outlooks

The [Climate Prediction Center](#) (CPC) outlook for December 2015 (issued November 30, 2015) indicates an enhanced chance for above normal temperatures and equal chances for above, near, and below 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. Positive phases of the Arctic Oscillation and the North Pacific Oscillation also favor mild temperatures for at least the first half of December across much of North America.

For the 3-month period December-January-February 2015-16, CPC is forecasting an equal chance for above, near, and below normal temperatures across all of eastern OK and northwest. This outlook also indicates an enhanced chance for above median precipitation across all of eastern OK and west central AR, with equal chances for above, near, and below median rainfall in northwest AR (outlook issued November 19, 2015). According to CPC, strong El Niño conditions remain in place and are an important driver of climate scale

forecasts over North America. The ongoing El Niño is among the strongest on record and is expected to persist into Spring 2016. This event is likely to peak in strength during Winter 2015-16. There is a 95% chance for El Niño to continue through the upcoming winter and peak as a very strong (sometimes referred to as a “super”) El Niño, with sea surface temperature anomalies near or exceeding +2.0°C. 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

November 1-15

Deep moisture was in place across the region as an upper-level system moved into the southern plains. As a pacific front approached from the west, rain increased across eastern OK and northwest AR on the 5th, with the heaviest rain over southeast OK and west central AR during the evening and overnight hours. Rainfall across much of the area totaled around 1” or less, with 1.5” to around 3.5” occurring southeast of an Atoka to Wilburton to Fayetteville to Berryville line (Fig. 3). Strong deep layer shear allowed storms to rotate, and an EF-0 tornado occurred near Okemah during the afternoon. Several wind damage reports were also received.

Some of the highest 24-hr rainfall totals (inches) ending at 6am CST November 6, 2015:

Panama 2E, OK	3.54	Big Cedar 2E, OK	3.33	Ratcliff, AR	3.12
Poteau 1ENE, OK	3.09	Charleston 1.7E, AR	3.08	Greenwood 1.4W, AR	3.04

Some of the highest 2-day Rainfall Totals ending 6am November 6, 2015:

Big Cedar 2E, OK	4.86	Panama 2E, OK	4.26	Daisy 4ENE, OK	3.81
Poteau 1ENE, OK	3.58	Riverdale 4.2E, AR	3.37	Hartshorne 3.9NNE, OK	3.31
Inola 3SSE, OK	3.31	Decatur 2.6ESE, AR	3.28	Quapaw 3SE, OK	3.16
Miami 2NE, OK	3.14	Radcliff, AR	3.12	Charleston 1.7E, AR	3.08
Greenwood 1.4W, AR	3.04	Broken Arrow 7ENE, OK	3.03		

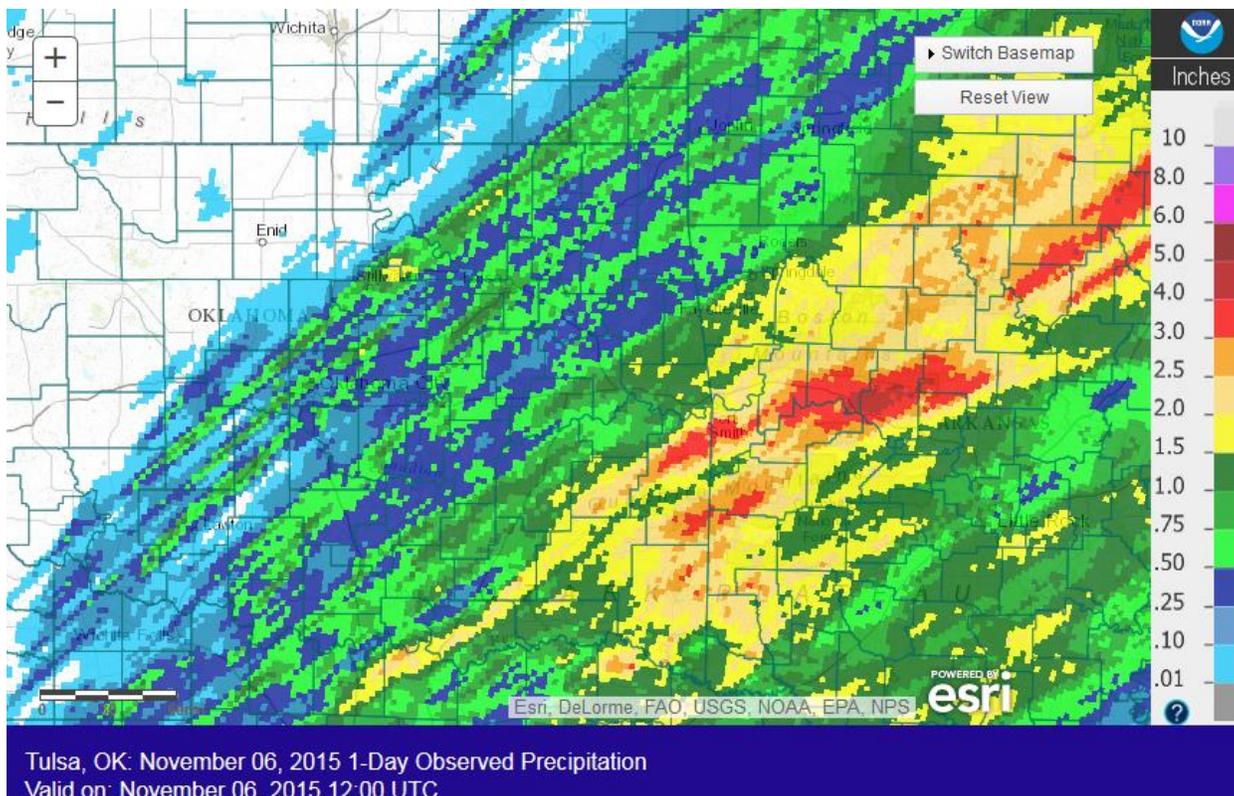


Fig. 3. 24-hour Estimated Observed Rainfall ending at 6am CST 11/06/2015.

A closed low moved out of the Rockies and into the central plains on the 11th, with a trailing dryline and cold front over the southern plains. Scattered storms developed ahead of the dryline, affecting primarily southeast OK and west central AR. Rainfall totals were light at less than 0.50". Very high winds followed the dryline passage, bringing sustained winds of 15-30 mph and gusts of 40 to 50 mph for much of the day (Fig. 4). These winds, combined with the low relative humidity, led to several large fires. Approximately 40,000 acres burned across Osage, Washington, and Nowata Counties, and the fires burned two residences and several barns and outbuildings. The winds decreased and humidity rose as the cold front passed during the night.

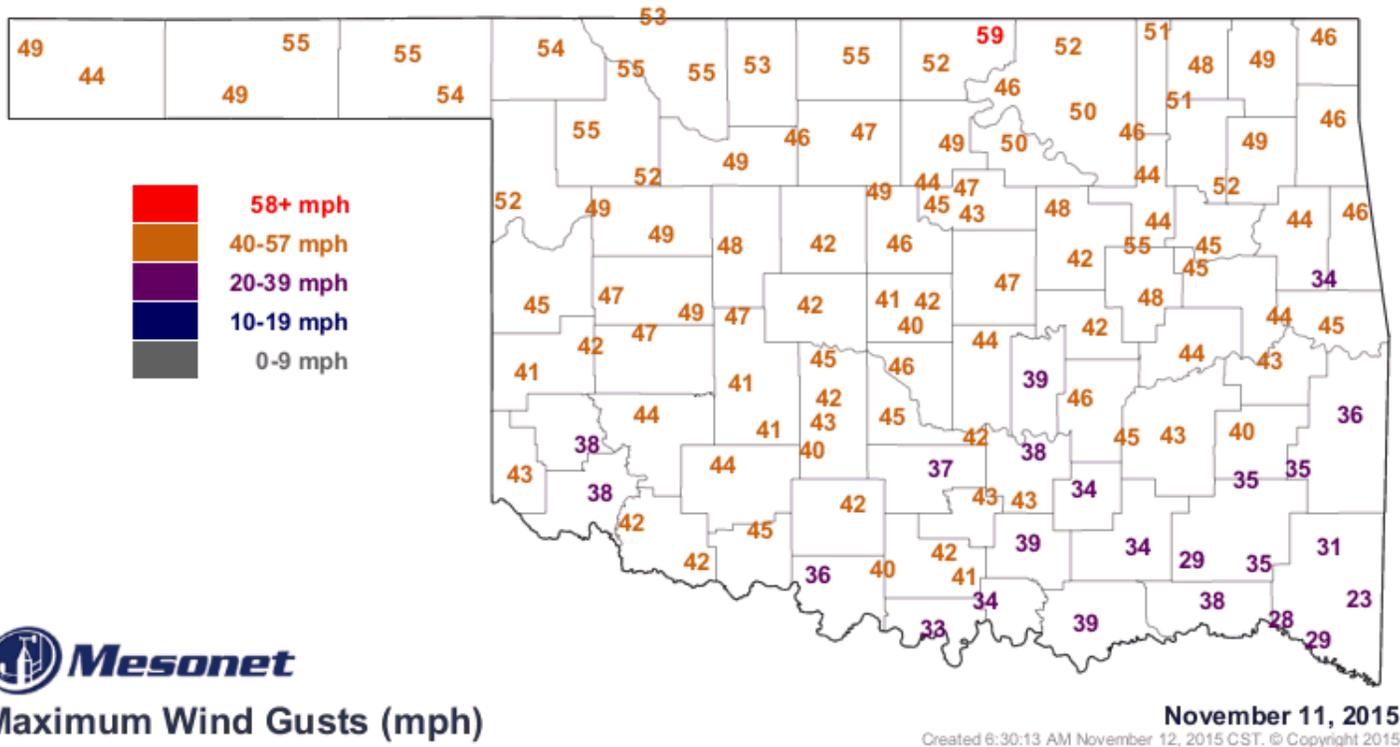


Fig. 4. Maximum wind gusts for 11/11/2015 courtesy of the Oklahoma Mesonet.

November 16-30

Scattered showers spread northeast into the area during the morning of the 15th in association with a weak upper-level wave. The precipitation increased in coverage during the evening through the morning of the 16th as warm advection and a low-level jet developed ahead of a strong upper-level low over the Intermountain West.

A brief lull in rain occurred midday on the 16th. Precipitation again increased during the evening and overnight hours within an area of warm advection combined with the low-level jet axis over the region. This led to periods of heavy rain. During the predawn hours of the 17th, a squall line moved east into eastern OK and continued to push eastward into northwest AR during the morning. The stronger cells within the line produced heavy rain, with rainfall rates of 1"-2" per hour. Street flooding was reported in or near Fort Smith, Hackett, Rogers, and Van Buren, AR. The squall line also produced strong winds across northeast OK, including a 99 mph gust at Red Rock (immediately west of the HSA boundary), a 62 mph gust at New Kirk, and a 63 mph gust at Copan, OK (all wind gust courtesy of the Oklahoma Mesonet). An EF-1 tornado occurred early on the 17th, affecting homes, outbuildings, trees, and power lines from 6 miles ESE of Checotah to 7.5 miles ENE of Checotah. The rain ended west to east through the day, finally exiting the HSA by late afternoon. The rainfall over the Illinois River Basin led to rises along the Illinois River, with the river cresting above action stage but below flood stage near Tahlequah. Lee Creek near Van Buren also rose above Action Stage, but remained below Flood Stage (preliminary hydrographs found at the end of this report). Rainfall totals from the 15th through 17th ranged from 0.75" to around 5" across eastern OK and northwest AR (Figs 5-7). Many locations across far eastern OK and northwest AR measured 4"-5" of rain during this time. Tulsa, McAlester, and Fayetteville set new daily rainfall records on the 17th.

