

**MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS**

REPORT FOR:  
 MONTH **May** 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  
**June 10, 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.

May 2013 was a tumultuous month across eastern OK and northwest AR, with snow, tornadoes, flooding, and drought. 13 forecast points went into minor or moderate flood due to rainfall this month, with the Neosho River and Kiamichi River both flooding twice. Normal precipitation ranges from 4.4 inches in Washington (OK) County to 6.4 inches in Le Flore County. The Ozark region of northwest Arkansas averages 5.1 inches for the month.

**Monthly Summary**

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 1a), rainfall totals for May 2013 ranged from 3" to 17", with a large portion of the HSA receiving 5"-10". This resulted in much of the region having 100% to over 200% percent of the normal May rainfall (Fig. 1b). However, far southeast OK and portions of northeast OK southeast of I-44 and north of I-40 only had 50% to 90% of the normal May rainfall.

Tulsa, OK (TSA): May, 2013 Monthly Observed Precipitation  
 Valid at 6/1/2013 1200 UTC- Created 6/3/13 13:48 UTC

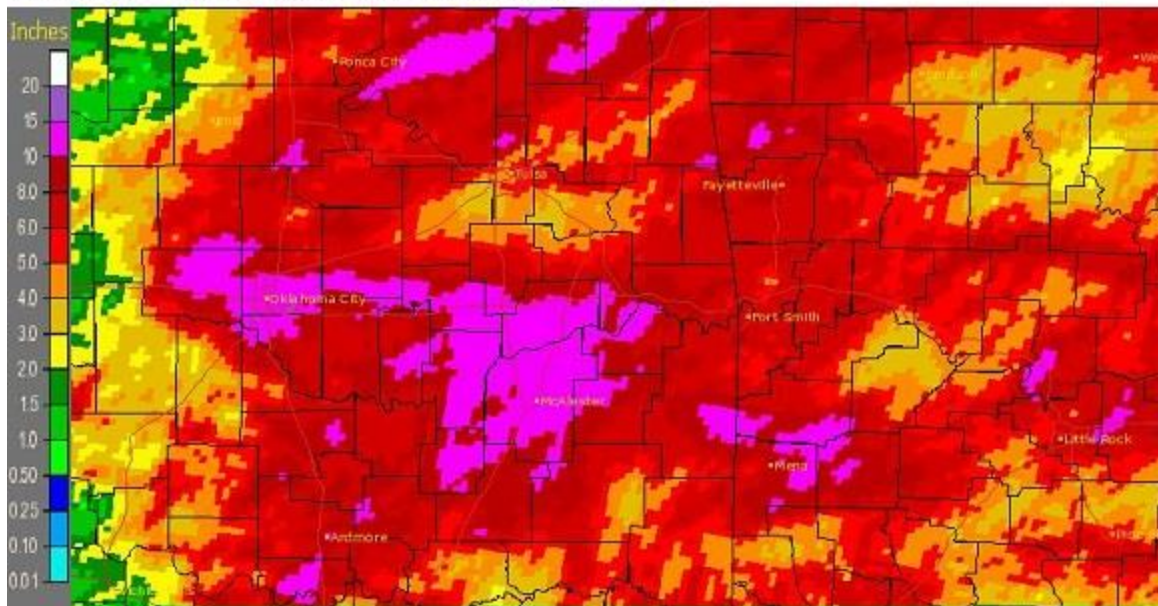


Fig. 1a. Estimated Observed Rainfall for May 2013

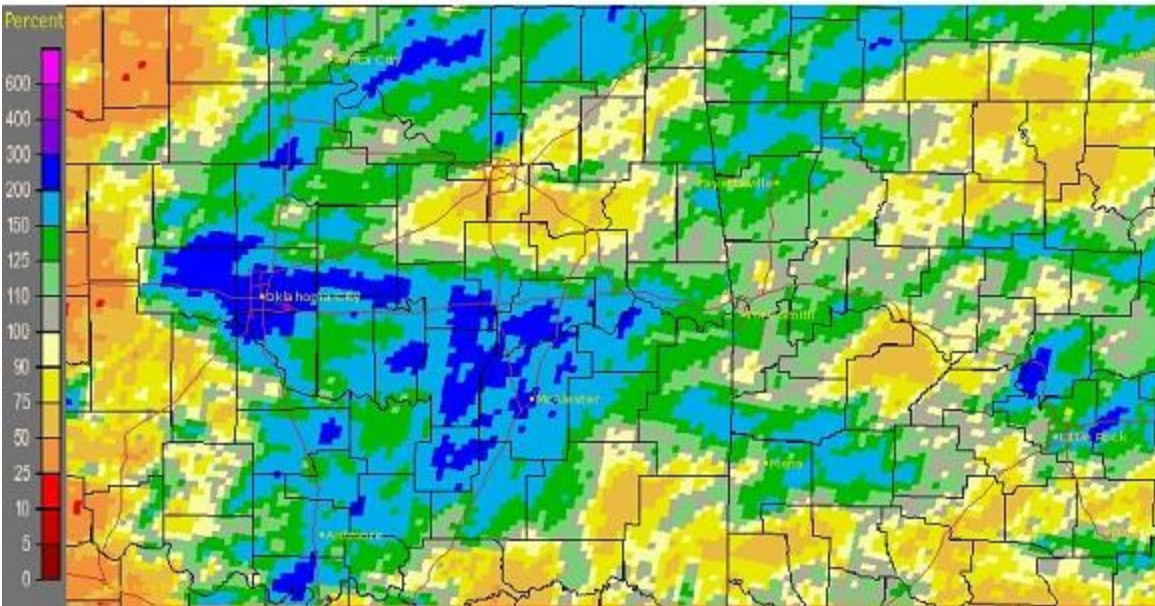


Fig. 1b. Estimated % of Normal Rainfall for May 2013

In Tulsa, OK, May 2013 ranked as the 23<sup>rd</sup> coldest May (66.8°F; since records began in 1905), the 57<sup>th</sup> driest May (4.71"; since records began in 1888), and the record snowiest May (T; since records began in 1900). Fort Smith, AR was the 51<sup>st</sup> coldest May (69.0°F, tied 1890, 1948; since records began in 1883) and the 52<sup>nd</sup> wettest May (5.40"; since records began in 1883). Fayetteville, AR was the 13<sup>th</sup> coldest (63.6°F, tied 1969), the 11<sup>th</sup> wettest (8.24"), and the record snowiest (0.5") May since records began in 1950. May 2013 was the first time snow has fallen in May at Tulsa and Fayetteville (and the entire state of Arkansas) since record keeping began.

In Tulsa, OK, Spring 2013 (March-April-May) ranked as the 4<sup>th</sup> coldest Spring (56.9°F; since records began in 1905) and the 33<sup>rd</sup> driest Spring (9.16"; since records began in 1888). Fort Smith, AR was the 32<sup>nd</sup> coldest Spring (59.9°F; since records began in 1883) and the 56<sup>th</sup> wettest Spring (12.55"; since records began in 1883). Fayetteville, AR was the 4<sup>th</sup> coldest (54.3°F) and the 11<sup>th</sup> wettest (18.25") Spring since records began in 1950. For the cold season (September-May), Tulsa ranked as the 86<sup>th</sup> snowiest (3.7", since records began in 1900), Fort Smith was the 31<sup>st</sup> snowiest (8.0", since records began in 1884), and Fayetteville ranked as the 46<sup>th</sup> snowiest (3.1", since records began in 1950).

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

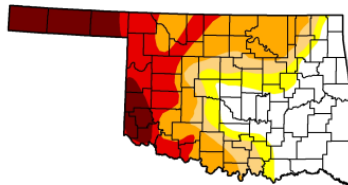
Springdale 5.8ENE, AR (coco)	17.13	Westville 0.2ENE, OK (coco)	10.08	NW AR Reg. Arpt (ASOS)	10.00
McAlester, OK (ASOS)	9.54	Burbank, OK (meso)	9.53	McAlester, OK (meso)	9.42
Foraker, OK (meso)	9.42	Sperry 6.7 WNW, OK (coco)	9.05	Copan, OK (meso)	8.94

## U.S. Drought Monitor

May 28, 2013  
Valid 7 a.m. EST

Oklahoma

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	31.88	68.12	58.80	48.33	26.51	11.34
Last Week (05/21/2013 map)	25.21	74.79	61.60	50.91	26.73	10.60
3 Months Ago (02/26/2013 map)	0.00	100.00	100.00	100.00	61.65	11.80
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 (05/22/2012 map)	31.44	68.56	13.99	9.34	3.54	0.00



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

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

<http://droughtmonitor.unl.edu>



Released Thursday, May 30, 2013  
Brad Rippey, U.S. Department of Agriculture

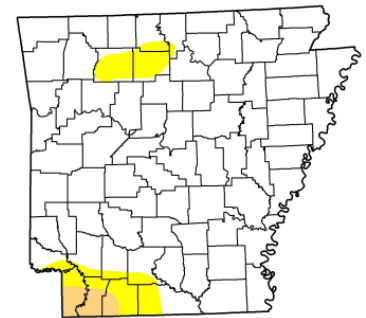
Fig. 2. Drought Monitor for Oklahoma

## U.S. Drought Monitor

May 28, 2013  
Valid 7 a.m. EST

Arkansas

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	91.68	8.32	1.89	0.00	0.00	0.00
Last Week (05/21/2013 map)	74.76	25.24	2.83	0.00	0.00	0.00
3 Months Ago (02/26/2013 map)	50.22	49.78	31.54	16.23	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 (05/22/2012 map)	5.59	94.41	11.63	0.02	0.00	0.00



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

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

<http://droughtmonitor.unl.edu>



Released Thursday, May 30, 2013  
Brad Rippey, U.S. Department of Agriculture

Fig. 3. Drought Monitor for Arkansas

According to the [U.S. Drought Monitor](#) (USDM) from May 28, 2013 (Figs 2, 3), only a small portion of eastern OK remained in Moderate to Severe drought. This Drought Monitor, however, does not include the heavy rain that fell over the drought areas during the last few days of May 2013. As of May 28, severe (D2) drought was present across eastern Kay, Osage, Pawnee, Washington, and Nowata Counties in eastern OK. Moderate (D1) conditions existed over sections of far western Craig, southeast Nowata, Rogers, Tulsa, and northern Creek Counties in eastern OK. Abnormally dry conditions continued in portions of Craig, Rogers, Tulsa, southern Creek, Okmulgee, and northern Okfuskee Counties in eastern.

After months of well-below normal lake levels, all but 1 of the major reservoirs in the Tulsa HSA were operating within their flood control pools as of June 3, 2013, due to the heavy rain at the end of the month. The only lake within its conservation pool was Skiatook Lake at 78%. The following lakes were ≥105% of their pools: Wister Lake 168%, Eufaula Lake 143%, Oologah Lake 141%, Hudson Lake 141%, Beaver Lake 139%, Ft. Gibson Lake 131%, Copan Lake 131%, Sardis Lake 127%, Pensacola Lake 125%, Hulah Lake 121%, Keystone Lake 116%, Hugo Lake 112%, Tenkiller Lake 109%, Kaw Lake 105%.

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

Rank since 1921	Last 30 Days (May 2 – May 31)	Last 60 Days (Apr 2 – May 31)	Spring 2013 (Mar 1 – May 31)	Year-to-Date 2013 (Jan 1 – May 31)	Water Year-to-Date (Oct 1 – May 31)	Last 180 Days (Dec 3 – May 31)	Last 365 Days (June 1, 2012 – May 31, 2013)
Northeast OK	16 <sup>th</sup> wettest	11 <sup>th</sup> wettest	24 <sup>th</sup> wettest	16 <sup>th</sup> wettest	41 <sup>st</sup> driest	25 <sup>th</sup> wettest	20 <sup>th</sup> driest
East Central OK	29 <sup>th</sup> wettest	20 <sup>th</sup> wettest	25 <sup>th</sup> wettest	22 <sup>nd</sup> wettest	35 <sup>th</sup> driest	28 <sup>th</sup> wettest	24 <sup>th</sup> driest
Southeast OK	33 <sup>rd</sup> wettest	34 <sup>th</sup> wettest	37 <sup>th</sup> wettest	36 <sup>th</sup> wettest	24 <sup>th</sup> driest	39 <sup>th</sup> wettest	14 <sup>th</sup> driest
Statewide	39 <sup>th</sup> wettest	33 <sup>rd</sup> wettest	45 <sup>th</sup> wettest	31 <sup>st</sup> wettest	22 <sup>nd</sup> driest	38 <sup>th</sup> wettest	10 <sup>th</sup> driest

## **Outlooks**

The [Climate Prediction Center](#) (CPC) outlook for June 2013 (issued May 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, as well as climate forcing mechanisms such as soil conditions and decadal-timescale climate trends.

For the 3-month period Jun-Jul-Aug 2013, CPC is forecasting an enhanced chance for above normal temperatures and an equal chance for above, near, and below median precipitation across all of eastern OK and northwest AR (outlook issued May 16, 2013). According to CPC, ENSO neutral conditions remained through May. ENSO neutral conditions are expected to continue through Summer 2013, followed by uncertain conditions in the ENSO state from late 2013 and beyond. Therefore, this outlook is primarily based on recent trends and dynamic computer model output, with some input from statistical forecast tools and long-term trends.

## **Summary of Precipitation Events**

### **May 1-16**

A few isolated thunderstorms developed in the higher terrain of Madison and Carroll Counties during the afternoon of May 1 under the influence of a low near the Gulf Coast. In the evening, isolated showers and thunderstorms affected western Osage, Pawnee, far western Creek, and far western Okfuskee Counties ahead of a strong cold front. These storms produced isolated rainfall totals of 0.25" to near 1.5" in the affected areas.

Strong upper-level highs over the Pacific Northwest and the northwest Atlantic funneled cold Canadian air southward into the Southern Plains on May 2, 2013. The cold front associated with this cold air moved through eastern OK and northwest AR on May 2, with precipitation occurring along and behind the front.



The unusually cold temperatures for May allowed for sleet and snow to mix in with the rain across northeast OK during the afternoon and evening hours of the 2<sup>nd</sup>. **Snowflakes were first observed at the NWS Tulsa office at 1:40pm CDT, making May 2, 2013 the latest observed snow in Tulsa since records began in 1900.** The previous latest observed snow in Tulsa was on April 18, 1953. This also marks the first time snow has fallen in Tulsa in the month of May. As the precipitation continued to move east overnight, heavier snow developed over far northeast OK, the higher elevations of southeast OK, and northwest AR, where snowfall totals of 1" to 2" were common by the morning of the 3<sup>rd</sup> (Fig. 4). The highest totals of 3"-5" occurred in Adair County, OK and Benton County, AR. **This is the first time snow has fallen in the state of Arkansas during the month of May.** Ironically, this latest snow on record follows the [hottest year \(2012\) on record](#) across eastern Oklahoma and northwest Arkansas, and high temperatures had been in the 80s across eastern OK and northwest AR on April 29, April 30, and May 1. Rainfall/snow liquid equivalent totals ranged from around 0.10" to around 1" across all but far southeast OK (Fig. 6).

Additional snow occurred primarily over northwest Arkansas during the early morning hours of the 4<sup>th</sup> as precipitation wrapped around the upper-level low that was still near the AR-MO state line. Overall, the snowfall on the 4<sup>th</sup> was much lighter than the previous night, though the higher elevations did receive near 2" of additional snow (Fig. 5). May 4, 2013 will go down in the record books as the latest snowfall in AR. More information about this event, including record latest snowfall information and pictures of the snow can be found at [http://www.srh.noaa.gov/tsa/?n=weather-event\\_2013may2](http://www.srh.noaa.gov/tsa/?n=weather-event_2013may2) Rainfall/snow liquid equivalent totals were generally around 0.10" to around 0.50" from the wrap-around precipitation.

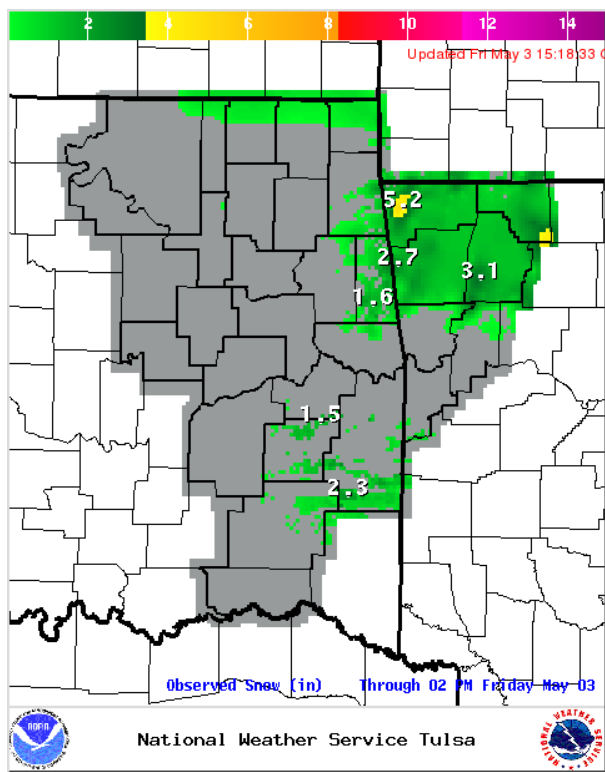


Fig. 4. Snowfall totals for May 2-3, 2013.

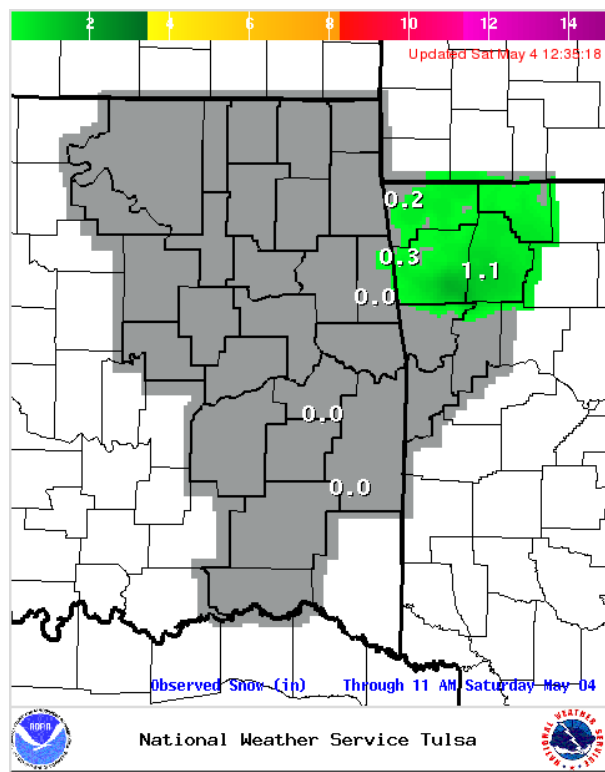


Fig. 5. Snowfall totals for May 3-4, 2013.

