

**MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS**

REPORT FOR:  
MONTH: **August** 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  
**September 3, 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)*

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 August 2013 brought cooler temperatures and flooding rains. The second half of the month was hot and dry. Normal rainfall for August ranges from 2.6 inches in McIntosh County to 3.8 inches in Ottawa County. In the Ozark region of northwest Arkansas, rainfall averages 3.7 inches for the month.

**Monthly Summary**

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 1a), rainfall totals for August 2013 ranged from 0.25" in Choctaw County to over 10" in far northeast OK and northwest AR. A large portion of the HSA received 2"-6". Locations north of a Vinita, OK to Fayetteville, AR line, plus most of Franklin, Madison, southern Creek, Okfuskee, Okmulgee, McIntosh, Haskell, northern Le Flore, and Muskogee Counties ended the month well above normal, receiving 150% to over 300% of the normal August rainfall (Fig. 1b). The remainder of the area had near normal rainfall up to 50% below normal rainfall, with the exception of Pushmataha and Choctaw Counties, which only received 5%-50% of the normal rainfall for the month.

Tulsa, OK (TSA): August, 2013 Monthly Observed Precipitation  
Valid at 9/1/2013 1200 UTC- Created 9/3/13 13:37 UTC

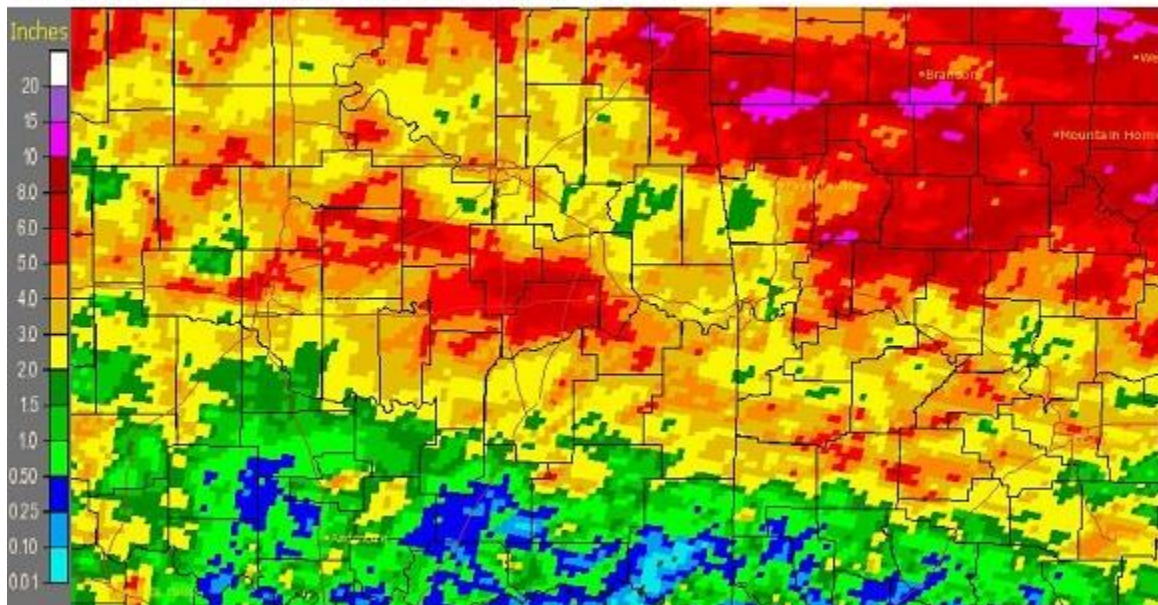


Fig. 1a. Estimated Observed Rainfall for August 2013

Tulsa, OK (TSA): August, 2013 Monthly Percent of Normal Precipitation  
 Valid at 9/1/2013 1200 UTC- Created 9/3/13 13:41 UTC

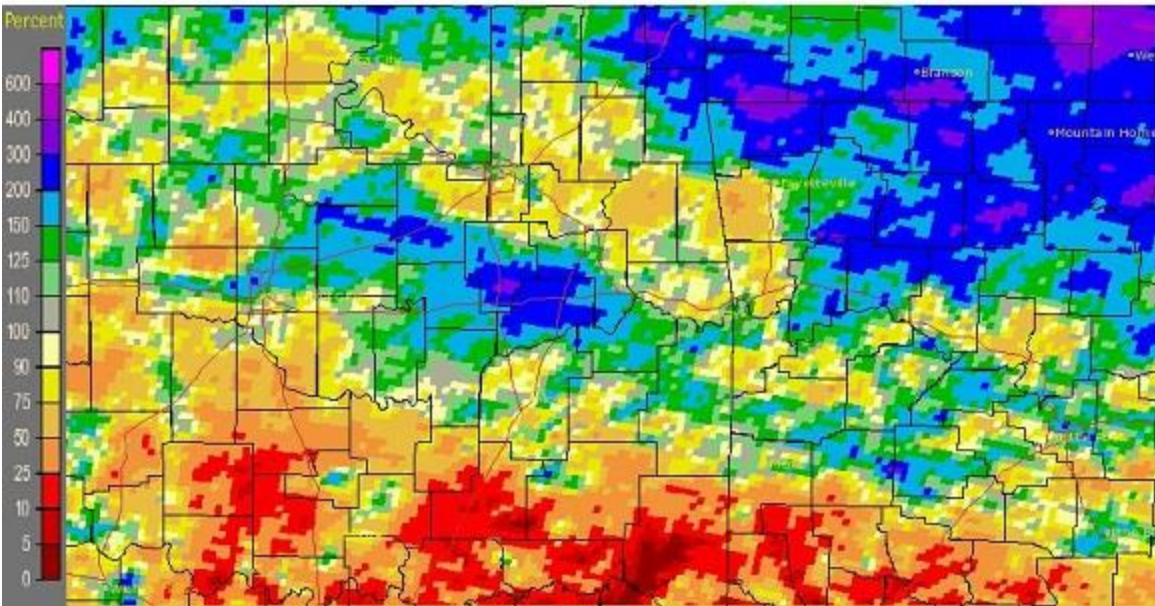


Fig. 1b. Estimated % of Normal Rainfall for August 2013

In Tulsa, OK, August 2013 ranked as the 36<sup>th</sup> coldest August (80.8°F, tied 2008, 1941, 1910; since records began in 1905) and the 63<sup>rd</sup> wettest August (2.88"; since records began in 1888). Fort Smith, AR was the 52<sup>nd</sup> warmest August (82.2°F, tied 1901; since records began in 1882) and the 37<sup>th</sup> wettest August (3.84"; since records began in 1882). Fayetteville, AR was the 24<sup>th</sup> coldest (76.0°F) and the 29<sup>th</sup> driest (2.82") August since records began in 1949.

In Tulsa, OK, Summer 2013 ranked as the 40<sup>th</sup> coldest Summer (80.4°F, tied 1947; since records began in 1905) and the 52<sup>nd</sup> driest Summer (9.50"; since records began in 1888). Fort Smith, AR was the 44<sup>th</sup> warmest Summer (81.3°F, tied 2000, 1957; since records began in 1882) and the 24<sup>th</sup> wettest Summer (13.89", tied 1950; since records began in 1882). Fayetteville, AR was the 20<sup>th</sup> coldest (75.4°F) and the 9<sup>th</sup> driest (6.97") Summer since records began in 1950.

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

Hindsville 10NNE, AR (coop)	8.06	Okmulgee, OK (meso)	6.98	Jay, OK (meso)	6.94
NW AR Regional Airport (ASOS)	6.63	Miami, OK (meso)	6.35	Berryville 5NW, AR (coop)	6.26
Vinita, OK (meso)	6.20	Bristow, OK (meso)	6.05	Eufaula, OK (meso)	6.01

(Highest CoCoRaHS reports include: Bella Vista 2E, AR 11.82; Prairie Creek 0.7NE, AR 8.76; Holiday Island 1.3SSW, AR 8.12; Charleston 1.7E, AR 8.00; Decatur 2.6ESE, AR 7.48)

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

Hugo, OK (meso)	0.17	Antlers, OK (meso)	0.79	Antlers, OK (coop)	0.99
Cloudy, OK (meso)	1.38	Tahlequah, OK (meso)	1.71	Clayton, OK (meso)	1.80
McAlester, OK (meso)	2.22	McAlester, OK (ASOS)	2.24	Inola, OK (meso)	2.32

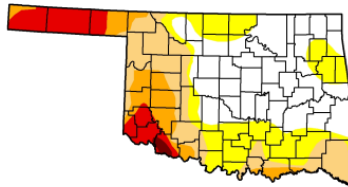
Most of the major reservoirs in the HSA were operating within ±4% of the top of their conservation pools, though a few remained in flood control operations. Just one lake was below normal: Skiatook Lake 82%. The following lakes were >104% of their pools: Pensacola Lake 118%, Kay Lake 114%, Eufaula Lake 112%, Oologah Lake 111%, Ft. Gibson Lake 107%, Hudson Lake 105%, and Tenkiller Lake 105%.

