

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 2014
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, 2014	

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.

It was feast or famine across eastern OK and northwest AR during October 2014 as several rounds of heavy rain resulted in flooding in between dry spells. 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 2014 ranged from 2" to 12" from west to east across eastern OK and northwest AR. The majority of the HSA received 3"-6" of rain this month. A large portion of the HSA received above normal rainfall this month (Fig. 1b), with far northeast OK, northwest AR, and Le Flore County getting 150%-300% of the normal October rain. However, below normal rainfall, only 25%-75% of normal, occurred across portions of Osage, Pawnee, Creek, Okfuskee, Okmulgee, McIntosh, Pittsburg, Pushmataha, and Choctaw Counties in eastern OK.

Tulsa, OK (TSA): October, 2014 Monthly Observed Precipitation
 Valid at 11/1/2014 1200 UTC- Created 11/3/14 17:56 UTC

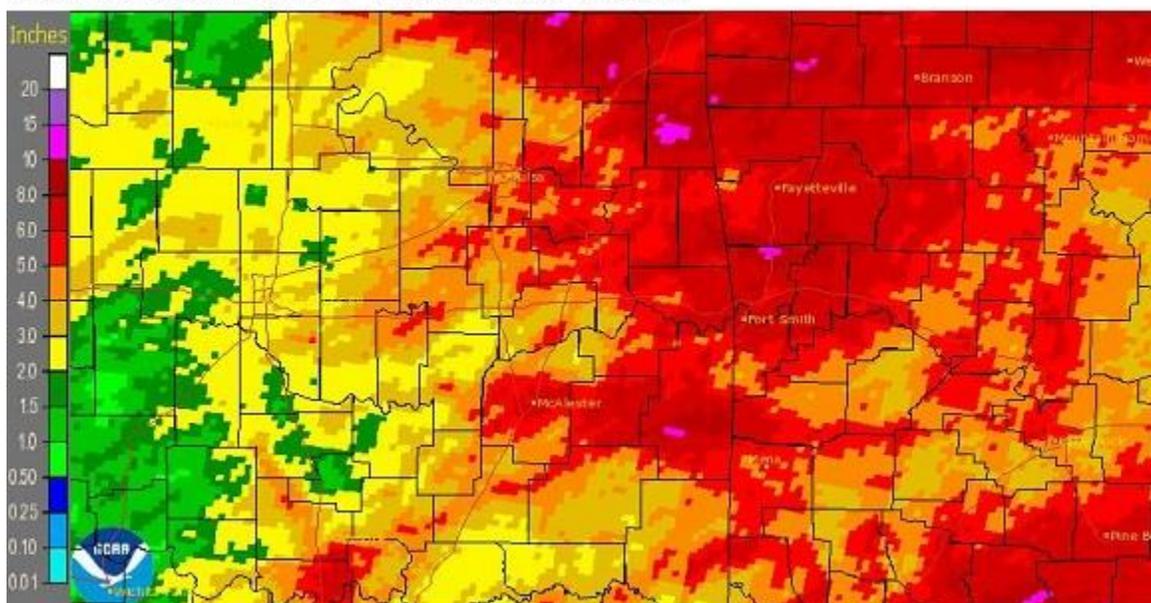


Fig. 1a. Estimated Observed Rainfall for October 2014

Tulsa, OK (TSA): October, 2014 Monthly Percent of Normal Precipitation
 Valid at 11/1/2014 1200 UTC- Created 11/3/14 17:56 UTC

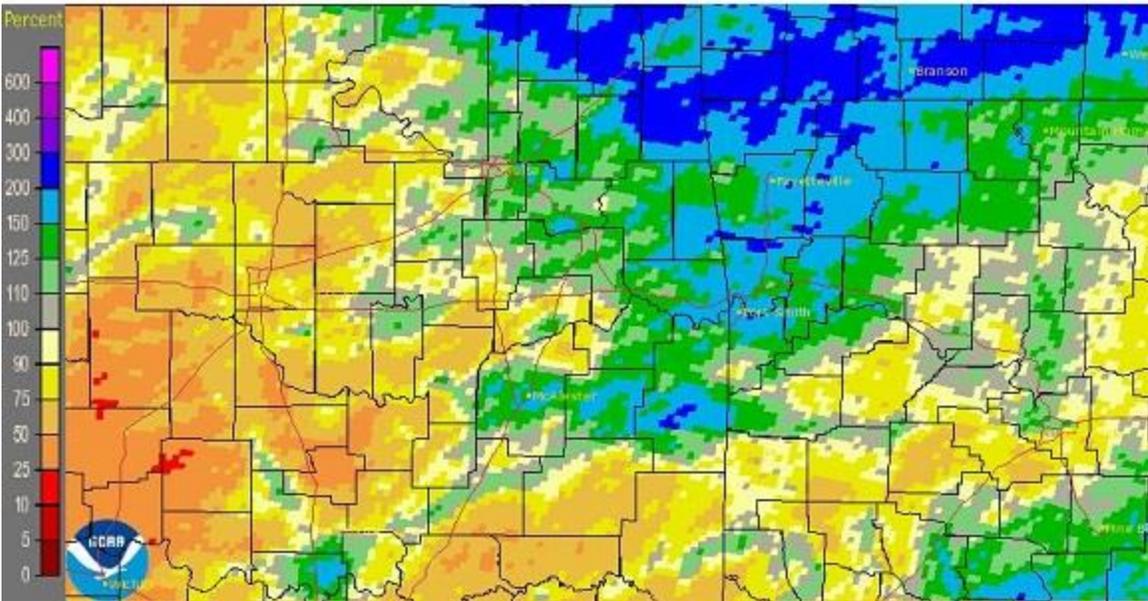


Fig. 1b. Estimated % of Normal Rainfall for October 2014

In Tulsa, OK, October 2014 ranked as the 18th warmest October (65.3°F, tied 1954; since records began in 1905) and the 35th wettest October (4.82"; since records began in 1888). Fort Smith, AR was the 29th warmest October (65.6°F; since records began in 1882) and the 10th wettest October (7.90"; since records began in 1882). Fayetteville, AR was the 21st warmest (59.8°F, tied 1975, 1953) and the 7th wettest (7.23") October since records began in 1949.

Fort Smith had a rainfall total of 14.80" from September 1-October 31, 2014 after two months of above normal rain. This ranks as the 6th wettest Sep-Oct period on record. The October rainfall also pushed the year-to-date rainfall above normal for the first time this year.

Some of the larger precipitation reports (in inches) for October 2014 included:

Vinita, OK (meso)	9.04	Copan, OK (meso)	8.69	Mountainburg 2NE, AR (coop)	8.55
Cookson, OK (meso)	8.49	Miami, OK (meso)	8.18	Fort Smith, AR (ASOS)	7.90
NW AR Regional Arpt (ASOS)	7.89	Jay, OK (meso)	7.82	Wilburton, OK (meso)	7.70

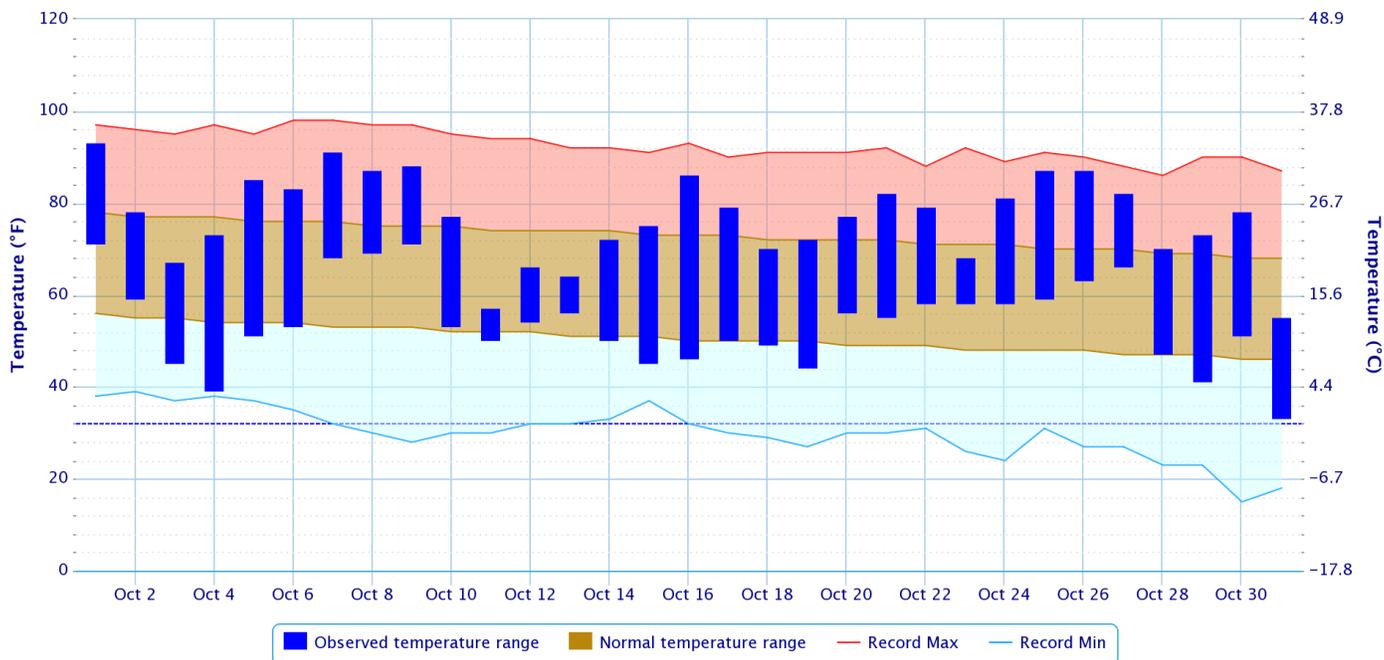
Some of the lowest precipitation reports (in inches) for October 2014 included:

Ralston, OK (coop)	2.30	Burbank, OK (meso)	2.85	Hugo, OK (meso)	3.70
Oilton, OK (meso)	3.80	Tulsa, OK (meso)	3.85	Pawnee, OK (meso)	3.94
Wynona, OK (meso)	4.04	Cloudy, OK (meso)	4.14	Antlers, OK (meso)	4.20

According to the USACE, several of the major reservoirs in the HSA were operating within $\pm 3\%$ of the top of their conservation pools as of 10/31/2014. Skiatook Lake has slightly decreased in its conservation pool from 57% at the end of September to 56% at the end of October. As of 10/31/2014, the Skiatook pool was at 698.11' and falling. This is the lowest the lake has been since it was filled in 1984. New low pool records will continue as the lake continues to fall. Several lakes were reporting below normal pool levels: Skiatook Lake 56%, Eufaula Lake 83%, Beaver Lake 84%, Keystone Lake 92%, and Birch Lake 93%. One lake had levels within its flood control pool: Oologah Lake 107%.