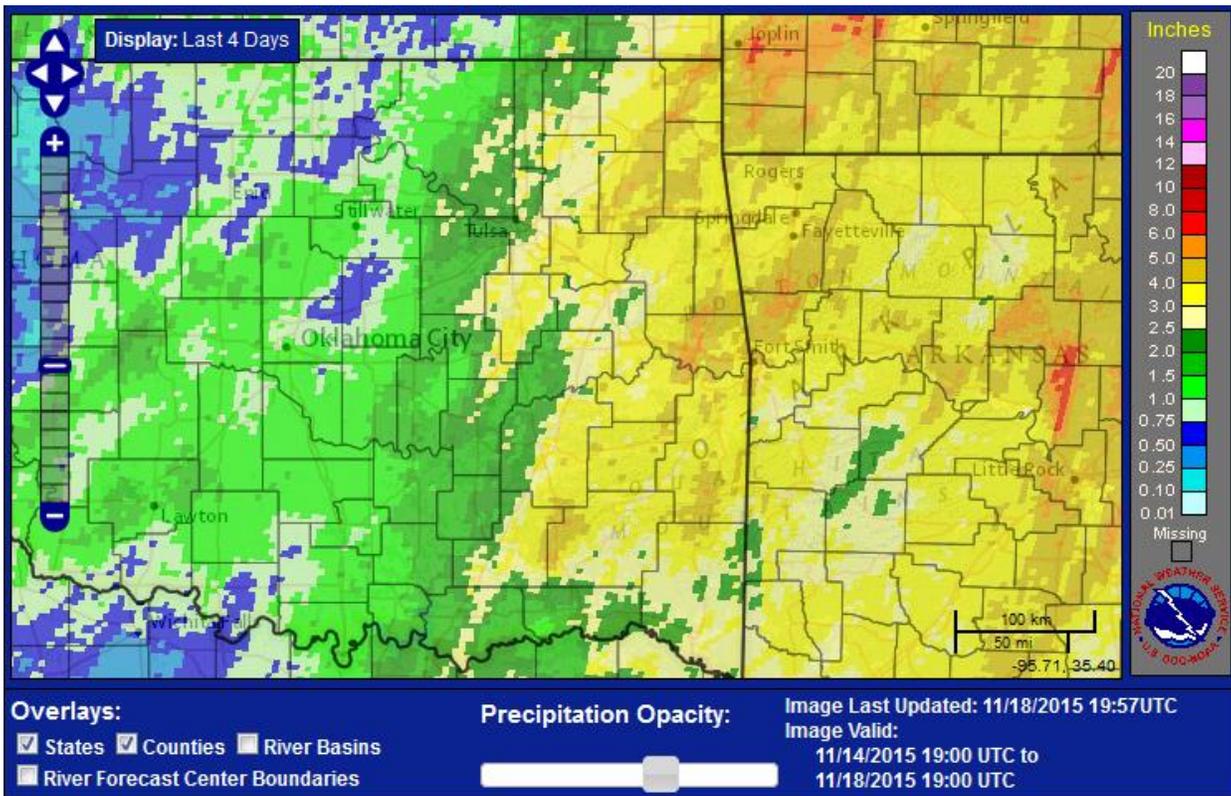


Fig. 5. 4-day Estimated Observed Rainfall ending at 1pm CST 11/18/2015.

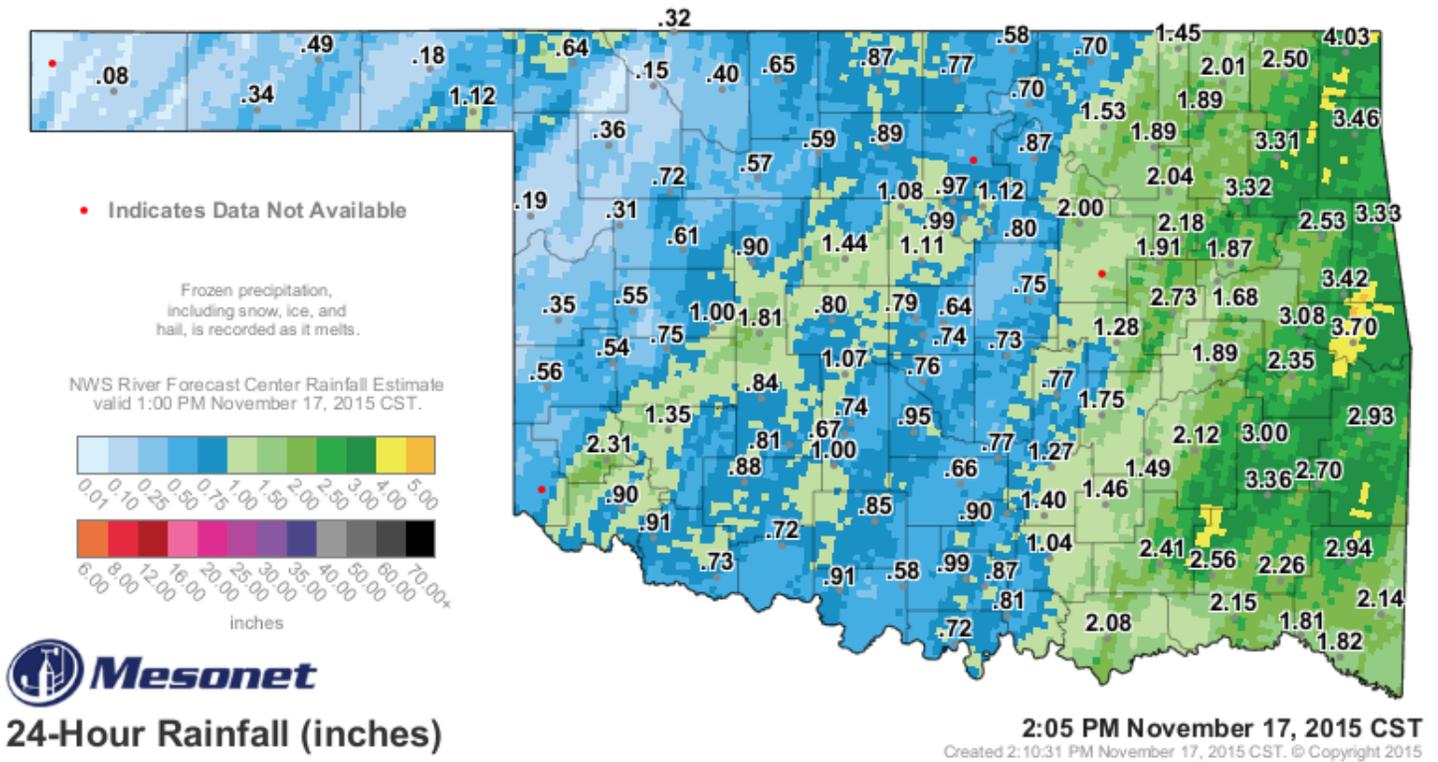


Fig. 6. 24-hour Estimated Observed Rainfall (image) and OK Mesonet measurements ending at 2:05pm CST 11/17/2015.

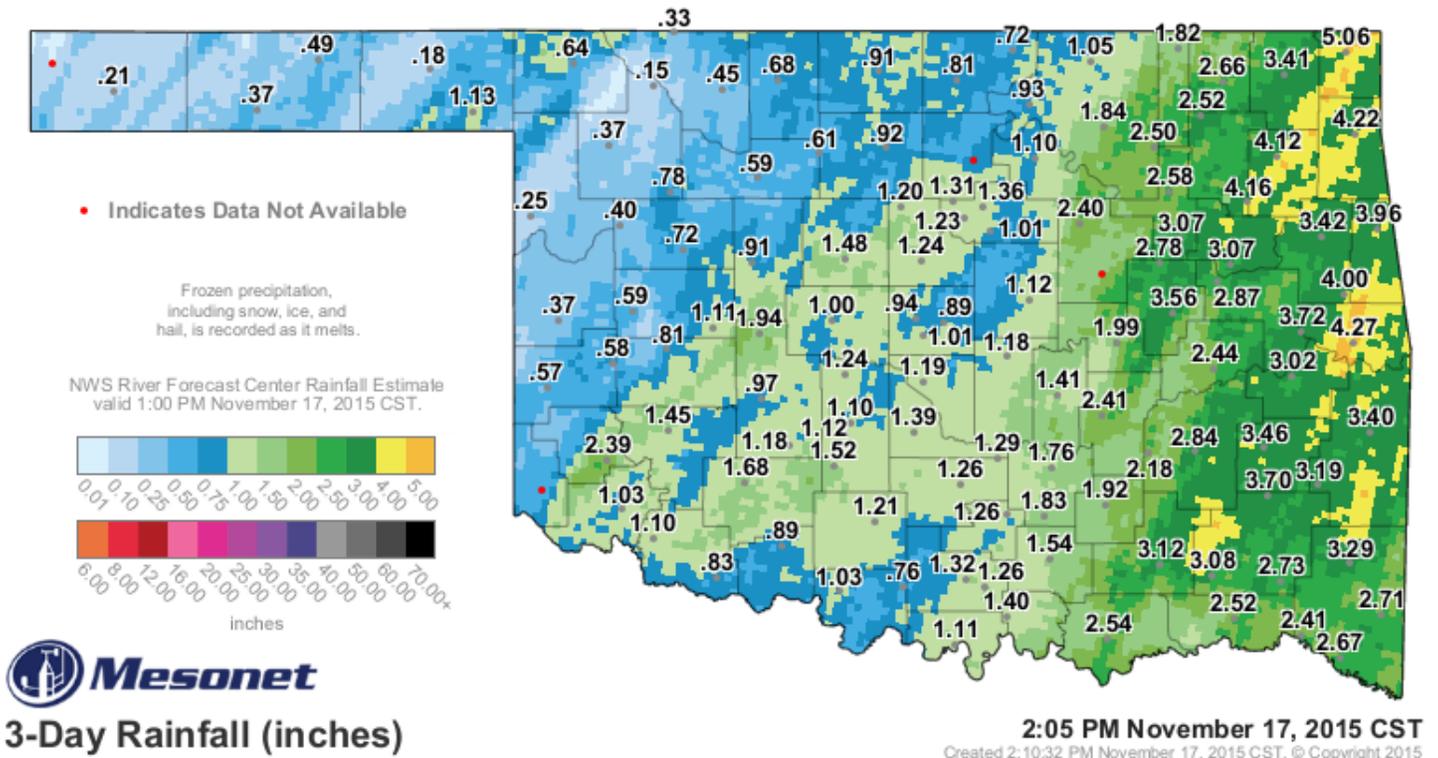


Fig. 7. 3-day Estimated Observed Rainfall (image) and OK Mesonet measurements ending at 2:05pm CST 11/17/2015.

A strong cold front moved into the region during the evening of the 20th, moving southeast across the HSA during the evening and overnight hours. Shower activity occurred near the front, affecting primarily northeast OK and northwest AR, with a secondary area of showers over far southeast OK. Rainfall totals remained light, with amounts of a few hundredths of an inch to near half an inch. The cold air behind the front brought the first freeze to Tulsa on the 21st. This late freeze for Tulsa meant 2015 had the longest growing season on record, with a season length of 259 non-freeze days from March 6 to November 21, 2015 (records began in 1906). The previous record was 257 days from March 6 to November 19, 1985. The cold air also resulted in some light snow in northeast OK and northwest AR behind the front, with little to no accumulation.