Tulsa, OK (TSA): 5/3/2013 1-Day Observed Precipitation  
 Valid at 5/3/2013 1200 UTC- Created 5/9/13 7:42 UTC

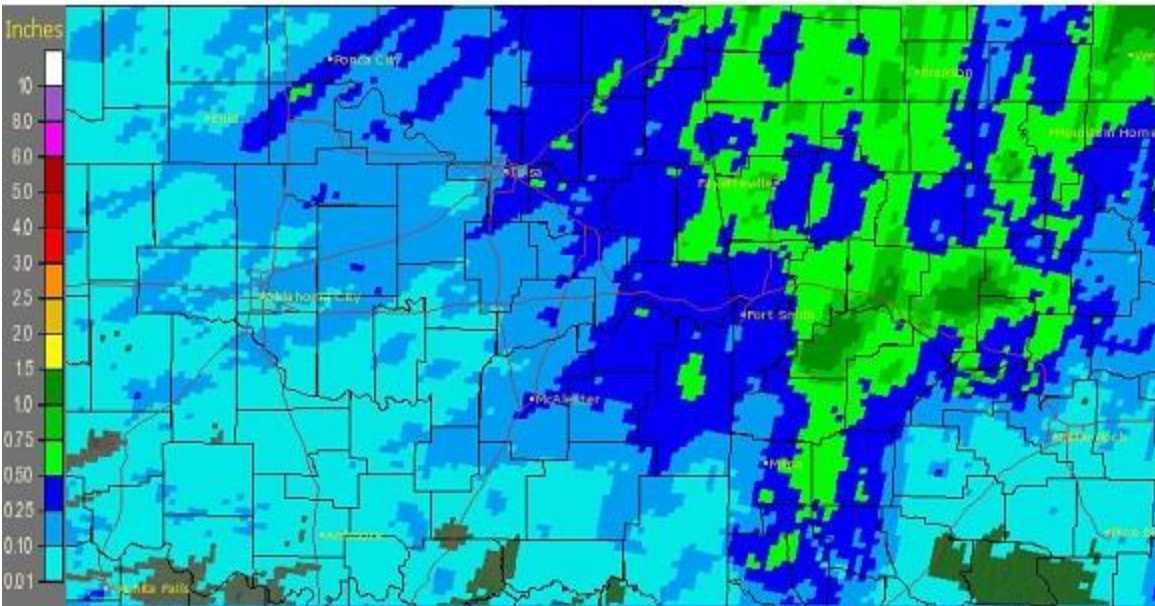
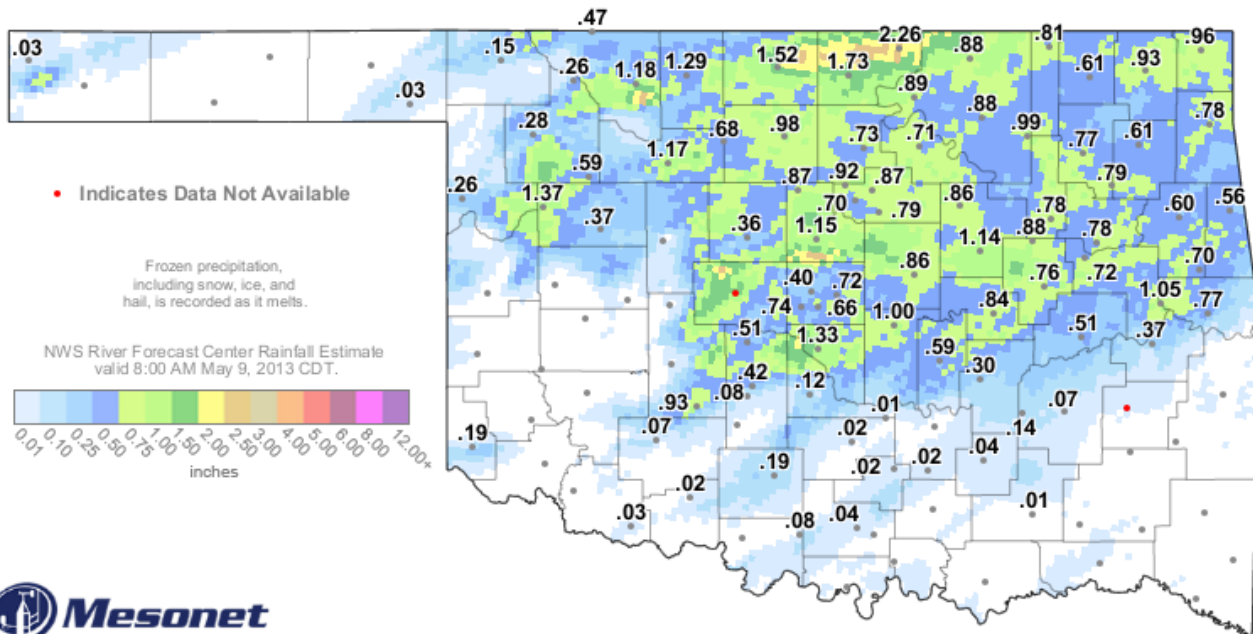


Fig. 6. 24-hr Estimated Observed Rainfall ending at 7am CDT 5/03/2013.

Aided by a strong low-level nocturnal jet, showers and thunderstorms developed over northeast OK on the morning of the 8<sup>th</sup>. Later in the day, thunderstorms initiated along the dryline in western OK. These storms progressed east into a more stable environment, causing them to diminish as they moved across east central OK during the late evening hours. A mesoscale convective system (MCS) then moved out of western KS and swept eastward through northeast OK and northwest AR during the early- to mid-morning hours of the 9<sup>th</sup>, bringing widespread rainfall. Rainfall totals for the three rounds of precipitation ranged from 0.50" to 1" north of I-40 (Figs. 7, 8). The highest totals occurred in northern Kay County, where over 2" of rain fell. The OK Mesonet station in Newkirk measured 2.26" (Fig. 7).



**24-Hour Rainfall (inches)**

Fig. 7. 24-hour rainfall totals ending at 9:15 am CDT 5/09/2013.

9:15 AM May 9, 2013 CDT  
 Created 9:19:10 AM May 9, 2013 CDT. © Copyright 2013

Tulsa, OK (TSA): 5/9/2013 1-Day Observed Precipitation  
 Valid at 5/9/2013 1200 UTC- Created 5/9/13 17:56 UTC



Fig. 8. 24-hr Estimated Observed Rainfall ending at 7am CDT 5/09/2013.

On the 9<sup>th</sup>, afternoon thunderstorms developed near the Red River along an outflow boundary from the morning’s MCS. Additional convection developed during the evening hours over northwest AR and the adjacent OK counties. This activity was largely focused along a diffuse frontal zone and within a weakly sheared environment. This promoted back-building of storms within a southwesterly flow that paralleled the boundary. Rainfall persisted in this area from about 5pm CDT 5/09/2013 until 5am CDT 5/10/2013, with periods of very heavy rainfall during this time. The result was 3” to 6” of rain across most of Benton County, leading to widespread flash flooding (Fig. 9-11). Numerous roads were closed, with reports of roads being several feet under water. The asphalt was even washed off of S. Opal Rd. in Benton County (see Figs. 12). Hydrographs from the smaller creeks and streams in the area show how they rose several feet in a very short period of time (Figs. 13-15). The Westville, OK mesonet station measured almost 0.50” in 15 minutes and a CoCoRaHS observer 5.8 miles ENE Springdale, AR measured 2” in 1.5 hours. This rainfall occurred in the headwaters of the Illinois River, causing downstream moderate flooding at the NWS river forecast points near Watts and near Tahlequah (preliminary hydrographs available at the end of this report; see E3 reports for further detail).

24-hr rainfall totals >3” ending 7 am CDT 5/10/2013:

Springdale 5.8 ENE, AR	5.85	Bentonville 2.8 SSW, AR	5.70	Northwest AR Rgnl Arpt	5.27
Rogers 3.8 SW, AR	4.30	Rogers 2 SSW, AR	3.97	Bella Vista 1 ESE, AR	3.83
West Siloam Springs, OK	3.79	Kansas 6 ESE, OK	3.67	Rogers 2.1 SE, AR	3.37
Little Flock 2 NNE, AR	3.28	Bella Vista 2 E, AR	3.27	Bella Vista 1.7 N, AR	3.19
Pea Ridge, AR	3.07	Decatur 2.6 ESE, AR	3.04		





Figs. 12. Asphalt removed off of S. Opal Road in Benton Co. by high water. Photo courtesy of Benton Co. EM Robert McGowen. 5/10/2013

**CoCoRaHS** COMMUNITY COLLABORATIVE RAIN, HAIL & SNOW NETWORK  
*"Because every drop counts"*

Home | States | View Data | Maps      My Account | Admin | Logout

Maps : Daily Precipitation

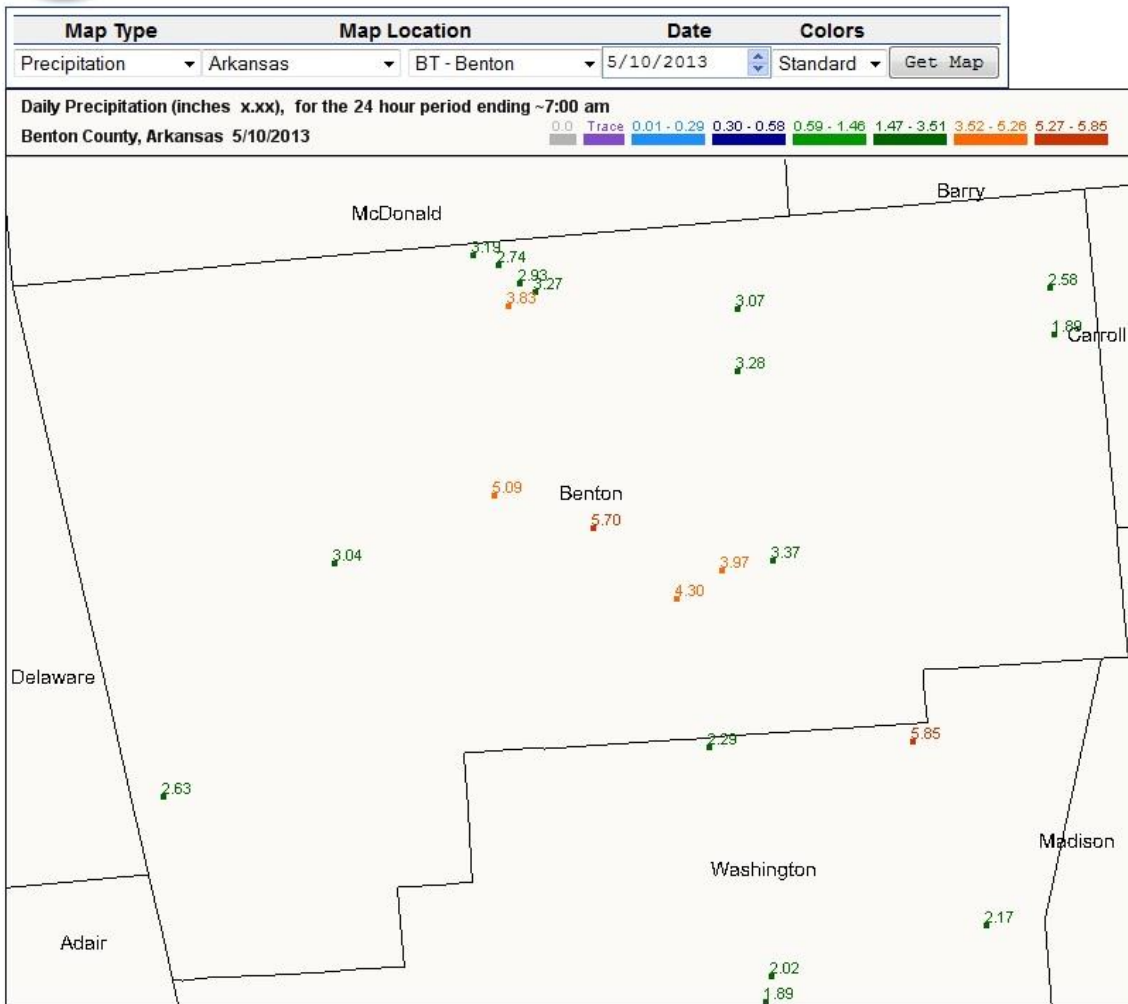


Fig. 9. 24-hr measured rainfall from CoCoRaHS volunteer observers ending ~7am CDT 5/10/2013.

Tulsa, OK (TSA): 5/10/2013 1-Day Observed Precipitation  
 Valid at 5/10/2013 1200 UTC- Created 5/12/13 21:32 UTC

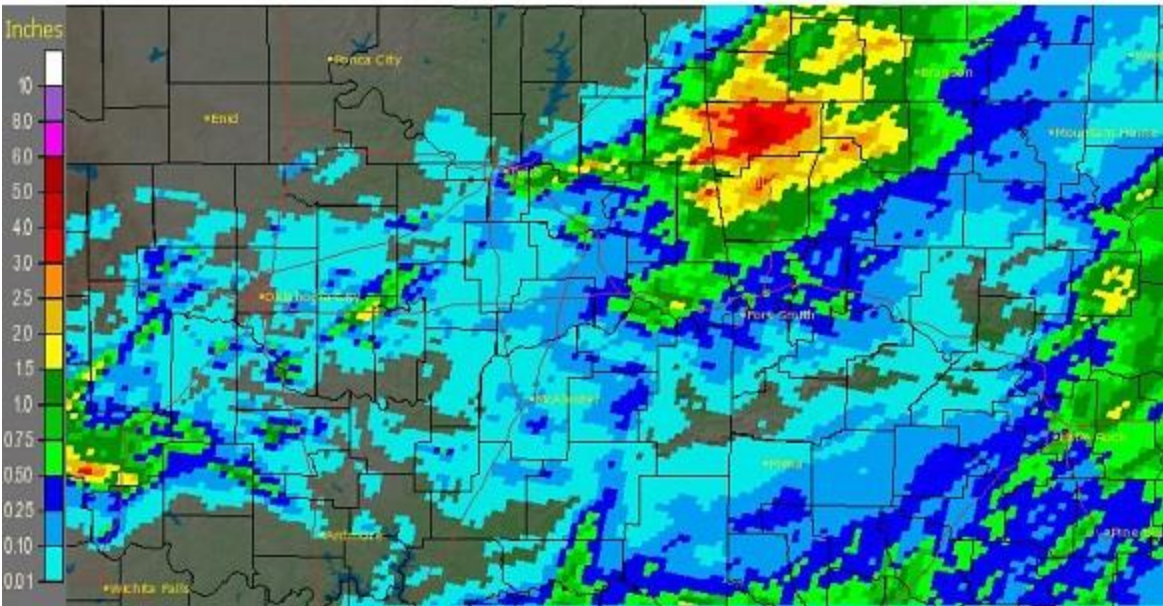


Fig. 10. 24-hr Estimated Observed Rainfall ending at 7am CDT 5/10/2013.

### Surface Rainfall Reports

Reports include ASOS, Raws, DCP, Ok Mesonet, CocoRahs and Coop

Daily (24 hr ending at 6am) 
  Obs 
  Img 
  Monthly Totals

Year: 2013 Month: 05 Day: 10 
[Download :20130510.kmz](#)

Year: 2013 Month: 05

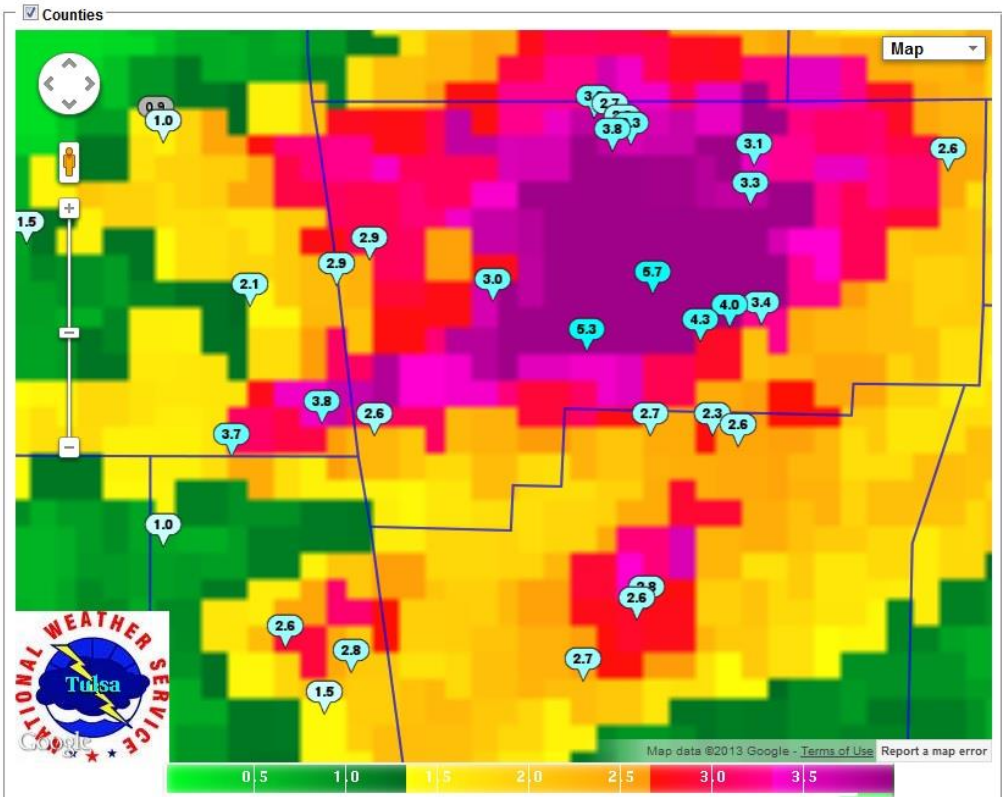


Fig. 11. 24-hr Estimated Observed Rainfall (image) and measurements (values) ending at 7am CDT 5/10/2013.