Daily Temperature Data – Tulsa Area, OK (ThreadEx)

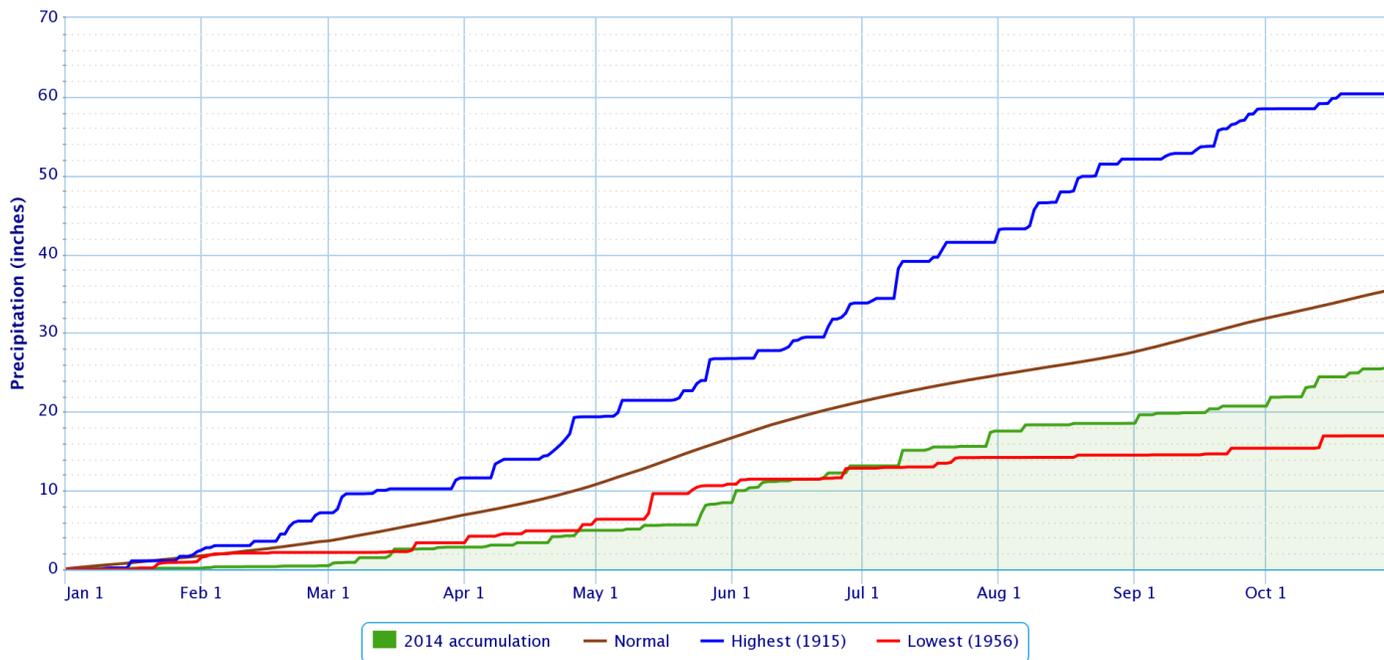
Period of Record – 1905-01-06 to 2014-11-02. Normals period: 1981-2010. Click and drag to zoom chart.



Powered by ACIS

Accumulated Precipitation – Tulsa Area, OK (ThreadEx)

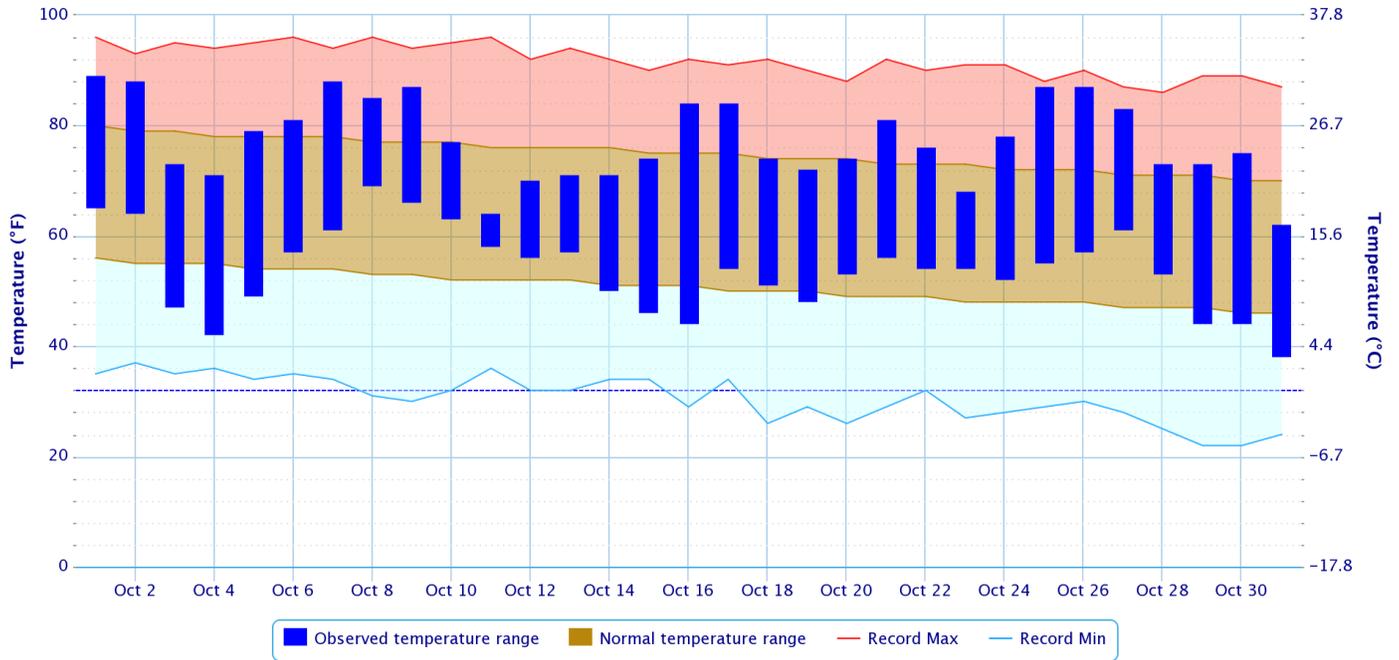
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

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

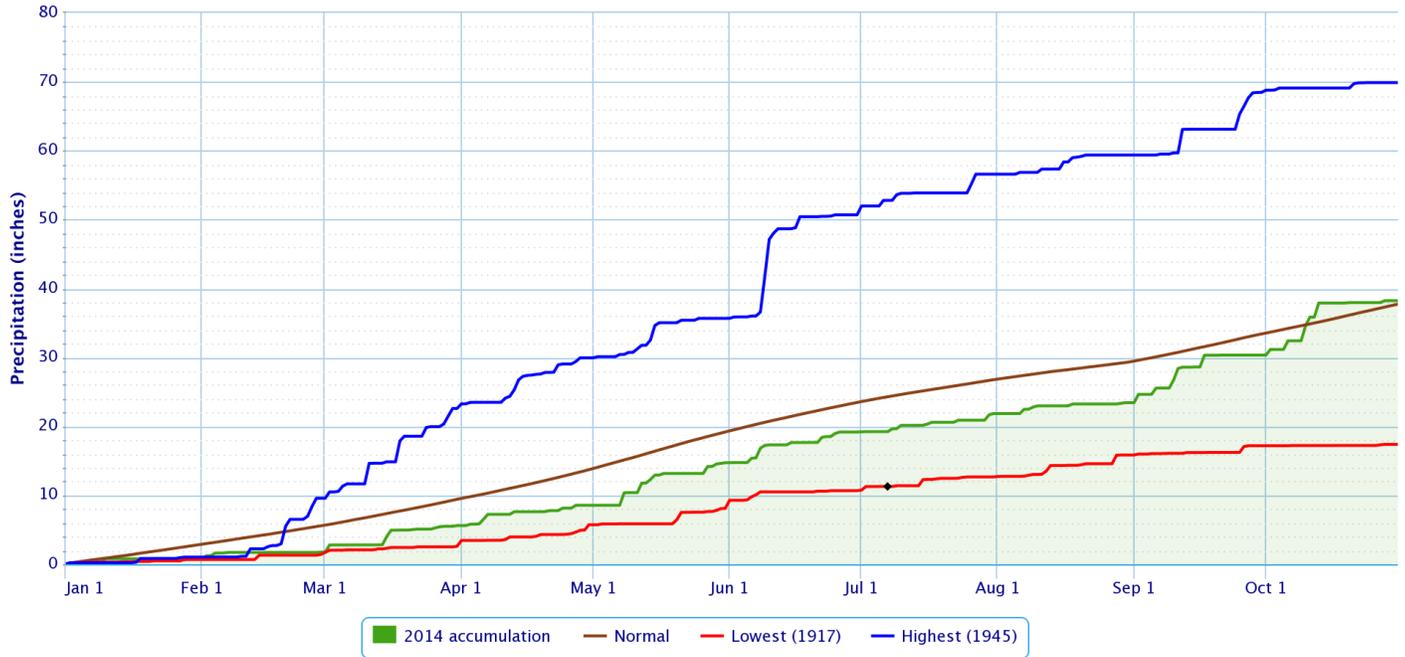
Period of Record – 1882-06-01 to 2014-11-02. Normals period: 1981-2010. Click and drag to zoom chart.