A strong and shallow cold front plunged south and east from the evening of the 26th into the 27th across the region and interacted with unseasonably moist air in place. Precipitable water values were more than 3 times climatology for this time of year. Showers increased during Thanksgiving morning, the 26th, over northeast OK, while bands of heavy rain and embedded thunderstorms began late on the afternoon of the 26th, gradually spreading south, and continuing through the 27th and 28th. The front became quasi-stationary over southeast OK while the tropical moisture plume persisted. Multiple rounds of rainfall brought significant rainfall to the entire HSA, with southeast OK receiving the most rain. By 6am on the 27th, most of eastern OK had received 1"-3" over the last 24 hours. Isolated areas of northeast OK had 3"-3.5", while 3"-5" had fallen over Pushmataha and Choctaw Counties in southeast OK (Fig. 8). Over the next 24 hours, an additional 1.5" to 5" fell southeast of I-44, with around 0.50" to 1.5" falling north of the interstate (Fig. 9). Southeast OK once again received 2.5"-5" of rain. 48-hour totals ending at 6am CST November 28, 2015 included:

Hugo 2NW, OK	8.53"	Cloudy 6SSE, OK	7.42"
Antlers 5W, OK	7.14"	Antlers 2NE, OK	6.85"

Some of the highest 24-hr rainfall totals (inches) ending at 6am CST November 27, 2015:

Hugo 2NW, OK	4.38	Antlers 2NE, OK	3.75	Antlers 5W, OK	3.71
Cloudy 6SSE, OK	3.45	Ochelata 5.6N, OK	3.41	Copan 3ENE, OK	3.29
Sand Springs 8.2NW, OK	3.21	Talala 0.5W, OK	3.21	Skiatook 4NW, OK	3.71

Some of the highest 24-hr rainfall totals (inches) ending at 6am CST November 28, 2015:

Big Cedar 2E, OK	4.63	Hugo 2NW, OK	4.15	Cloudy 5ENE, OK	4.11
Cloudy 6SSE, OK	3.97	Hartshorne 3.9NNE, OK	3.51	Antlers 5W, OK	3.43
Wilburton 2SW, OK	3.41	Charleston 1.7E, AR	3.13	Antlers 2NE, OK	3.10

Several stations, including Tulsa, Fort Smith, Fayetteville, and McAlester, recorded new daily rainfall records on the 27th. The heavy rain resulted in numerous road closures throughout eastern OK and northwest AR, and there were several swift water rescues. In addition to the flash flooding, area rivers rose significantly. Eight forecast points went into flood, including Polecat Creek near Sapulpa, the Caney River near Collinsville, the Neosho River near Commerce, the Illinois River near Watts and Tahlequah, the Poteau River near Panama, the Kiamichi River near Antlers, and the Red River near Arthur City (preliminary hydrographs available at the end of this report). Moderate flooding occurred along the Neosho River near Commerce and the Kiamichi River near Antlers, with minor flooding elsewhere.

Behind the front, shallow cold air brought freezing temperatures to locations northwest of a Chandler to Oilton to Copan line on the 27th. This resulted in some light ice accumulation in portions of Osage, Pawnee, and Creek Counties on the 27th. The highest ice accumulations of around one quarter of an inch occurred in far northwest Osage County.

After a brief lull in the rain during the evening of the 27th over most of the area, light to moderate rain once again expanded northeast early on the 28th in response to the approach of an upper-level jet from southern New Mexico into the OK panhandle region. Areal coverage diminished later on the 28th as the jet exited the region. 24-hour rainfall totals ending at 6am 11/29 ranged from a few hundredths of an inch to near 1" (Fig. 10).

Another upper-level jet approached the region late on the 28th, leading to yet another round of rainfall over the area early on the 29th. The heaviest rain occurred over southeast OK and west central AR, which was closest to the mid-level warm front. Rainfall then tapered off from southwest to northeast during the overnight hours and into the 30th as the upper-level low shifted into the Central Plains. By 6am on the 30th, 24-hour rainfall totals yielded another 0.10" to around 0.75" of rain to the region (Fig. 11). The last day of the month was also the last day of the cold, cloudy, rainy conditions than began on the 26th.

The 4-day event rainfall totals ranged from 2.5" near Ponca City to nearly 10" along the Red River (Figs. 12, 13). Most of eastern OK and northwest AR received 3"-5" of rain from this event. Widespread 5"-10" affected much of southeast OK.

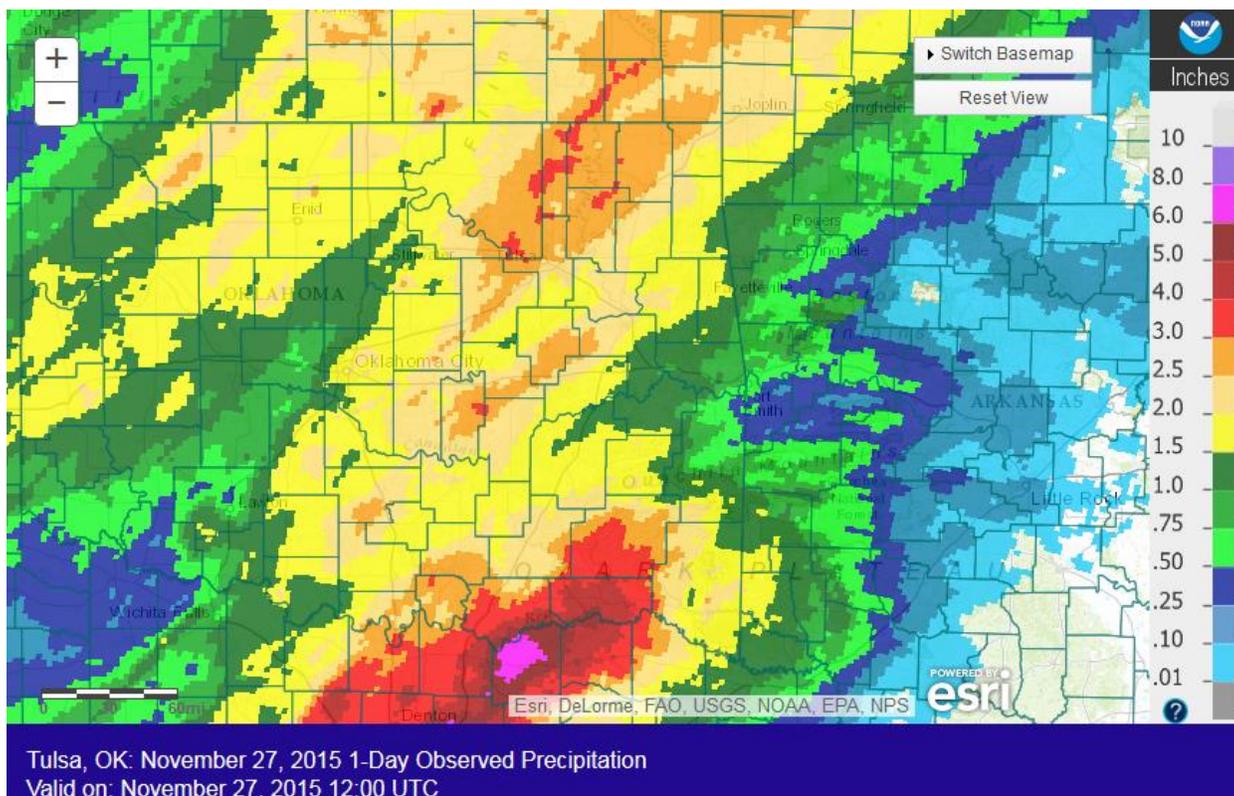


Fig. 8. 24-hr Estimated Observed Rainfall ending at 6am CST 11/27/2015.

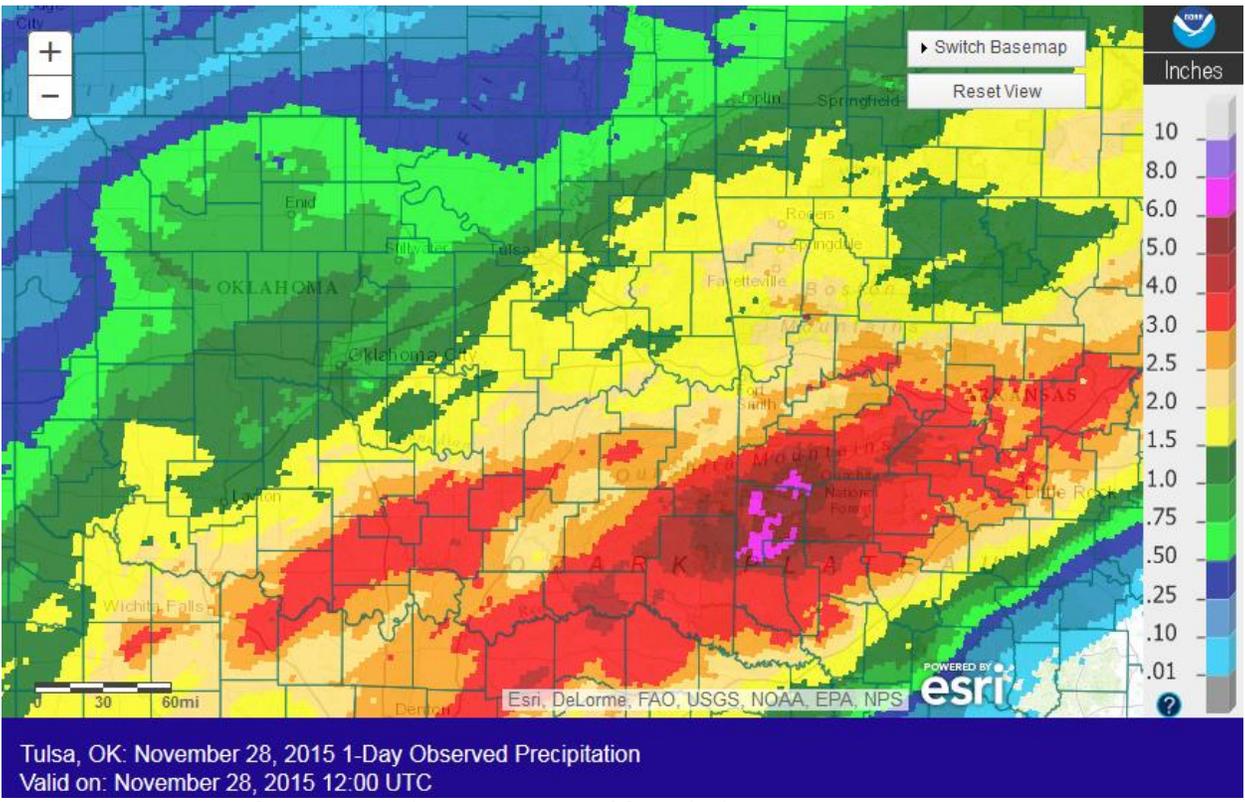


Fig. 9. 24-hr Estimated Observed Rainfall ending at 6am CST 11/28/2015.