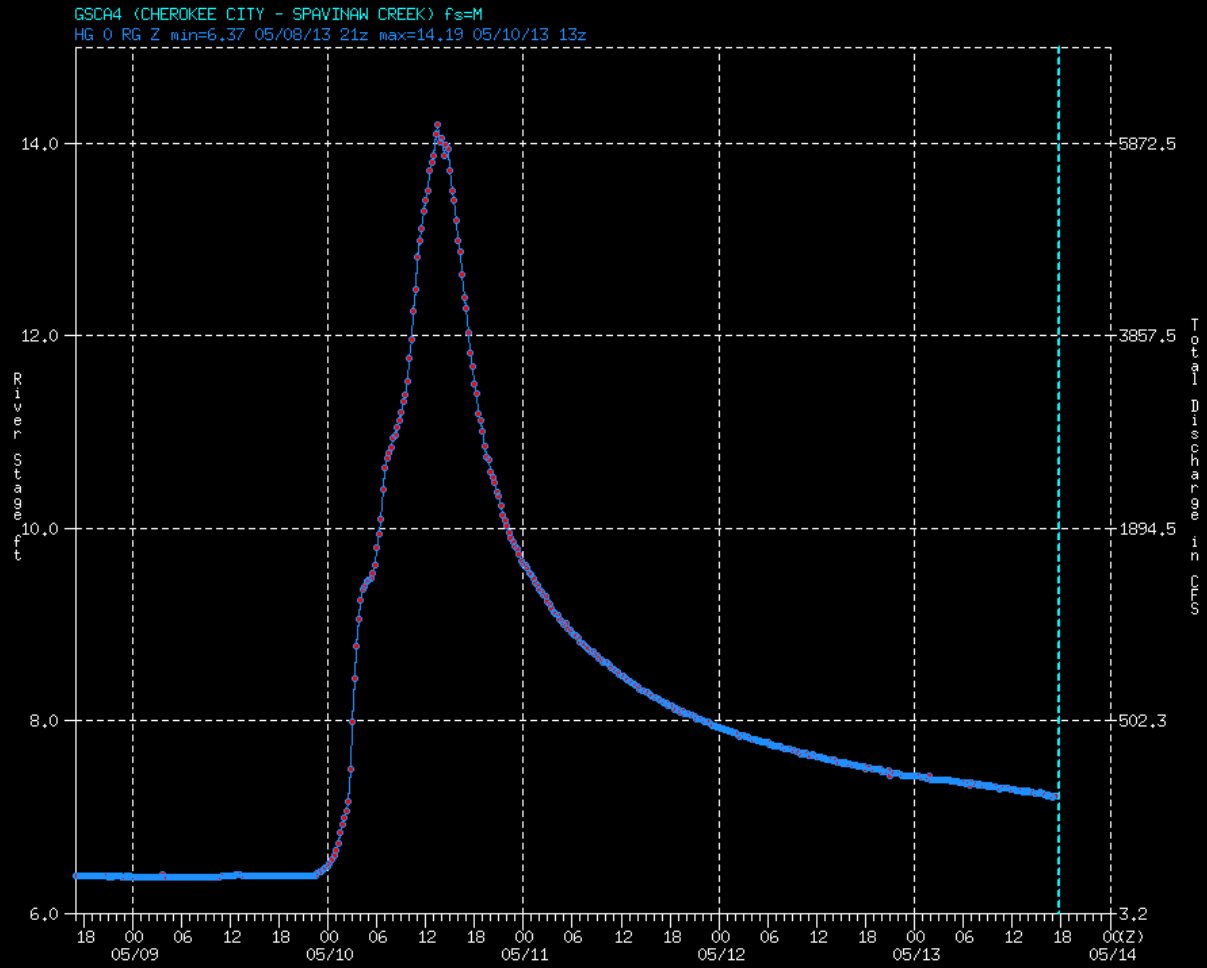


Fig. 13. Hydrograph for Spavinaw Creek near Cherokee City, AR May 9-10, 2013. (x-axis time in UTC)

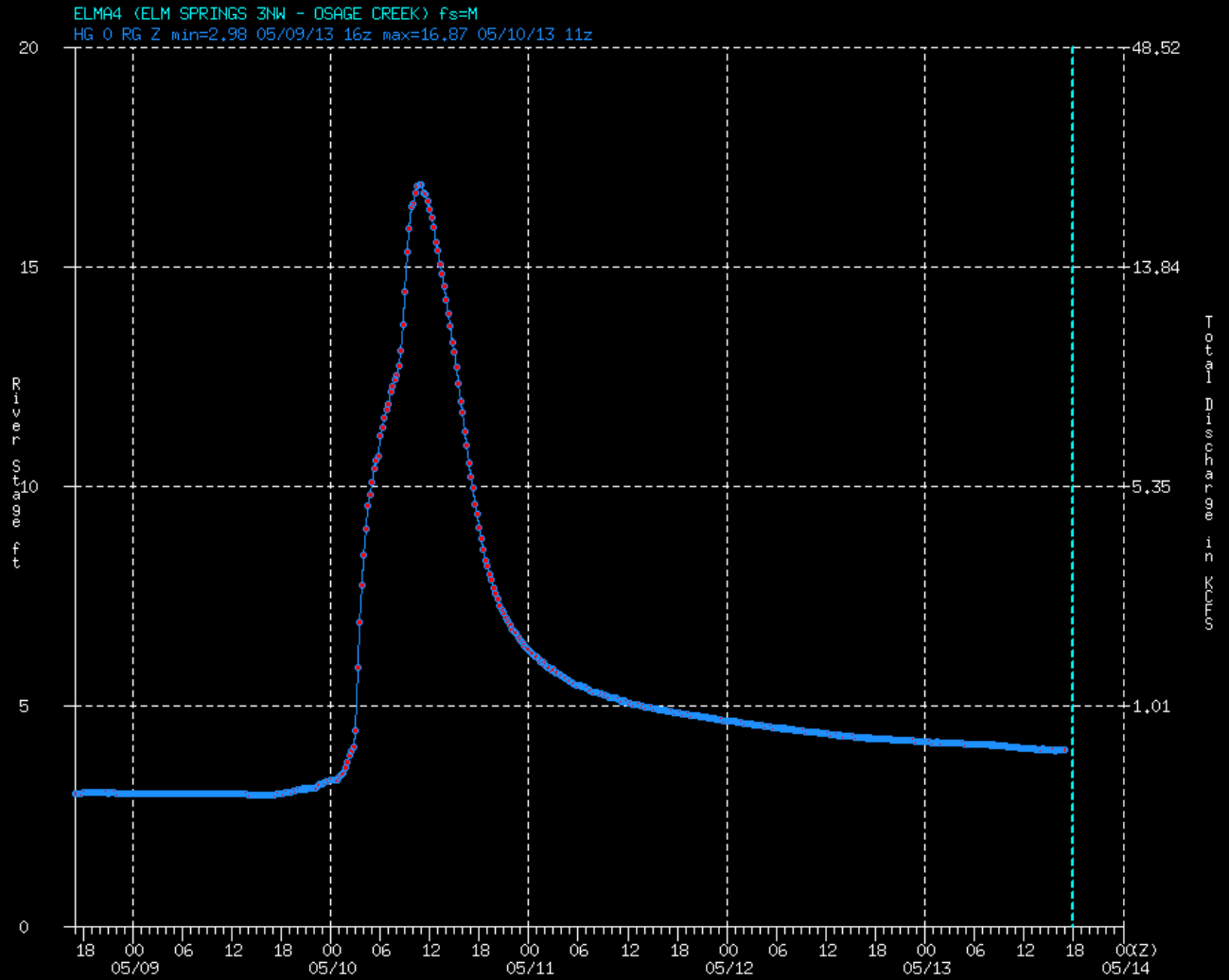


Fig. 14. Hydrograph for Osage Creek 3NW Elm Springs Springs, AR May 9-10, 2013. (x-axis time in UTC)



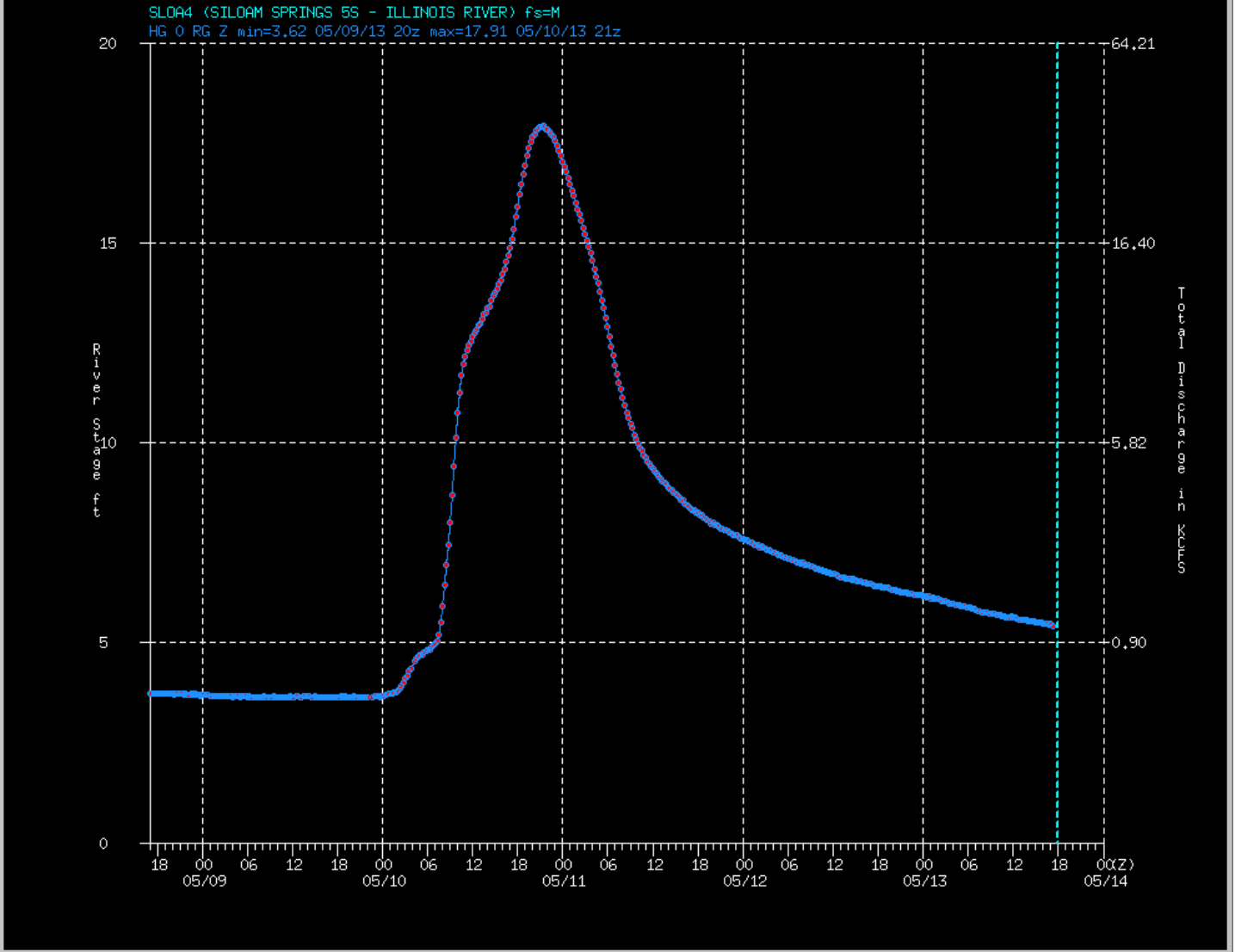


Fig. 15. Hydrograph for Illinois River 5S Siloam Springs, AR May 9-10, 2013. (x-axis time in UTC)

Showers and thunderstorms moved north out of TX on the 15<sup>th</sup> as a low pressure system moved across northern TX and into central OK. As the low slowly tracked northeastward, widespread rain fell during the day and through the overnight hours primarily south of I-44. Additional activity continued near the Red River on the 16<sup>th</sup> before the upper-low's influence left the area. Much of the region received 0.10"-near 1.5", with the highest totals of 2.5"-4" across Pittsburg, Latimer, Pushmataha, and Choctaw Counties in southeast OK (Fig. 16).

Tulsa, OK (TSA): 5/16/2013 1-Day Observed Precipitation  
Valid at 5/16/2013 1200 UTC- Created 5/18/13 21:33 UTC

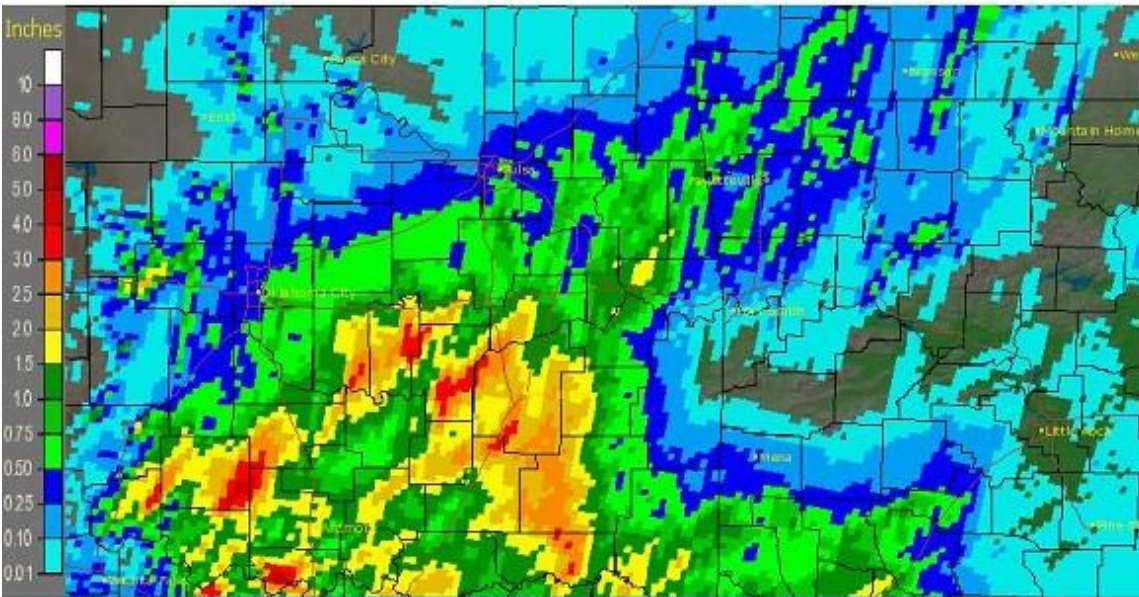


Fig. 16. 24-hr Estimated Observed Rainfall ending at 7am CDT 5/16/2013.

### **May 17-31**

Isolated convection developed over northeast OK on the 18<sup>th</sup> within a warm advection regime. Rainfall from this activity remained below 0.50". Stronger storms developed over central OK during the late afternoon and moved northeast into Osage County, where 0.25" to around 1.5" of much need rain occurred.

**May 19-21 Tornado Events:** Severe thunderstorms developed across central OK along a dry line during the late afternoon of the 19<sup>th</sup>. Very unstable air combined with very strong wind shear allowed these storms to evolve rapidly into supercells, which produced several damaging tornadoes in central OK before moving into eastern OK. Most of these supercell thunderstorms gradually weakened as they moved into the eastern portion of the state. The storm that produced damaging tornadoes around Shawnee also produced a strong tornado west and northwest of Prague and another north northeast of Prague that moved across northwestern Okfuskee County. The highest rainfall totals from the 19<sup>th</sup> occurred along the OK-KS state line, where totals ranged from 0.50" to around 3" (see Fig. 17). Central and northern Osage County received some much needed rainfall, as this area had seen an overall minimum in precipitation and is where the worst drought conditions in the HSA were occurring.

Tulsa, OK (TSA): 5/20/2013 1-Day Observed Precipitation  
Valid at 5/20/2013 1200 UTC- Created 5/21/13 17:38 UTC



Fig. 17. 24-hr Estimated Observed Rainfall ending at 7am CDT 5/20/2013.

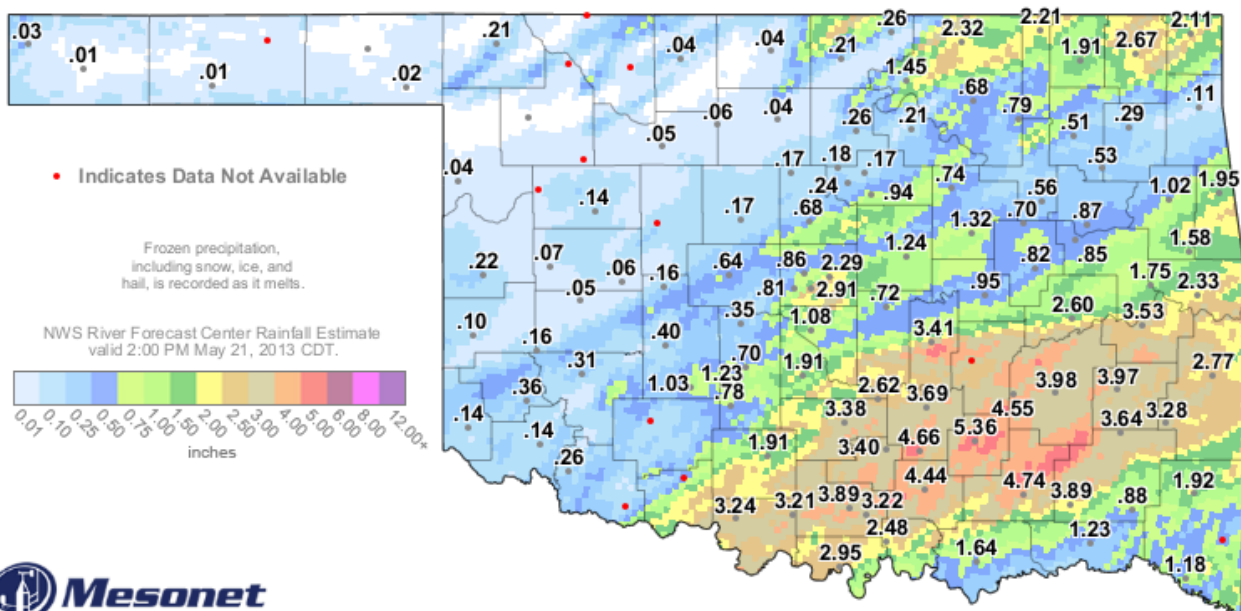


The same dangerous atmospheric conditions persisted on the 20<sup>th</sup>. By mid-afternoon, thunderstorms developed rapidly across central OK. Approximately 30-40 minutes after the storms formed, the strongest ones began producing tornadoes. A violent EF-5 tornado devastated the Oklahoma City suburb of Moore, OK (for the 3rd time in 14 years). Information on the Moore, OK tornado, as well as the other tornadoes in central OK can be found from the [NWS Norman office](#). As the storms progressed east, additional tornadoes developed in eastern OK during the late afternoon and early evening hours. An outflow boundary left over from the storms on the 19<sup>th</sup> was draped from far northwest AR, through Tulsa, to the Ponca City area. This boundary provided a local enhancement of storm relative helicity, one of the ingredients for tornadoes. As more storms developed, a line of severe thunderstorms moved eastward across eastern OK and into western AR. This line contained bowing segments that produced damaging straight-line winds and brief tornados, as well as embedded supercells. 13 tornadoes occurred within the Tulsa HSA, and more information about this event, including a map of tornado paths, can be found at [http://www.srh.noaa.gov/tsa/?n=weather-event\\_2013may19](http://www.srh.noaa.gov/tsa/?n=weather-event_2013may19). Enough rain fell over the Neosho River basin from May 19-20 to cause minor flooding near Commerce (see E-3 report for more detail; preliminary hydrograph is available at the end of this report).