# U.S. Drought Monitor

August 27, 2013  
Valid 7 a.m. EST

## Oklahoma

	Drought Conditions (Percent Area)						
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4	
Current	39.80	60.20	38.01	19.44	9.89	0.54	
Last Week (08/20/2013 map)	53.91	46.09	32.82	22.26	9.89	0.54	
3 Months Ago (05/28/2013 map)	31.88	68.12	58.80	48.33	26.51	11.34	
Start of Calendar Year (01/01/2013 map)	0.00	100.00	100.00	100.00	94.89	37.06	
Start of Water Year (09/25/2012 map)	0.00	100.00	100.00	99.98	95.33	42.09	
One Year Ago (08/21/2012 map)	0.00	100.00	100.00	99.62	90.11	48.10	



**Intensity:**

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

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

<http://droughtmonitor.unl.edu>

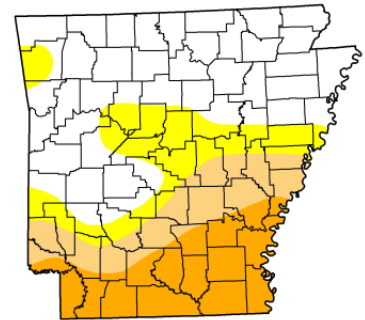
Fig. 2. Drought Monitor for Oklahoma

# U.S. Drought Monitor

August 27, 2013  
Valid 7 a.m. EST

## Arkansas

	Drought Conditions (Percent Area)						
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4	
Current	49.49	50.51	33.59	19.56	0.00	0.00	
Last Week (08/20/2013 map)	50.48	49.52	28.79	4.38	0.00	0.00	
3 Months Ago (05/28/2013 map)	91.68	8.32	1.89	0.00	0.00	0.00	
Start of Calendar Year (01/01/2013 map)	24.37	75.63	54.32	41.05	24.37	0.00	
Start of Water Year (09/25/2012 map)	0.11	99.89	91.37	73.93	41.99	8.74	
One Year Ago (08/21/2012 map)	0.00	100.00	99.79	96.55	74.38	45.30	



**Intensity:**

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

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

<http://droughtmonitor.unl.edu>

Fig. 3. Drought Monitor for Arkansas

According to the [U.S. Drought Monitor](#) (USDM) from August 27, 2013 (Figs 2, 3), Severe (D2) drought crept back into the southwest portion of Choctaw County in southeast OK. Moderate (D1) Drought expanded into Choctaw and Pushmataha Counties in southeast OK. Portions Mayes, eastern Wagoner, Cherokee, Adair, southwest Delaware, Pushmataha, and Choctaw Counties in northeast OK and Washington County in northwest AR were classified as Abnormally Dry (D0), but not experiencing drought conditions.

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

Rank since 1921	Last 30 Days (Aug 1 – Aug 30)	Summer -to-Date (Jun 1 – Aug 30)	Last 60 Days (Jul 2 – Aug 30)	Warm Growing Season (Mar 1 – Aug 30)	Year-to-Date 2013 (Jan 1 – Aug 30)	Water Year-to-Date (Oct 1, 2012 – Aug 30, 2013)	Last 365 Days (Aug 31, 2012 – Aug 30, 2013)
Northeast OK	23 <sup>rd</sup> wettest	21 <sup>st</sup> wettest	9 <sup>th</sup> <b>wettest</b>	20 <sup>th</sup> wettest	17 <sup>th</sup> wettest	37 <sup>th</sup> wettest	40 <sup>th</sup> wettest
East Central OK	28 <sup>th</sup> wettest	26 <sup>th</sup> wettest	18 <sup>th</sup> wettest	20 <sup>th</sup> wettest	18 <sup>th</sup> wettest	43 <sup>rd</sup> wettest	43 <sup>rd</sup> driest
Southeast OK	19 <sup>th</sup> driest	32 <sup>nd</sup> wettest	30 <sup>th</sup> wettest	33 <sup>rd</sup> wettest	31 <sup>st</sup> wettest	27 <sup>th</sup> driest	24 <sup>th</sup> driest
Statewide	34 <sup>th</sup> wettest	24 <sup>th</sup> wettest	10 <sup>th</sup> <b>wettest</b>	29 <sup>th</sup> wettest	24 <sup>th</sup> wettest	44 <sup>th</sup> wettest	39 <sup>th</sup> driest

## Outlooks

The [Climate Prediction Center](#) (CPC) outlook for September 2013 (issued August 31, 2013) indicates equal chances for above, near, and below normal temperatures and precipitation across all of northeast OK and northwest AR. This outlook is based primarily on dynamical computer models.

For the 3-month period Sep-Oct-Nov 2013, CPC is forecasting an enhanced chance for above median precipitation and an equal chance for above, near, and below normal temperatures across all of eastern OK and northwest AR (outlook issued August 15, 2013). According to CPC, ENSO neutral conditions remained through August. ENSO neutral conditions are expected to continue into Autumn 2013, and likely to continue into Winter 2013-14. Therefore, this outlook is primarily based on dynamical computer model output, though also includes some input from recent trends, soil moisture conditions, statistical forecast tools, and long-term trends.



## Summary of Precipitation Events

### August 1-14

Several mesoscale convective systems (MCS) affected the HSA at the beginning of August. The first complex of storms developed in KS and moved southeast, bringing rain to locations along the KS/OK and MO/AR state lines during the morning and early afternoon hours of the 2<sup>nd</sup>. Isolated 3"+ totals led to localized flooding in Benton County (24-hour rainfall totals of 3.88" measured in Pea Ridge; 3.70" measured 3.8 miles SW of Rogers; and 3.17" measured 1.5 miles NNE of Bella Vista by 7am Aug. 3). A few additional showers and thunderstorms affected the same area during the late afternoon/evening along left over outflow boundaries. The same areas were once again affected during the early morning through early afternoon hours of the 3<sup>rd</sup> as another storm complex moved across the region. While the majority of these areas received around 1" or less from these two storm complexes, much of Benton and portions of Madison, Washington, and Carroll Counties in northwest AR had 1.5"-3" of rain (Figs. 4, 5).

Scattered showers and thunderstorms affected west central AR and adjacent OK counties during the afternoon of the 4<sup>th</sup>, producing around 1" or less of localized rain. During the late evening, thunderstorms developed over south central/southeast KS. These storms moved southeast into far northeast OK and far northwest AR overnight and into the morning hours of the 5<sup>th</sup>, bringing 1.5" to near 4" of rain to eastern Craig and Ottawa Counties (Figs. 6, 7). Several 24-hour rainfall measurements over 2.50" were reported as of 7am 8/5/2013, including: Miami 1E, OK 3.67"; Miami, OK 3.10"; Miami 1NNW, OK 2.80"; and Commerce 5W, OK 2.51". All of this rainfall, plus additional heavy rain in southeast KS led to moderate flooding along the Neosho River near Commerce and along the Verdigris River near Lenapah (see E3 report for details).

Tulsa, OK (TSA): 8/3/2013 1-Day Observed Precipitation  
Valid at 8/3/2013 1200 UTC- Created 8/5/13 13:32 UTC

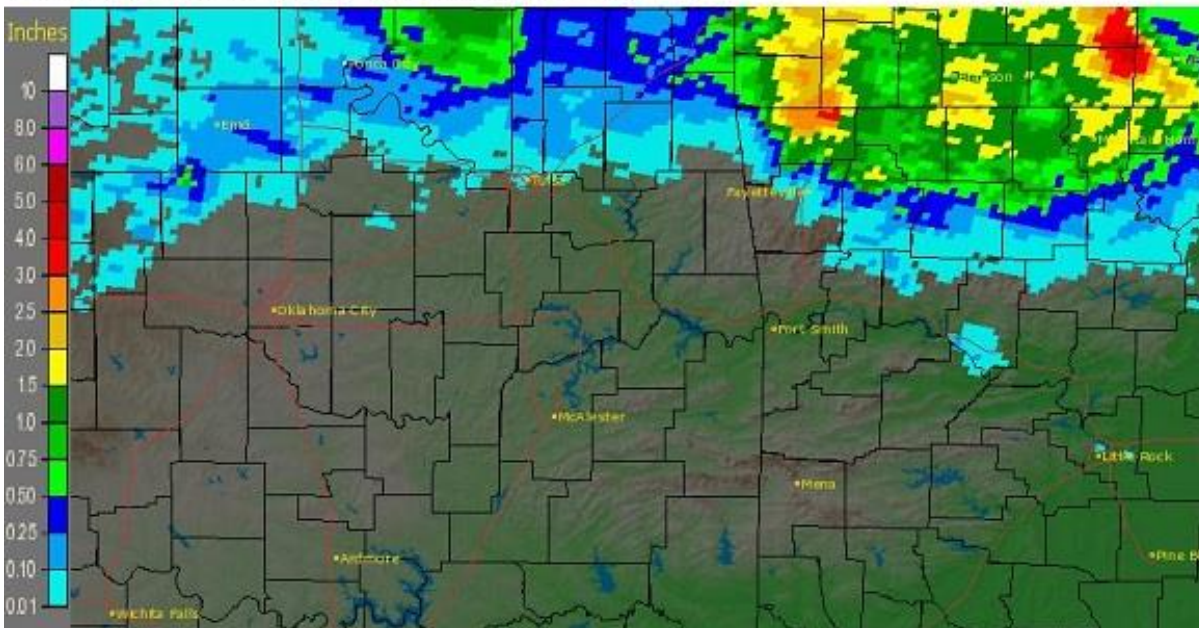


Fig. 4. Estimated Observed 24-hr Rainfall ending 7am 8/3/2013

Tulsa, OK (TSA): 8/4/2013 1-Day Observed Precipitation  
Valid at 8/4/2013 1200 UTC- Created 8/5/13 13:35 UTC