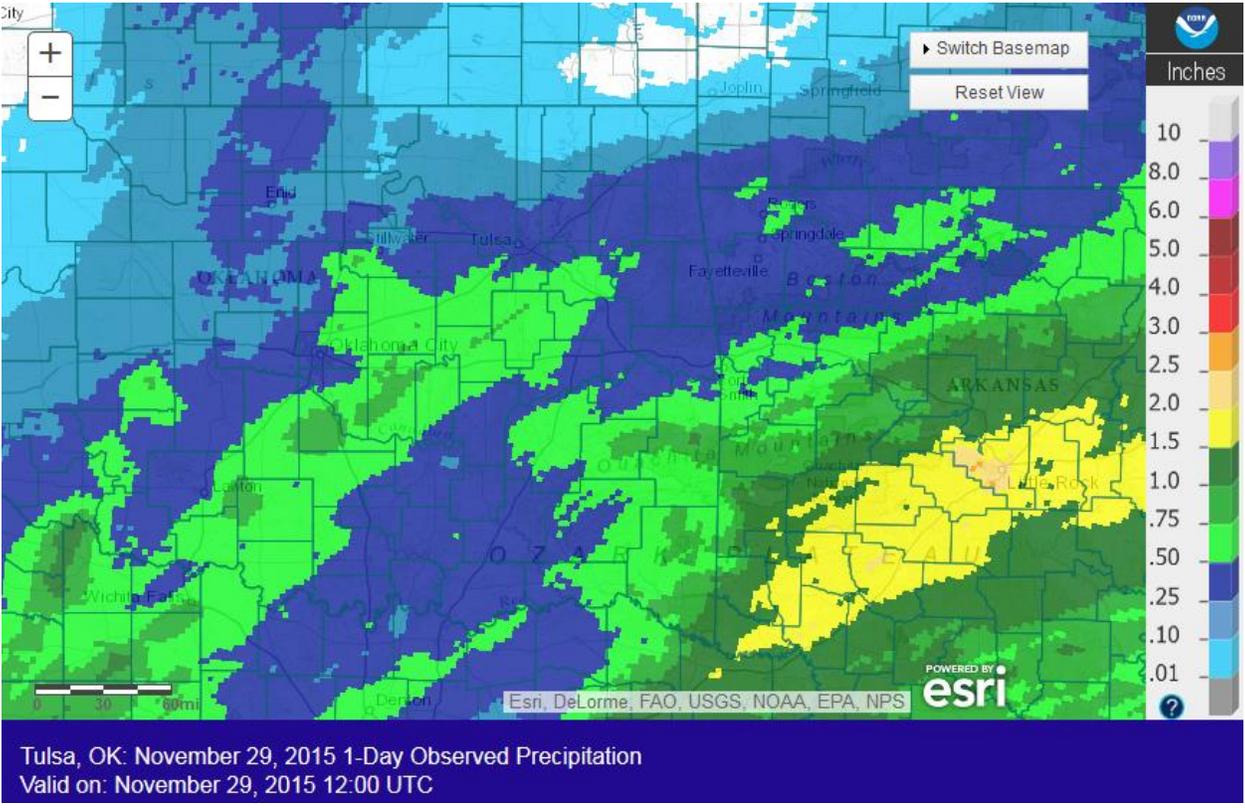


Fig. 10. 24-hr Estimated Observed Rainfall ending at 6am CST 11/29/2015.

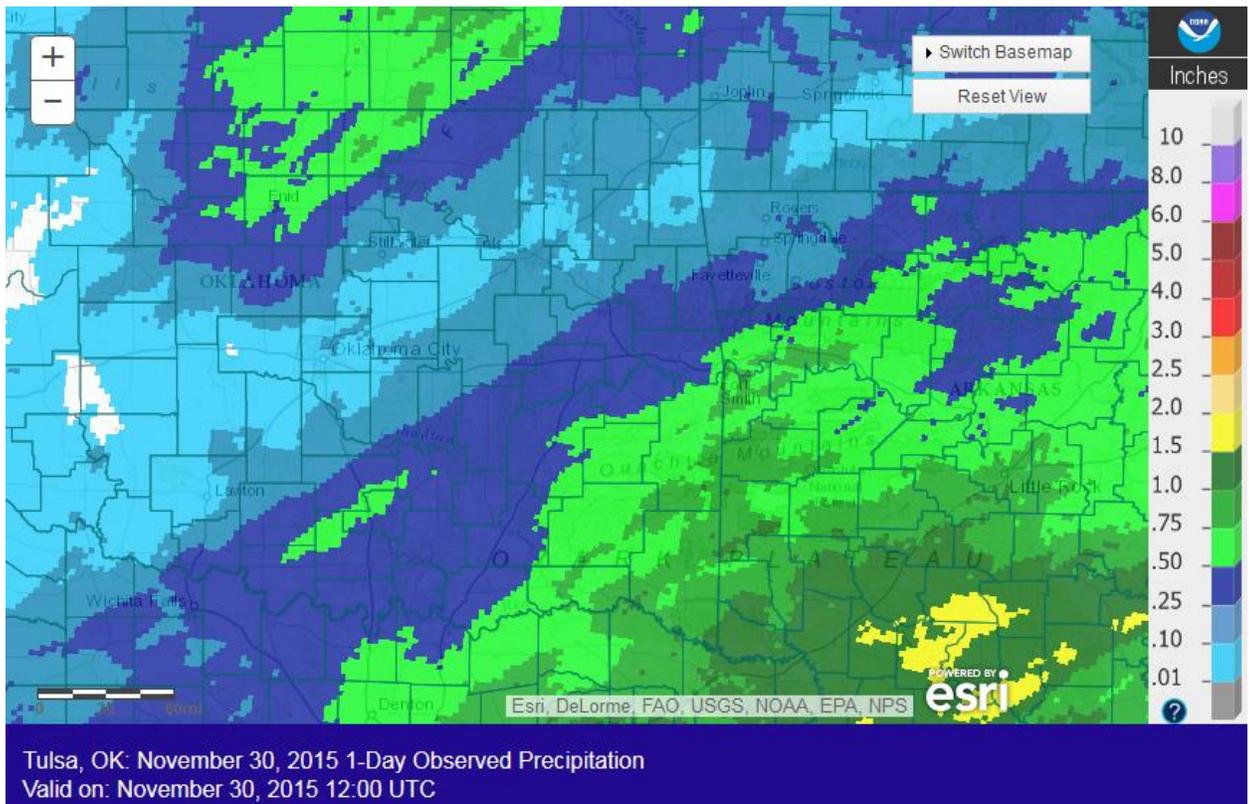


Fig. 11. 24-hr Estimated Observed Rainfall ending at 6am CST 11/30/2015.

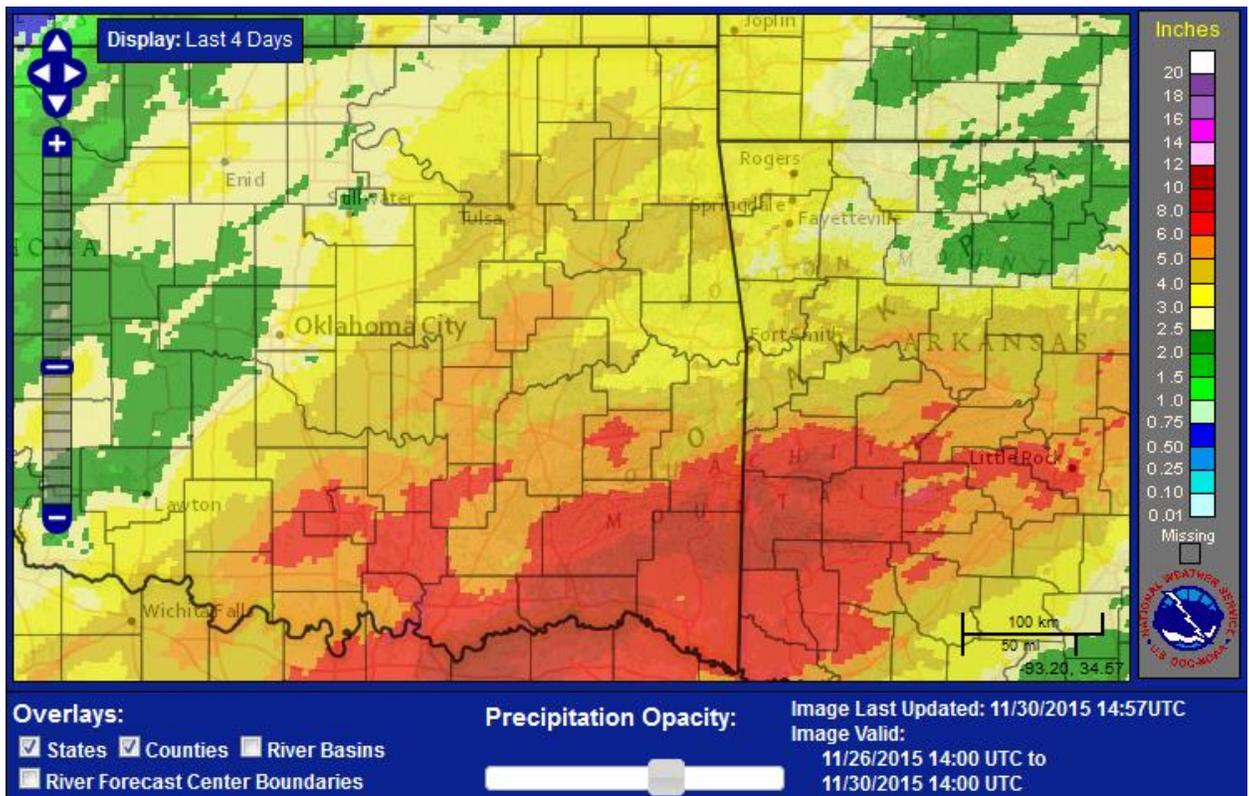


Fig. 12. 4-day Estimated Observed Rainfall ending at 8am CST 11/30/2015.

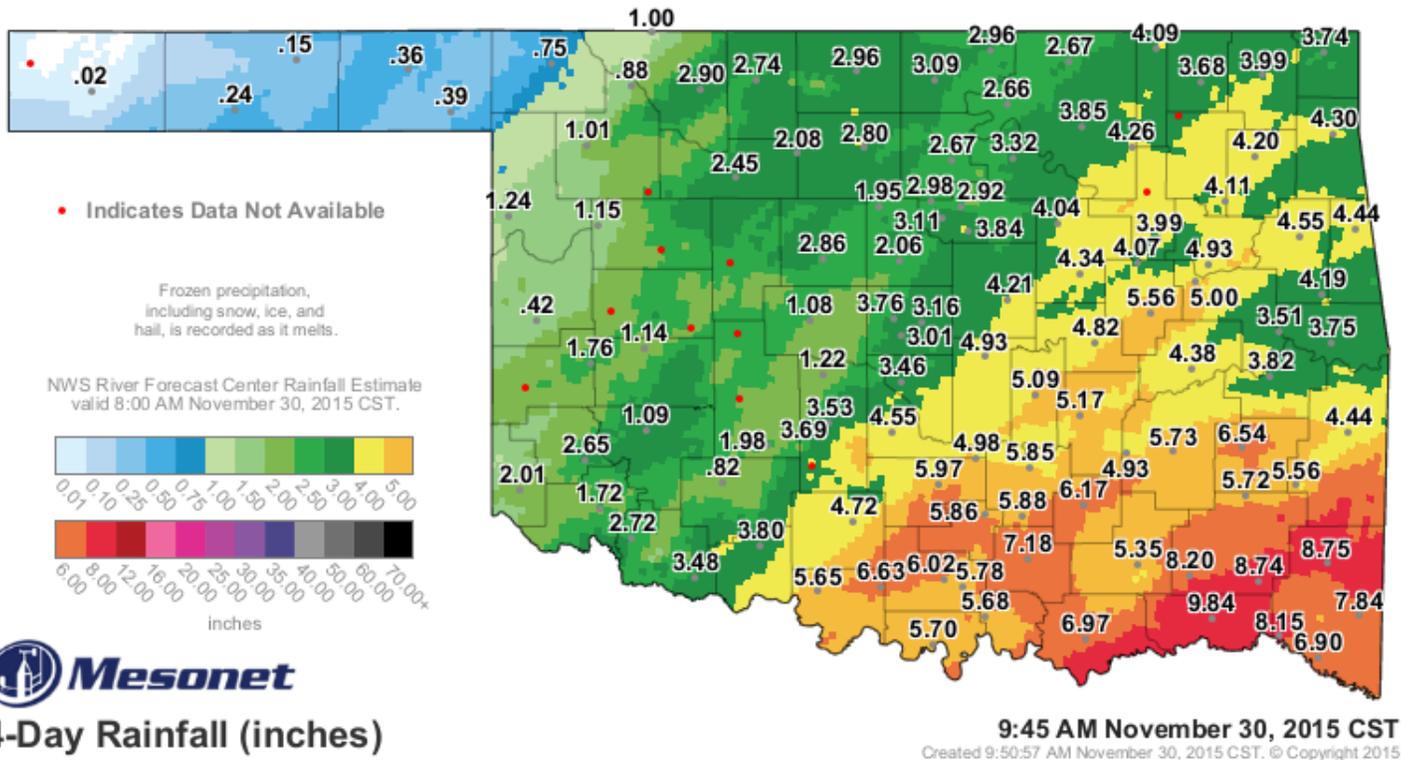


Fig. 13. 4-day Estimated Observed Rainfall (image) and OK Mesonet measurements ending at 9:45am CST 11/30/2015.