During the early morning hours of the 21<sup>st</sup>, a convective line developed from southwest to east central OK near the cold front. The front slowly moved south and stalled briefly near the Red River during the day. Thunderstorms continued to develop along and north of the front as an upper-level wave moved through the region. The winds were nearly parallel to the front, leading to the training of storms. This in turn led to widespread 2"-4", and isolated totals of around 6", of rain in southeast OK, the same area that had received widespread 1"-3" the day before. The highest 24-hour rainfall total ending at 7am CDT 5/22/13 of 6.20" was measured 4 miles ENE of Daisy, OK, near the Atoka-Pushmataha-Pittsburg County lines. This station reported 1.60" the previous day, for a 2-day total of 7.80". The 2-day rainfall total across southeast OK and west central AR ended up being 2.5"- around 7.5" (see Figs. 18, 19). All of this rain led to widespread flash flooding, moderate flooding along the Kiamichi River near Antlers, and dangerous flows (though no flooding) along the Illinois River near Tahlequah (see E-3 report for more detail; preliminary hydrograph is available at the end of this report).

**24-hr rainfall totals >3" ending 7 am CDT 5/22/2013:**

Daisy 4 ENE, OK	6.20	Krebs 0.3WNW, OK	3.50	Antlers 5W, OK	3.49
Antlers 2NE, OK	3.23	McAlester Reg. Arpt., OK	3.12	Antlers 1W, OK	3.09
McAlester 4S, OK	3.05	Talihina 4SE, OK	3.00		



**2-Day Rainfall (inches)**

3:10 PM May 21, 2013 CDT

Created 3:15:03 PM May 21, 2013 CDT. © Copyright 2013

Fig. 18. 48-hr Measured and radar estimated observed rainfall ending at 3:10pm CDT 5/21/2013.

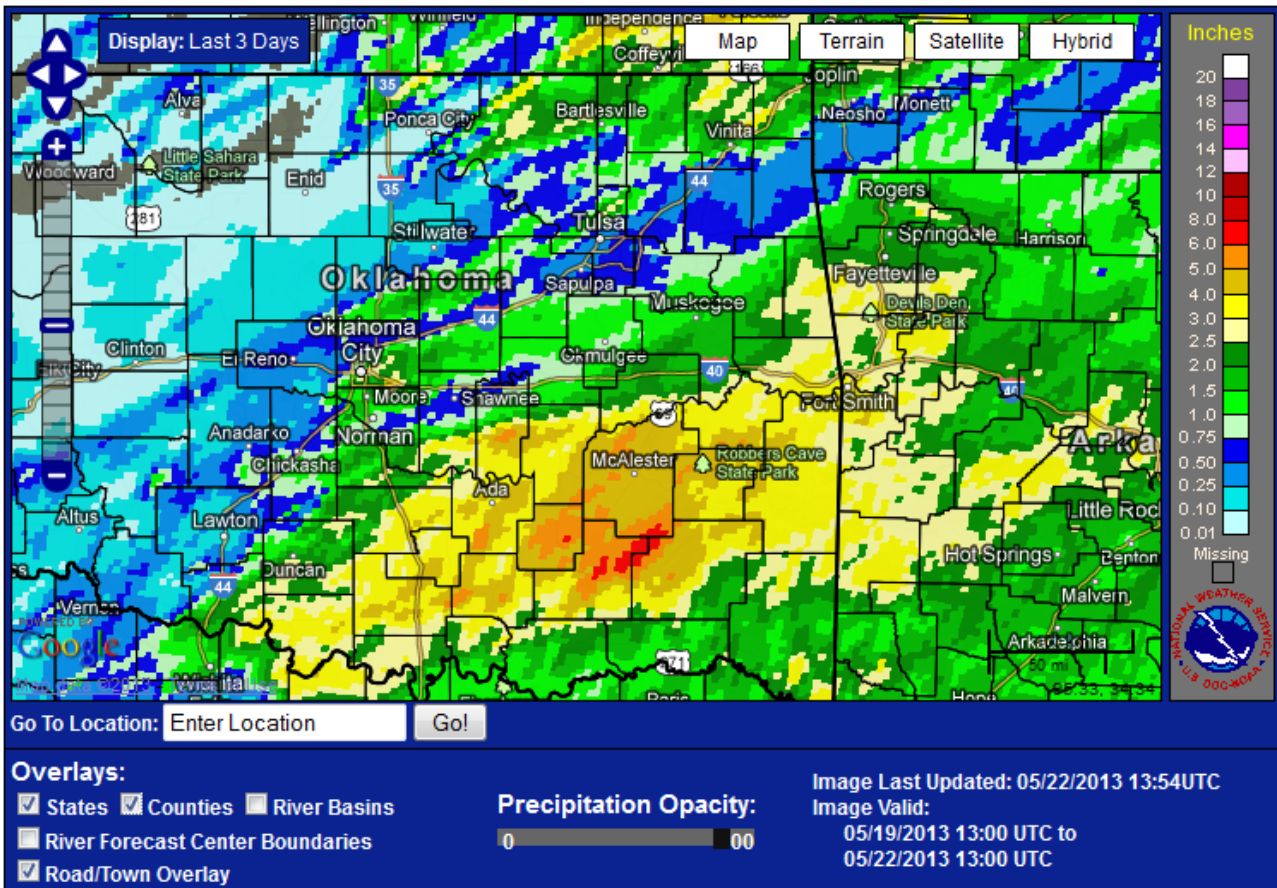


Fig. 19. 3-Day Estimated Observed Rainfall ending at 8am CDT 5/22/2013.

Showers and thunderstorms developed over central OK on the morning of the 23<sup>rd</sup> and slowly moved into portions of eastern OK. As the isentropic lift weakened, this activity diminished by late evening. Rainfall totals were generally around 0.25" or less in the affected area, though a few locations received around 0.50".

**May 29-June 1 Tornado/Flood Events:**

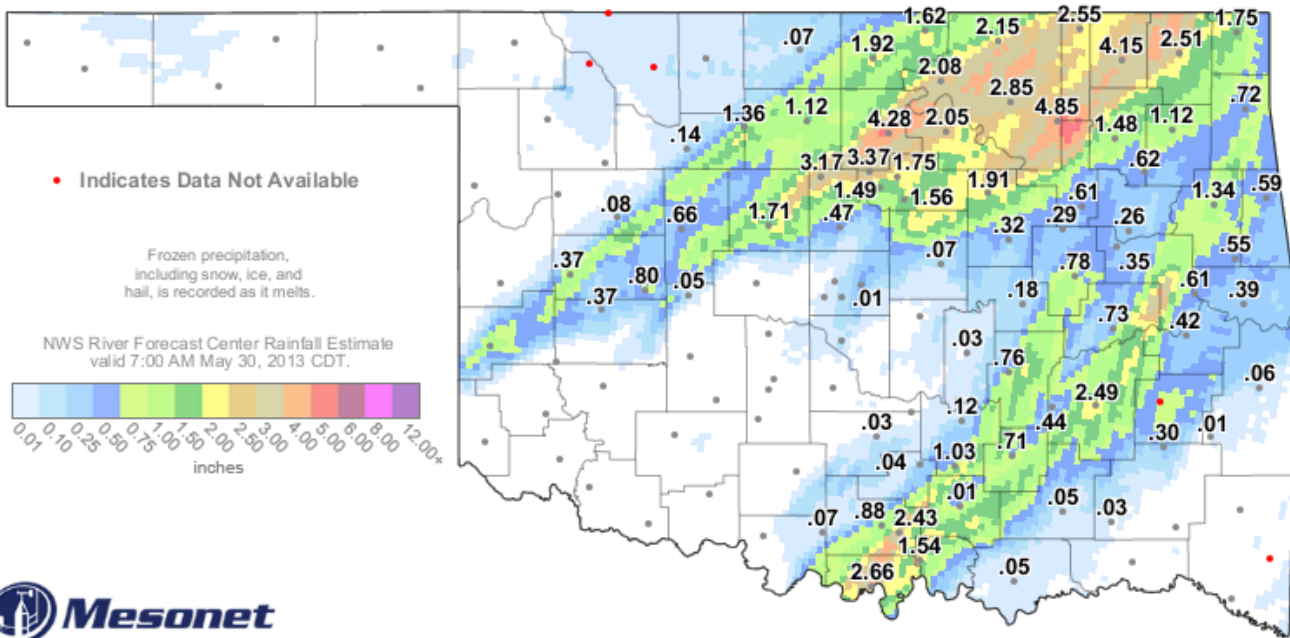
Three rounds of heavy rain, large hail, and tornadoes affected eastern OK and northwest AR from May 29 through the morning of June 1. Two rounds of thunderstorms affected the region from the 29<sup>th</sup> into the early hours of the 30<sup>th</sup>. The first round was a faster moving line of storms over much of eastern OK, followed by a second round of slower moving thunderstorms over northeast OK. A large portion of the HSA received over 0.50" of rain. However, much of northeast OK northwest of I-44 had 1.5"- 4" of rain (see Figs. 20-22). The highest totals of 4"-5" occurred in the Skiatook, OK area (northern Tulsa Co./southeast Osage Co./southern Washington Co.). This resulted in flooding along Bird Creek, the Caney River, the Verdigris River, and the Neosho River (see the E3 report for details; hydrographs available at the end of this report).



Tulsa, OK (TSA): 5/30/2013 1-Day Observed Precipitation  
 Valid at 5/30/2013 1200 UTC- Created 5/31/13 13:37 UTC



Fig. 20. 24-hr Estimated Observed Rainfall ending at 7am CDT 5/30/2013.



**12-Hour Rainfall (inches)**

8:30 AM May 30, 2013 CDT

Created 8:35:04 AM May 30, 2013 CDT. © Copyright 2013

Fig. 21. 12-hr Measured and radar estimated observed rainfall ending at 8:30am CDT 5/30/2013.

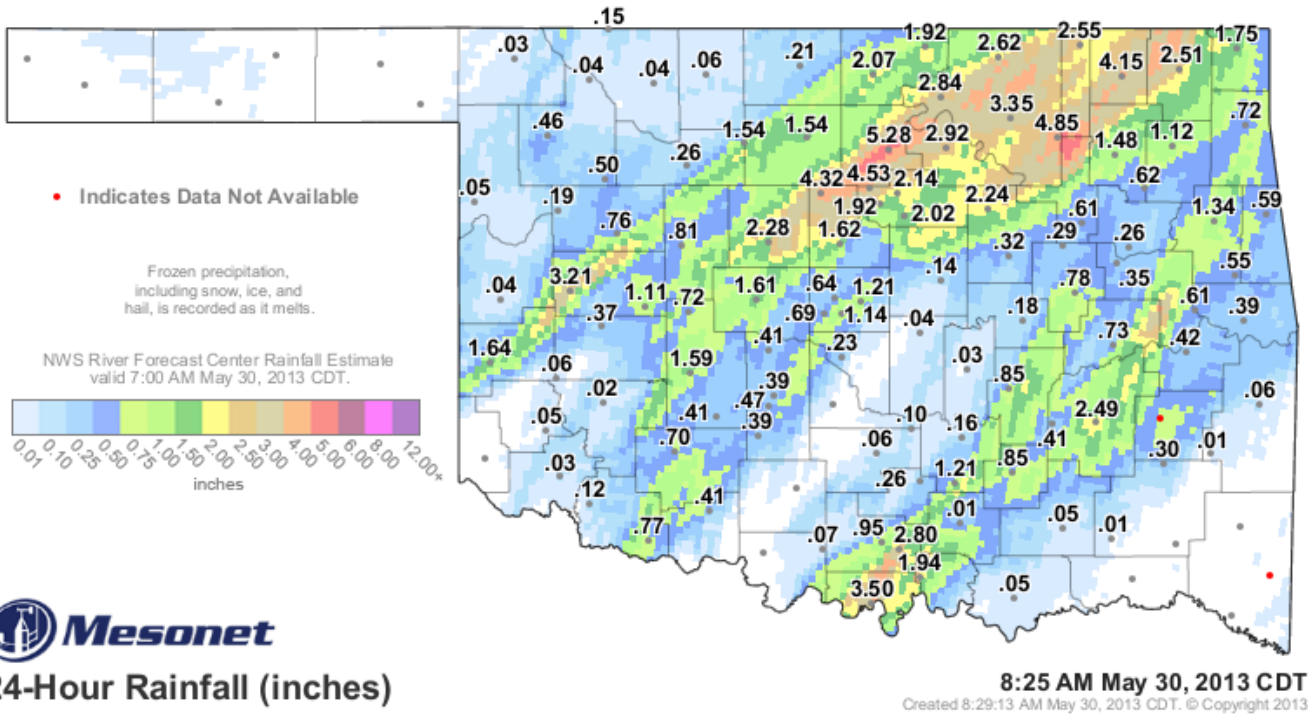


Fig. 22. 24-hr Measured and radar estimated observed rainfall ending at 8:25am CDT 5/30/2013.

Thunderstorms continued on the 30<sup>th</sup> across the area, with the strongest activity occurring during the afternoon and evening hours. Tornadoic supercells moved across northeast OK, producing 4 tornadoes, including one in the Tulsa suburb of Broken Arrow. Rainfall on the 30<sup>th</sup> was generally 0.75"-2" across northeast OK north of Hwy 412, as well as across northwest AR (see Figs. 23, 24). Additional rainfall of 0.25"-over 2" occurred in southeast OK. Southern Le Flore County received 3" to over 6" of rain on the 30<sup>th</sup> into the 31<sup>st</sup>, with a majority of that rain falling in the 6-hour period from 9pm 5/30 to 3am 5/31. This rain led to extreme flash flooding, with the Emergency Manager reporting 4'-5' of water in homes, several bridges washed out, and numerous roads and culverts with damage. Thankfully, no injuries were reported.

Tulsa, OK (TSA): Current 1-Day Observed Precipitation  
Valid at 5/31/2013 1200 UTC- Created 5/31/13 13:55 UTC

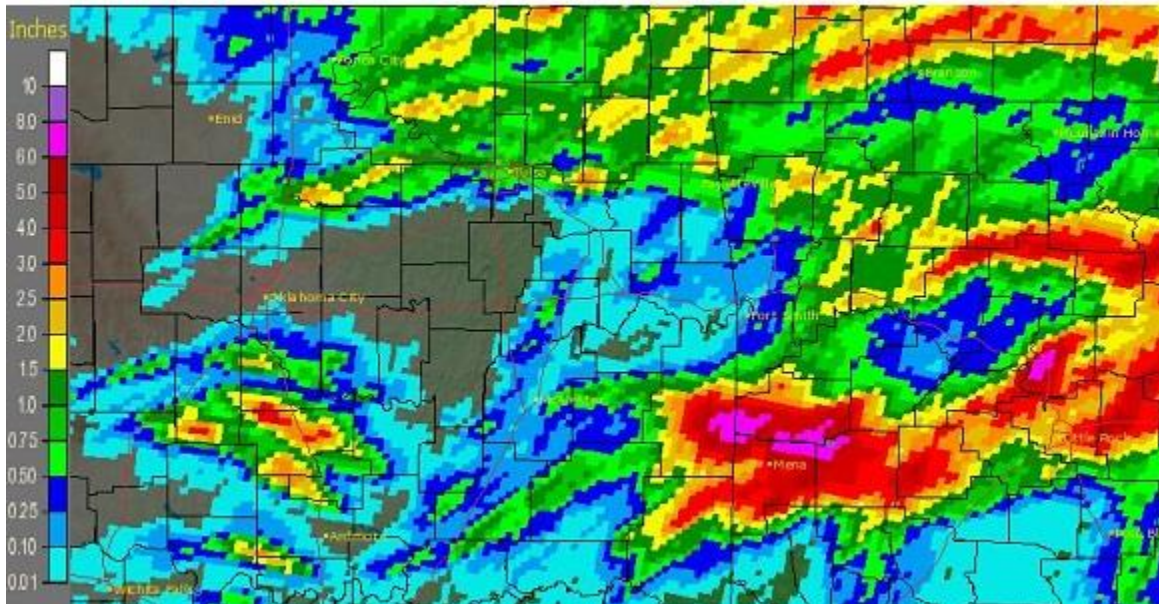
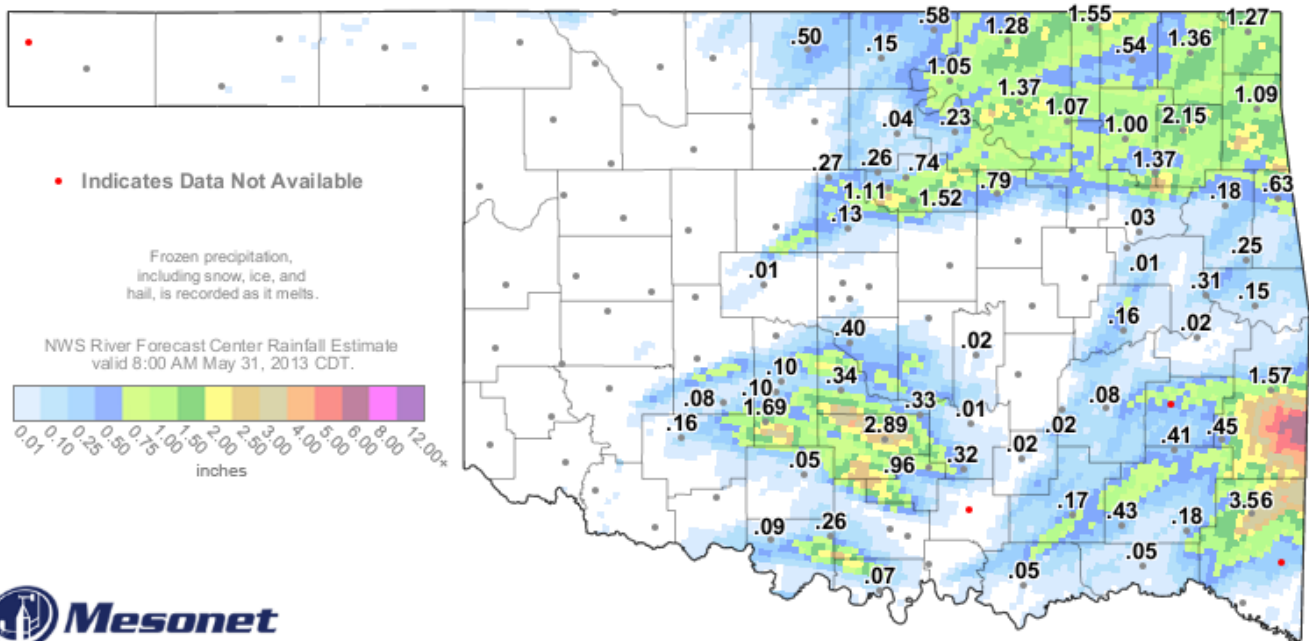


Fig. 23. 24-hr Estimated Observed Rainfall ending at 7am CDT 5/31/2013.