Powered by ACIS

Accumulated Precipitation – Fort Smith Area, AR (ThreadEx)

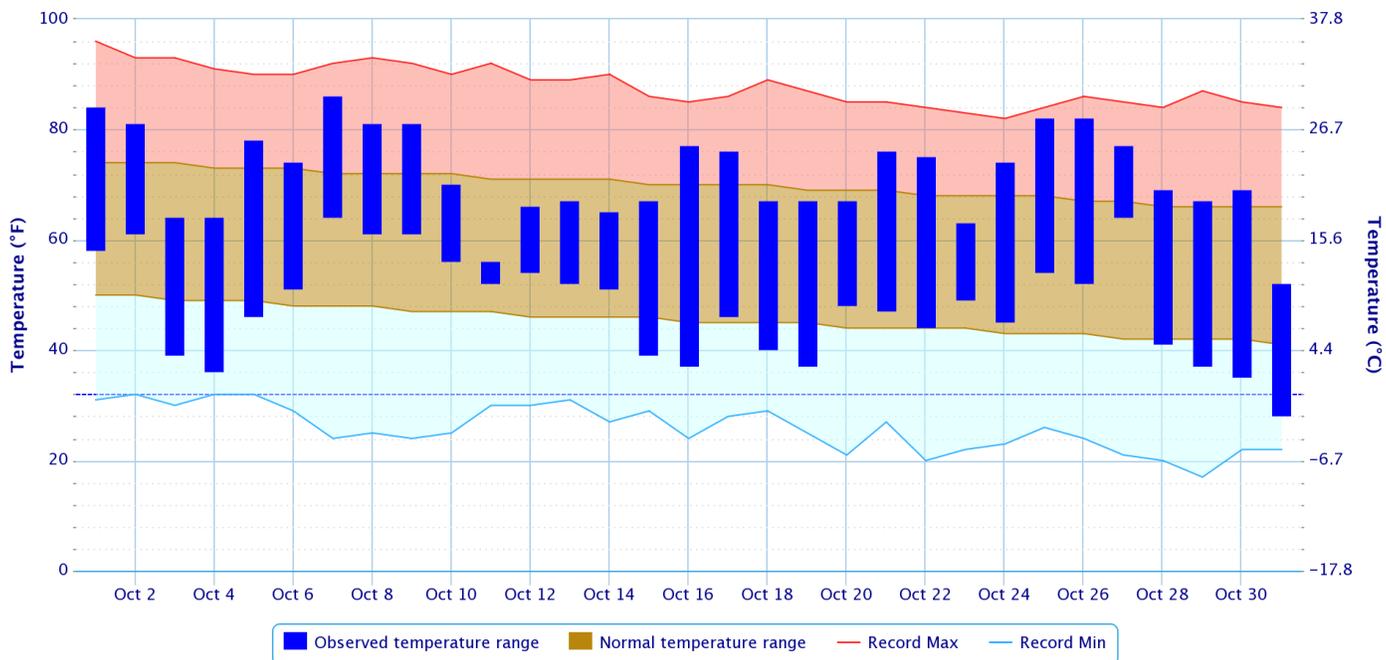
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

Daily Temperature Data – FAYETTEVILLE DRAKE FLD, AR

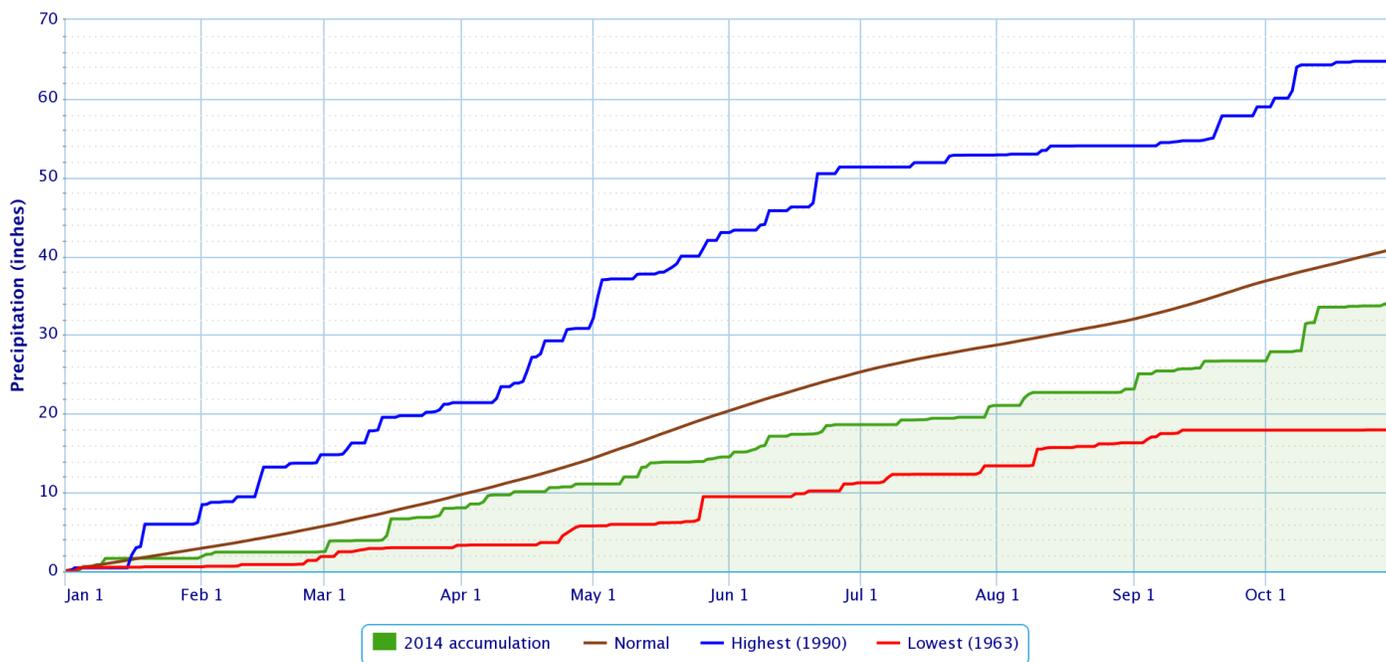
Period of Record – 1949–07–14 to 2014–11–02. Normals period: 1981–2010. Click and drag to zoom chart.



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

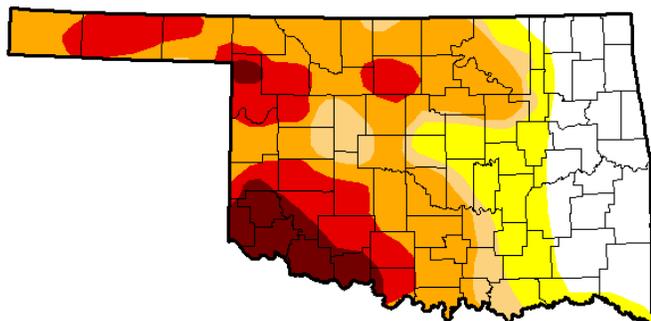


Powered by ACIS

According to the [U.S. Drought Monitor](#) (USDM) from October 28, 2014 (Figs 2, 3), Severe Drought (D2) conditions were occurring across portions of eastern Kay, southwest Osage, Pawnee, northern Creek, and far western Tulsa Counties in eastern OK. Moderate Drought (D1) conditions were present across portions of Osage, western Tulsa, and Creek Counties in eastern OK. Abnormally Dry (D0), but not experiencing drought, conditions existed across northern Osage, Washington, Tulsa, far western Rogers, southern Creek, Okmulgee, Okfuskee, far western McIntosh, western Pittsburg, and Choctaw Counties in eastern OK. Drought/abnormally dry conditions were not present in northwest AR.

U.S. Drought Monitor Oklahoma

October 28, 2014
(Released Thursday, Oct. 30, 2014)
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	21.40	78.60	64.49	56.08	23.00	6.86
Last Week 10/21/2014	22.15	77.85	64.49	55.44	20.87	4.84
3 Months Ago 7/29/2014	12.06	87.94	76.16	60.09	23.36	4.48
Start of Calendar Year 12/01/2013	50.84	49.16	38.17	18.99	4.84	2.40
Start of Water Year 9/30/2014	8.55	91.45	73.31	58.13	20.92	4.64
One Year Ago 10/29/2013	47.79	52.21	30.50	14.58	4.42	1.47

Intensity:



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

Author:
Brian Fuchs
National Drought Mitigation Center

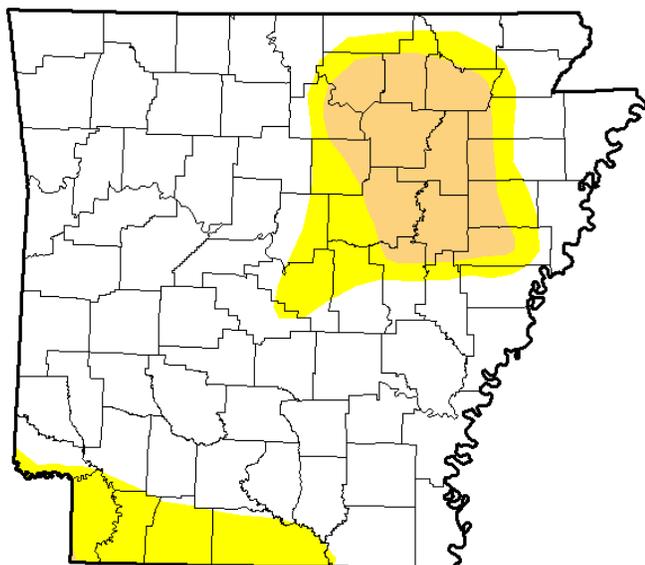


<http://droughtmonitor.unl.edu/>

Fig. 2. Drought Monitor for Oklahoma

U.S. Drought Monitor Arkansas

October 28, 2014
(Released Thursday, Oct. 30, 2014)
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	74.88	25.12	10.57	0.00	0.00	0.00
Last Week 10/21/2014	74.99	25.01	10.57	0.00	0.00	0.00
3 Months Ago 7/29/2014	90.00	10.00	2.83	0.00	0.00	0.00
Start of Calendar Year 12/01/2013	96.56	3.44	0.00	0.00	0.00	0.00
Start of Water Year 9/30/2014	54.54	45.46	9.13	0.00	0.00	0.00
One Year Ago 10/29/2013	54.33	45.67	15.46	0.66	0.00	0.00