Written by:

Nicole McGavock
Service Hydrologist
WFO Tulsa

Products issued in November 2015:

*MLBA4 and OZGA4 transferred to NWS Tulsa HSA February 5, 2014

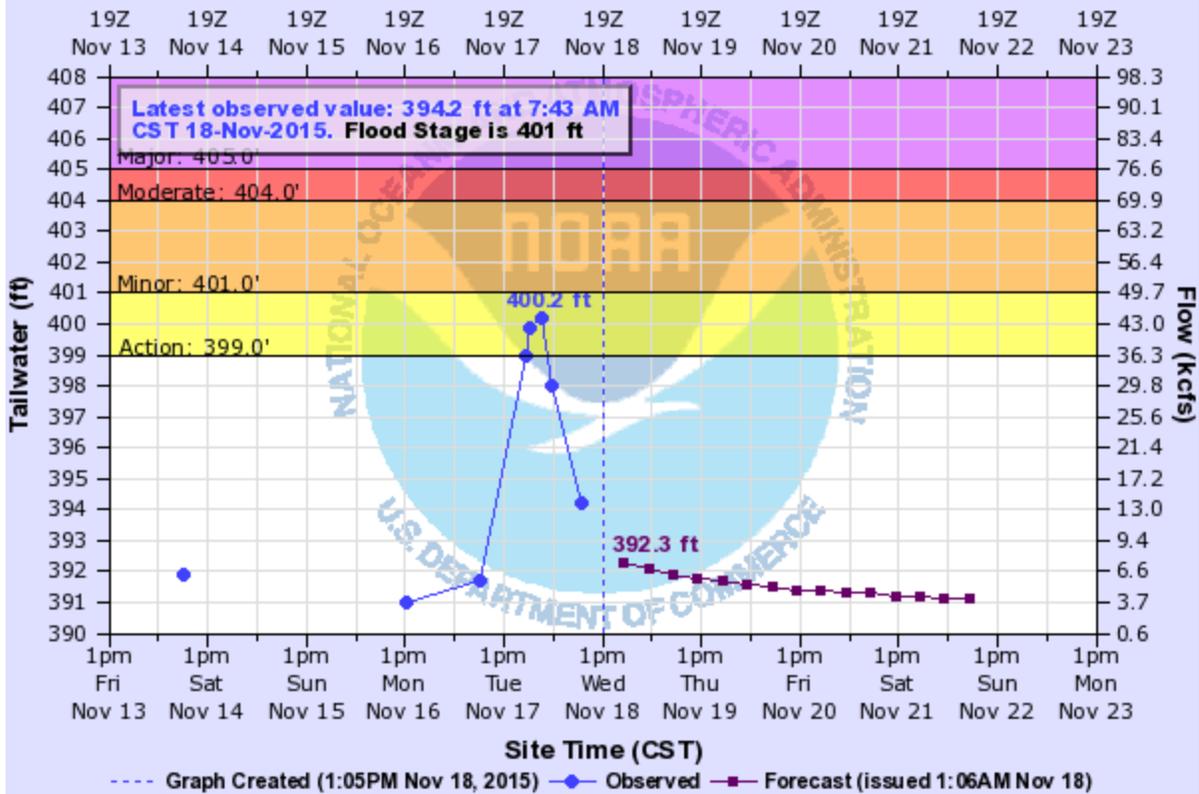
*Mixed case River Flood products began July 31, 2013

- 2 Flash Flood Warnings (FFW)
- 1 Flash Flood Statements (FFS)
- 2 Flash/Areal Flood Watches (FFA) (15 Watch FFA CON/EXT/EXA/EXB/CAN)
- 4 Urban and Small Stream Advisories (FLS)
- 4 Areal Flood Warnings (FLW)
- 4 Areal Flood Statements (FLS)
- 19 River Flood Warnings (FLW)
- 143 River Flood Statements (FLS)
- 3 River Flood Advisories (FLS) (13 Advisory FLS CON/EXT/CAN)
- 0 River Flood Watches (FFA) (0 Watch FFA CON/EXT/CAN)
- 2 River Statements (RVS)
- 0 Hydrologic Outlooks (ESF)
- 0 Drought Information Statements (DGT)

Preliminary Hydrographs:

LEE CREEK NEAR VAN BUREN LCR

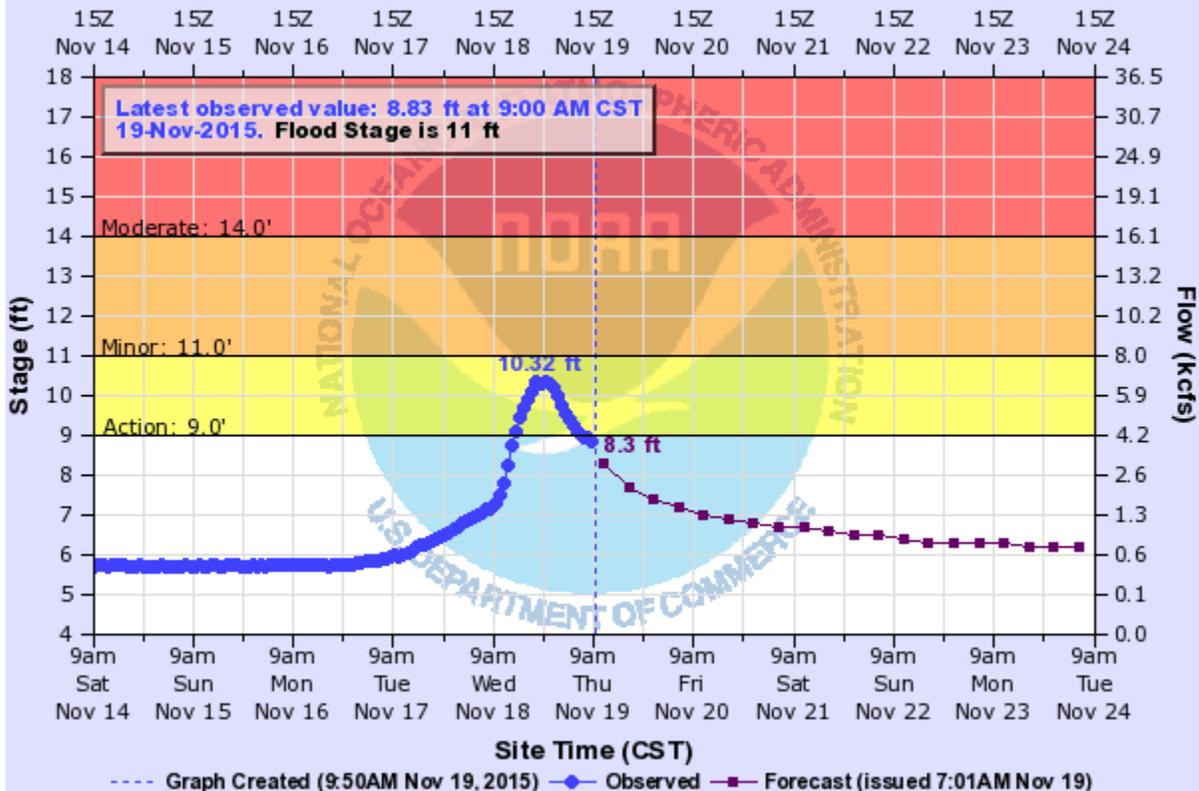
Universal Time (UTC)



VBRA4(plotting HTIRZ) "Gage 0" Datum: 0'

ILLINOIS RIVER (AR OK) NEAR TAHLEQUAH

Universal Time (UTC)

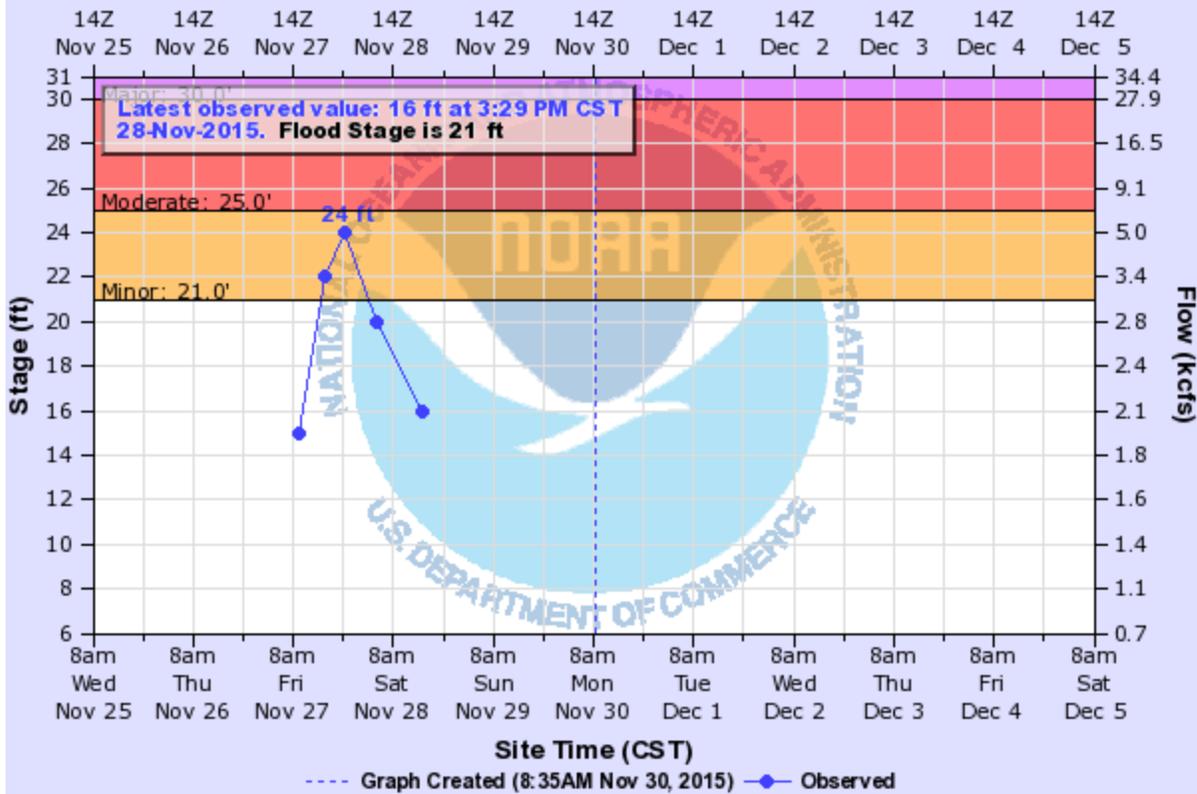


TAL02(plotting HGIRG) "Gage 0" Datum: 664.14'