9:15 AM May 31, 2013 CDT  
Created 9:20:04 AM May 31, 2013 CDT. © Copyright 2013



**24-Hour Rainfall (inches)**

Fig. 24. 24-hr Measured and radar estimated observed rainfall ending at 9:15am CDT 5/31/2013.

A third round of severe weather and heavy, flooding rain once again affected Oklahoma on May 31<sup>st</sup>. Thunderstorms initially developed across much of central OK along a cold front/dryline, and tracked northeast into eastern OK during the afternoon and evening hours. Several rotating storms affected eastern OK, with 8 tornadoes confirmed. A long-lived HP supercell brought numerous tornadoes and widespread flooding to the Oklahoma City metro area (see NWS Norman <http://www.srh.noaa.gov/oun/?n=events-20130531> for details), before moving east along I-40 into eastern OK. This slow moving storm continued to be a prolific rain producer, bringing widespread 3"-8" of rain to all of Okfuskee and McIntosh Counties, as well as portions of Okmulgee, Muskogee, Pittsburg, and Haskell Counties (see Fig. 25). 7.54" of rain was measured 3 miles east of Okemah, OK. This heavy rain resulted in widespread flash flooding, and unfortunately, one fatality occurred when a 69-year old woman drowned after her car was swept into Alabama Creek (about 5 miles south of Clearview in Okfuskee Co.) early on June 1. A teenage passenger was able to escape through the vehicle's sunroof. Okfuskee County Emergency Management reported that 20 people were evacuated from Weleetka on June 1 due to flooding. Additionally, several roadways and bridges have damage from flooding. Okmulgee County Emergency Management reported approximately 25 homes and one nursing home were evacuated in Henryetta due to flooding from Coal Creek (which according to local media spread out over 100 yards wide above the embankment). Dewar had more than 50 homes affected by the flooding, which were not accessible. Water rescues took place in both communities, and many roads were barricaded due to high water (see Figs. 26-29). Widespread 1"-3" of rain fell elsewhere in east central OK and west central AR as the storm finally began to weaken. 0.50"-around 3" of rain also occurred along the counties that border KS.

24-hr rainfall totals >3" ending 7 am CDT 6/01/2013:

Okemah 3E, OK	7.54	Okemah, OK	6.50	Eufaula 5W, OK	6.01
Stigler 4WNW, OK	5.40	Eufaula 4.6ENE, OK	5.10	Whitefield 1N, OK	4.80
Okmulgee 5SE, OK	3.64	Scipio 1S, OK	3.30	Charleston 1.7E, AR	3.24
Natural Dam, AR	3.01				

The final week of May 2013 brought 2"-10" of rain to most of eastern OK and northwest AR. The exceptions were along the Red River (Choctaw County received 0.50" or less of rain) and from central Creek County, through Wagoner County, into western Washington County AR, and through Benton and Carroll Counties (this area received 0.50" to less than 2") (see Figs. 30, 31). Mainstem river flooding occurred (or flooding from the 29<sup>th</sup> rainfall was exacerbated) from this widespread heavy rain on the 30<sup>th</sup>-31<sup>st</sup>, causing moderate flooding along Bird Creek, the Caney River, the Neosho River, and the Poteau River. Minor flooding also occurred along Bird Creek, the Caney River, the Spring River, and the Kiamichi River. Refer to the E3 report for specific



details. Preliminary hydrographs are available at the end of this report. More information about the severe weather from May 29-31, 2013 can be found at [http://www.srh.noaa.gov/tsa/?n=weather-event\\_2013may30-31](http://www.srh.noaa.gov/tsa/?n=weather-event_2013may30-31).

Tulsa, OK (TSA): 6/1/2013 1-Day Observed Precipitation  
Valid at 6/1/2013 1200 UTC- Created 6/3/13 13:45 UTC

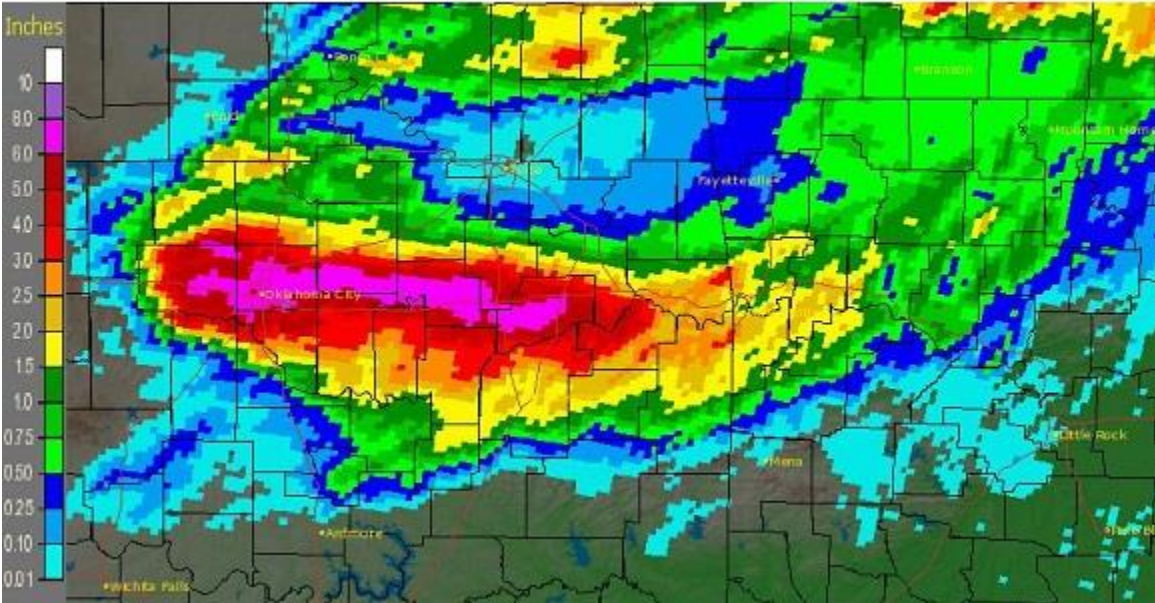


Fig. 25. 24-hr Estimated Observed Rainfall ending at 7am CDT 6/01/2013.



Fig. 26. Henryetta area. Courtesy of the Henryettan newspaper.



Fig. 27. Henryetta area. Courtesy of the Henryettan newspaper.





Fig. 28. Henryetta area. Courtesy of the Henryettan newspaper.



Fig. 29. Henryetta area. Courtesy of the Henryettan newspaper.

Tulsa, OK (TSA): Current 7-Day Observed Precipitation  
Valid at 6/2/2013 1200 UTC- Created 6/2/13 22:48 UTC

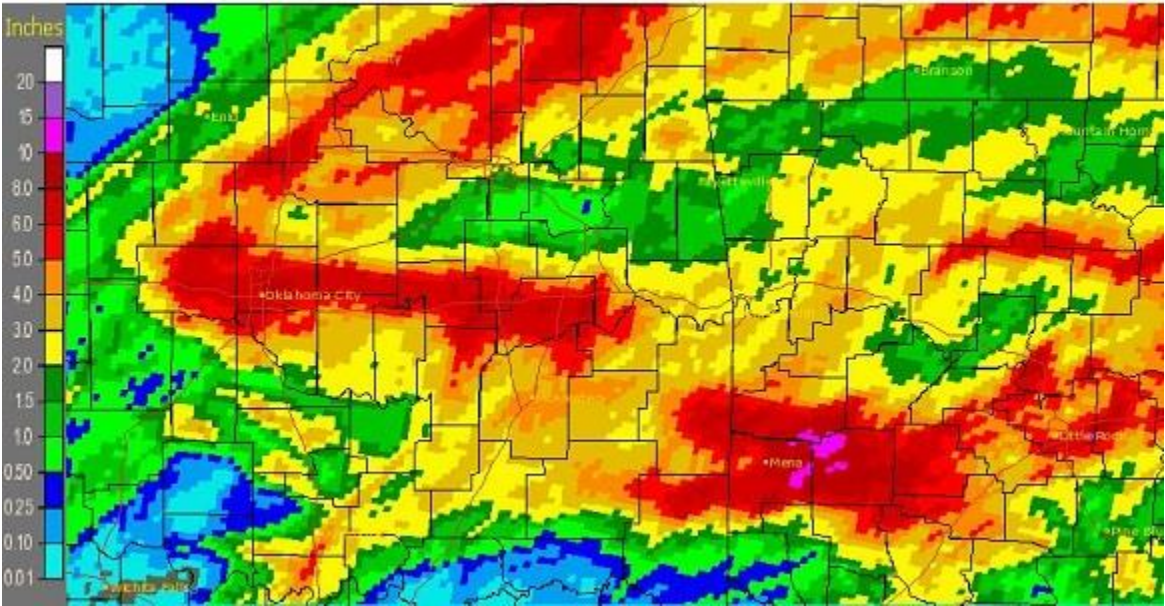
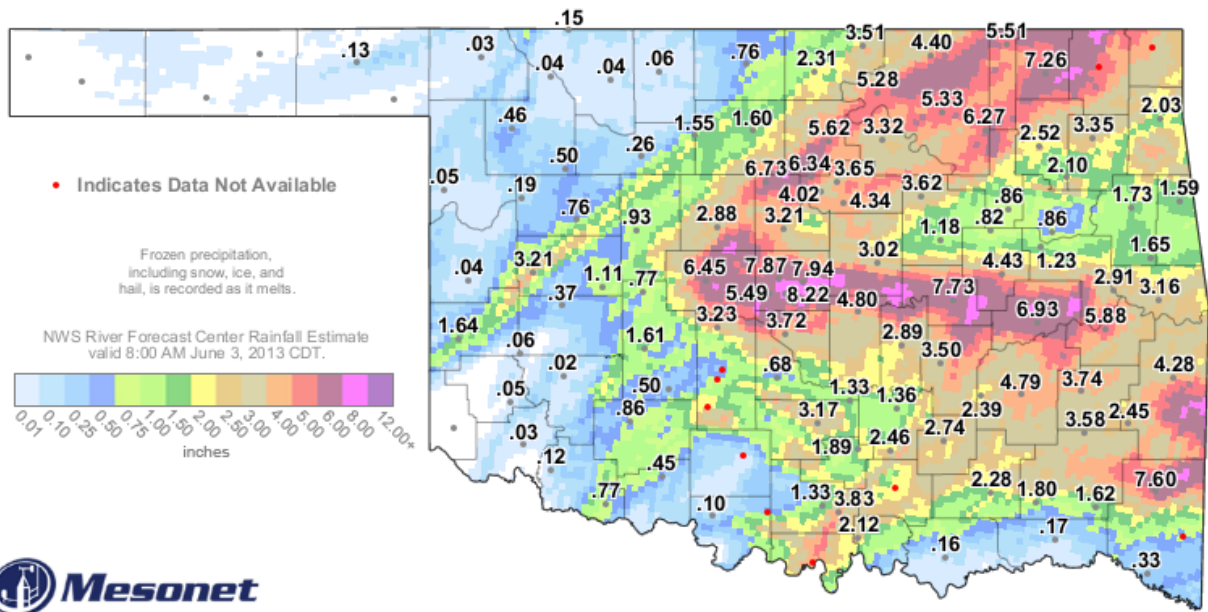


Fig. 30. 7-Day Estimated Observed Rainfall ending at 7am CDT 6/02/2013.



8:45 AM June 3, 2013 CDT

Created 8:50:02 AM June 3, 2013 CDT. © Copyright 2013

Fig. 31. 5-Day Measured and radar estimated observed rainfall ending at 8:45am CDT 6/03/2013.

Written by:

Nicole McGavock  
Service Hydrologist  
WFO Tulsa

**Products issued in May 2013:**

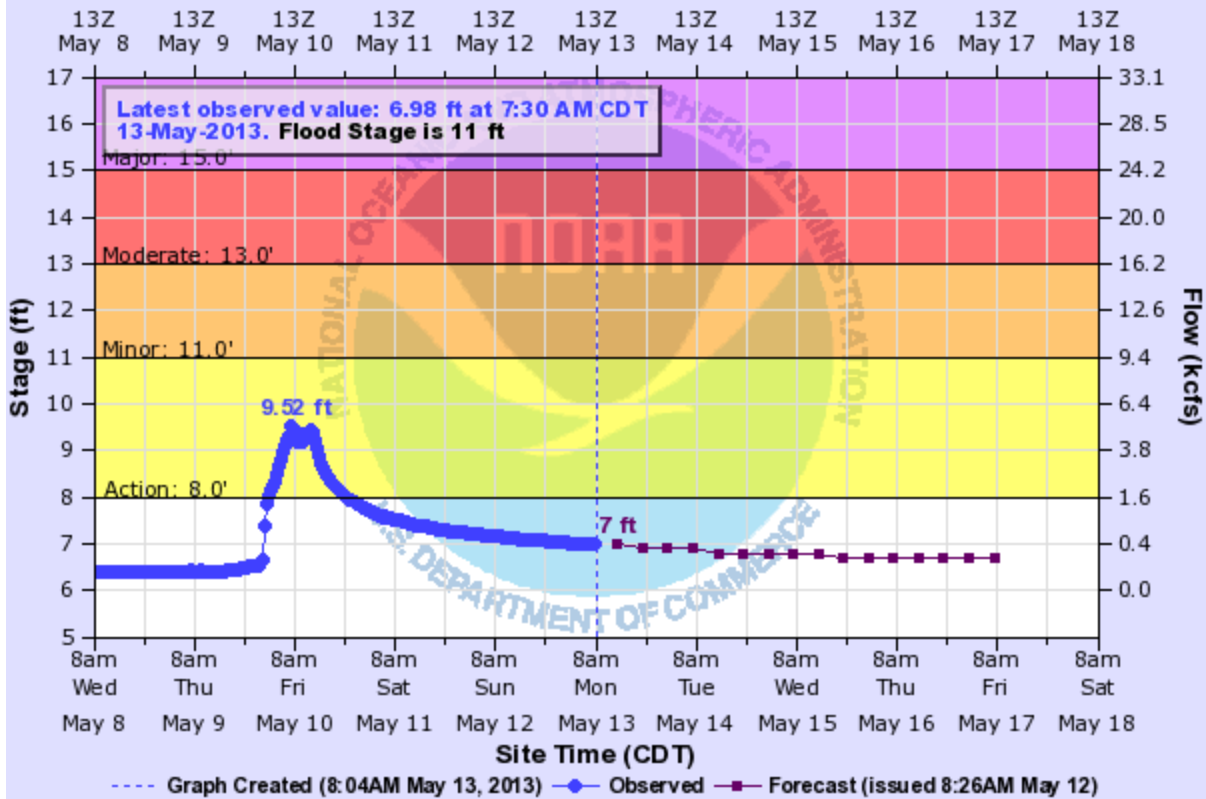
- 13 Flash Flood Warnings (FFW)
- 8 Flash Flood Statements (FFS)
- 2 Flash/Areal Flood Watches (FFA) (9 Watch FFA CON/EXT/CAN)
- 10 Urban and Small Stream Advisories (FLS)
- 7 Areal Flood Warnings (FLW)
- 3 Areal Flood Statements (FLS)
- 23 River Flood Warnings (FLW)
- 78 River Flood Statements (FLS)
- 4 River Flood Advisories (FLS) (9 Advisory FLS CON/EXT/CAN)
- 11 River Flood Watches (FFA) (10 Watch FFA CON/EXT/CAN)
- 0 River Statements (RVS)
- 0 Hydrologic Outlooks (ESF)
- 1 Drought Information Statements (DGT)

**Preliminary Hydrographs:**



## FLINT CREEK NEAR KANSAS

Universal Time (UTC)

