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 **2013**
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 4, 2013**

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.

The first half of October 2013 was relatively quiet, with several rounds of heavy rainfall across eastern OK and northwest AR during the second half of the month. Much of the HSA received near to above normal rainfall this month. 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.

Monthly Summary

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 1a), rainfall totals for October 2013 ranged from 2" in Osage and Pawnee Counties to around 8" in portions of eastern OK and northwest AR. A large portion of the HSA received 3"-6". Portions of eastern Kay, Osage, Pawnee, Creek, Tulsa, and Washington Counties in eastern OK ended the month at 50% to 75% of normal. Portions of Muskogee, Sebastian, and Franklin Counties were also below normal this month. The remainder of the HSA was near to above normal, with some areas receiving 150%-200% of the normal October rainfall this month (Fig. 1b).

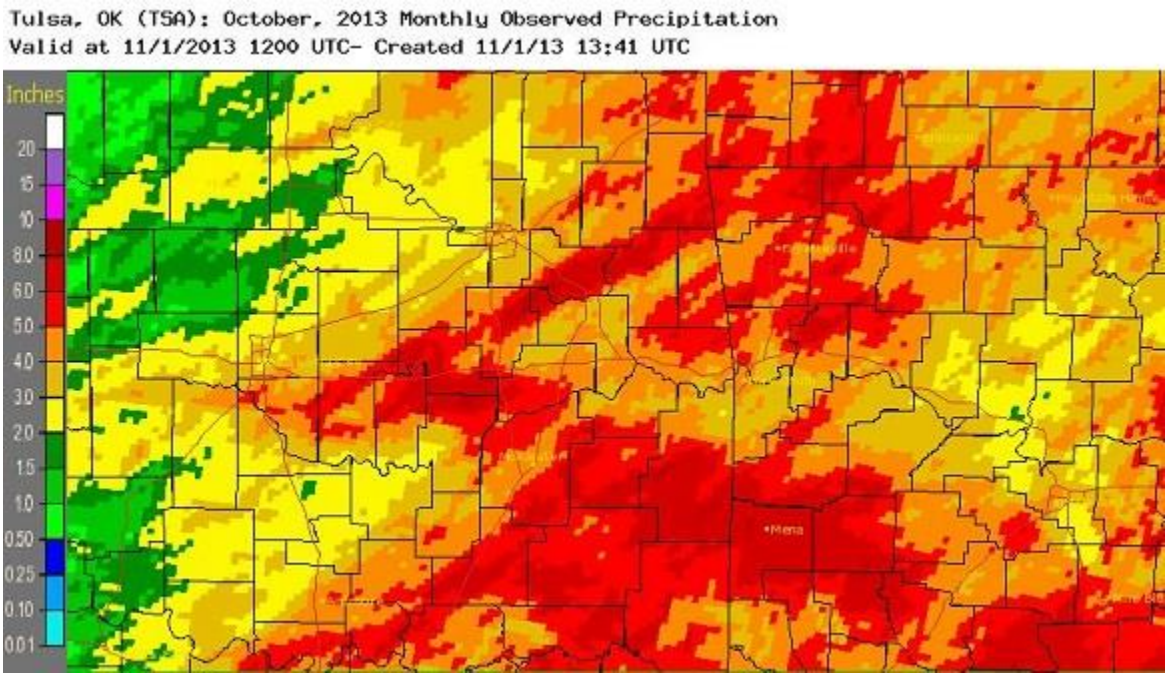


Fig. 1a. Estimated Observed Rainfall for October 2013

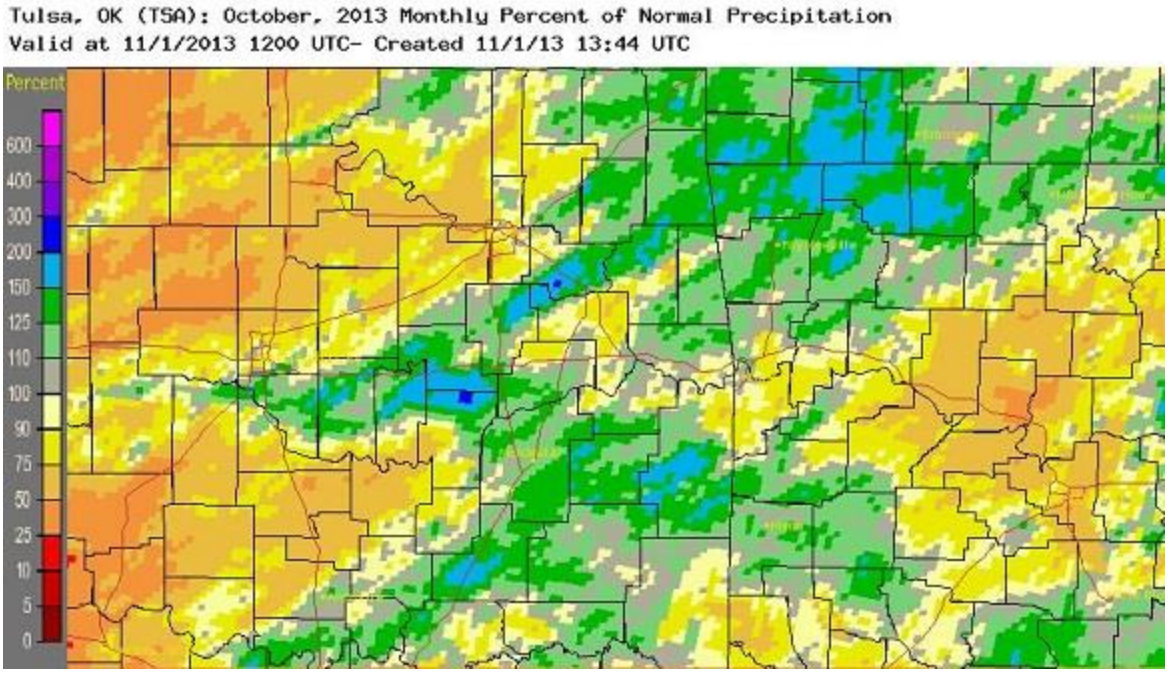


Fig. 1b. Estimated % of Normal Rainfall for October 2013