Observations courtesy of US Geological Survey

POLECAT CREEK NEAR SAPULPA

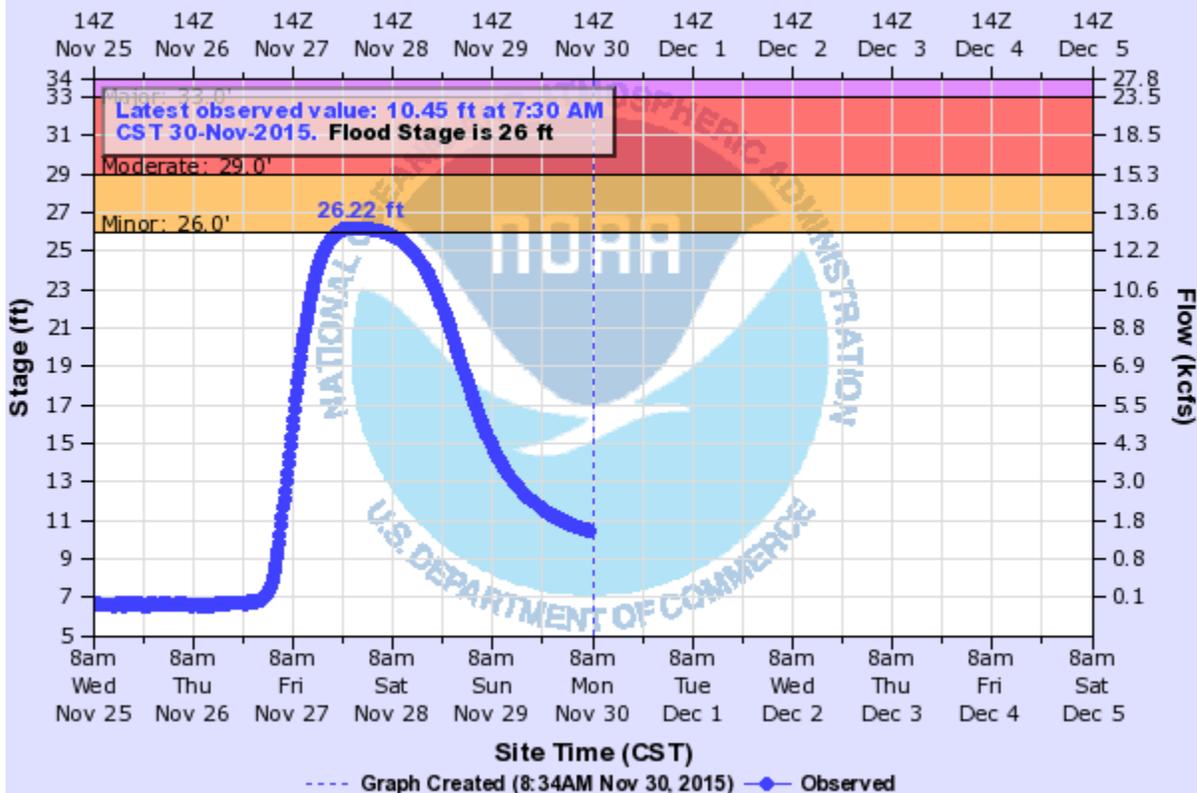
Universal Time (UTC)



SPCO2(plotting HGIRZ) "Gage 0" Datum: 626.2'

CANEY RIVER NEAR COLLINSVILLE

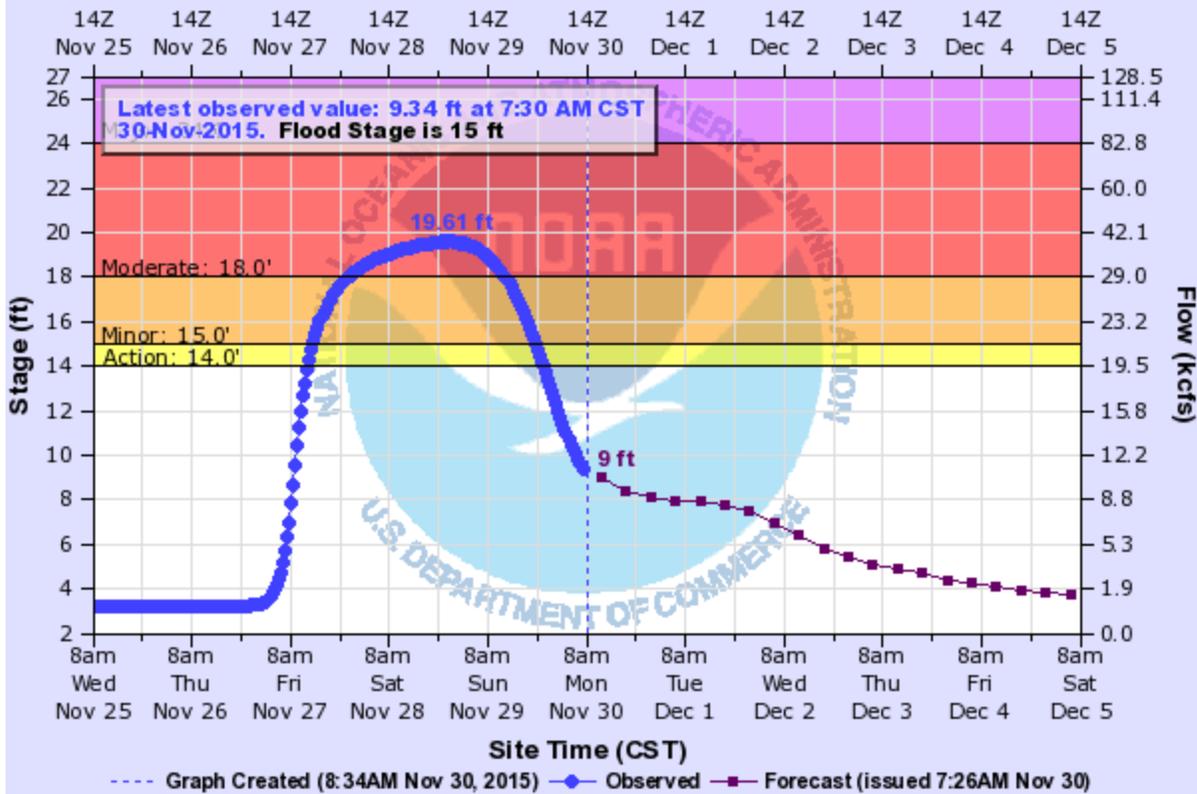
Universal Time (UTC)



CVL02(plotting HGIRG) "Gage 0" Datum: 565.72'

NEOSHO RIVER NEAR COMMERCE

Universal Time (UTC)

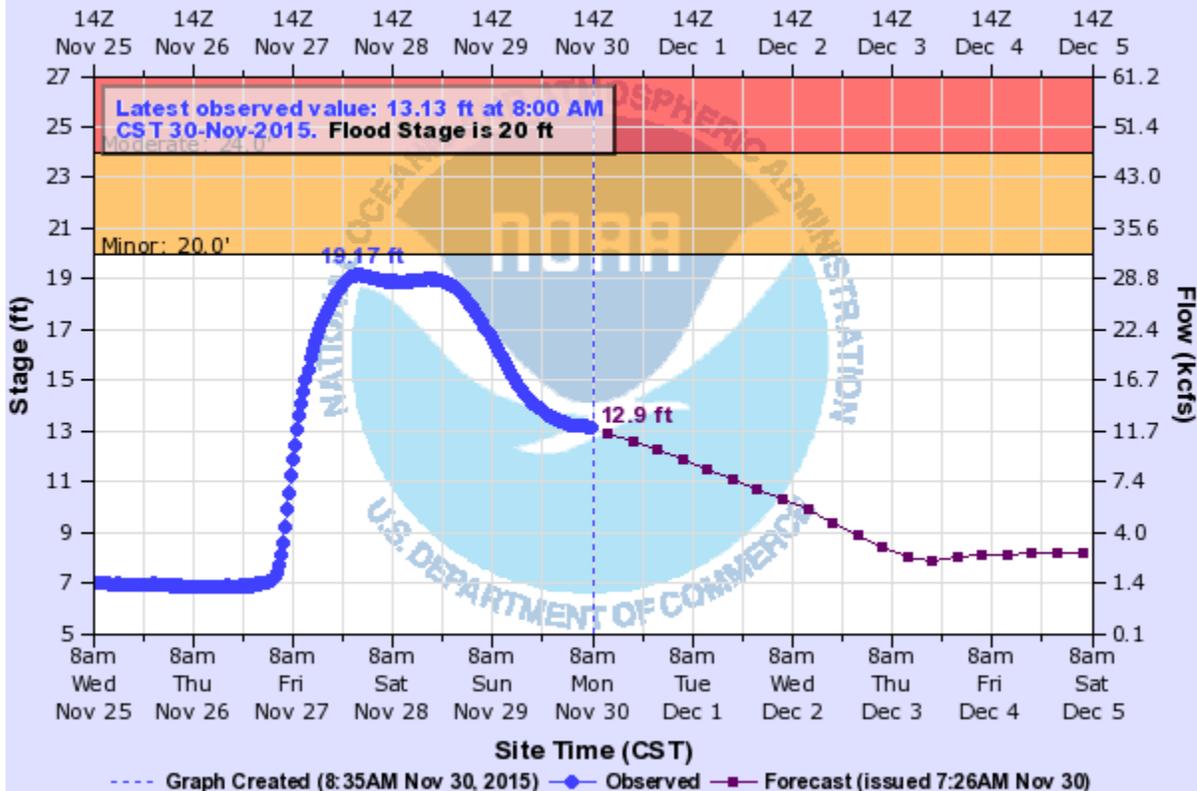


COMO2(plotting HGIRG) "Gage 0" Datum: 748.97'

Observations courtesy of US Geological Survey

SPRING RIVER NEAR QUAPAW

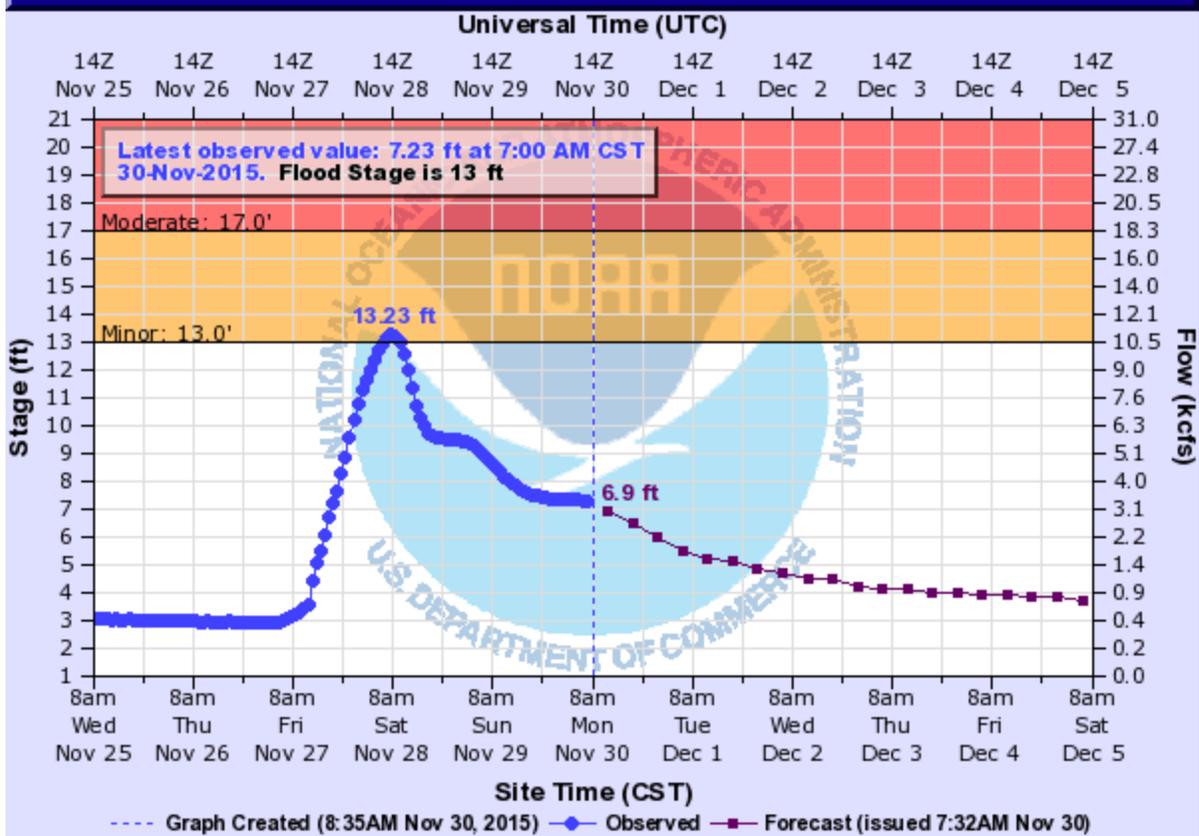
Universal Time (UTC)