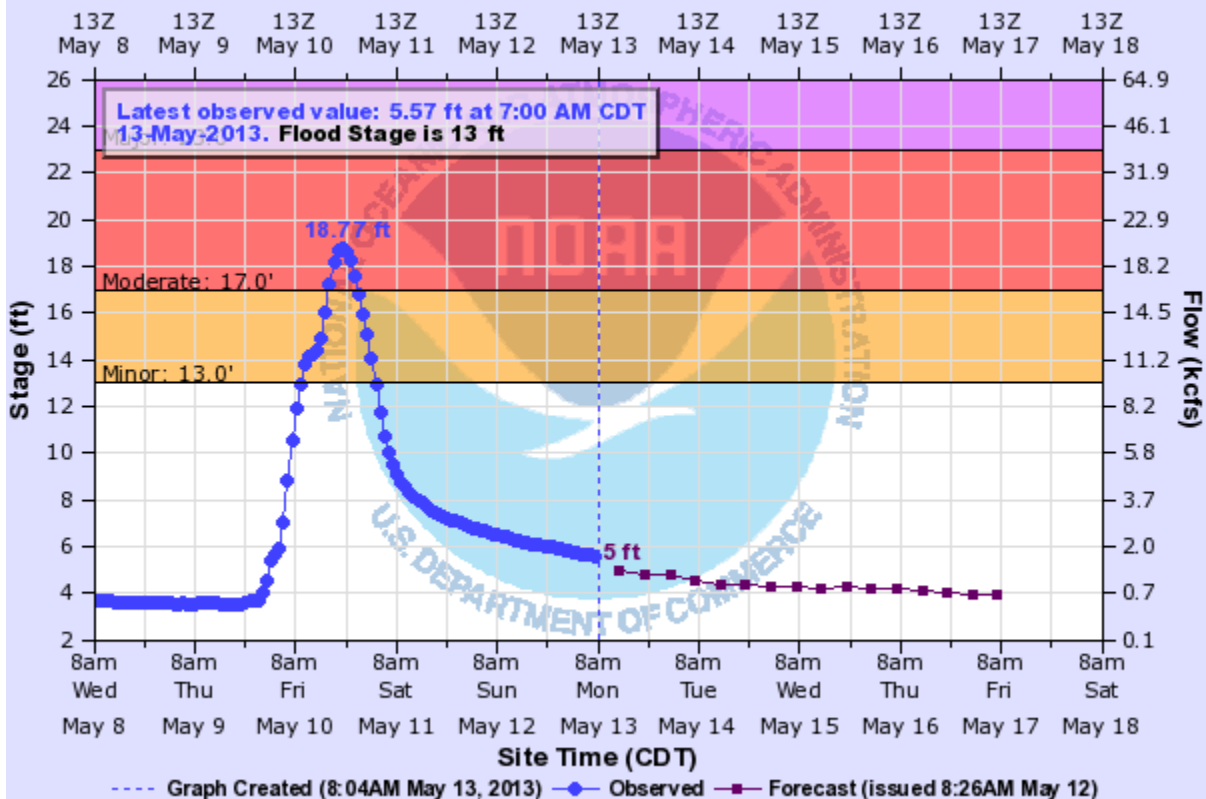


KNSO2(plotting HGIRG) "Gage 0" Datum: 854.59'

Observations courtesy of US Geological Survey

## ILLINOIS RIVER NEAR WATTS

Universal Time (UTC)

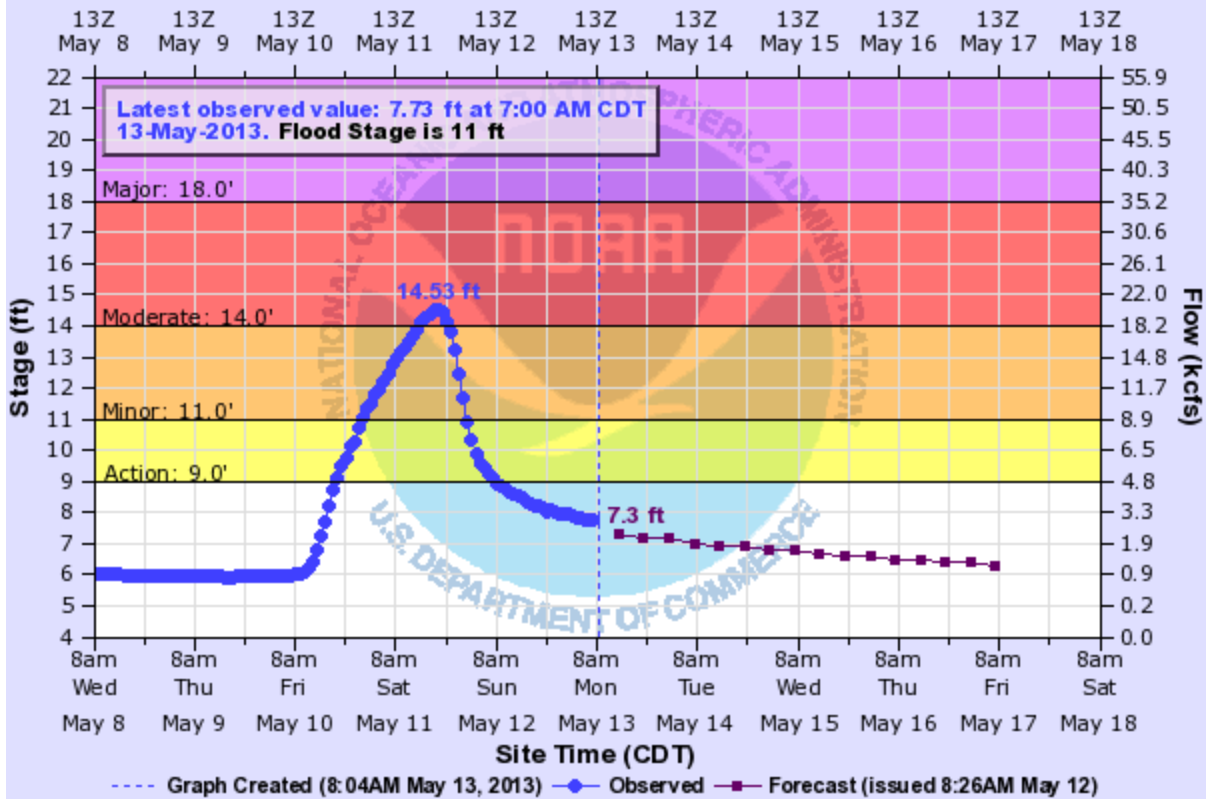


WTO2(plotting HGIRG) "Gage 0" Datum: 893.77'

Observations courtesy of US Geological Survey

## ILLINOIS RIVER NEAR TAHLEQUAH

Universal Time (UTC)

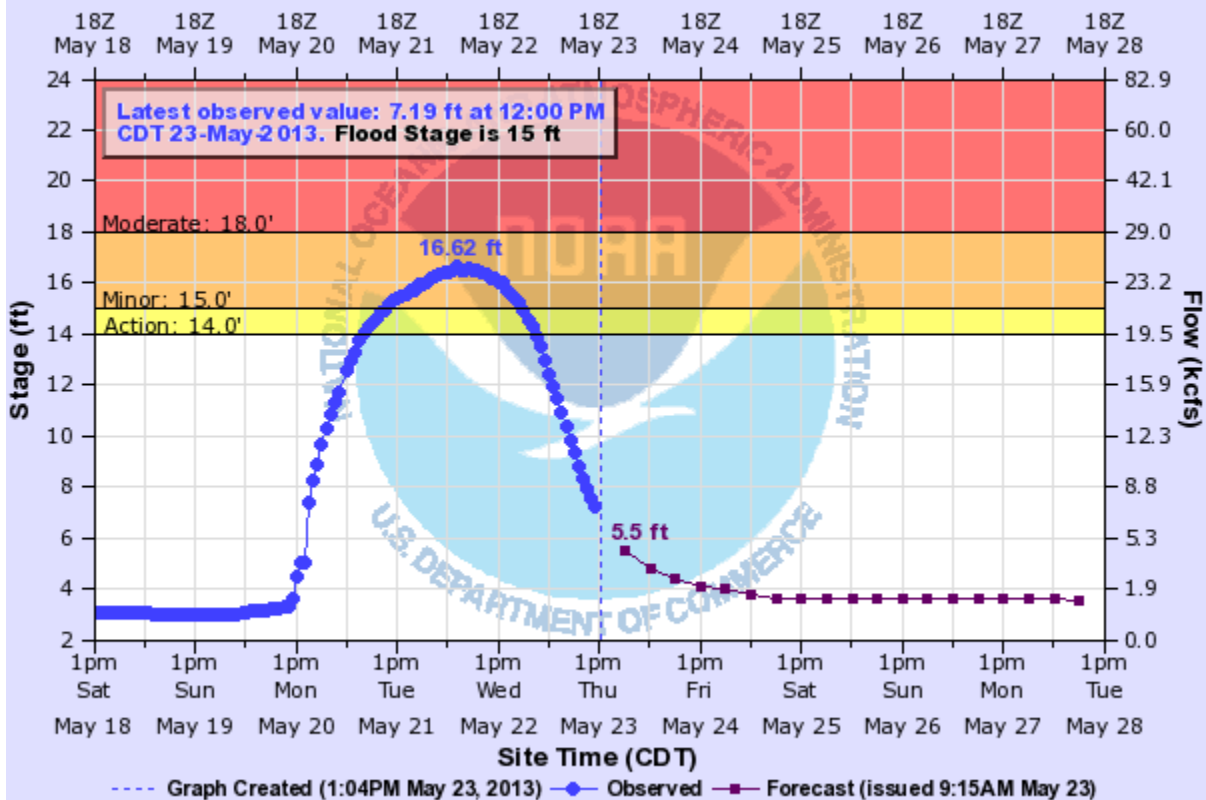


TALO2(plotting HGIRG) "Gage 0" Datum: 664.14'

Observations courtesy of US Geological Survey

## NEOSHO RIVER NEAR COMMERCE

Universal Time (UTC)

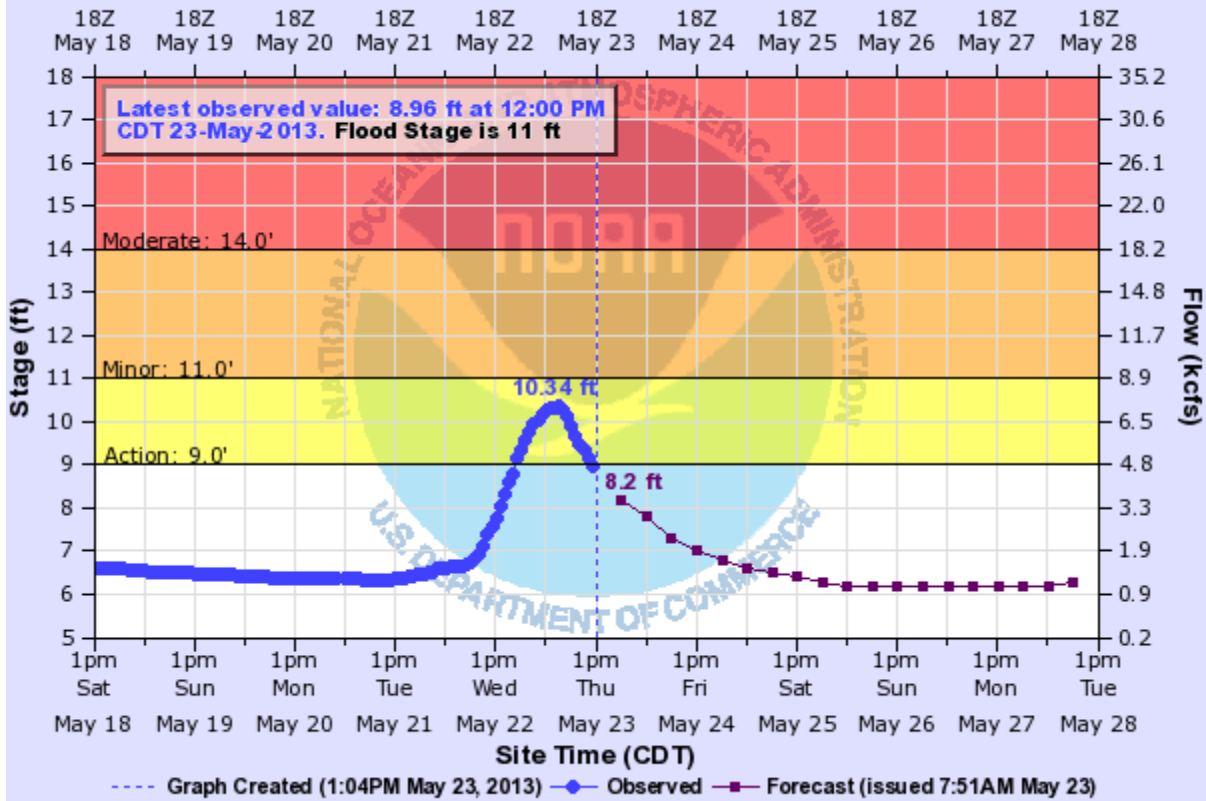


COMO2(plotting HGIRG) "Gage 0" Datum: 748.97'

Observations courtesy of US Geological Survey

## ILLINOIS RIVER NEAR TAHLEQUAH

Universal Time (UTC)

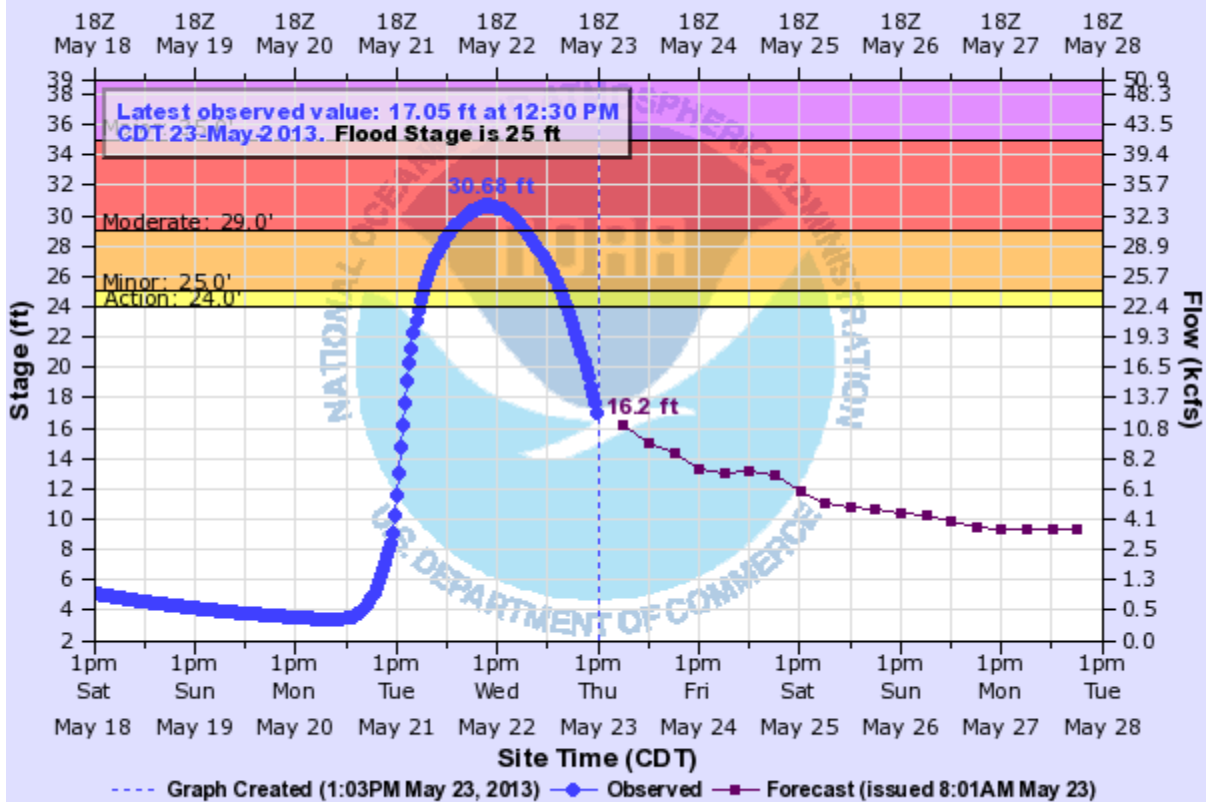


TAL02(plotting HGIRG) "Gage 0" Datum: 664.14'

Observations courtesy of US Geological Survey

## KIAMICHI RIVER NEAR ANTLERS

Universal Time (UTC)



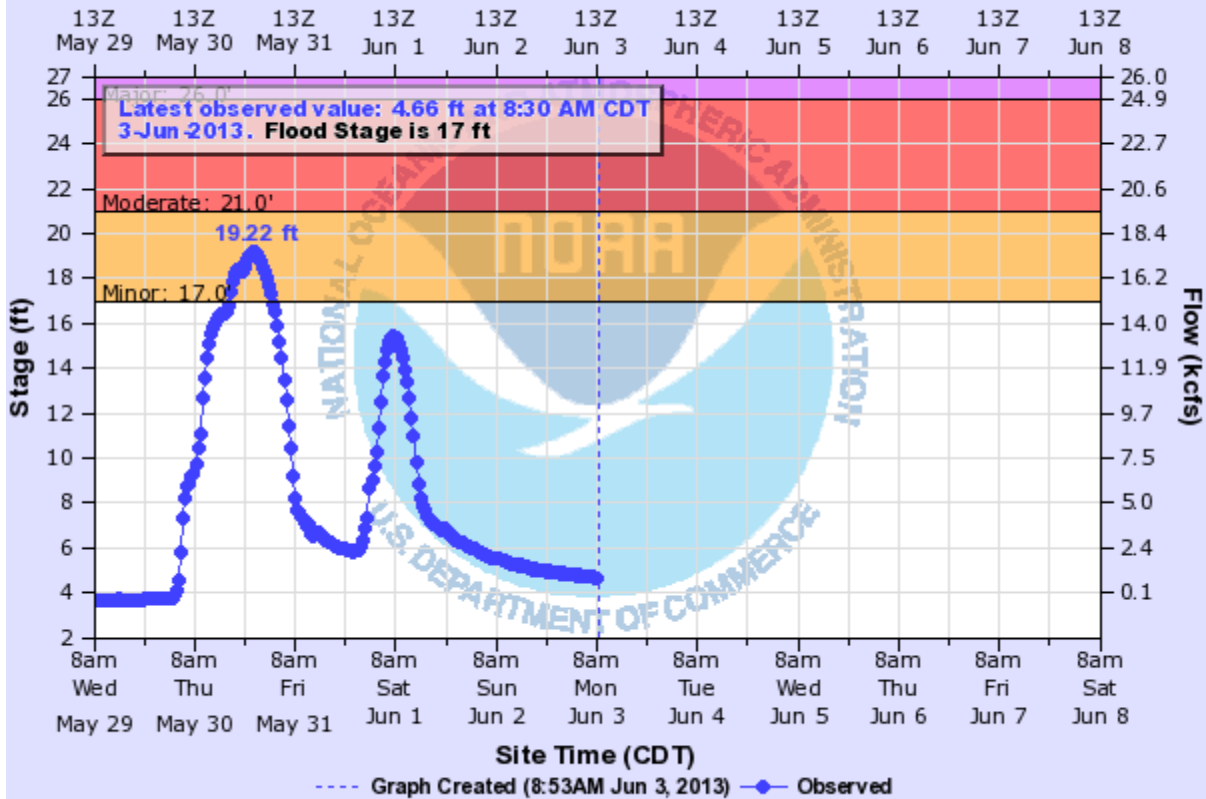
ANT02(plotting HGIRG) "Gage 0" Datum: 419.82'