In Tulsa, OK, October 2013 ranked as the 34th coldest October (61.2°F, tied 2006, 1967; since records began in 1905) and the 48th wettest October (3.52"; since records began in 1888). Fort Smith, AR was the 61st warmest October (63.3°F, tied 1961, 1921; since records began in 1882) and the 42nd wettest October (4.18"; since records began in 1882). Fayetteville, AR was the 24th coldest (57.8°F, tied 1997) and the 16th wettest (5.55") October since records began in 1949.

Some of the larger precipitation reports (in inches) for October 2013 included:

Wister, OK (meso)	7.15	Antlers, OK (meso)	7.02	Talihina, OK (meso)	7.01
Tahlequah, OK (meso)	6.84	Bengal, OK (coop)	6.83	Porter, OK (meso)	6.61
Antlers, OK (coop)	6.51	Fanshawe, OK (coop)	6.41	Clayton, OK (meso)	6.32

Some of the lowest precipitation reports (in inches) for October 2013 included:

Pawnee, OK (coop)	2.25	Pawnee, OK (meso)	2.44	Ralston, OK (coop)	2.64
Burbank, OK (meso)	2.71	Sallisaw 2NW, OK (coop)	2.76	Wynona, OK (meso)	2.83
Bartlesville, OK (coop)	2.93	Jenks Riverside Arpt, OK (ASOS)	3.16	Skiatook, OK (meso)	3.18

According to the USACE, most of the major reservoirs in the HSA were operating within ±4% of the top of their conservation pools. A few lakes were still below normal: Heyburn Lake 73%, Skiatook Lake 76%, Beaver Lake 94%, and Sardis Lake 95%.