QUAO2(plotting HGIRG) "Gage 0" Datum: 746.25'

Observations courtesy of US Geological Survey

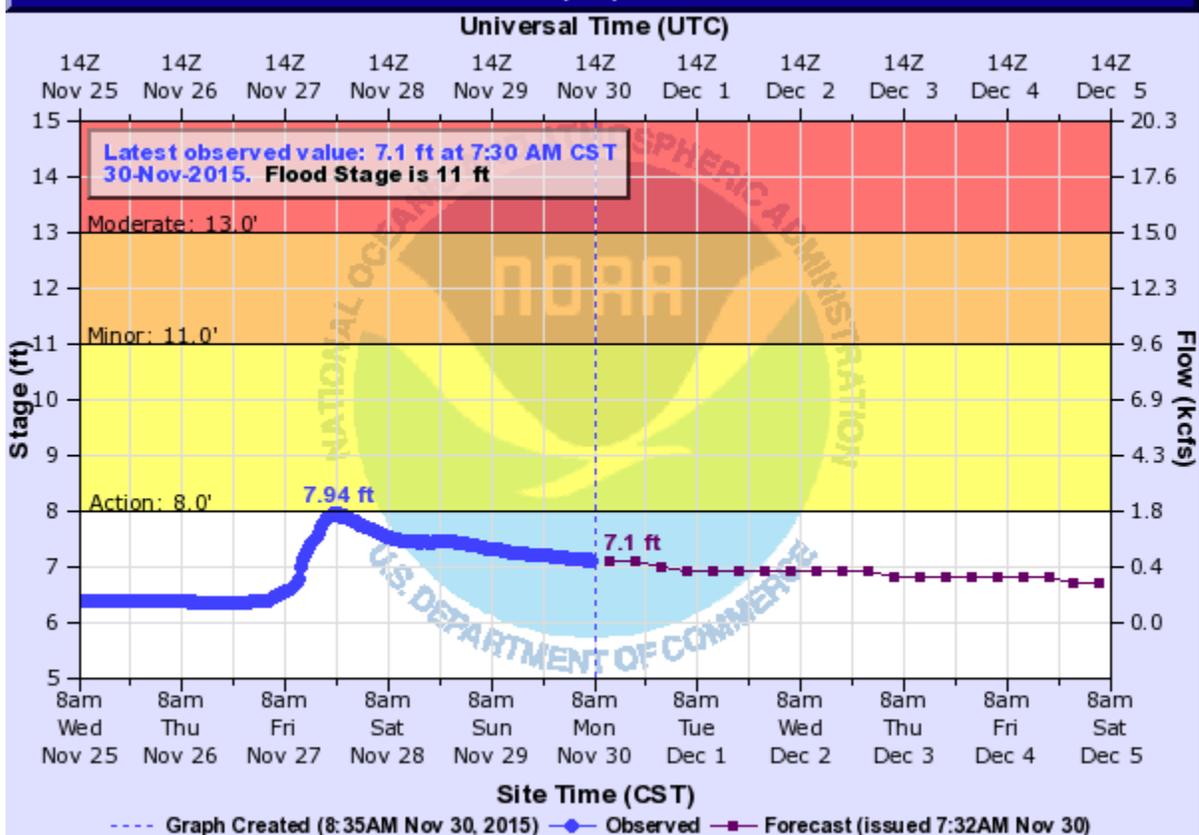
ILLINOIS RIVER (AR OK) NEAR WATTS



WTT02(plotting HGIRG) "Gage 0" Datum: 893.77'

Observations courtesy of US Geological Survey

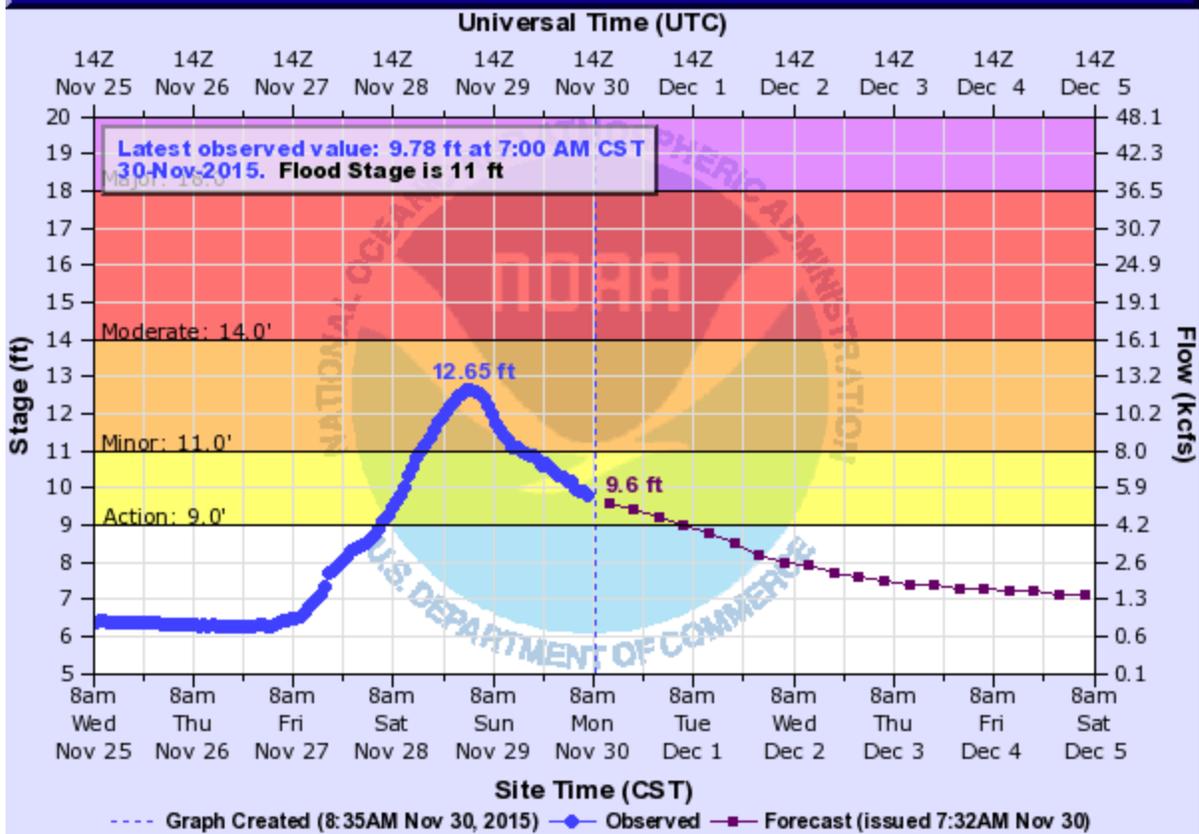
FLINT CREEK (OK) NEAR KANSAS



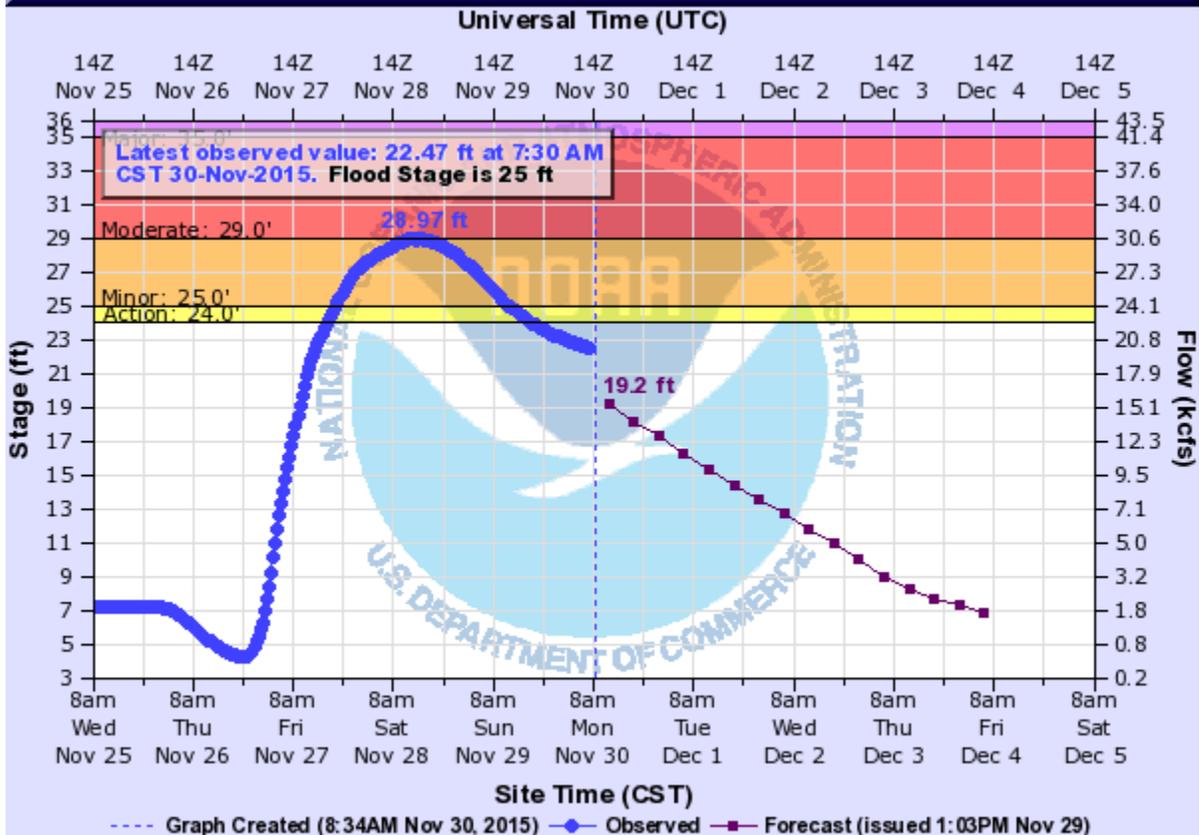
KNS02(plotting HGIRG) "Gage 0" Datum: 854.59'