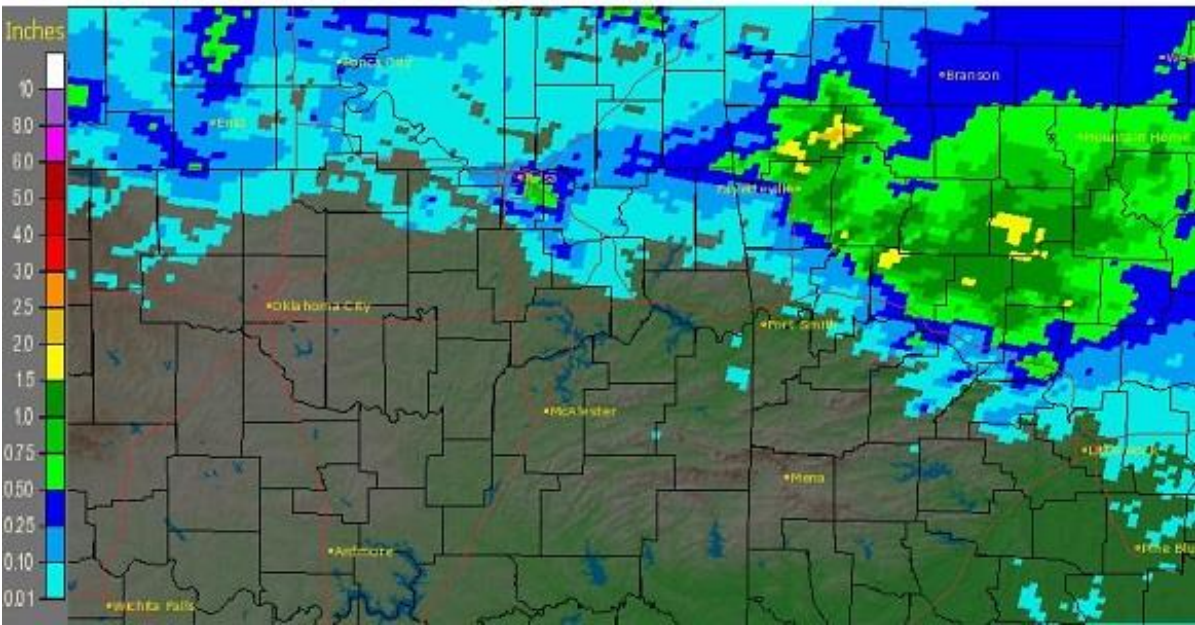


Fig. 5. Estimated Observed 24-hr Rainfall ending 7am 8/4/2013

Tulsa, OK (TSA): 8/5/2013 1-Day Observed Precipitation  
Valid at 8/5/2013 1200 UTC- Created 8/5/13 13:44 UTC

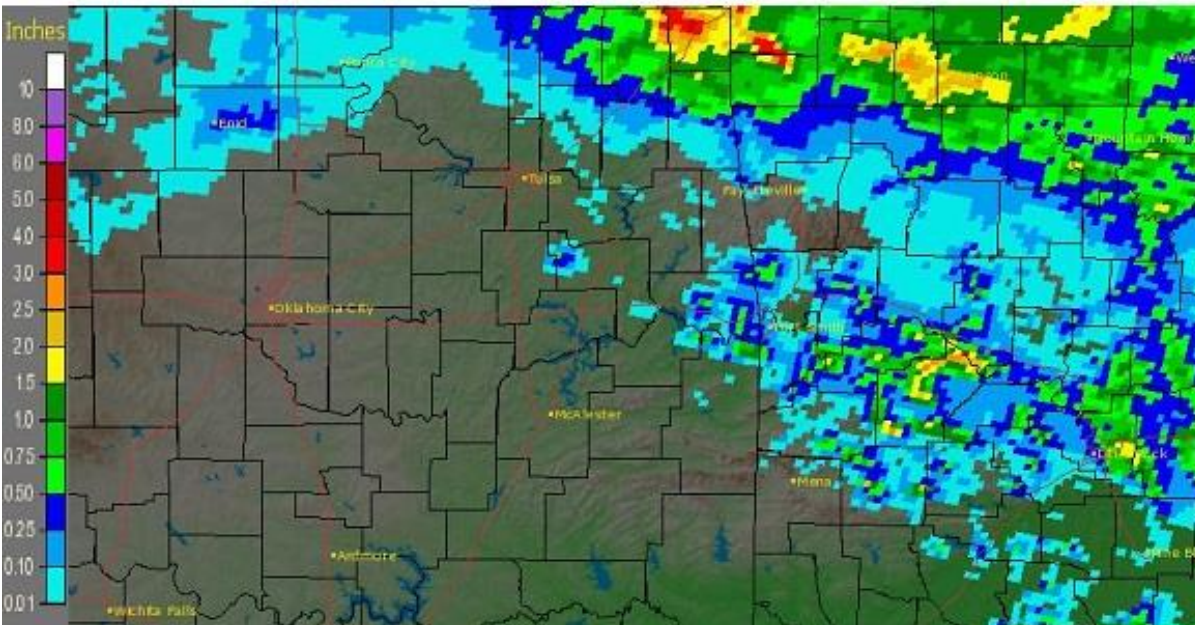


Fig. 6. Estimated Observed 24-hr Rainfall ending 7am 8/5/2013



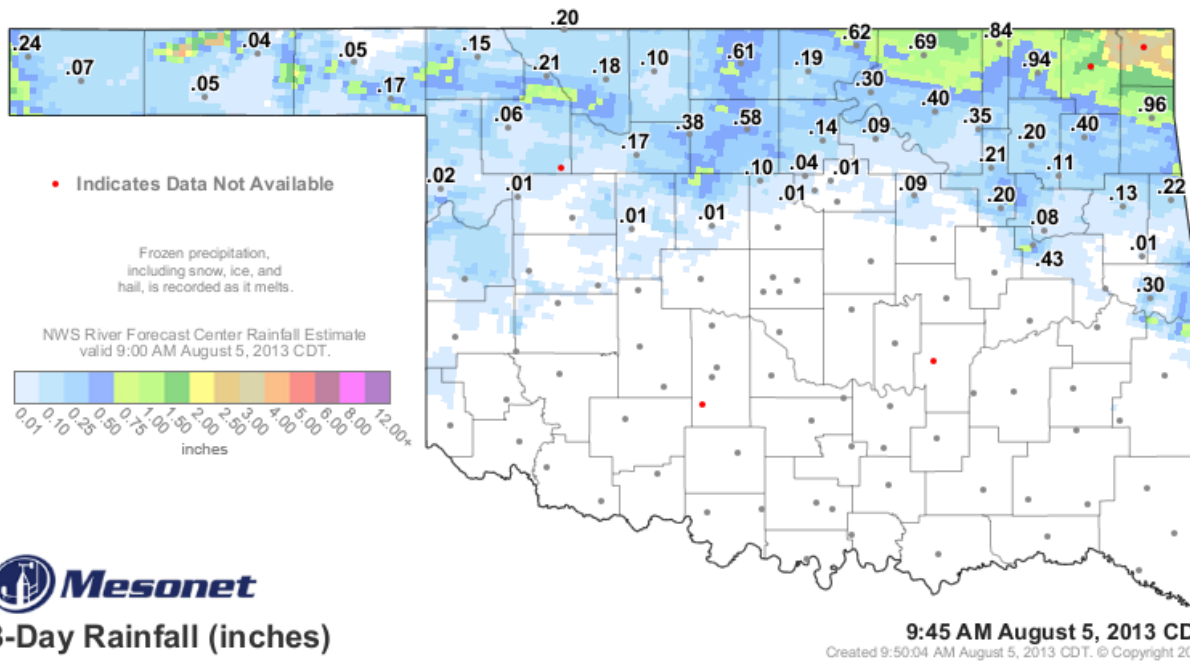


Fig. 7. Mesonet measured and NWS estimated 3-day rainfall ending 9:45am August 5, 2013.

A stationary front that had been draped over southern KS/MO for a couple of days drifted further south into northeast OK and northwest AR on the 7<sup>th</sup>. Showers and thunderstorms developed over southeast CO and moved east while additional storms developed over western TX and moved northeast. Both areas of storms congealed into a complex, affecting northeast OK and northwest AR during the early morning hours of the 8<sup>th</sup>. Very heavy rain occurred over far northeast OK and far northwest AR near the MO border. Widespread rainfall totals of 3"-6" led to flash flooding and numerous water rescues, especially in Benton and Carroll Counties (Figs. 8, 9). Elsewhere, affected locations received from 0.25" to around 1.5" of rain from this activity. This heavy rain fell in the upper reaches of the Illinois River basin, and lead to minor flooding along the Illinois River near Watts and Tahlequah, as well as rises along Flint Creek near Kansas (see E3 report for details).