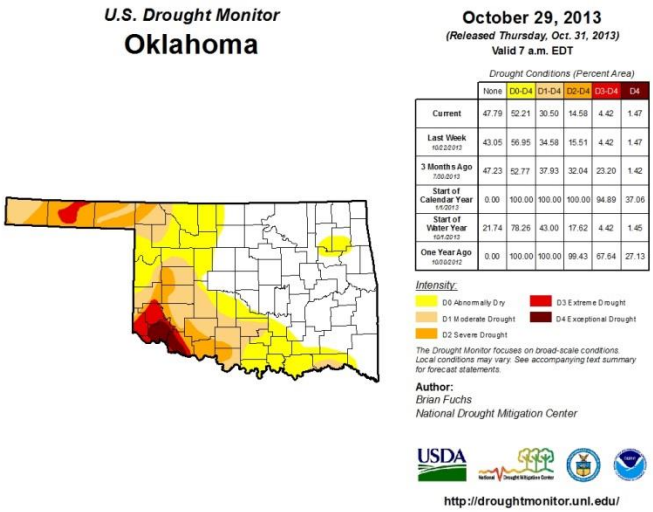


Fig. 2. Drought Monitor for Oklahoma

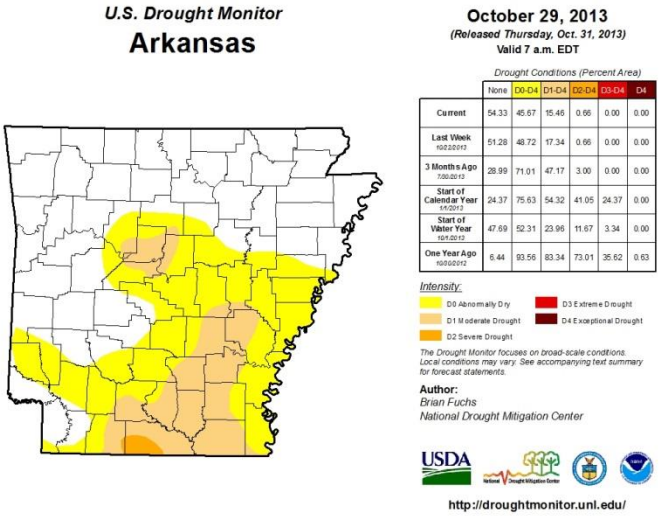


Fig. 3. Drought Monitor for Arkansas

According to the U.S. Drought Monitor (USDM) from October 29, 2013 (Figs 2, 3), Moderate (D1) Drought conditions continued in southern Choctaw County in southeast OK. Southern Rogers, Mayes, northern Wagoner, far southern Pushmataha, and Choctaw Counties were classified as Abnormally Dry (D0), but not experiencing drought conditions.

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

Rank since 1921	October 2013	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 2013 (Jan 1 – Oct 31)	Last 365 Days (Nov 1, 2012 – Oct 31, 2013)
Northeast OK	33rd wettest	44th wettest	42nd wettest	21st wettest	27th wettest	25th wettest	35th wettest
East Central OK	26th wettest	44th driest	45th wettest	34th wettest	35th wettest	25th wettest	43rd wettest
Southeast OK	21st wettest	36th wettest	46th wettest	34th driest	28th wettest	30th wettest	44th driest
Statewide	36th wettest	37th driest	42nd driest	23rd wettest	35th wettest	28th wettest	46th wettest

Outlooks

The Climate Prediction Center (CPC) outlook for November 2013 (issued October 31, 2013) indicates an enhanced chance for above normal temperatures and a slightly enhanced chance for above normal precipitation across all of eastern OK and northwest AR. This outlook is based primarily on short term forecasts of expected weather conditions during the first half of the month, as well as longer term climate anomalies.

For the 3-month period Nov-Dec-Jan 2013, CPC is forecasting an enhanced chance for above normal temperatures and equal chances for above, near, and below median rainfall across all of eastern OK and northwest AR (outlook issued October 17, 2013). According to CPC, ENSO neutral conditions remained through October. ENSO neutral conditions are expected to continue into Spring 2014. Therefore, this outlook is based on both statistical and dynamical forecast tools.

Summary of Precipitation Events

October 1-15

A cold front brought widespread rain to eastern OK and northwest AR late on the 4th and into the 5th. Most of the HSA received 0.50” to 1.5” of rain, though portions of Choctaw, Pushmataha, Okfuskee, and Okmulgee Counties had less than 0.50” (Fig. 4). Higher totals occurred in northwest AR, with widespread 1.5” to 3”. A few locations even received over 3” of rain.

A slow moving cold front brought showers and thunderstorms to portions of eastern OK and northwest AR late on the 11th and lingering into the 12th. Rainfall totals varied across the HSA, with most affected areas receiving between 0.25” and 1.5” of rain. However, isolated locations in Craig, Le Flore, Pushmataha, Latimer, and Choctaw Counties received 1.5” to 2.5” of rain.