Intensity:



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

Author:
Brian Fuchs
National Drought Mitigation Center



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

Fig. 3. Drought Monitor for Arkansas

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

Rank since 1921	October 2014	Autumn-to-Date (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, 2013- Oct 31, 2014)
Northeast OK	10th wettest	26 th wettest	34 th wettest	30 th wettest	38 th wettest	22 nd driest	16 th driest
East Central OK	23 rd wettest	34 th wettest	47 th driest	37 th wettest	47 th wettest	27 th driest	22 nd driest
Southeast OK	30 th wettest	29 th wettest	45 th wettest	21 st wettest	21 st wettest	44 th driest	43 rd driest
Statewide	32 nd wettest	43 rd driest	23 rd driest	45 th wettest	45 th wettest	18 th driest	14th driest

Outlooks

The [Climate Prediction Center \(CPC\)](#) outlook for November 2014 (issued October 31, 2014) indicates an enhanced chance for above median precipitation all of northeast OK and northwest AR, with the highest chances across southeast OK. This outlook also indicates equal chances for above, near, and below normal temperatures across all of eastern OK and northwest AR. This outlook is based on short-range forecasts of expected weather conditions, primarily for the first 2 weeks of November, as well as climate signals.

For the 3-month period November-December-January 2014-15, CPC is forecasting a slightly enhanced chance for below normal temperatures along and south of I-40, with equal chances for above, near, and below normal temperatures for the remainder of eastern OK and northwest AR. This outlook also indicates equal chances for above, near, and below median precipitation across all of eastern OK and northwest AR (outlook issued October 16, 2014). According to CPC, current atmospheric and oceanic observations continue to indicate ENSO neutral conditions. Forecasts still indicate a transition to a weak El Niño event in late autumn or early winter. Therefore, this outlook is based on both statistical and dynamical forecast tools and considering El Niño conditions.

Summary of Precipitation Events

October 1-16

A few storms moved out of north central OK into Kay, western Osage, and western Pawnee Counties during the early morning hours of the 1st. These storms brought around 0.50" or less of rain.

Showers and thunderstorms developed around midnight on the 2nd across northeast OK and expanded within a strengthening low-level jet axis during the early morning hours. These storms shifted east and a second round of thunderstorms developed along a cold front as it moved east into the HSA during the afternoon. The cold front and storms progressed quickly east across eastern OK and northwest AR, bringing heavy rain to portions of east central OK and northwest AR before exiting the area by early evening. Marginal severe weather occurred with the early morning precipitation, with much stronger severe thunderstorms during the afternoon. One inch hail was common, with reports up to golf ball sized hail. These storms also produced damaging winds, with a measured wind gust of 83mph at the Oklahoma Mesonet site in Webbers Falls. Most of the HSA received some rain from these two rounds of rain, with totals ranging from around 0.10" to around 1". Higher totals of 2" to 3" occurred mainly in Pittsburg, Delaware, Madison, and Carroll Counties (Fig. 4). A few of the higher measurements include:

Storm totals (2-day Rainfall ending 10:35am 10/03/14)

2.50" New Eucha	2.46" Eufaula Mesonet	2.38" Chewey 1W
2.33" McAlester mesonet	2.21" McAlester ASOS	2.20" Nowata mesonet
2.13" Stuart 3SE	2.13" Webbers Falls L&D 16	2.09" New Eucha 5W

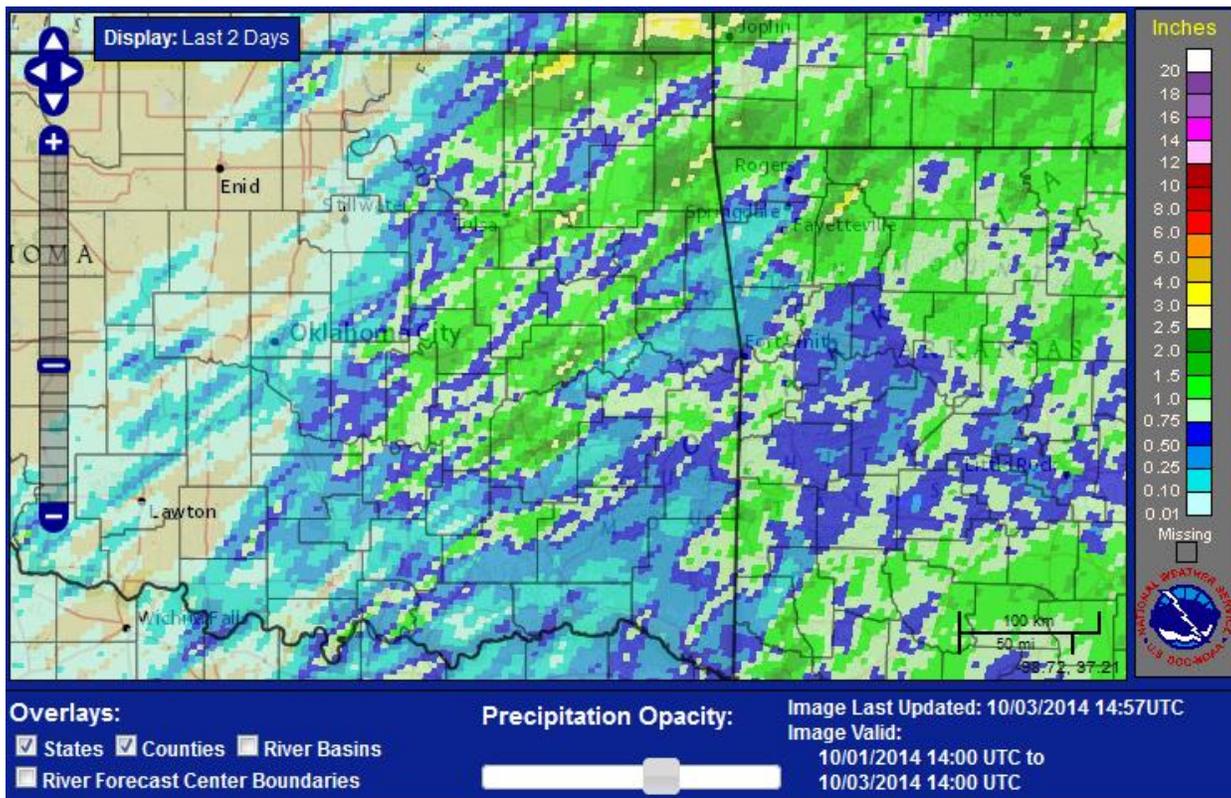


Fig. 4. 2-day Estimated Observed Rainfall ending at 9am CDT 10/03/2014.

Widely scattered showers and isolated thunderstorms developed overnight on the 5th into the early hours of the 6th, primarily south of a Pawnee, to Tulsa, to Fort Smith, to Fayetteville line. The heavier activity brought around 0.50" to 1.5" of rain, with the remainder of the affected area receiving less than half an inch. A brief EF-1 tornado also occurred near Spiro in Le Flore County with these storms.

Scattered convection developed during the early morning hours of the 8th along an elevated frontal zone. This activity brought 0.10" to near 1.5" of rain to portions of southern Mayes, eastern Wagoner, Cherokee, Adair, Benton, Carroll, Madison, Washington (AR), Crawford, and Franklin Counties.

Scattered showers and thunderstorms developed along a quasi-stationary front across southeast KS/southwest MO during the afternoon of the 9th. This activity moved south into northeast OK and northwest AR during the afternoon and evening hours. As this first round of storms diminished, a second round redeveloped close to an outflow boundary near the KS/OK state line during the evening, in the area that had already seen rain. The quasi-stationary front stretched from northeast OK into west central OK by early morning on the 10th, with a 25-35kt south-southwesterly low-level flow supporting heavy rain near and north of the boundary. Training of storms led to moderate to heavy rain over the same area that had received rainfall during the first round of storms. Rainfall rates of 1"-1.5"/hour were common in the heaviest rain cores, with a few locations measuring 1.5"-2.1" of rain in just one hour. Rainfall totals north of Hwy 412 ranged from 0.75" to near 7" (Figs. 5, 6). The result was both flash flooding and mainstem river flooding across northeast OK. Moderate flooding occurred along the Verdigris River near Lenapah, with the river cresting near 33.8'. The river rose 26' in just 8 hours and 45 min (4.00' at midnight; 30.00' at 8:45am CDT). Minor flooding occurred along the Neosho River near Commerce, with a river crest of just over 17' (see E3 report for river flood details; preliminary crests shown at the end of this report). Many city and county roads were closed due to high water in the areas that received the highest rainfall totals in northeast OK and northwest AR. 2 people were injured when a train derailed in Crawford County due to a washout.

Rainfall Totals as of 1:30pm CDT Oct. 10, 2014:

Childers 2SSE, OK	6.77"	Commerce, OK	6.30"	Copan Dam, OK	5.92"
Copan 3ENE, OK	5.77"	Quapaw 3SE, OK	5.44"	Vinita 10NNW, OK	5.27"
Lenapah 3E, OK	5.02"				

The front finally began to move south during the day on the 10th, bringing additional heavy rain further south across eastern OK and west central AR during the afternoon through late evening hours. Rainfall totals south of I-44 primarily ranged from 1"-2.5", with several areas receiving 2.5"-5" of rain (Fig. 7). Central Le Flore County had 5"-6" of rainfall. This led to rises along the Poteau River, but flood stage was not exceeded. Some shower activity lingered during the day on the 11th, bringing an additional 0.25"-0.75" of rain to northeast and east central OK, as well as northwest AR. Higher rain totals of 0.75"-1.5" occurred over Delaware and far northwest Benton Counties.