Observations courtesy of US Geological Survey



### BIRD CREEK AT AVANT

Universal Time (UTC)

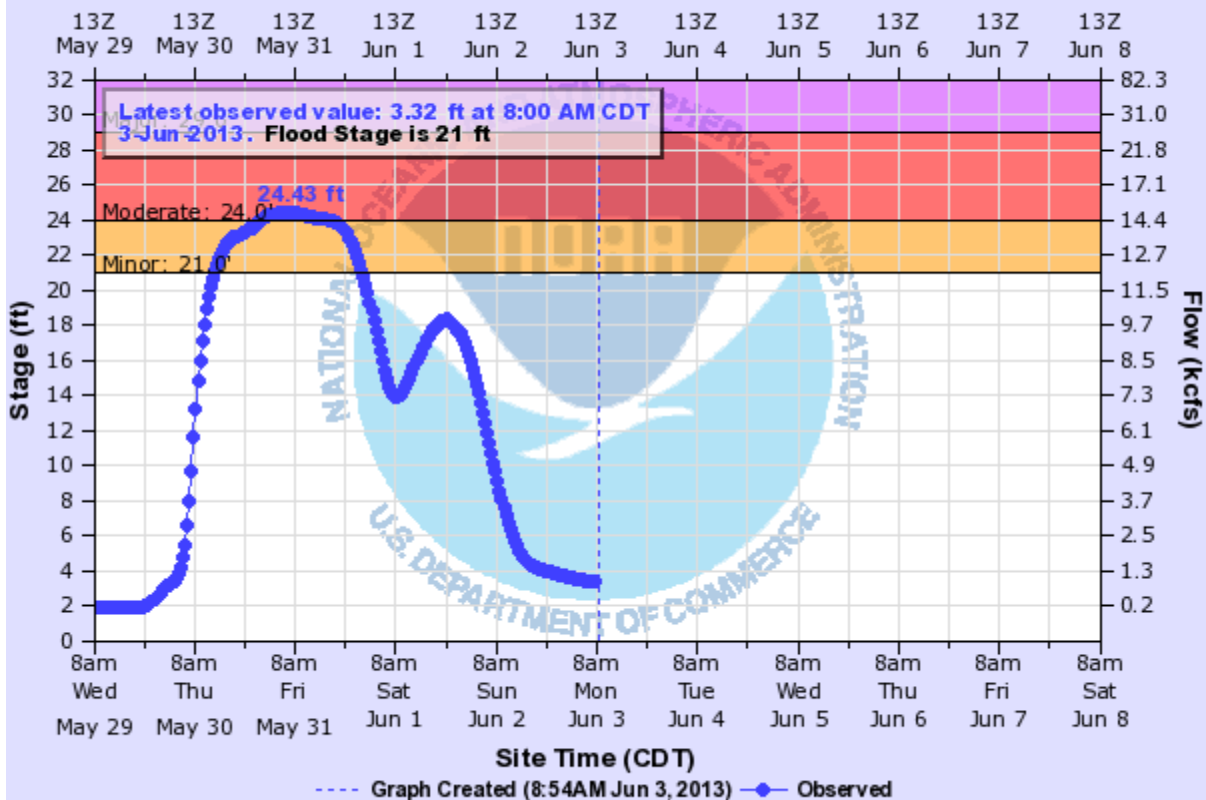


AVT02(plotting HGIRG) "Gage 0" Datum: 646.28'

Observations courtesy of US Geological Survey

### BIRD CREEK NEAR SPERRY

Universal Time (UTC)

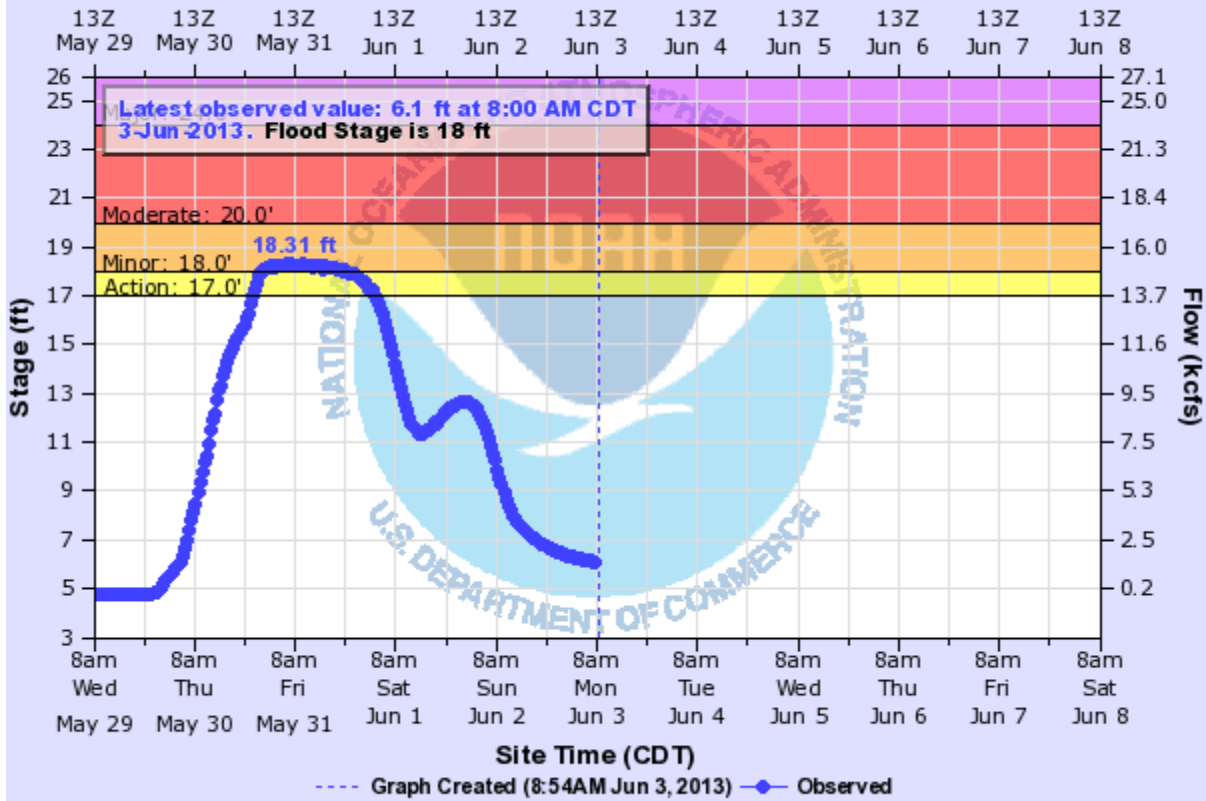


SPE02(plotting HGIRG) "Gage 0" Datum: 579.43'

Observations courtesy of US Geological Survey

## BIRD CREEK NEAR OWASSO

Universal Time (UTC)

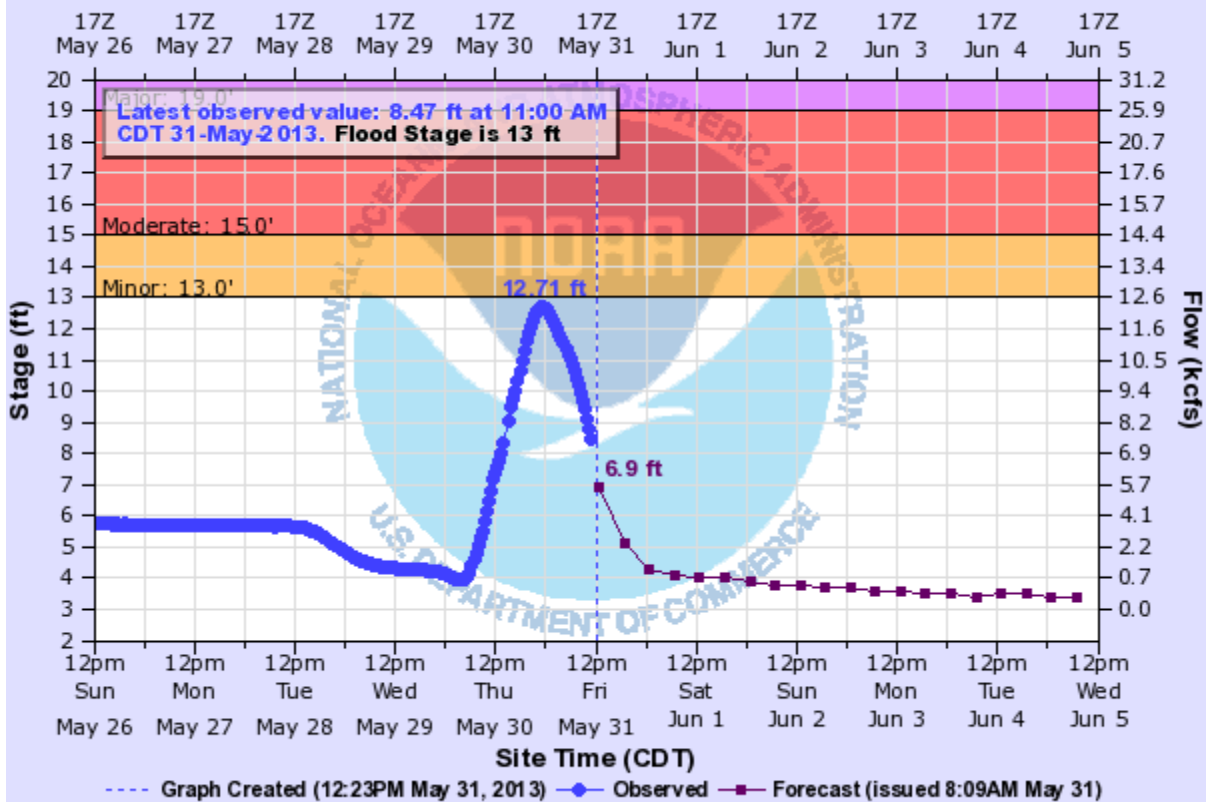


OWSO2(plotting HGIRG) "Gage 0" Datum: 560.17'

Observations courtesy of US Geological Survey

## CANEY RIVER AT BARTLESVILLE

Universal Time (UTC)

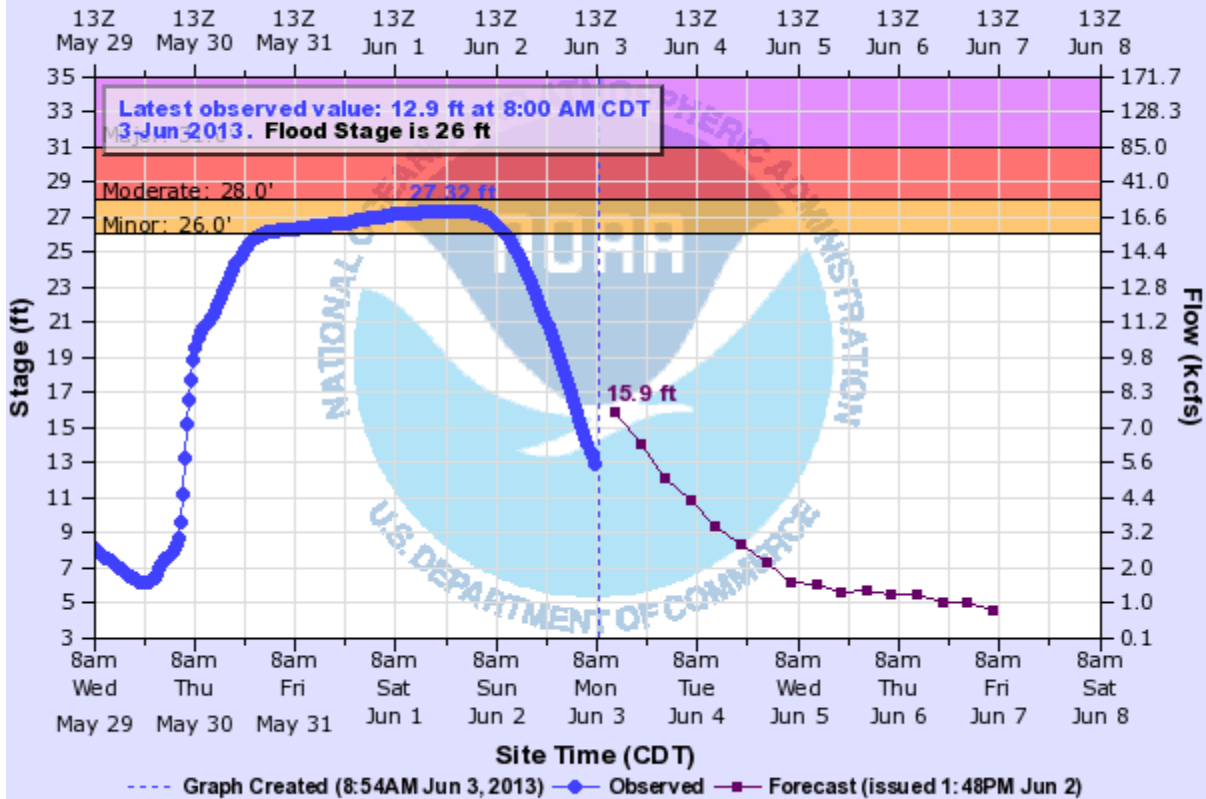


BVLO2(plotting HGIRG) "Gage 0" Datum: 653.33'

Observations courtesy of US Geological Survey

### CANEY RIVER NEAR RAMONA

Universal Time (UTC)

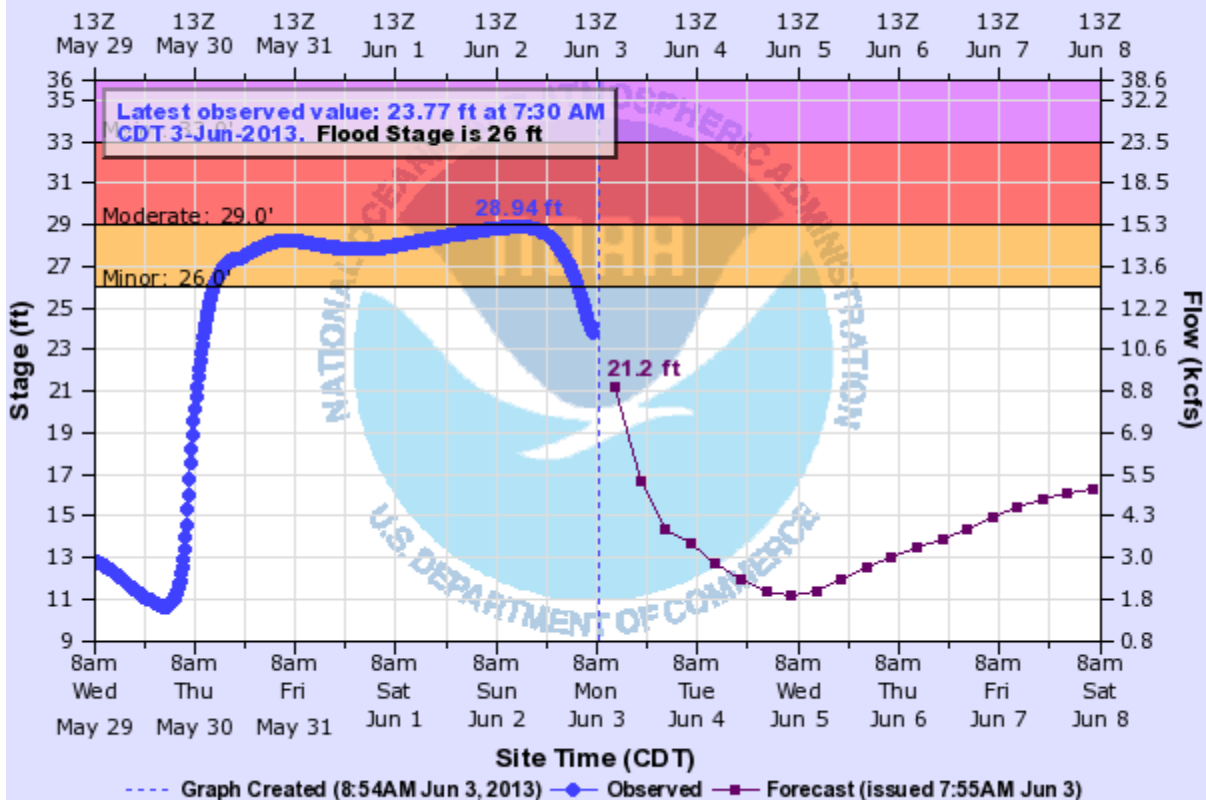


RAMO2(plotting HGIRG) "Gage 0" Datum: 586.43'

Observations courtesy of US Geological Survey

### CANEY RIVER NEAR COLLINSVILLE

Universal Time (UTC)