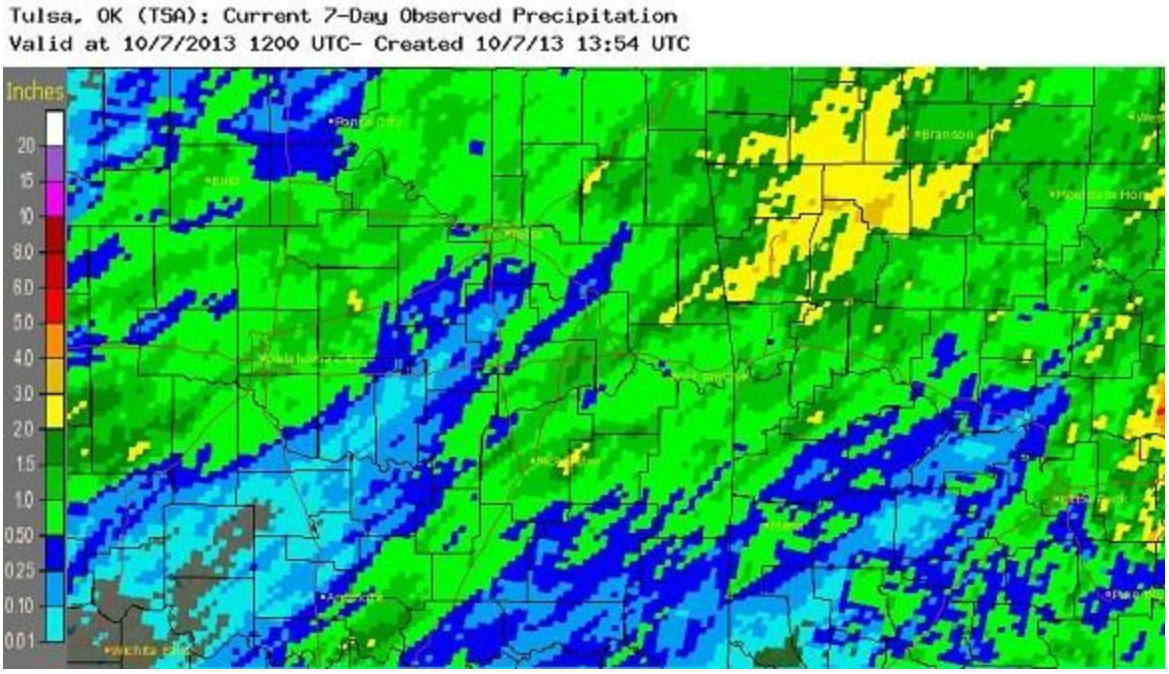


Fig. 4. 7-day Estimated Observed Rainfall ending at 7am 10/07/2013

As an upper-level low pressure system crossed the Plains, significant moisture was drawn up into eastern OK and northwest AR. Widespread showers and isolated thunderstorms developed on the 14th as a strong short-wave moved over the region. The rain continued on the 15th, finally clearing from northwest to southeast as a cold front moved through. While the entire area received much needed rainfall of 0.50"-1.5", locations along and south of I-40 had the highest rainfall totals. A large portion of this region received over 2" of rain, with several locations measuring 3"-4" over the entire event duration (Figs. 5, 6).

Measured precipitation reports ≥2.5" for the 48-hr period ending 7am 10/15/2013:

Wister 3ENE, OK (meso)	3.78	Antlers 5W, OK (meso)	3.39	Antlers, OK (dcp)	3.25
Talihina 3ENE, OK (dcp)	3.06	Cloudy 5ENE, OK (dcp)	2.95	Cloudy 6SSE, OK (meso)	2.93
Clayton 4NNE, OK (meso)	2.80	Van Buren 2.1NNW, AR (coco)	2.74	Bengal 2NNW, OK (coop)	2.74
Clayton 1SE, OK (dcp)	2.68	Vian 5.3 ENE, OK (coco)	2.65	Odell 2N, AR (coop)	2.63
Van Buren 1.1ESE, AR (coco)	2.63	Van Buren, AR (dcp)	2.59	Talihina 4SE, OK (meso)	2.57
Krebs 0.3WNW, OK (coco)	2.52				