**Measured 24-hr rainfall totals (inches)  $\geq 4"$  ending at 7am CDT August 8, 2013 (most of this rain fell from 4:30am-8am):**

Garfield 3.9E, AR (CoCo)	6.61	Bella Vista 1.7N, AR (CoCo)	6.24	Bella Vista 1ESE, AR (CoCo)	6.11
Pea Ridge 0.9WNW, AR (CoCo)	6.01	Bella Vista 1.6ENE, AR (CoCo)	5.61	Bella Vista 1.5NNE, AR (CoCo)	5.48
Jay 3.3NNE, OK (CoCo)	4.88	Elm Springs, OK (DCP)	4.62	Jay 4N, OK (Meso)	4.59
Colcord 4N, OK (DCP)	4.25	Kansas 6ESE, OK (DCP)	4.23	Rogers 3.8SW, AR (CoCo)	4.20
Decatur 2.6ESE, AR (CoCo)	4.15				

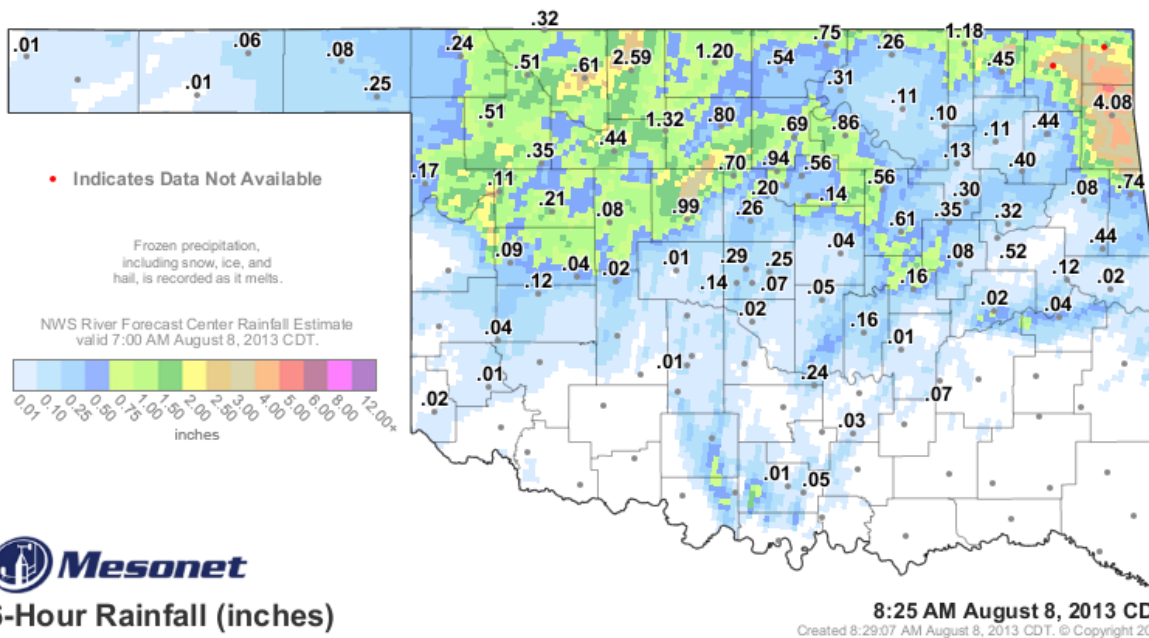


Fig. 8. Mesonet measured and NWS estimated 6-hour rainfall ending 8:25am August 8, 2013.

Tulsa, OK (TSA): Current 1-Day Observed Precipitation  
Valid at 8/8/2013 1200 UTC- Created 8/8/13 15:40 UTC

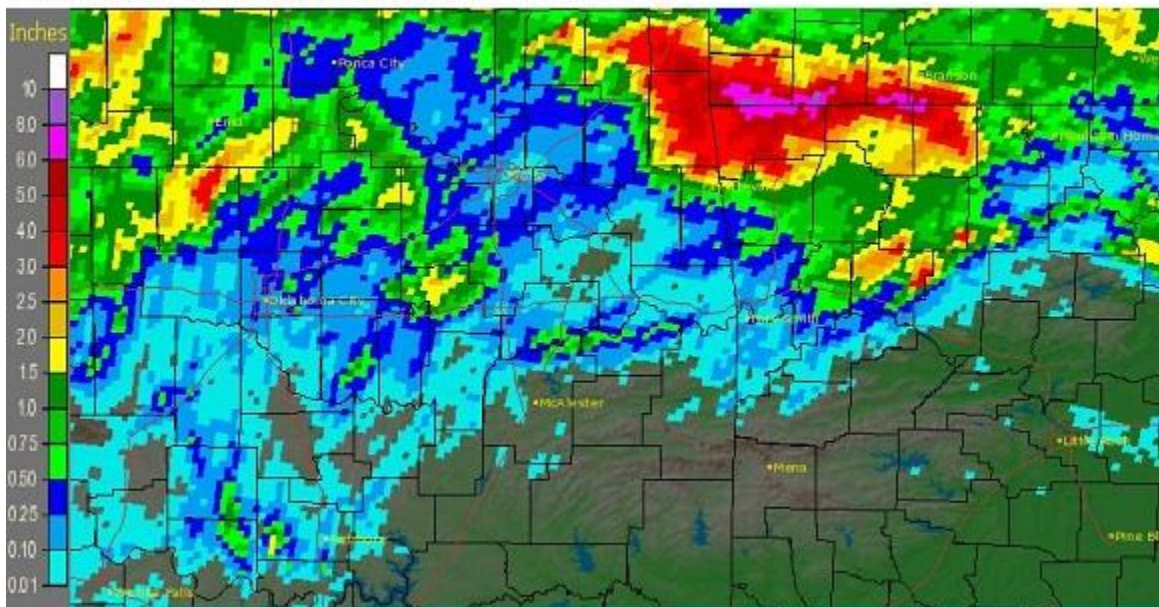


Fig. 9. Estimated Observed 24-hr Rainfall ending 7am 8/8/2013



Fig. 10 (left). Butler Creek at the 232 bridge near Beaver, AR in Carroll County. A 68-yr old Holiday Island woman driving over this bridge around 5am was swept downstream. Thankfully she was found soaked, but alive, after spending 3 hours on a tree limb awaiting rescue. *Image courtesy of Carroll County News.*

With all of the MCS activity, the first 7 days of the month resulted in 2" to over 10" of rain near the OK/KS and OK/AR/MO state lines (Figs. 11, 12). As water was evacuated from the upstream rivers and reservoirs, the Arkansas River near Muskogee remained just below flood stage for approximately 10 days (see hydrographs below; E3 report for details).



Tulsa, OK (TSA): Current 7-Day Observed Precipitation  
 Valid at 8/8/2013 1200 UTC- Created 8/8/13 15:54 UTC

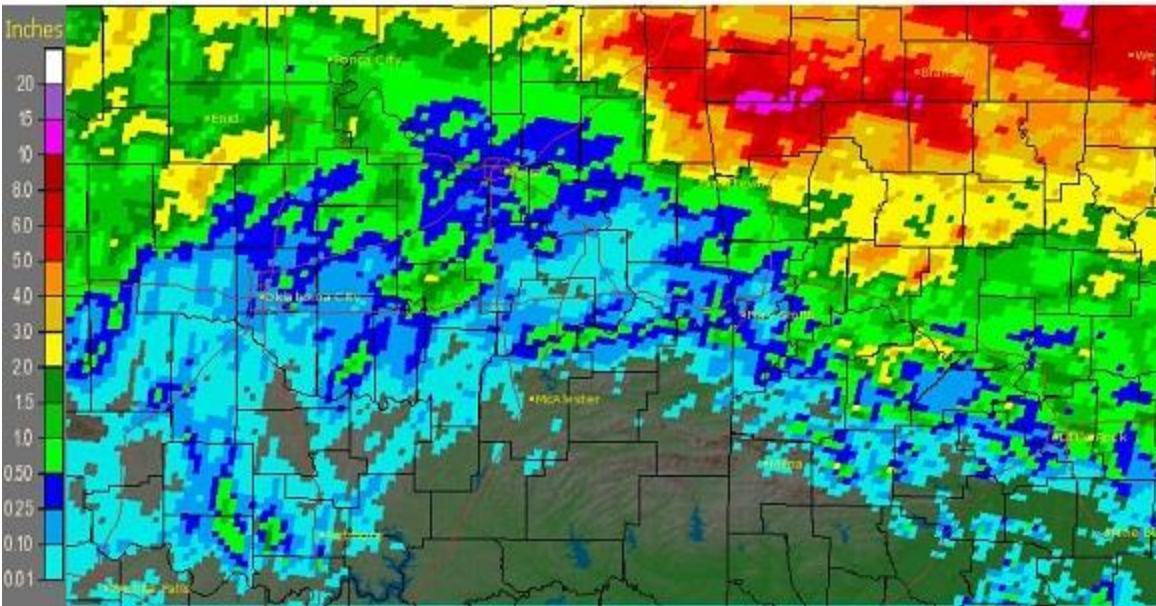
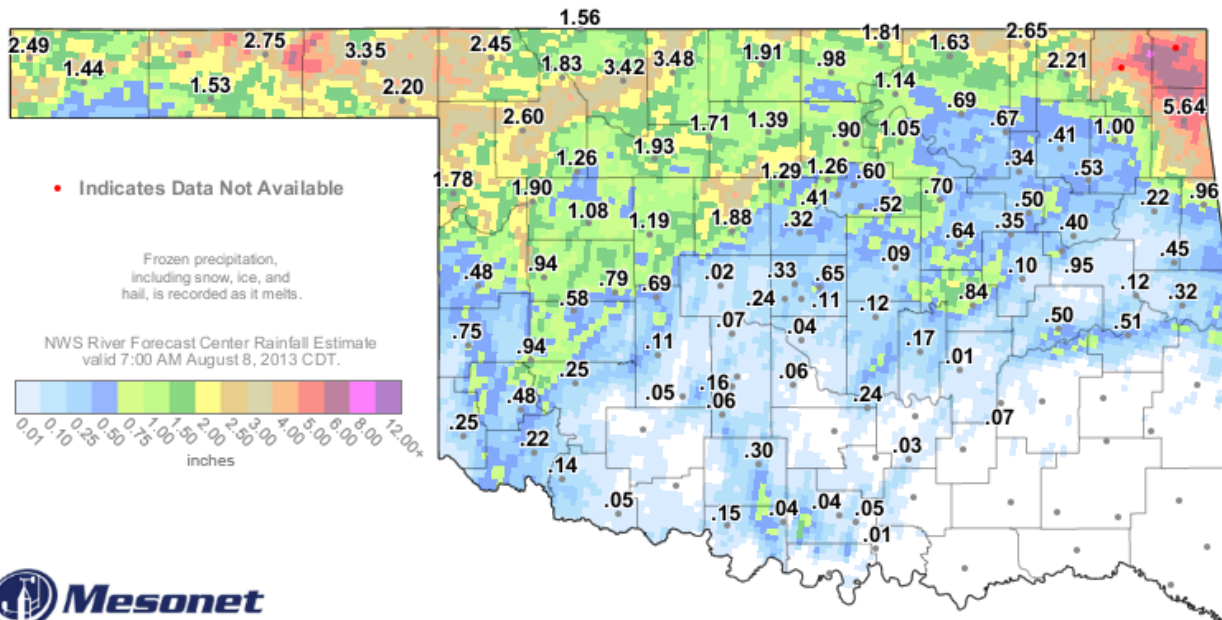