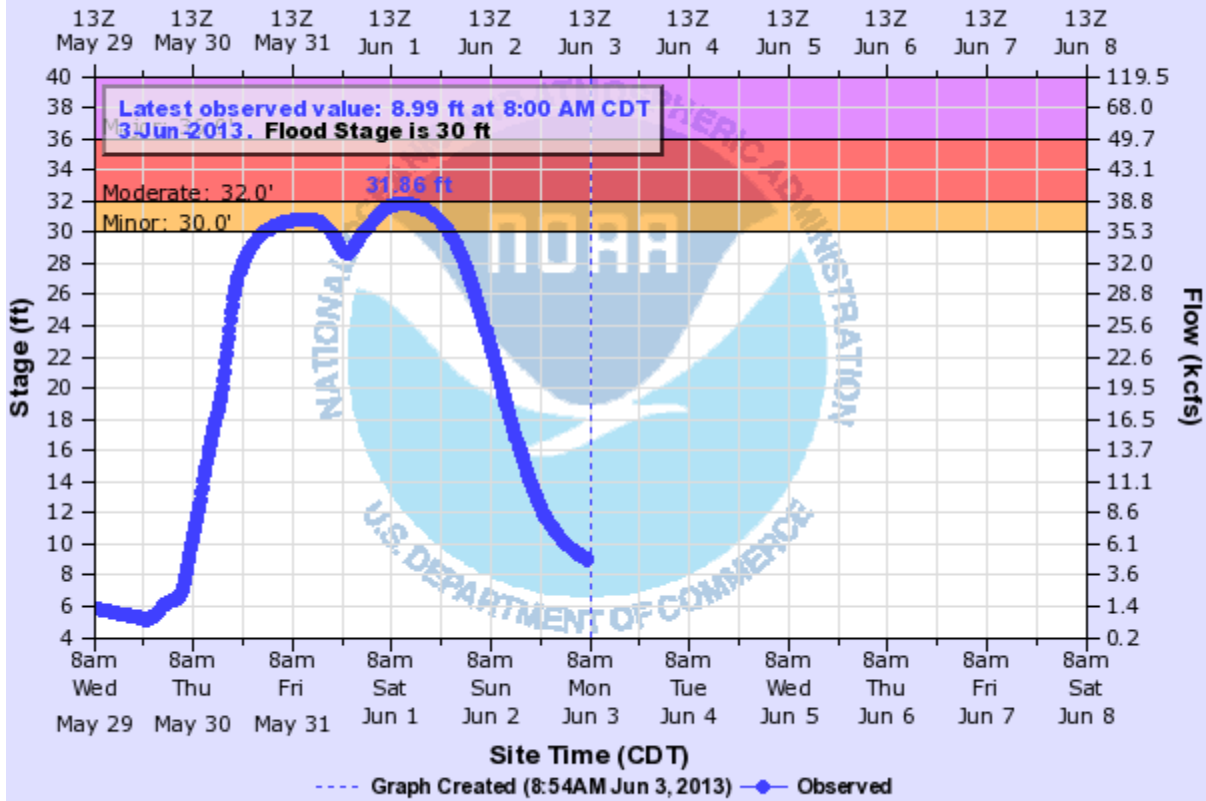


CVL02(plotting HGIRG) "Gage 0" Datum: 565.72'



## VERDIGRIS RIVER NEAR LENAPAH

Universal Time (UTC)

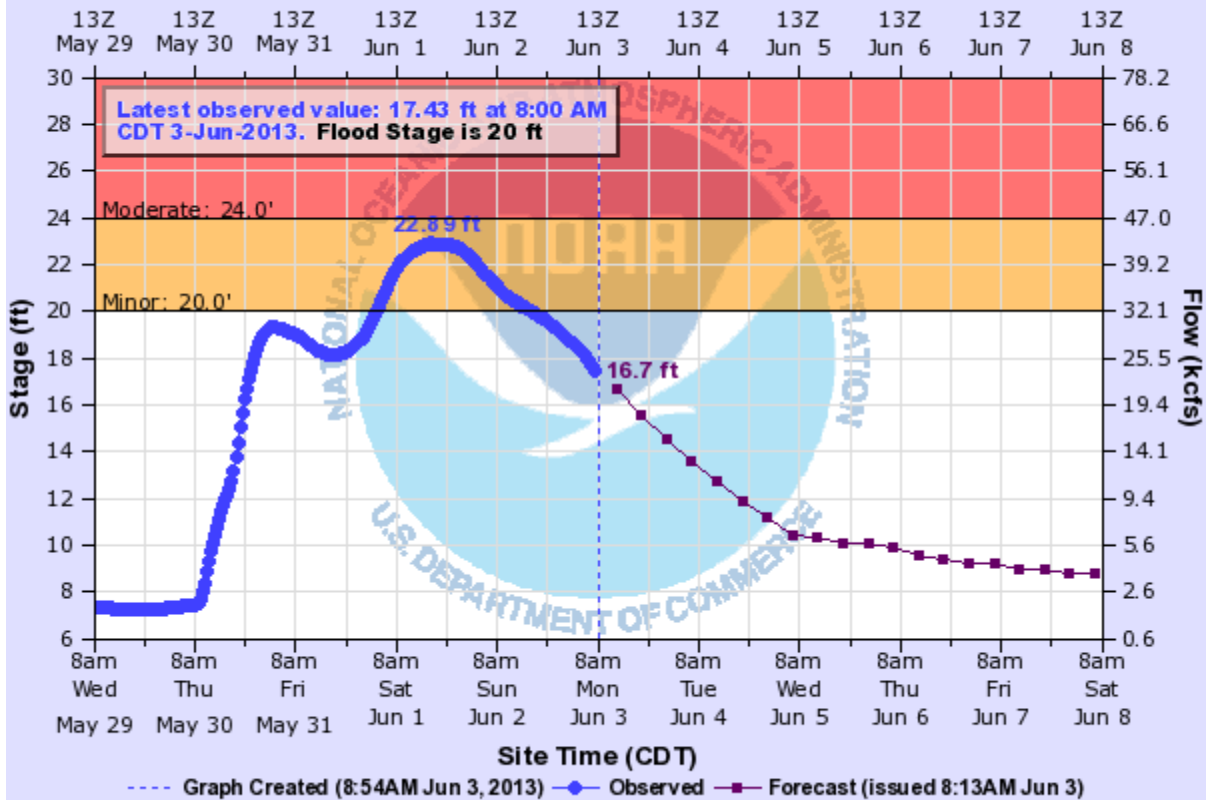


LEPO2(plotting HGIRG) "Gage 0" Datum: 644.9'

Observations courtesy of US Geological Survey

## SPRING RIVER NEAR QUAPAW

Universal Time (UTC)

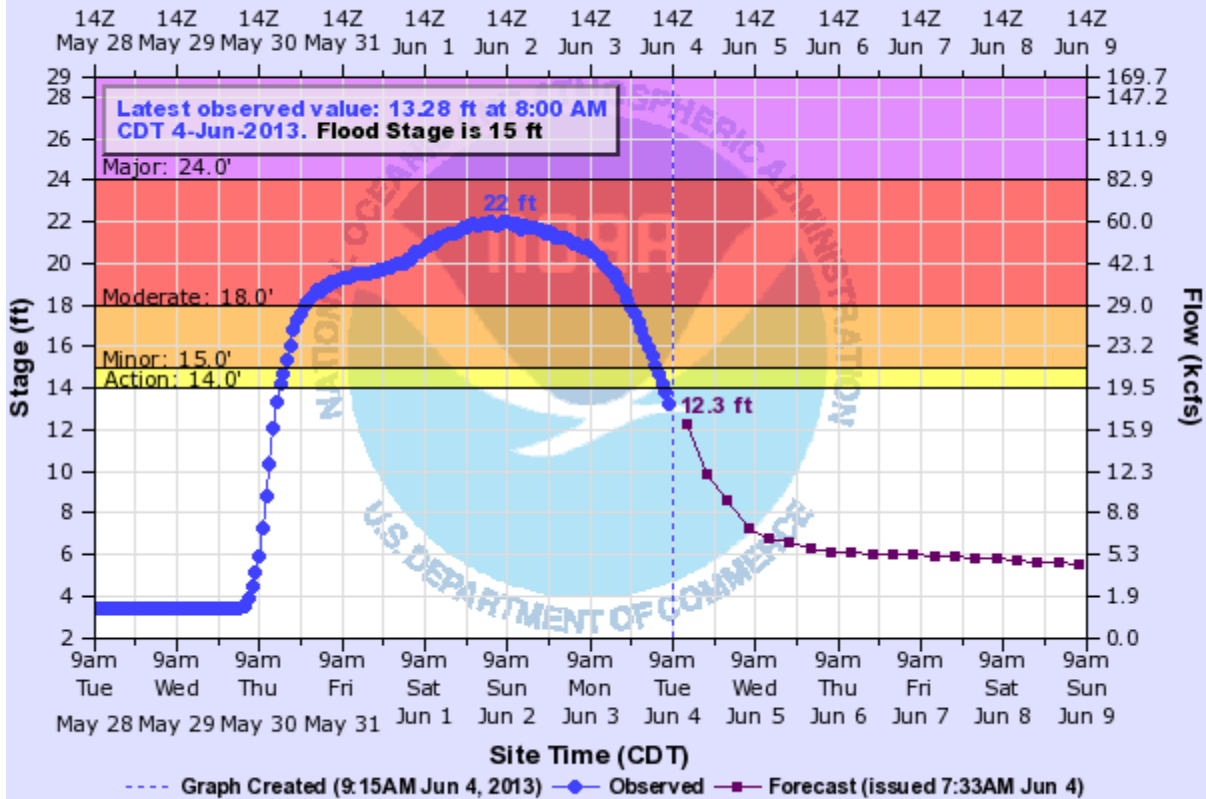


QUAO2(plotting HGIRG) "Gage 0" Datum: 746.25'

Observations courtesy of US Geological Survey

## NEOSHO RIVER NEAR COMMERCE

Universal Time (UTC)

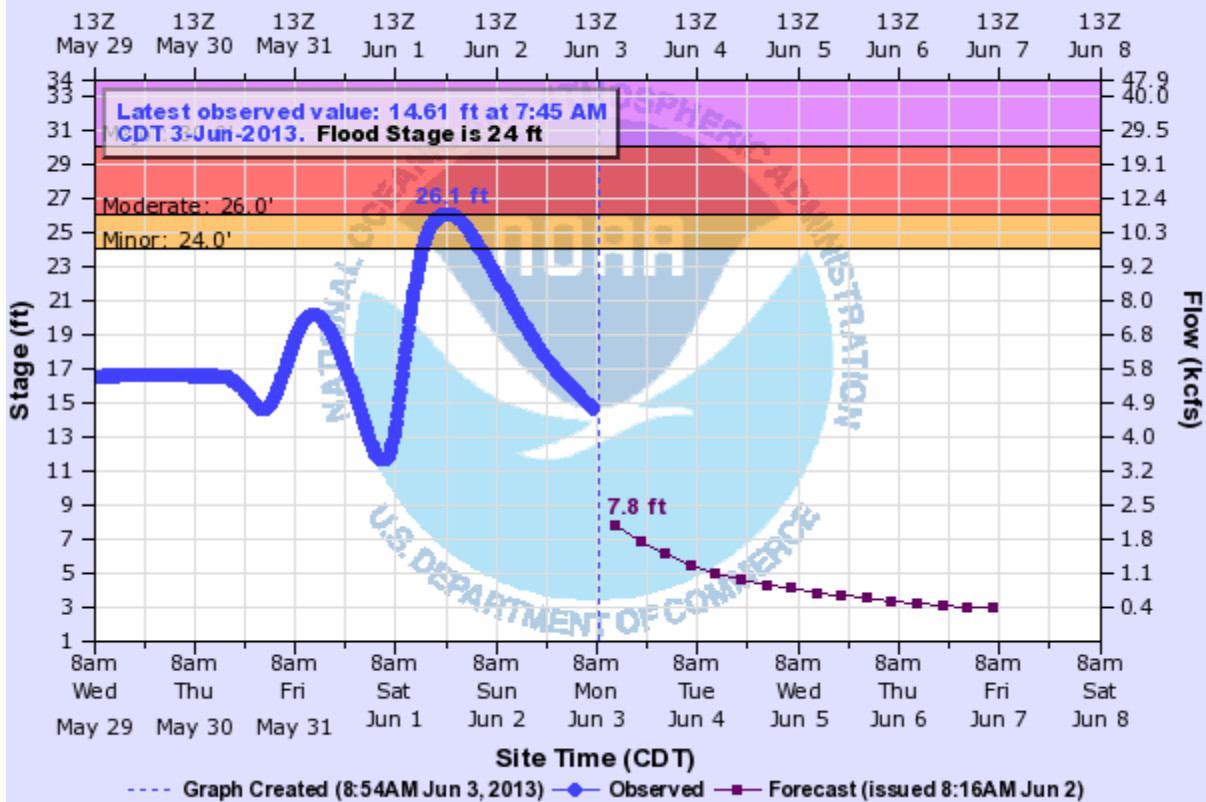


COMO2(plotting HGIRG) "Gage 0" Datum: 748.97'

Observations courtesy of US Geological Survey

## POTEAU RIVER NEAR POTEAU

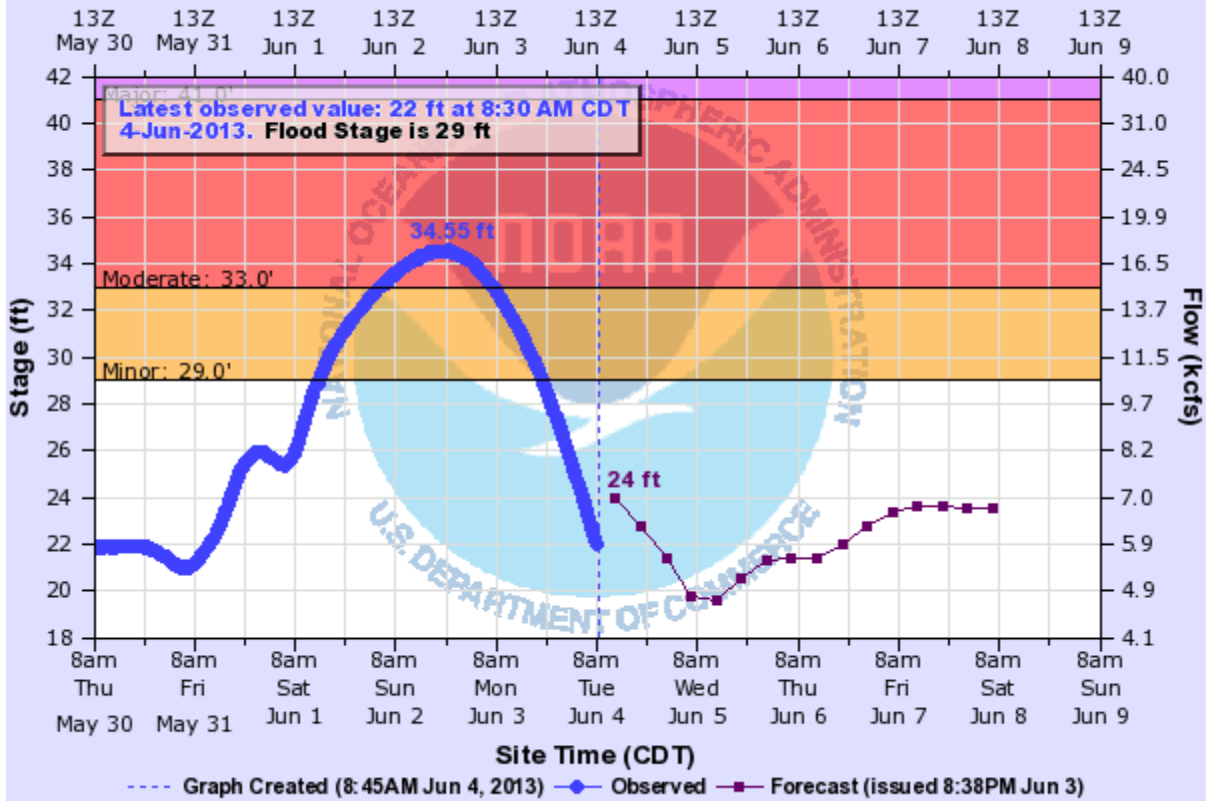
Universal Time (UTC)



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

## POTEAU RIVER NEAR PANAMA

Universal Time (UTC)

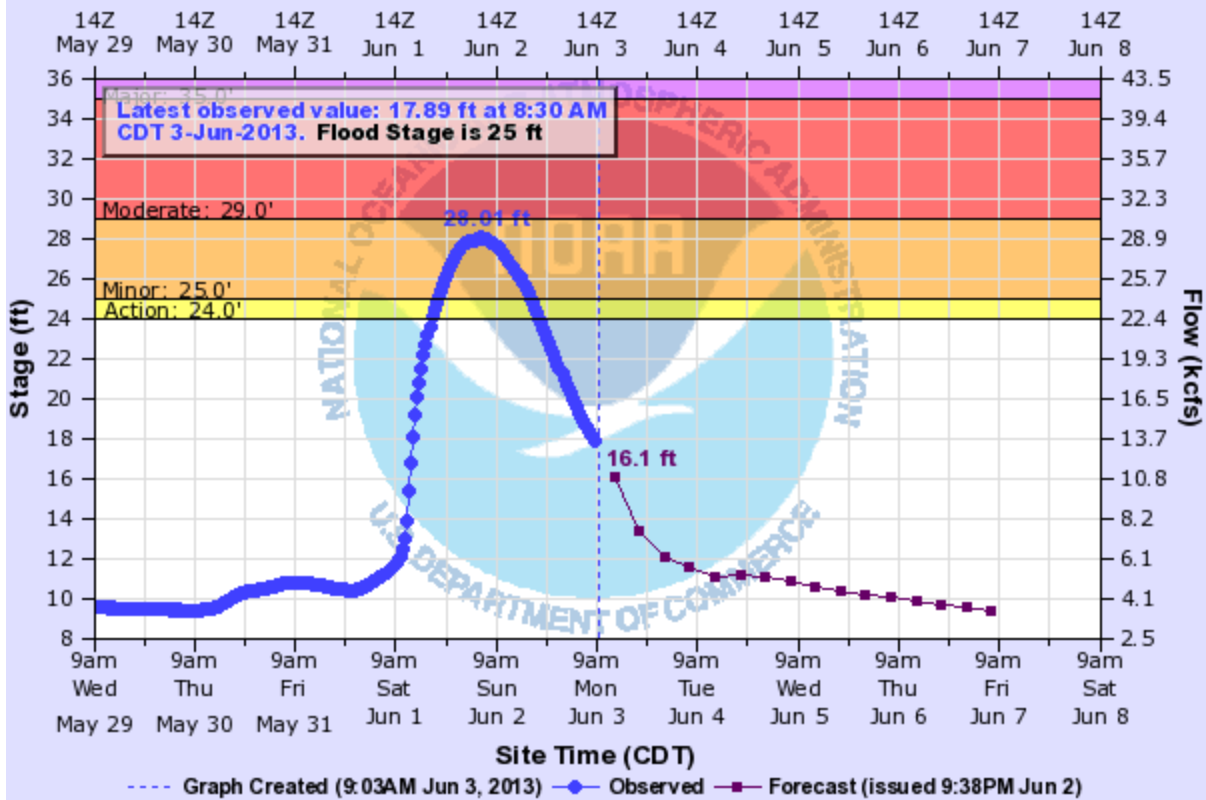


PANO2(plotting HGIRG) "Gage 0" Datum: 387.97'

Observations courtesy of US Geological Survey

## KIAMICHI RIVER NEAR ANTLERS

Universal Time (UTC)



ANTO2(plotting HGIRG) "Gage 0" Datum: 419.82'

Observations courtesy of US Geological Survey