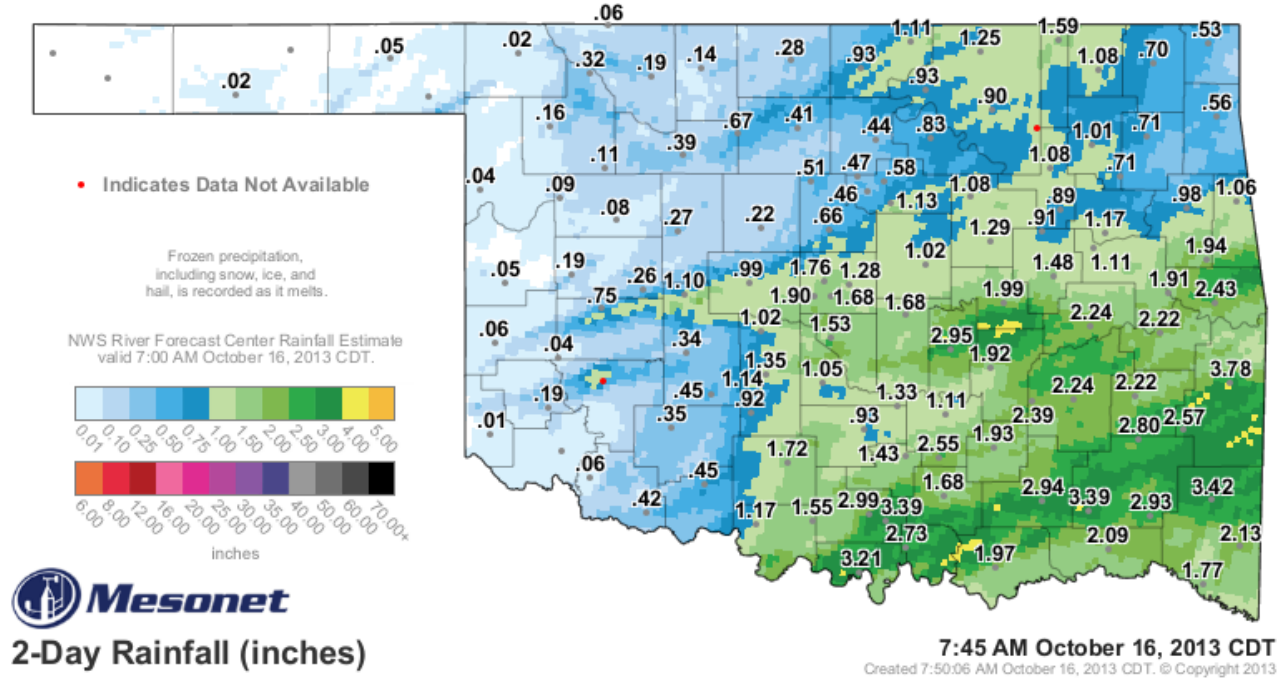


Fig. 5. 2-day Estimated Observed Rainfall (image) and measured Rainfall (numbers) ending at 7:45am 10/16/2013

Fig. 6. 2-day Estimated Observed Rainfall ending at 6am 10/16/2013

October 16-31

Light rain showers expanded across eastern OK and northwest AR on the 18th in response to an approaching upper-level system. Most locations northwest of a McAlester to Fort Smith line received some rain, though totals remained at around 0.50" or less. Far southeast OK missed out on this rain. A cold front brought another round of scattered light rain showers on the 21st, primarily southeast of an Okmulgee to Fayetteville line. Rainfall totals once again were around 0.50" or less.

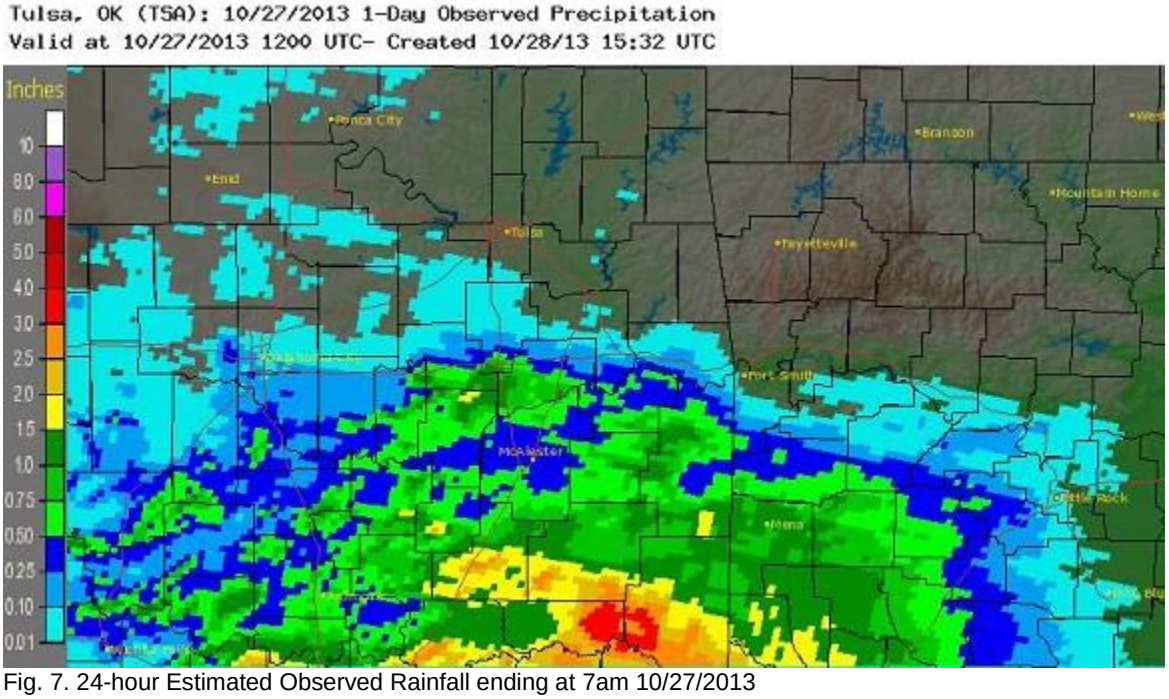


Fig. 7. 24-hour Estimated Observed Rainfall ending at 7am 10/27/2013

Showers and thunderstorms moved into southeast OK and southern Sebastian County AR on the 26th ahead of a cold front as an upper-level wave moved out of the OK/TX panhandles and into the ARLATX region. This activity remained near and south of I-40, with much of the area receiving 0.25" to 1.5" of rain. Heavier rainfall affected southern Pushmataha and the eastern half of Choctaw Counties. This area saw 1.5" to around 3" of rain (Fig. 7). The highest measurements included: Antlers 5W 2.96"; Cloudy 6SSE 2.60"; and Antlers 2.38".