Fig. 11. Estimated Observed 7-day Rainfall ending 7am 8/8/2013



**7-Day Rainfall (inches)**

8:25 AM August 8, 2013 CDT

Created 8:29:08 AM August 8, 2013 CDT. © Copyright 2013

Fig. 12. Mesonet measured and NWS estimated 7-day rainfall ending 8:25am August 8, 2013.

Numerous showers and thunderstorms developed further south on the 8<sup>th</sup>, bringing heavy rainfall to east central OK and west central AR during the evening and overnight hours. Rainfall totals ranged from 0.25"-1.5" across much of the HSA, with higher totals of 1.5" to around 3" (Fig. 13). Strong winds also accompanied the strongest storms, with wind damage reported in Creek, Le Flore, and Franklin Counties.



Tulsa, OK (TSA): 8/9/2013 1-Day Observed Precipitation  
Valid at 8/9/2013 1200 UTC- Created 8/9/13 17:40 UTC



Fig. 13. Estimated Observed 24-hr Rainfall ending 7am 8/9/2013

Thunderstorms trained over the same area of west central AR during the morning hours of the 10<sup>th</sup>, in the vicinity of a stationary front. 3"-6" of rain fell over southern Madison and northern Franklin Counties, with 6.24" measured in St. Paul, AR (Fig. 14). The Madison County Judge declared a disaster declaration for the county due to the flash flooding that occurred, which washed out sections of roads and guard rails.

Tulsa, OK (TSA): 8/10/2013 1-Day Observed Precipitation  
Valid at 8/10/2013 1200 UTC- Created 8/12/13 17:32 UTC

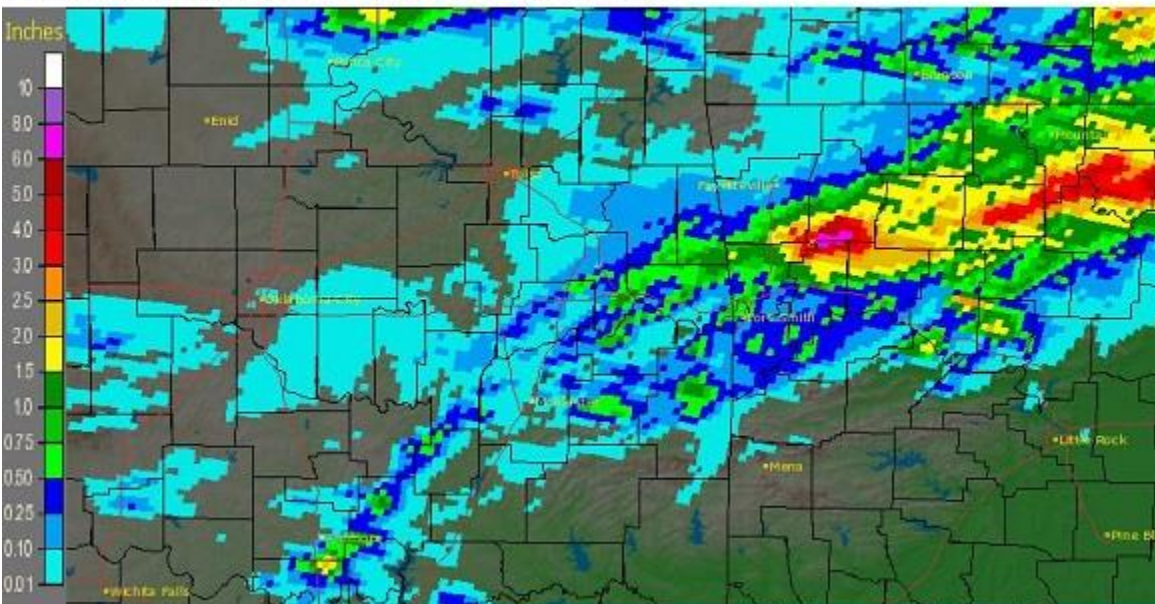


Fig. 14. Estimated Observed 24-hr Rainfall ending 7am 8/10/2013

Several rounds of storms affected the HSA on the 12<sup>th</sup>-13<sup>th</sup>. A thunderstorm complex moved across northeast OK and northwest AR during the morning of the 12<sup>th</sup>, pushing a boundary southward. Additional thunderstorms developed during the afternoon near this boundary, affecting primarily east central/southeast OK and west central AR. During the overnight hours, a line of thunderstorms moved east into eastern OK and west central AR, producing periods of heavy rain across Creek, Okmulgee, Muskogee, and McIntosh Counties. Most of the HSA received 0.25"-1.5" of rain by 7am on the 13<sup>th</sup>, with 1.5"-4" from southern Creek County to eastern McIntosh County (Fig. 15). Storms then continued near a boundary along and just south of I-40 during the morning and early afternoon hours of the 13<sup>th</sup>. Additional showers and isolated thunderstorms

developed along the KS/OK state line in the vicinity of a surface low and associated cold front. This activity moved across northeast OK and northwest AR during the afternoon and evening hours. Most affected areas received 0.10"-1" of rain from this activity, with isolated areas of 1"-2". The Bartlesville, OK area received 2"-2.25" in a short amount of time, resulting in some localized street flooding and one water rescue.

Tulsa, OK (TSA): 8/13/2013 1-Day Observed Precipitation  
Valid at 8/13/2013 1200 UTC- Created 8/13/13 19:44 UTC

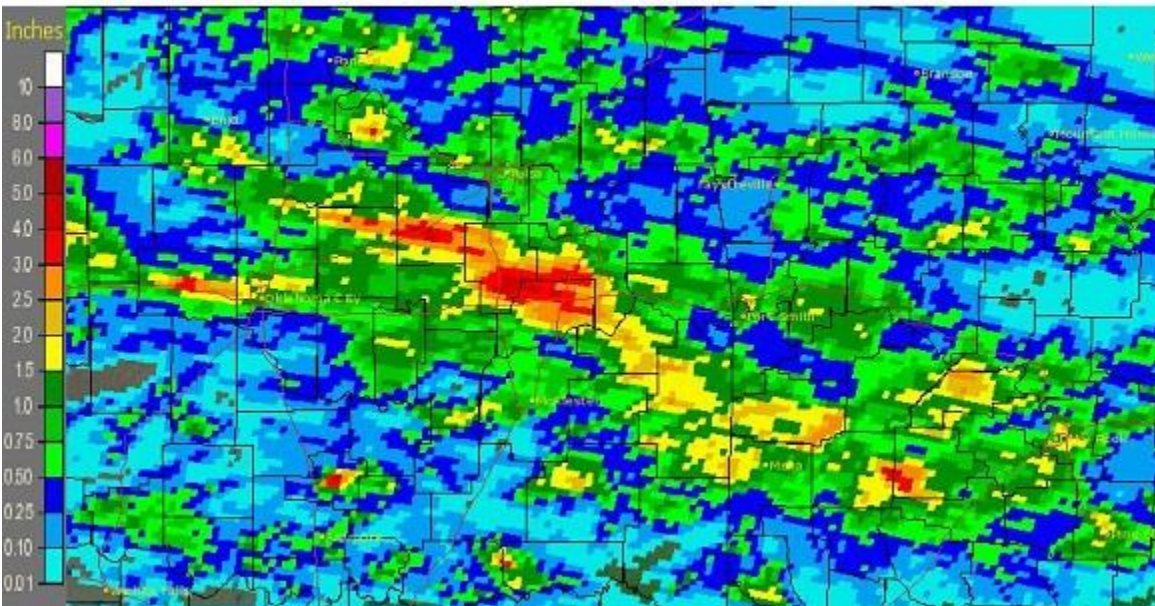


Fig. 15. Estimated Observed 24-hr Rainfall ending 7am 8/13/2013

### **August 15-31**

An MCS developed in central KS during the evening of the 15<sup>th</sup>, and moved south into eastern OK during the late night hours. This complex of storms brought around 0.25" to around 1" to locations along and west of Hwy 75 before moving south of the HSA by 2am.

After nearly daily rainfall for the first half of the month, a dome of high pressure developed over the Southern Plains. A weak mid-level wave sparked some isolated showers near Hwy 75 in northeast OK on the morning of the 23<sup>rd</sup>, followed by additional isolated storms during the afternoon and evening as a larger scale wave moved through the region. Overall, rainfall totals remained light with most locations receiving around 0.50" or less. Southern Cherokee, west central Adair, and far southern Pittsburg Counties had rainfall totals of 0.50"-1.5" in spots.