24-hour Rainfall Totals as of 7am CDT Oct. 11, 2014:

Page 5N, OK	5.30"	Bengal 2NNW, OK	4.33"	Porter, OK	4.20"
Wilburton 2SW, OK	3.99"	Hartshorne 3.9NNE, OK	3.69"	Haskell 2E, OK	3.50"

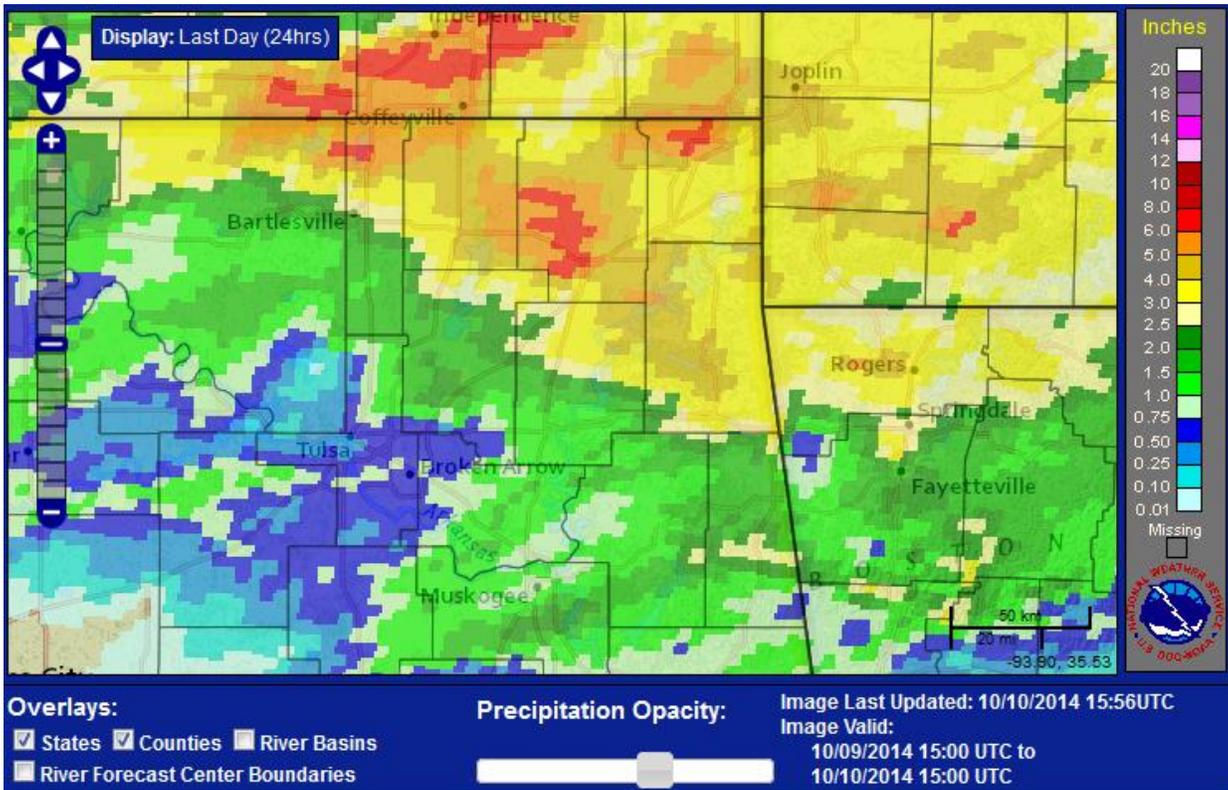


Fig. 5. 24-hr Estimated Observed Rainfall ending at 10am CDT 10/10/2014.

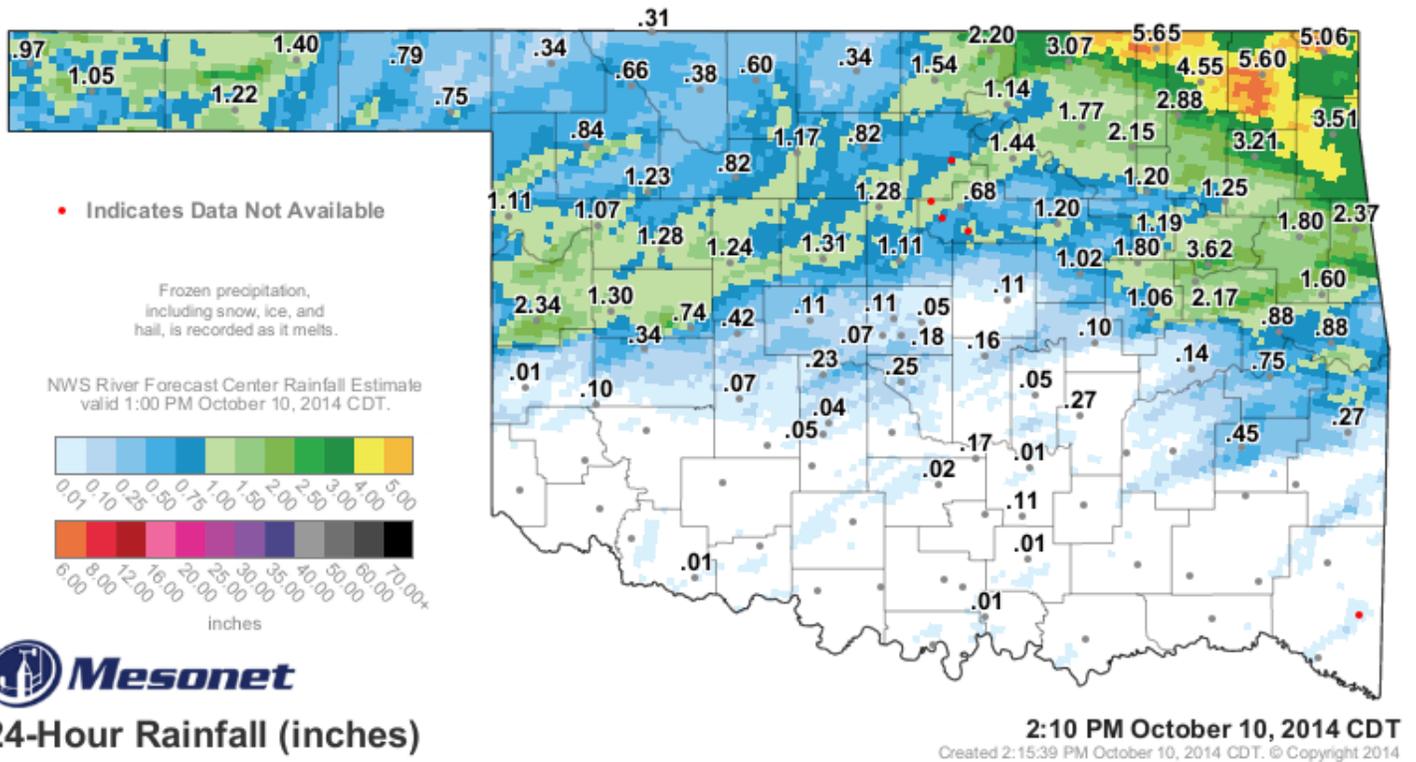


Fig. 6. 24-hr Estimated Observed Rainfall (image) and OK Mesonet Measurements ending at 2:10pm CDT 10/10/2014.

Tulsa, OK (TSA): 10/11/2014 1-Day Observed Precipitation
Valid at 10/11/2014 1200 UTC- Created 10/15/14 3:01 UTC

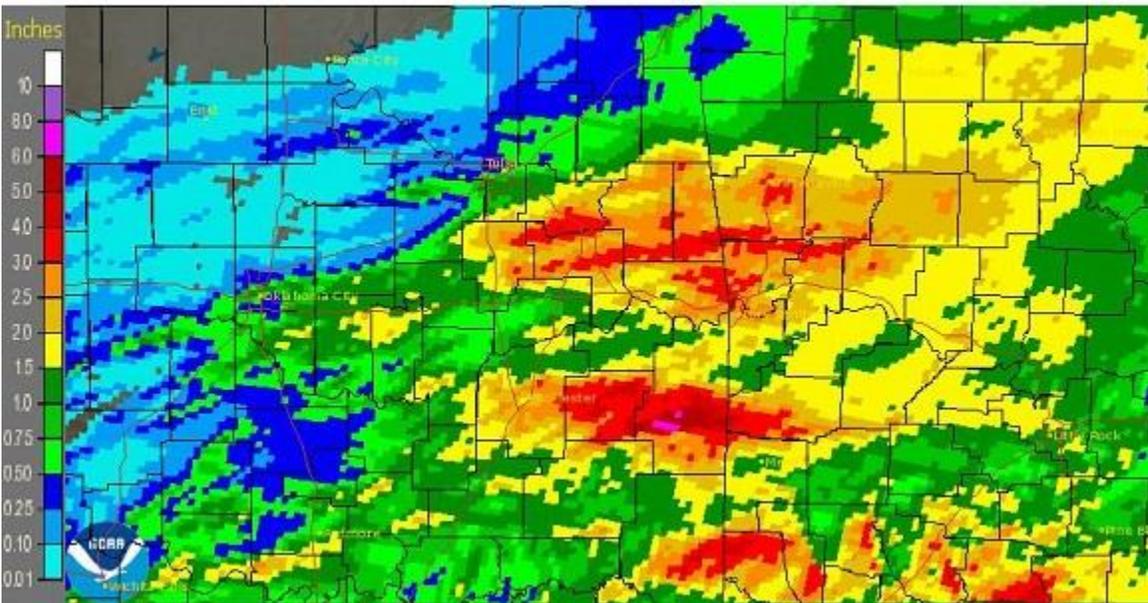


Fig. 7. 24-hr Estimated Observed Rainfall ending at 7am CDT 10/11/2014.