Scattered showers and thunderstorms developed across northeast OK, just south of a warm front that stretched from south central KS into southwest MO, late on the 28th and continued through the early morning hours of the 29th. Additional isolated showers occurred in northeast OK and northwest AR through the afternoon. Overall, rainfall totals were light, with most affected areas receiving less than 0.25". The highest totals of 0.50" to around 1" occurred in far northeast OK, mainly Nowata, Craig, and Ottawa Counties.

An unseasonably moist airmass remained over the HSA on the 30th, with showers and thunderstorms developing across eastern OK during the morning hours. This activity spread across the remainder of the area and continued through the day and into the morning of the 31st as a strong low-level jet and approaching low pressure system provided sustained lift over the region. A narrow band of thunderstorms trained over eastern OK from Okfuskee County through Wagoner County to western Benton County. This area received 2" to 6" of rain (Figs. 8, 9), causing small creeks and streams to run high and affecting some low water crossings in the area. However, drier antecedent conditions in this area precluded widespread flooding. Elsewhere, rainfall totals were generally around 0.30" to 1". Heavy rain further north in southeast KS lead to a rise along the Neosho River near Commerce on November 2nd, with the river cresting just below flood stage. A surface low moved east across northern OK and northwestern AR on the 31st, producing additional light showers. The rain then ended from west to east during the afternoon and early evening hours, just in time for trick-or-treating. Additional rainfall totals on the 31st ranged from a few hundredths to around 0.25". A few locations in far northeast OK and Benton County received around 0.50" to near 0.75".

Measured precipitation reports ≥3" for the 24-hr period ending 7am 10/31/2013:

Wagoner 4.1ESE, OK (coco)	6.00	Haskell 2E, OK (dcp)	5.75	Porter 3ESE, OK (ucoop)	4.60
Porter, OK (meso)	4.42	Okemah, OK (coop)	3.64	Haskell 6SSE, OK (meso)	3.48
Beggs 5S, OK (dcp)	3.27	Siloam Springs 2.8N, AR (coco)	3.25	Colcord 4N, OK (dcp)	3.15
Kansas 6ESE, OK (dcp)	3.07				