Isolated rainfall affected southwest Washington and southern Madison Counties in northwest AR on the 30<sup>th</sup>. Most of the affected area received around 0.50" or less, though a small area in Washington County ended up with near 2" of rain.

Written by:

Nicole McGavock  
Service Hydrologist  
WFO Tulsa

### **Products issued in August 2013:**

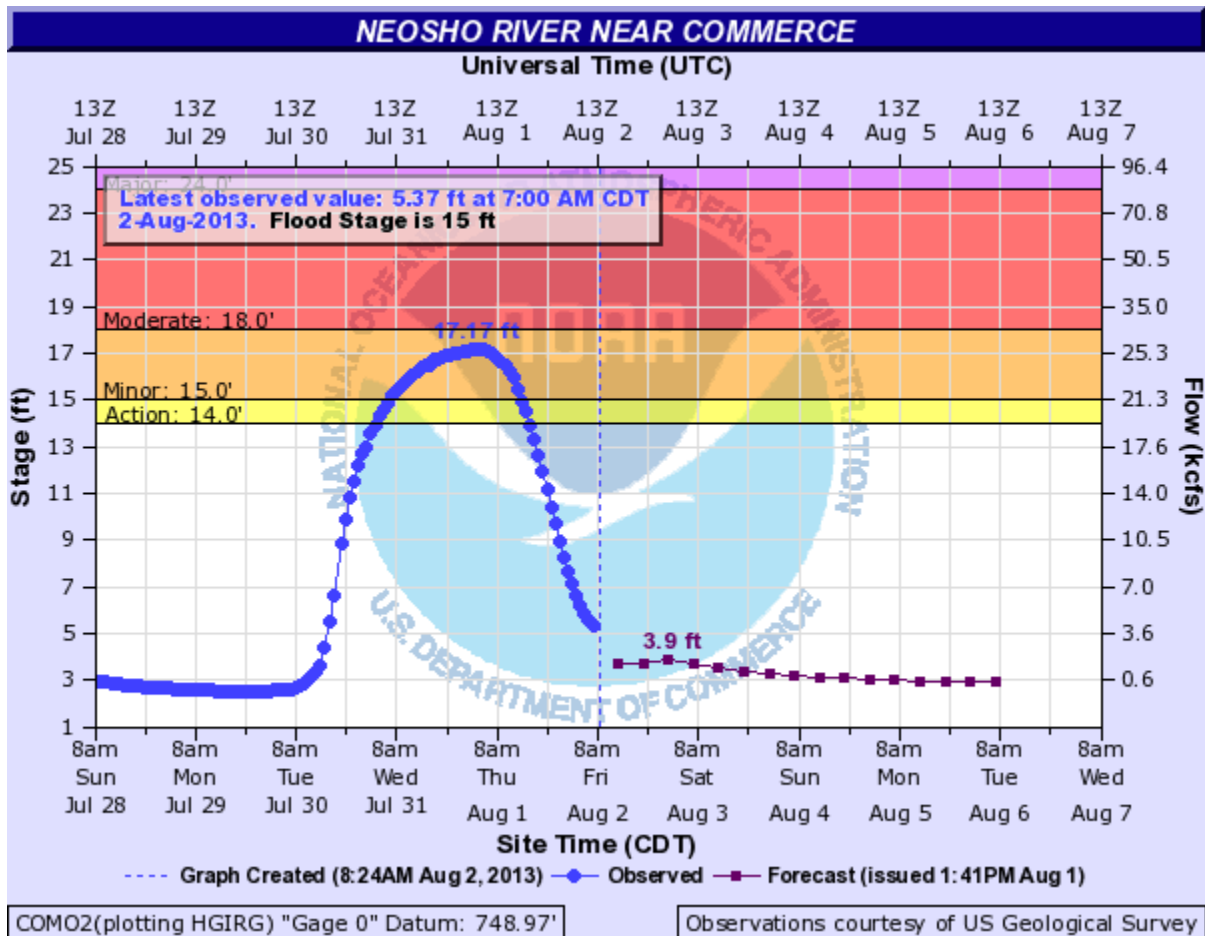
\*Mixed case River Flood products began July 31, 2013

- 11 Flash Flood Warnings (FFW)
- 6 Flash Flood Statements (FFS)



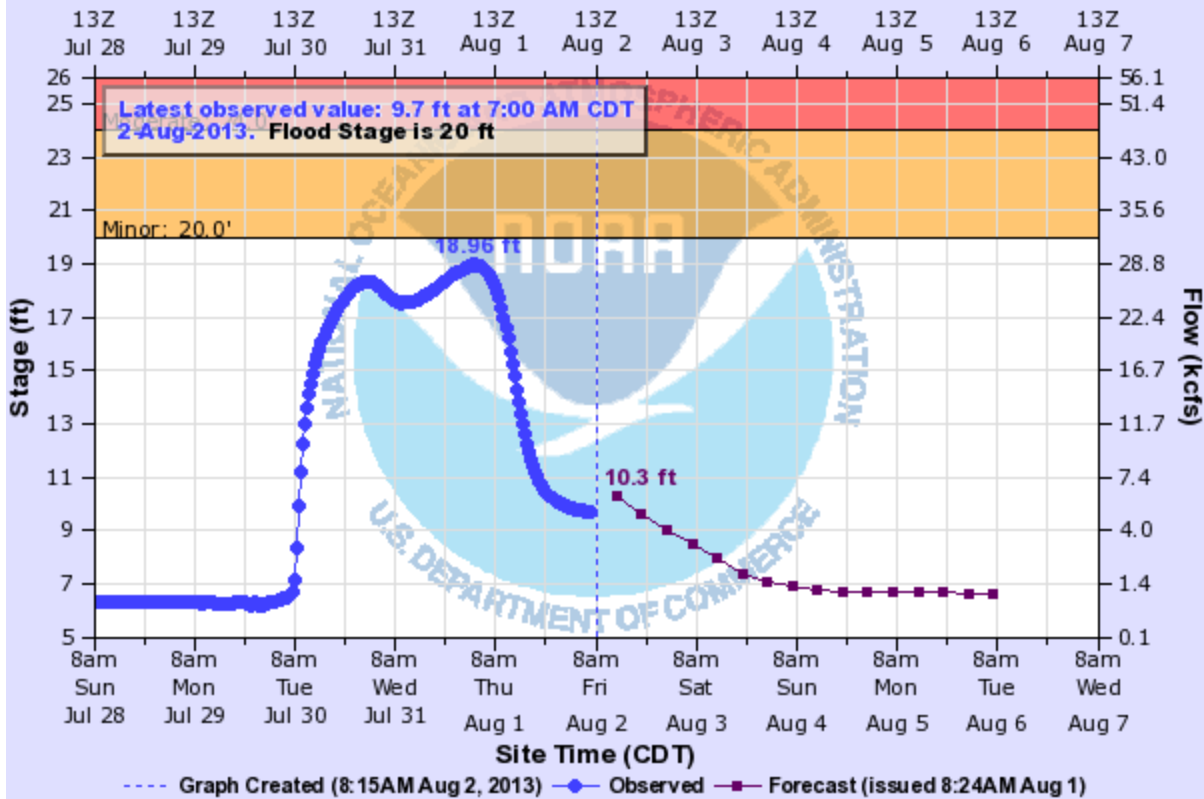
- 5 Flash/Areal Flood Watches (FFA) (20 Watch FFA CON/EXT/CAN)
- 16 Urban and Small Stream Advisories (FLS)
- 8 Areal Flood Warnings (FLW)
- 0 Areal Flood Statements (FLS)
- 7 River Flood Warnings (FLW)
- 55 River Flood Statements (FLS)
- 4 River Flood Advisories (FLS) (39 Advisory FLS CON/EXT/CAN)
- 0 River Flood Watches (FFA) (0 Watch FFA CON/EXT/CAN)
- 4 River Statements (RVS)
- 0 Hydrologic Outlooks (ESF)
- 0 Drought Information Statements (DGT)

**Preliminary Hydrographs:**



### SPRING RIVER NEAR QUAPAW

Universal Time (UTC)