Heavy rain once again affected the HSA late on the 12th and into the morning of the 13th. Storms developed when a surface low and associated cold front pushed into the area and a strong mid-level shortwave approached overhead. These storms eventually turned into a line of storms ahead of the strong cold front and moved eastward, bringing rain to all of eastern OK and northwest AR. Rainfall totals ranged from around 0.50" to around 3", with the heaviest rainfall occurring east of a McAlester to Bentonville line (Fig. 8). This rain, on top of what had fallen just a few days prior, led to minor flooding along the Poteau River near Panama (see E3 report for river flood details; preliminary crests shown at the end of this report). The Poteau River near Poteau remained just below flood stage. The Illinois River near Tahlequah also rose in response to these two rain events, exceeding action stage, but remaining below flood stage. In addition to the heavy rain, an EF-1 tornado occurred north of Hindsville in northern Madison County.

Showers continued on the 13th under the continued influence of the mid-level shortwave. These showers brought an additional 0.10"-1.5" of rain before coming to an end by the 14th (Fig. 9)

Tulsa, OK (TSA): 10/13/2014 1-Day Observed Precipitation
Valid at 10/13/2014 1200 UTC- Created 10/15/14 23:32 UTC

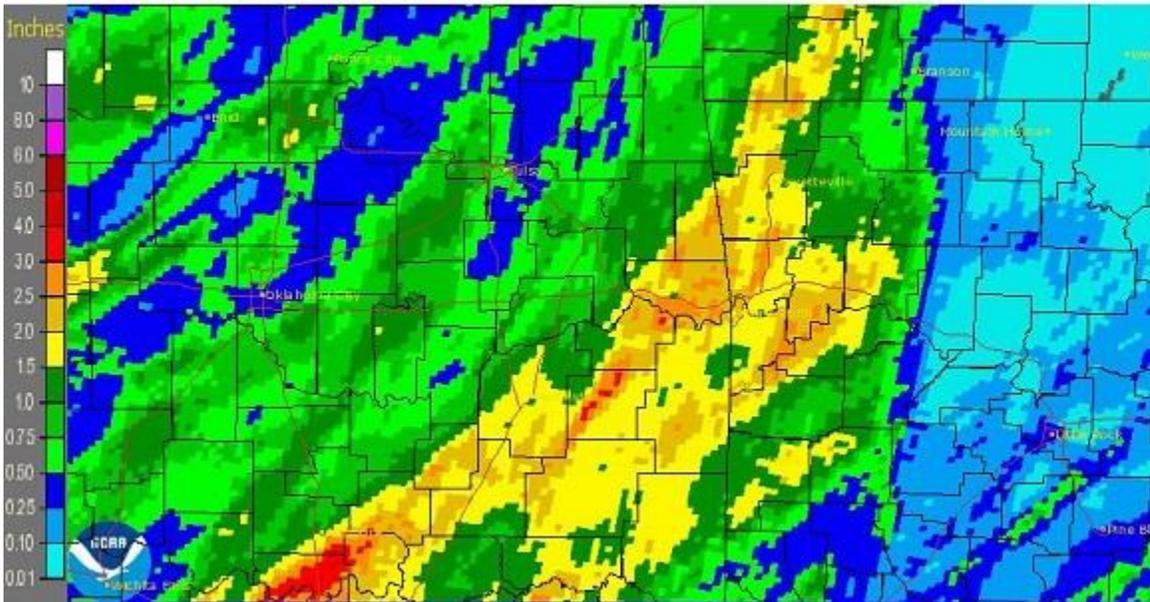


Fig. 8. 24-hr Estimated Observed Rainfall ending at 7am CDT 10/13/2014.

Tulsa, OK (TSA): 10/14/2014 1-Day Observed Precipitation
Valid at 10/14/2014 1200 UTC- Created 10/16/14 23:33 UTC



Fig. 9. 24-hr Estimated Observed Rainfall ending at 7am CDT 10/14/2014.

October 17-31

Widely scattered showers and isolated thunderstorms affected northeast OK and northwest AR late on the 19th and through the morning of the 20th as a weak cold front associated with a short-wave trough over the Great Lakes drops into the region. Rainfall totals from this activity were around 0.25" or less, though southern Rogers County and portions of the surrounding counties did receive 0.50" to around 1" of rain.

A mid-level trough moved across the area, bringing scattered showers from late on the 22nd through the afternoon on the 23rd. This rain primarily fell northwest of a McAlester to Fayetteville line. Rainfall totals were

0.10" to around 0.50", with isolated totals of 0.50" to near 1" in Pawnee, Tulsa, Wagoner and Delaware Counties.

Showers and thunderstorms developed around midnight on the 28th along and behind a cold front. This activity continued across the HSA through the overnight hours before pushing southeast of the area by sunrise. Most locations received around 0.25" or less, with a few places getting around 0.50" of rain in Adair, Washington (AR), Crawford, and Franklin counties.

Written by:

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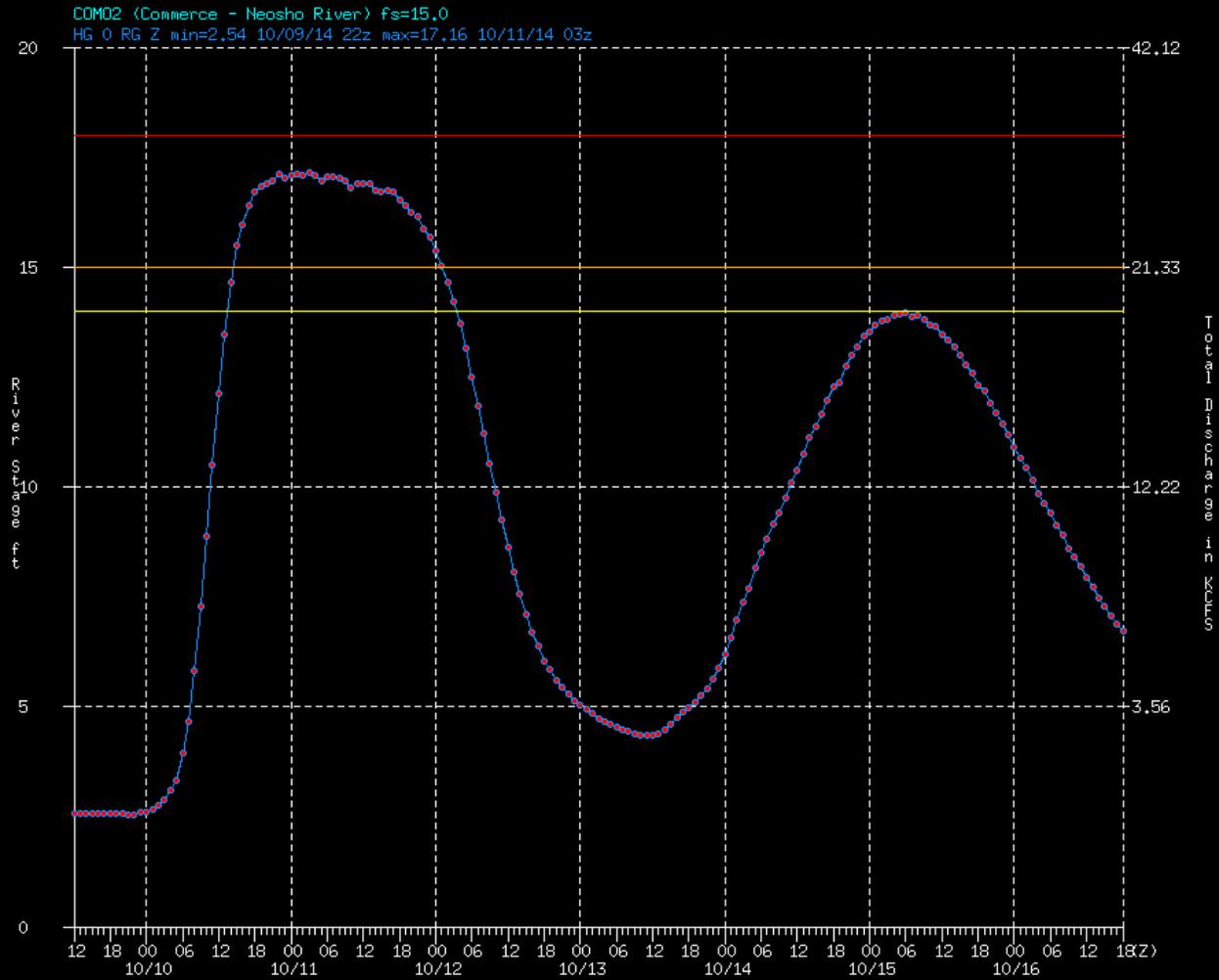
Products issued in October 2014:

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

*Mixed case River Flood products began July 31, 2013

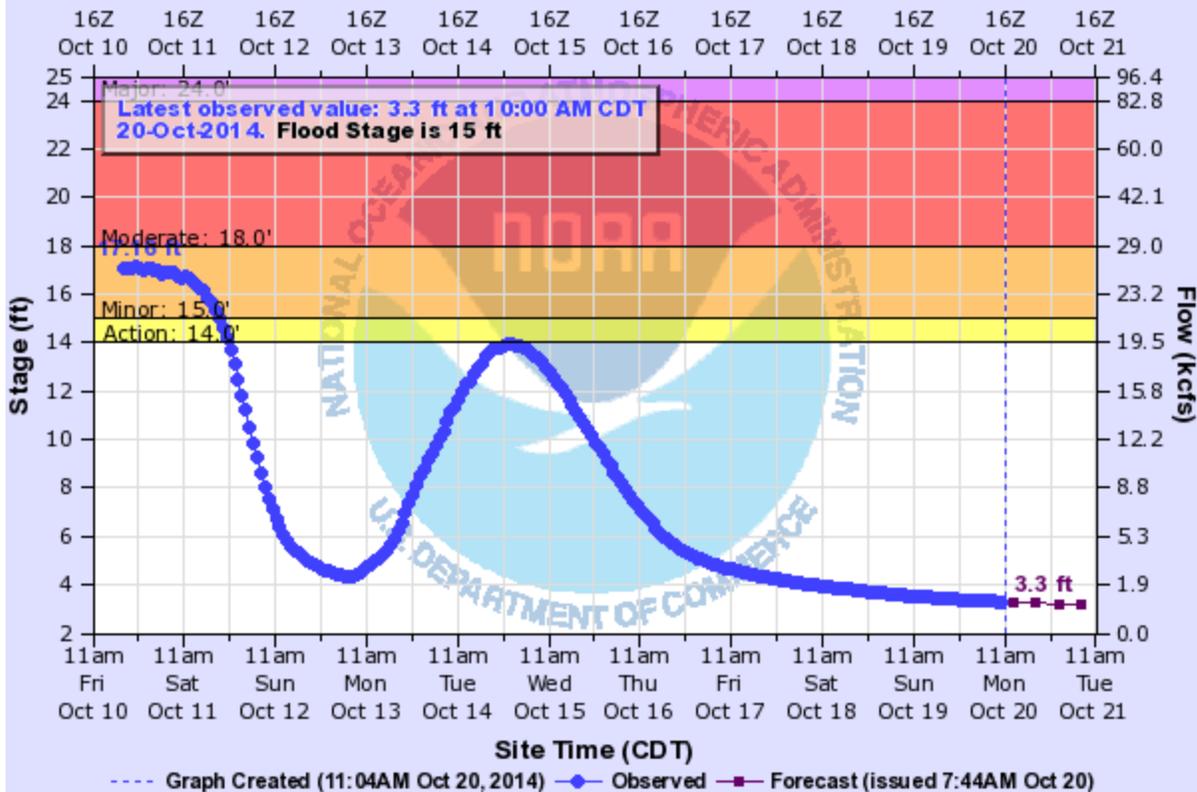
- 3 Flash Flood Warnings (FFW)
- 6 Flash Flood Statements (FFS)
- 2 Flash/Areal Flood Watches (FFA) (10 Watch FFA CON/EXT/EXA/CAN)
- 13 Urban and Small Stream Advisories (FLS)
- 2 Areal Flood Warnings (FLW)
- 0 Areal Flood Statements (FLS)
- 5 River Flood Warnings (FLW)
- 23 River Flood Statements (FLS)
- 2 River Flood Advisories (FLS) (2 Advisory FLS CON/EXT/CAN)
- 0 River Flood Watches (FFA) (0 Watch FFA CON/EXT/CAN)
- 3 River Statements (RVS)
- 0 Hydrologic Outlooks (ESF)
- 1 Drought Information Statements (DGT)

Preliminary Hydrographs:



NEOSHO RIVER NEAR COMMERCE

Universal Time (UTC)

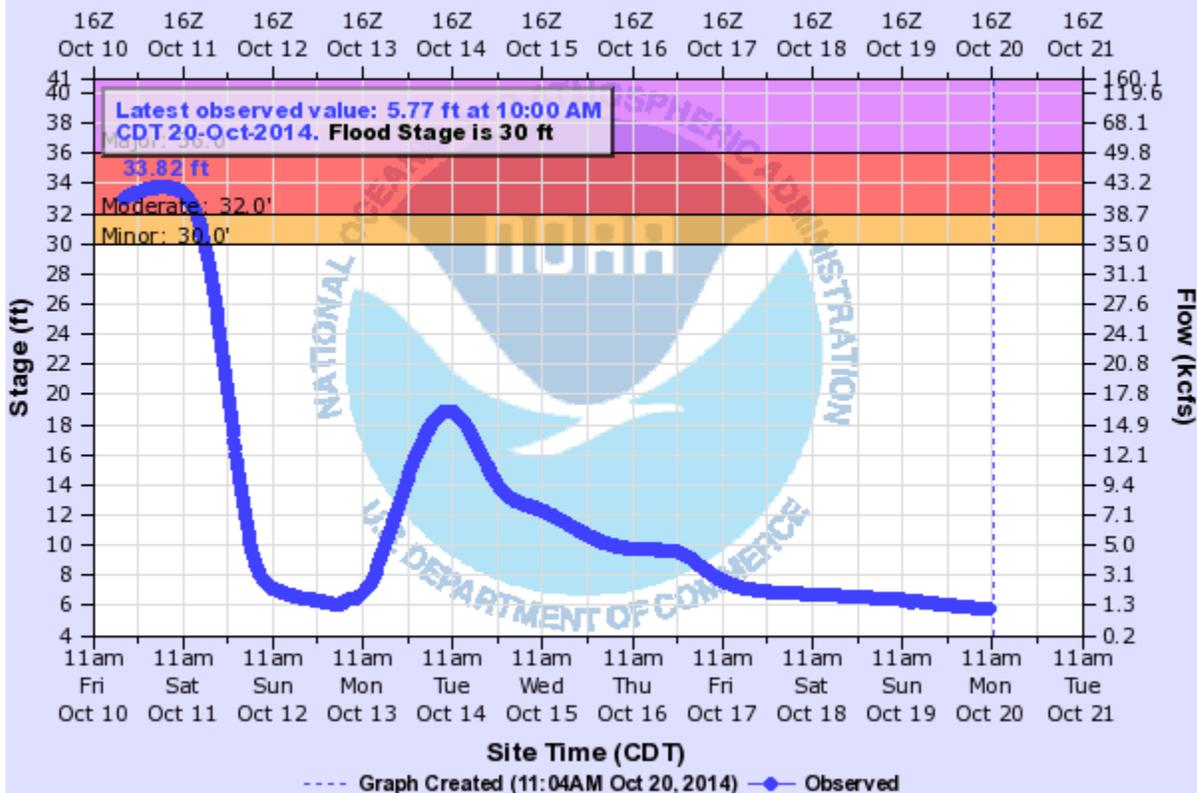


COMO2(plotting HGIRG) "Gage 0" Datum: 748.97'

Observations courtesy of US Geological Survey

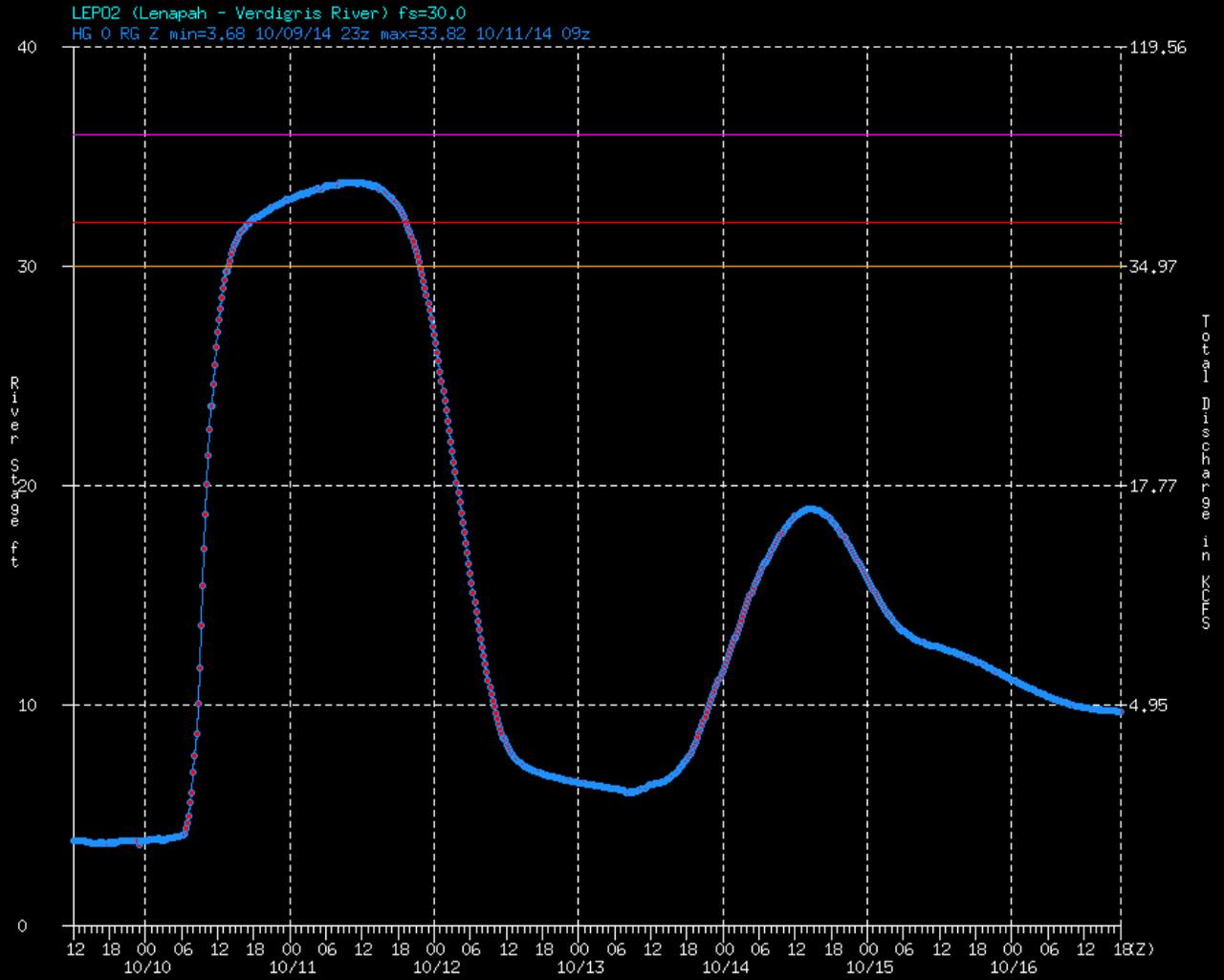
VERDIGRIS RIVER NEAR LENAPAH

Universal Time (UTC)