Observations courtesy of US Geological Survey

ILLINOIS RIVER (AR OK) NEAR TAHLEQUAH

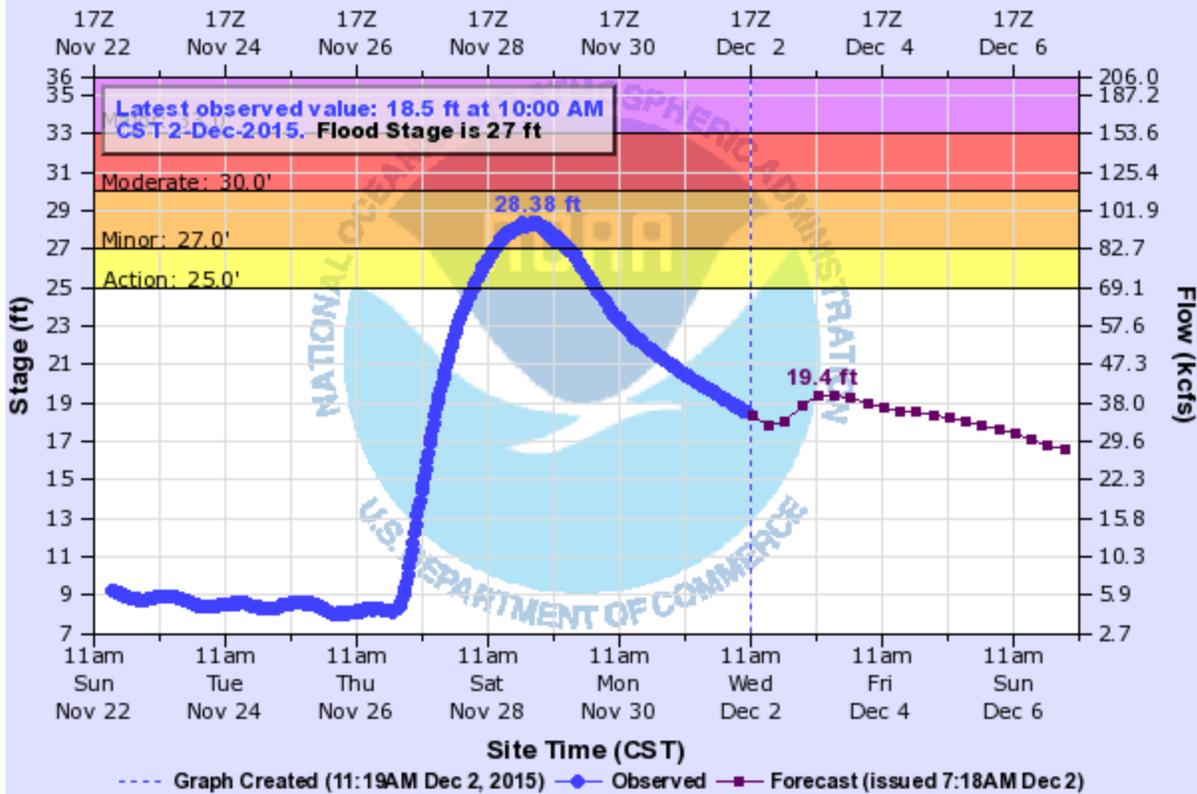


KIAMICHI RIVER NEAR ANTLERS



RED RIVER AT ARTHUR CITY

Universal Time (UTC)

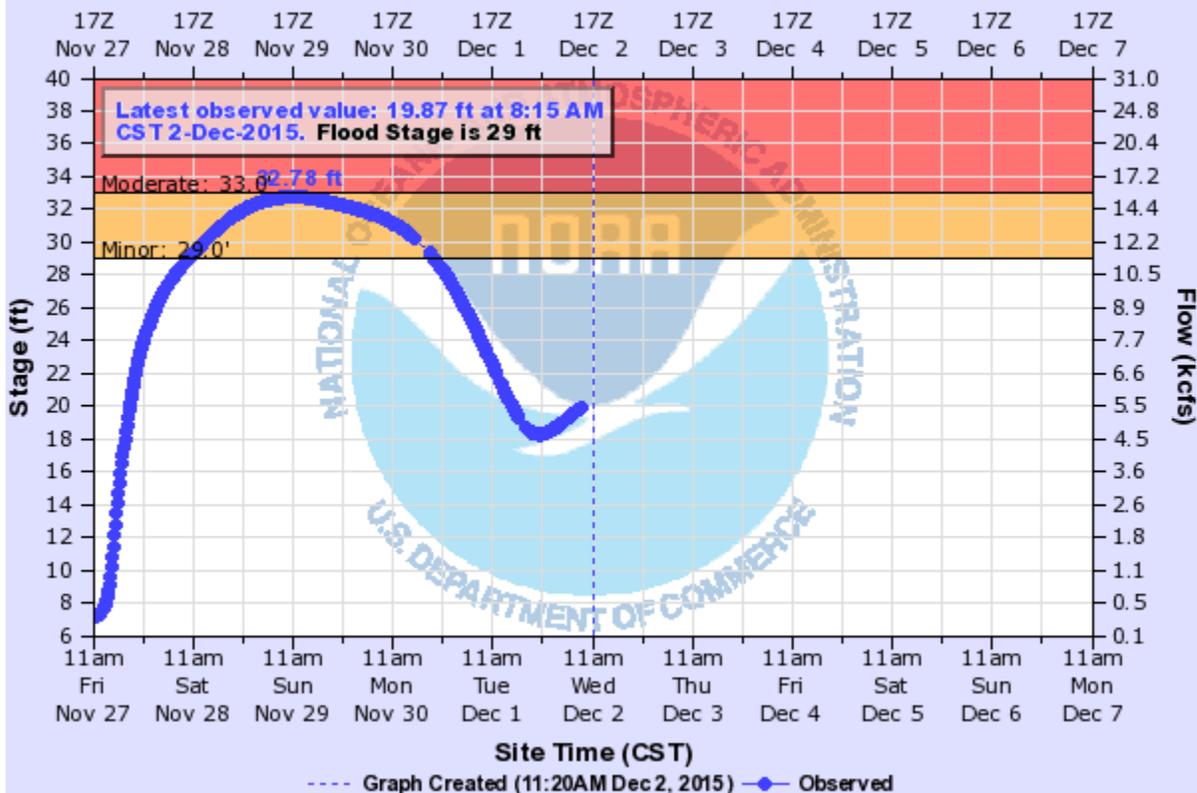


ARCT2(plotting HGIRG) "Gage 0" Datum: 375.07'

Observations courtesy of US Geological Survey

POTEAU RIVER NEAR PANAMA

Universal Time (UTC)

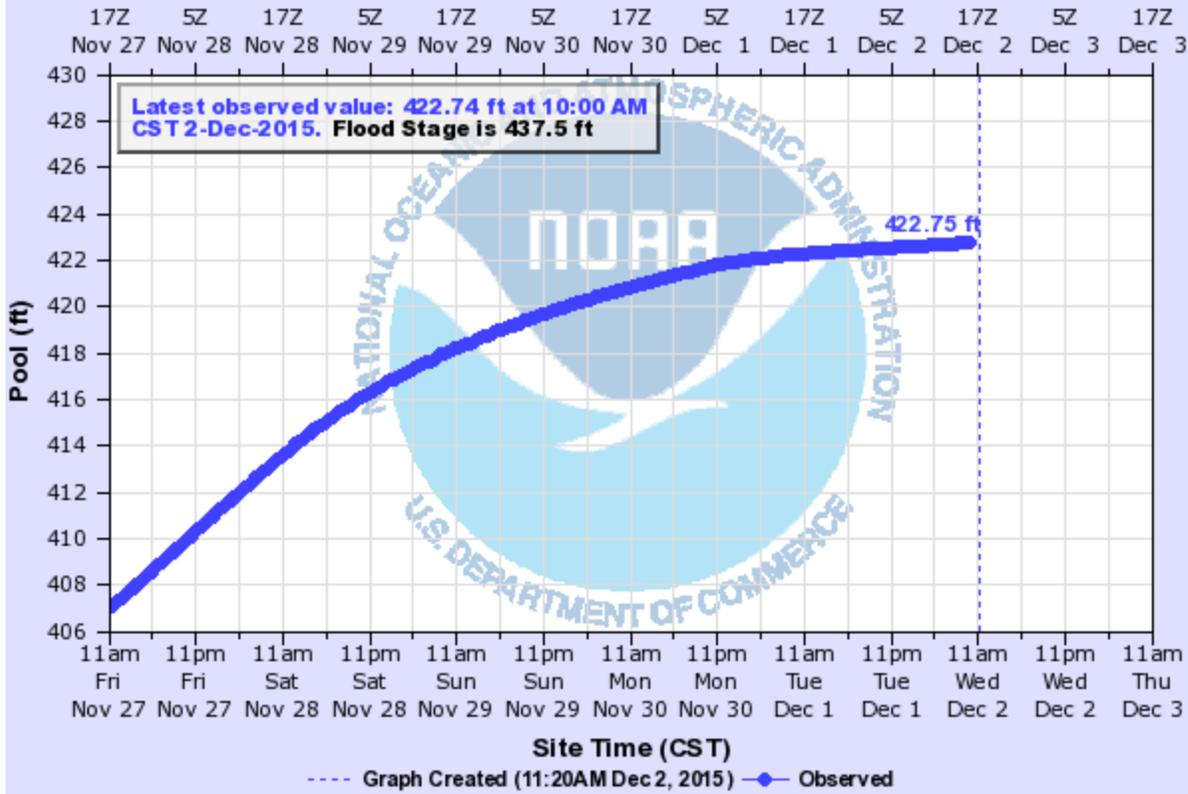


PANO2(plotting HGIRG) "Gage 0" Datum: 387.97'

Observations courtesy of US Geological Survey

EASTERN OKLAHOMA LAKES AT HUGO LAKE

Universal Time (UTC)

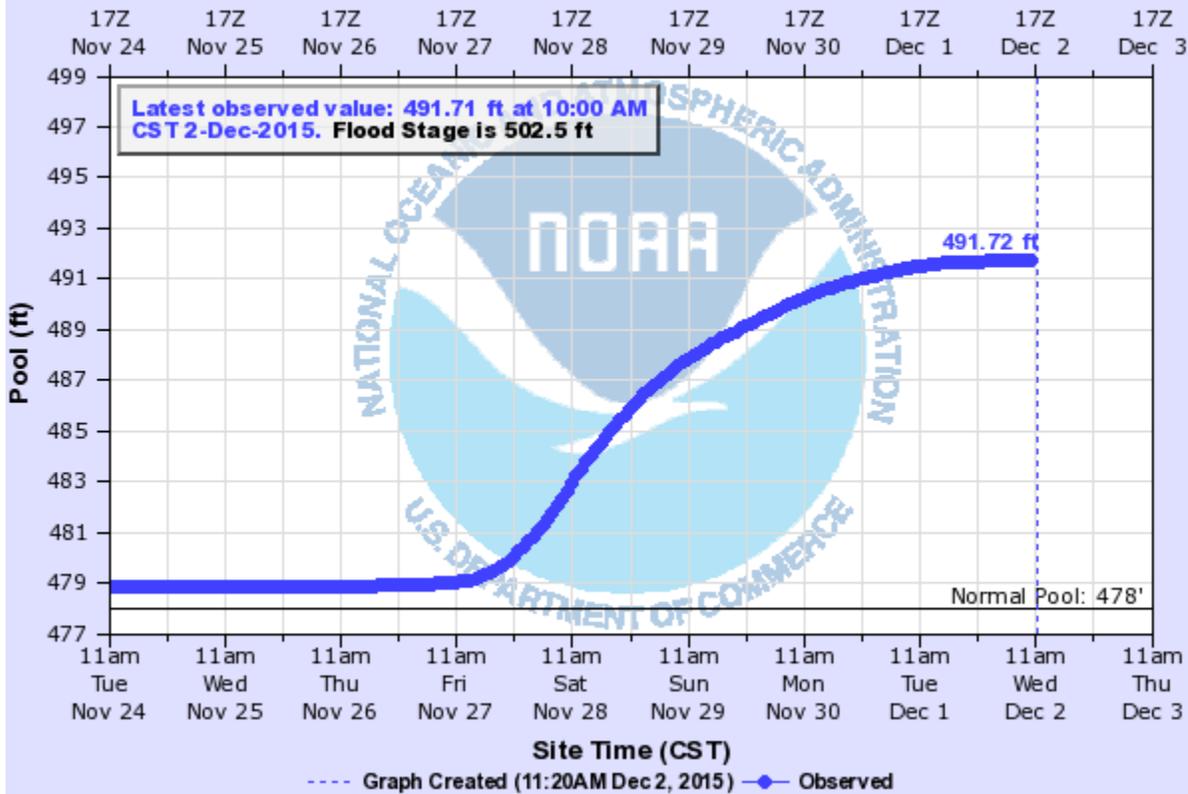


HGLO2(plotting HPIRG) "Gage 0" Datum: 0'

Observations courtesy of US Army Corps of Engineers

EASTERN OKLAHOMA LAKES AT WISTER LAKE

Universal Time (UTC)



WSLO2(plotting HPIRG) "Gage 0" Datum: 0'

Observations courtesy of US Army Corps of Engineers