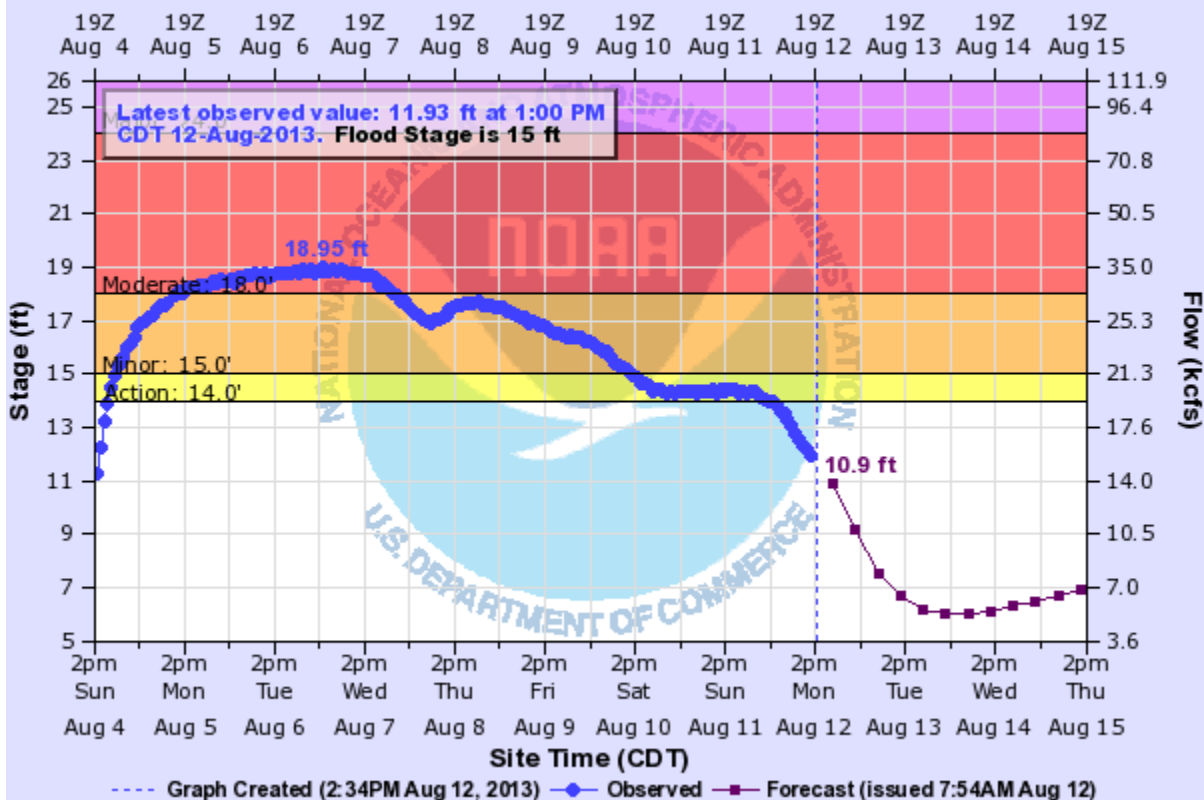


QUAO2(plotting HGIRG) "Gage 0" Datum: 746.25'

Observations courtesy of US Geological Survey

### NEOSHO RIVER NEAR COMMERCE

Universal Time (UTC)



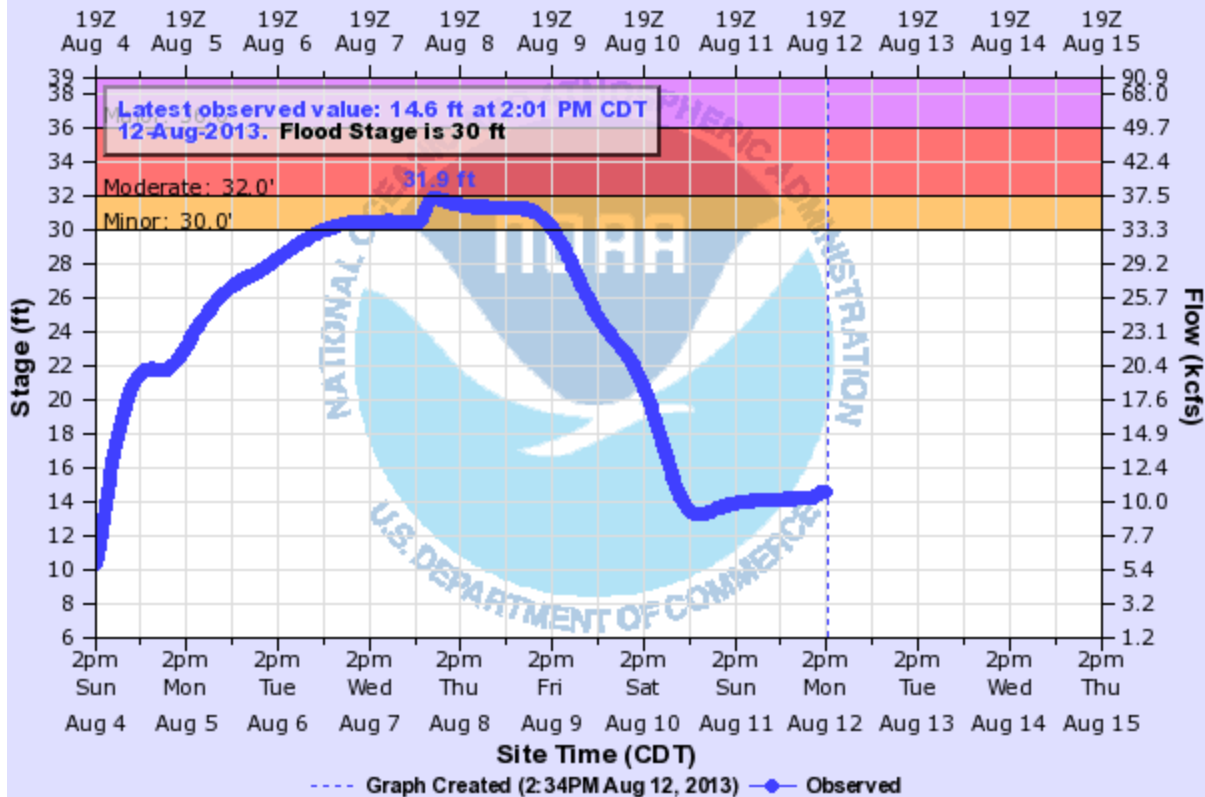
COMO2(plotting HGIRG) "Gage 0" Datum: 748.97'

Observations courtesy of US Geological Survey



## VERDIGRIS RIVER NEAR LENAPAH

Universal Time (UTC)

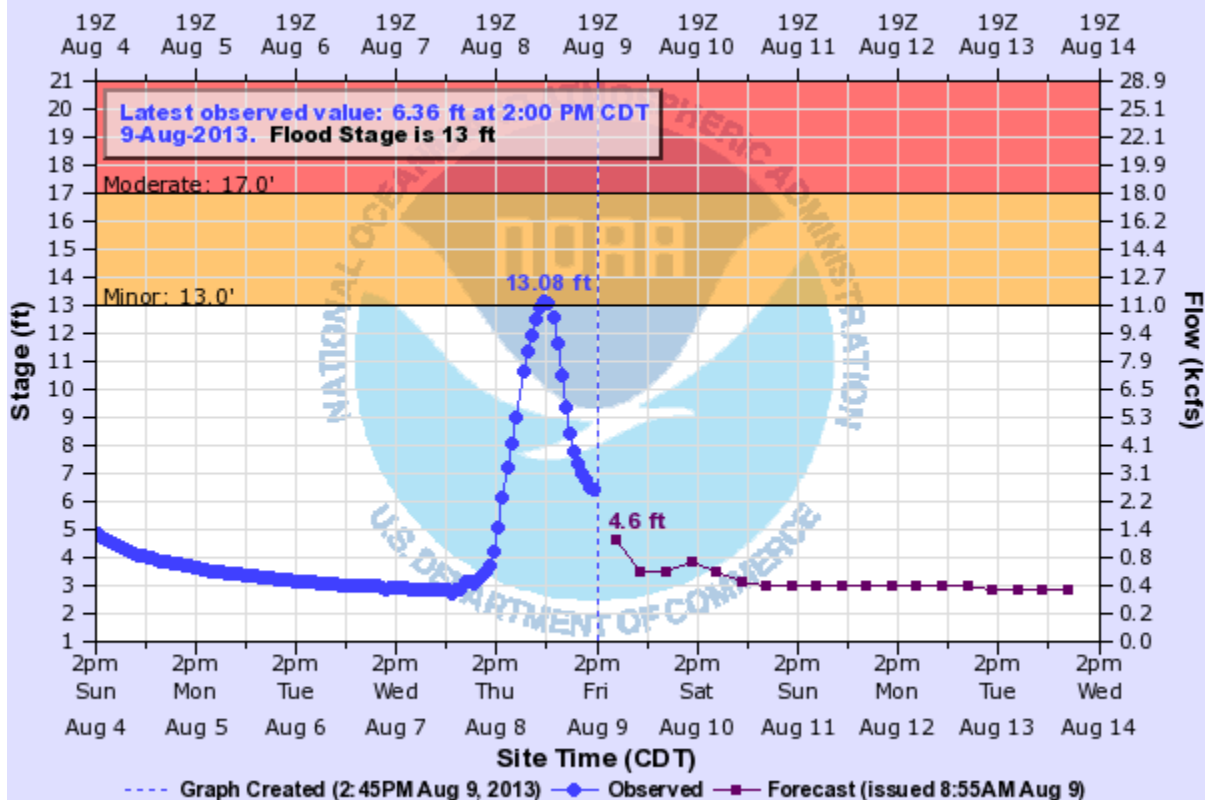


LEPO2(plotting HGIRG) "Gage 0" Datum: 644.9'

Observations courtesy of US Geological Survey

## ILLINOIS RIVER NEAR WATTS

Universal Time (UTC)