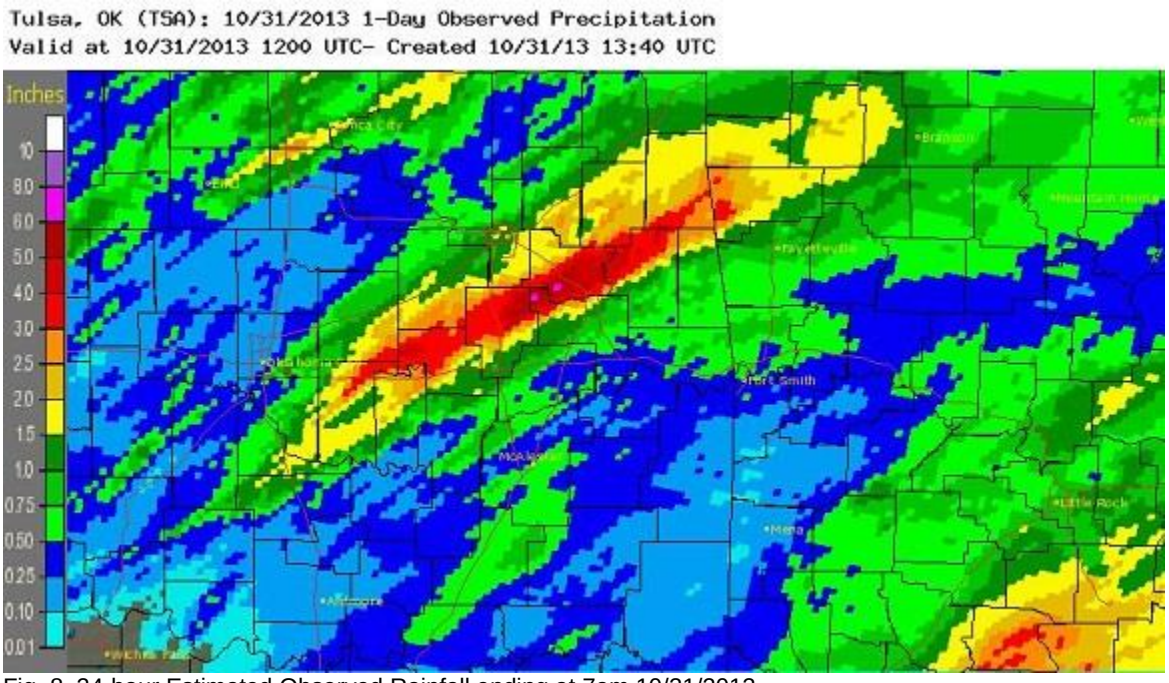


Fig. 8. 24-hour Estimated Observed Rainfall ending at 7am 10/31/2013

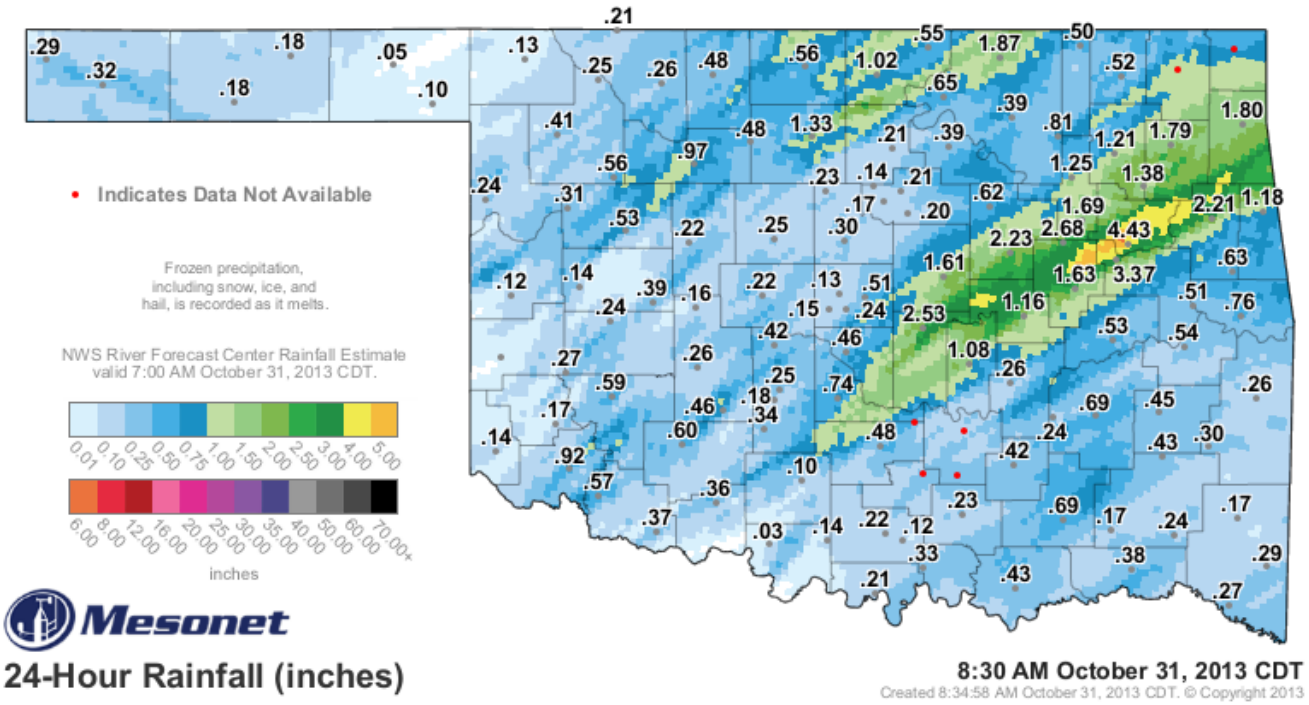


Fig. 9. 24-hour Estimated Observed Rainfall (image) and OK Mesonet measurements ending at 8:30am 10/31/2013

Written by:

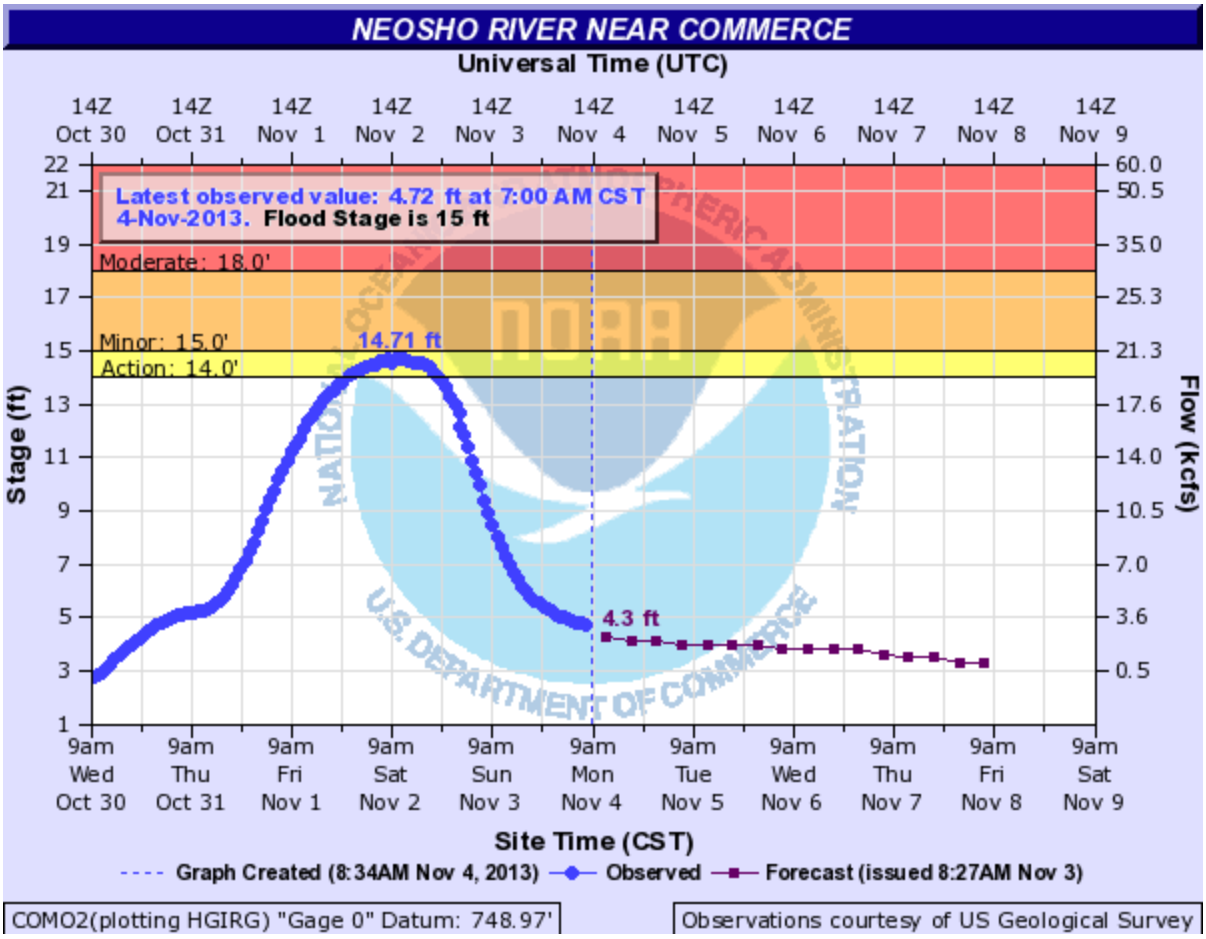
Nicole McGavock
Service Hydrologist
WFO Tulsa

Products issued in October 2013:

*Mixed case River Flood products began July 31, 2013

0 Flash Flood Warnings (FFW)
0 Flash Flood Statements (FFS)
4 Flash/Areal Flood Watches (FFA) (3 Watch FFA CON/EXT/CAN)
3 Urban and Small Stream Advisories (FLS)
0 Areal Flood Warnings (FLW)
0 Areal Flood Statements (FLS)
0 River Flood Warnings (FLW)
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:


NEOSHO RIVER NEAR COMMERCE
Universal Time (UTC)
14Z Oct 30
14Z Oct 31
14Z Nov 1
14Z Nov 2
14Z Nov 3
14Z Nov 4
14Z Nov 5
14Z Nov 6
14Z Nov 7
14Z Nov 8
14Z Nov 9
Latest observed value: 4.72 ft at 7:00 AM CST 4-Nov-2013. Flood Stage is 15 ft
Moderate: 18.0'
Minor: 15.0'
Action: 14.0'
14.71 ft
4.3 ft
Stage (ft)
Flow (kcfs)
22
21
19
17
15
13
11
9
7
5
3
1
60.0
50.5
35.0
25.3
21.3
17.6
14.0
10.5
7.0
3.6
0.5
9am Wed Oct 30
9am Thu Oct 31
9am Fri Nov 1
9am Sat Nov 2
9am Sun Nov 3
9am Mon Nov 4
9am Tue Nov 5
9am Wed Nov 6
9am Thu Nov 7
9am Fri Nov 8
9am Sat Nov 9
Site Time (CST)
Graph Created (8:34AM Nov 4, 2013)
Observed
Forecast (issued 8:27AM Nov 3)
COMO2(plotting HGIRG) "Gage 0" Datum: 748.97'
Observations courtesy of US Geological Survey