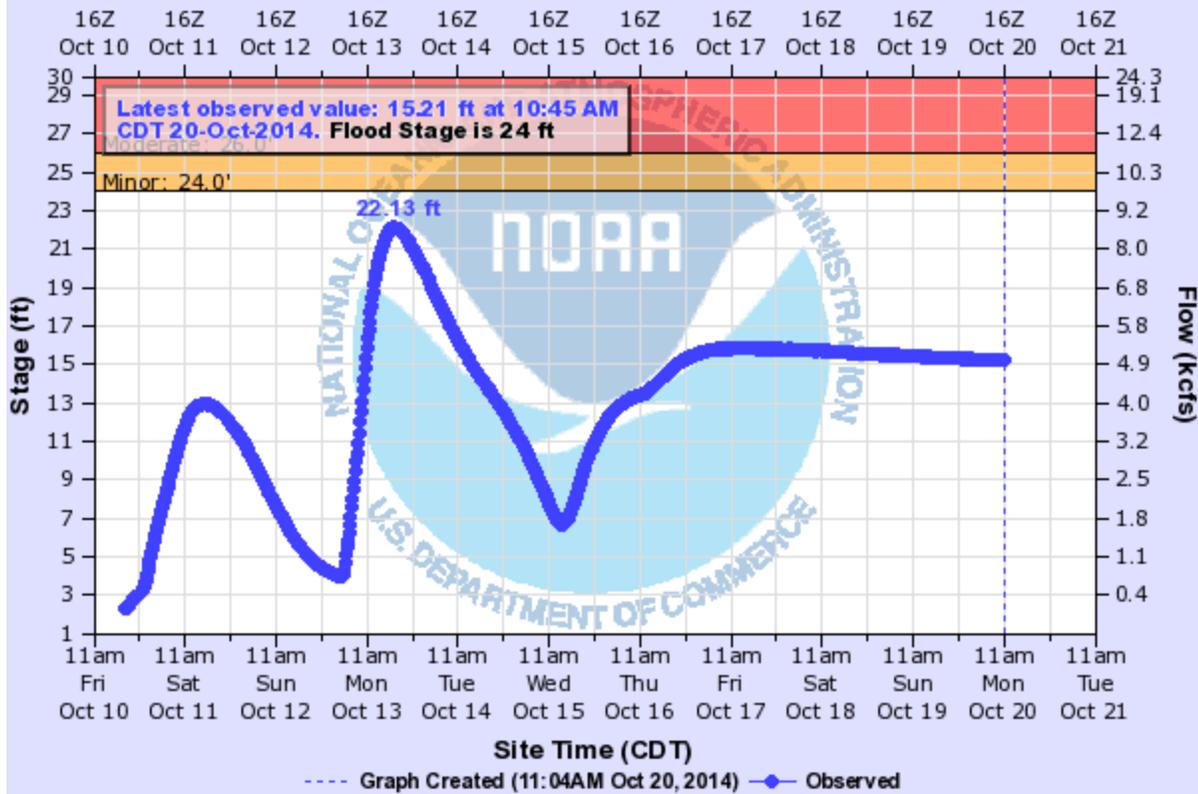
LEPO2(plotting HGIRG) "Gage 0" Datum: 644.9'

Observations courtesy of US Geological Survey



POTEAU RIVER NEAR POTEAU

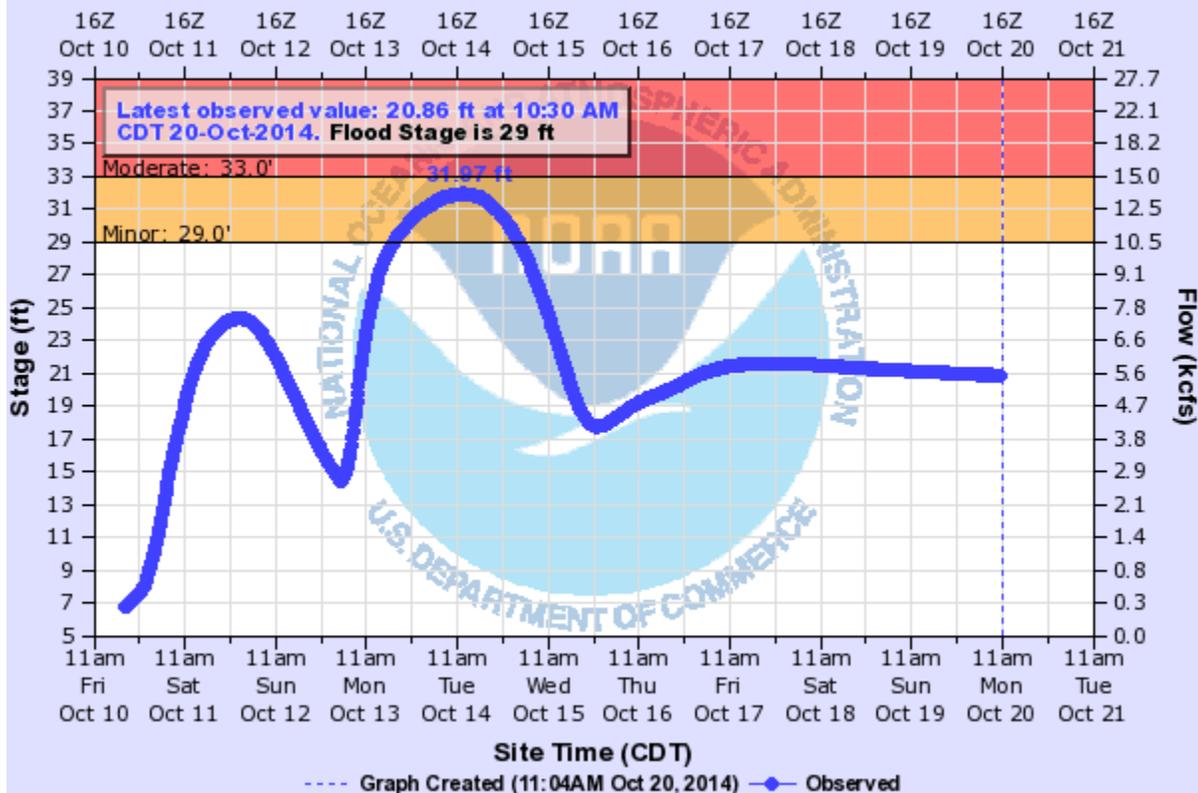
Universal Time (UTC)



PTAO2(plotting HGIRG) "Gage 0" Datum: 409.4'

POTEAU RIVER NEAR PANAMA

Universal Time (UTC)

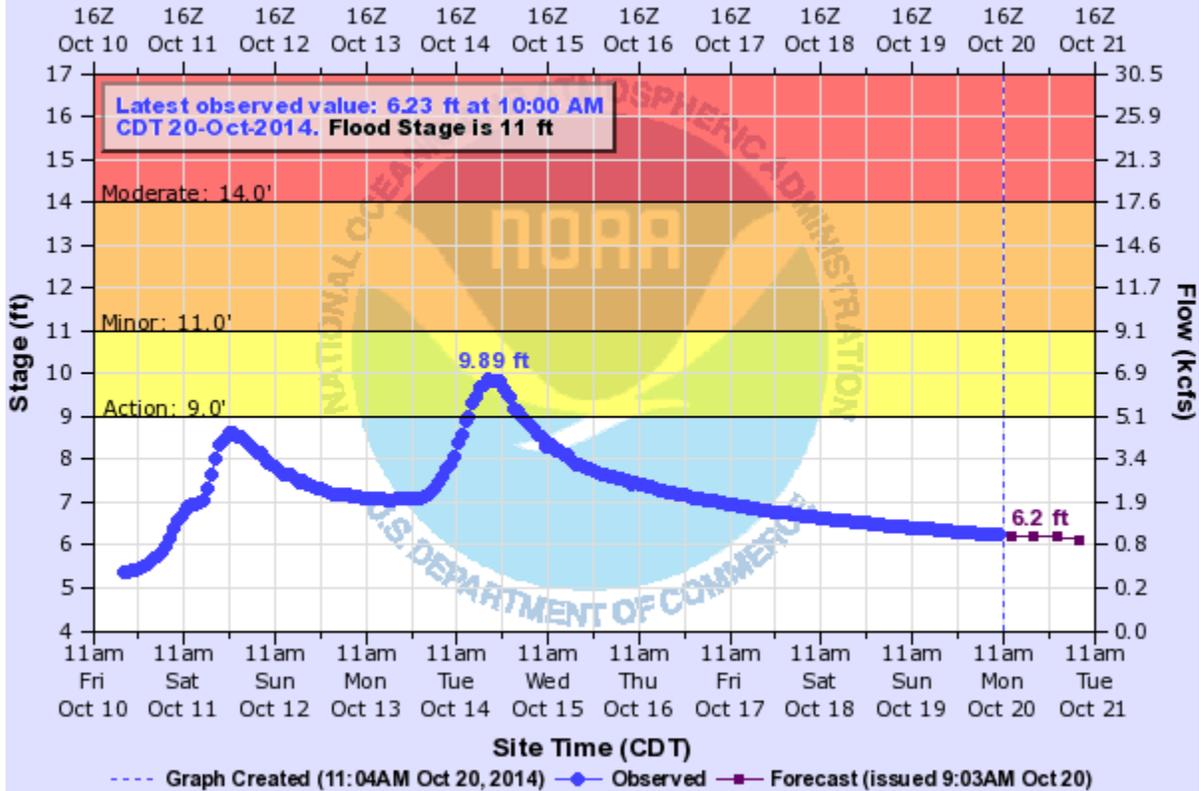


PANO2(plotting HGIRG) "Gage 0" Datum: 387.97'

Observations courtesy of US Geological Survey

ILLINOIS RIVER (AR OK) NEAR TAHLEQUAH

Universal Time (UTC)



TALO2(plotting HGIRG) "Gage 0" Datum: 664.14'

Observations courtesy of US Geological Survey