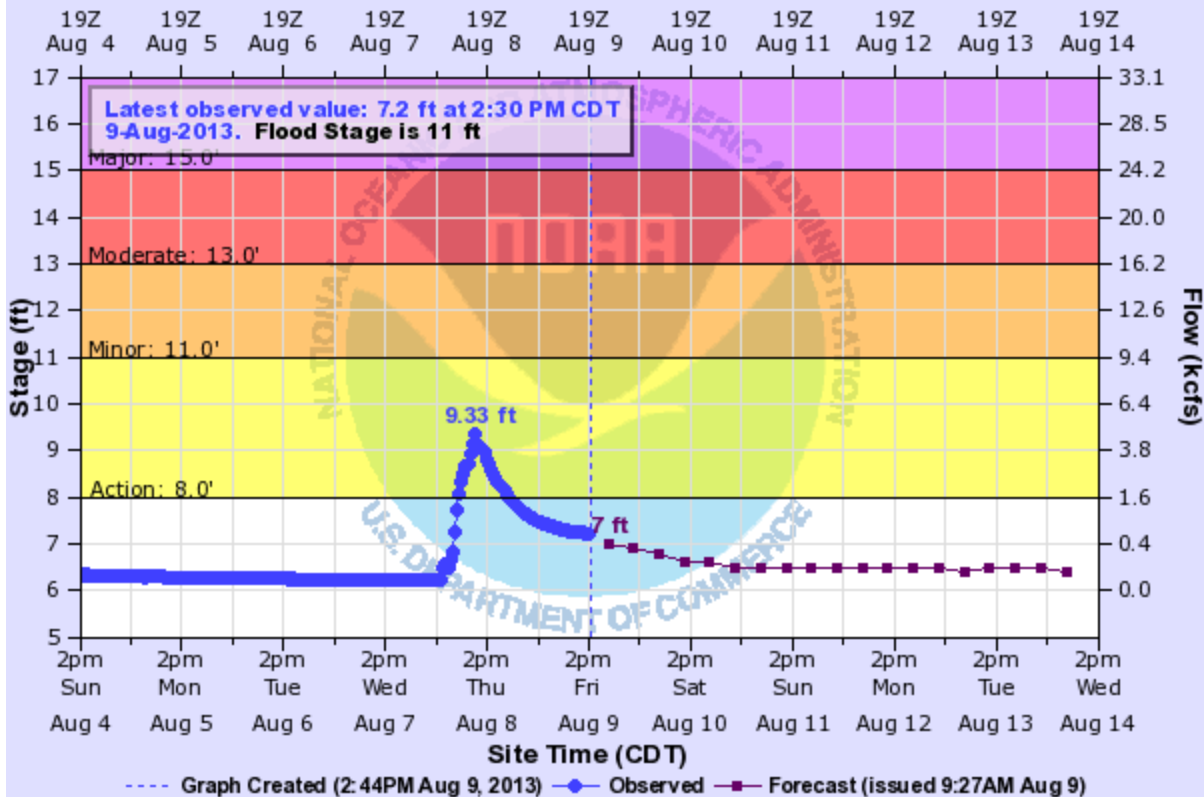


WTTO2(plotting HGIRG) "Gage 0" Datum: 893.77'

Observations courtesy of US Geological Survey

### FLINT CREEK NEAR KANSAS

Universal Time (UTC)

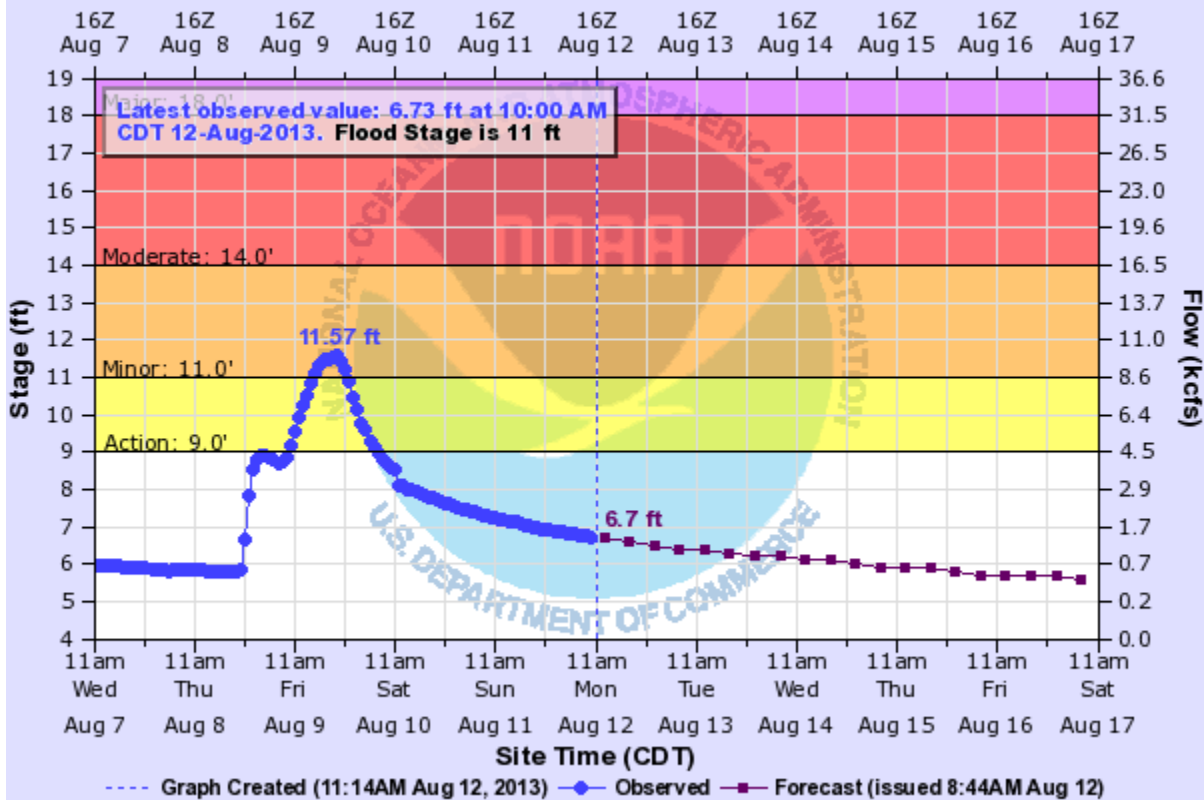


KNSO2(plotting HGIRG) "Gage 0" Datum: 854.59'

Observations courtesy of US Geological Survey

### ILLINOIS RIVER NEAR TAHLEQUAH

Universal Time (UTC)



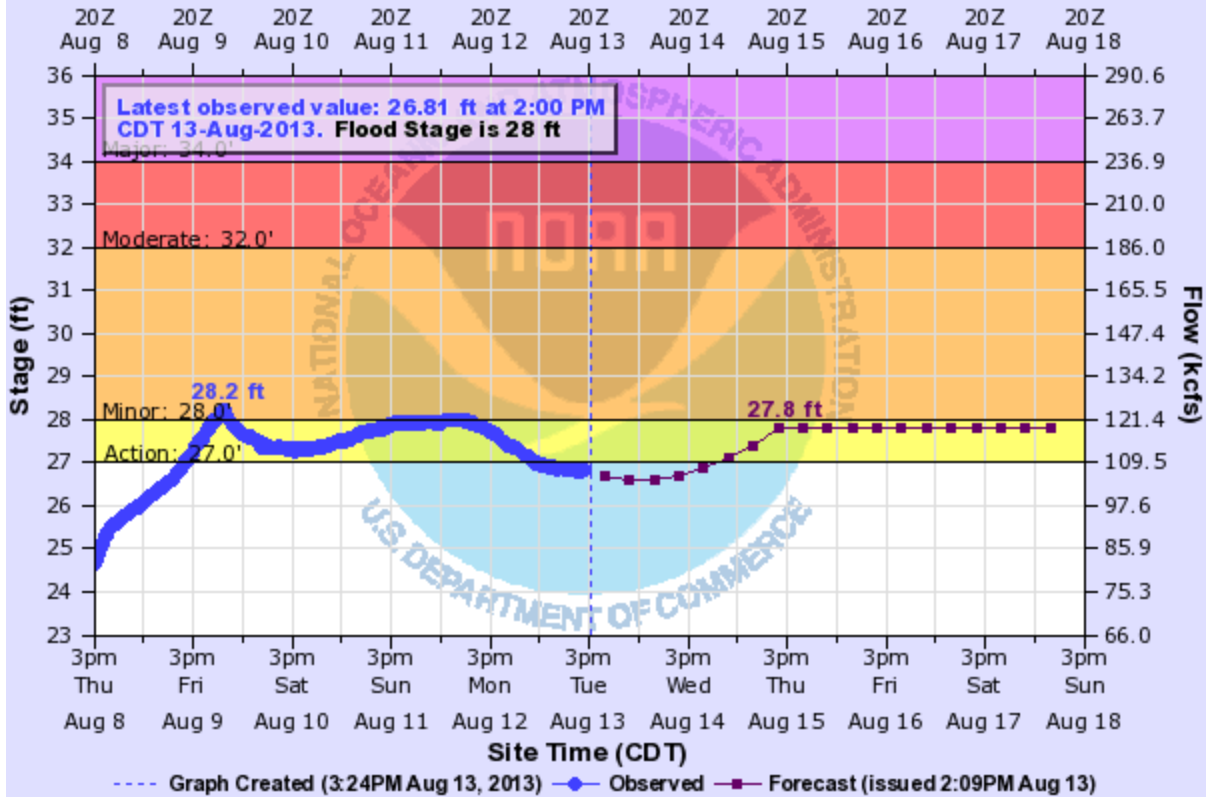
TALO2(plotting HGIRG) "Gage 0" Datum: 664.14'

Observations courtesy of US Geological Survey



## ARKANSAS RIVER NEAR MUSKOGEE

Universal Time (UTC)



MKGO2(plotting HGIRG) "Gage 0" Datum: 471.38'

Observations courtesy of US Geological Survey

## ARKANSAS RIVER NEAR MUSKOGEE

Universal Time (UTC)

