

Tulsa, OK (TSA): April, 2013 Monthly Percent of Normal Precipitation
 Valid at 5/1/2013 1200 UTC- Created 5/1/13 14:08 UTC

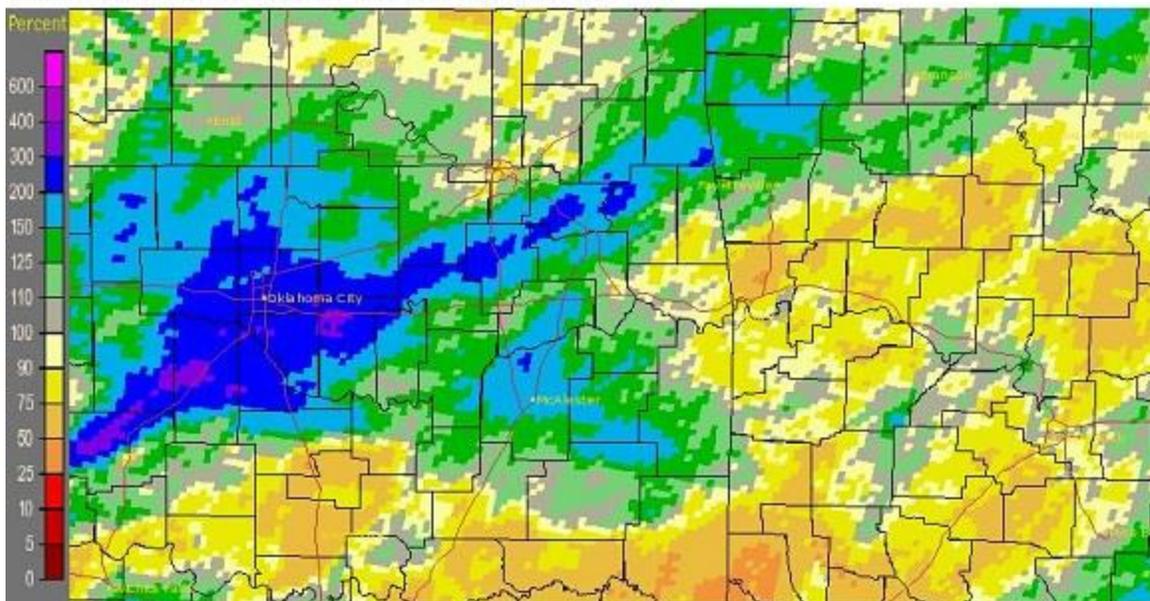


Fig. 1b. Estimated % of Normal Rainfall for April 2013

In Tulsa, OK, April 2013 ranked as the 7th coldest April (56.3°F; since records began in 1905) and the 54th driest April (3.35"; since records began in 1888). Tulsa was on course to be the second coldest April on record; however, high temperatures in the 80s the last two days of the month lowered the ranking to 7th. Fort Smith, AR was the 54th coldest April (60.9°F; since records began in 1883) and the 64th driest April (3.73"; since records began in 1883). Fayetteville, AR was the 18th coldest (55.3°F) and the 17th wettest (5.53") April since records began in 1950.

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

Clayton, OK (meso)	8.52	Talihina, OK (meso)	8.41	Okmulgee, OK (meso)	8.02
Spavinaw, OK (coop)	7.50	McAlester, OK (ASOS)	7.45	McAlester, OK (meso)	7.38
Haskell, OK (meso)	6.83	Bristow, OK (meso)	6.81	Hectorville, OK (meso)	6.59

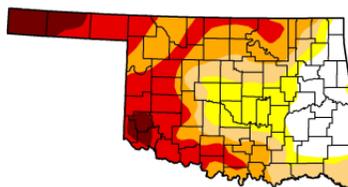
Some of the lowest precipitation reports (in inches) for April 2013 included:

Hugo, OK (meso)	3.21	Tulsa, OK (ASOS)	3.35	Foraker, OK (meso)	3.57
Copan, OK (meso)	3.60	Fort Smith, AR (ASOS)	3.73	Antlers, OK (meso)	3.76
Pawnee, OK (meso)	3.77	Natural Dam, AR (coop)	3.82	Cookson, OK (meso)	3.88

U.S. Drought Monitor Oklahoma

April 30, 2013
Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	16.69	83.31	67.94	52.82	30.53	6.39
Last Week (04/23/2013 map)	10.80	89.20	72.08	53.76	30.53	5.48
3 Months Ago (01/29/2013 map)	0.00	100.00	100.00	100.00	92.14	39.58
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 (04/24/2012 map)	74.94	25.06	15.00	9.78	3.27	0.00



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>



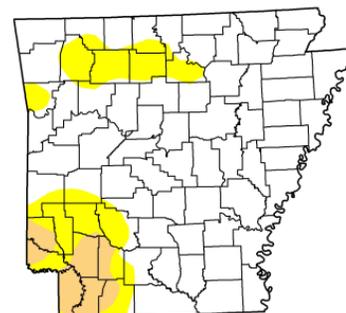
Released Thursday, May 2, 2013
Eric Luebbehusen, U.S. Department of Agriculture

Fig. 2. Drought Monitor for Oklahoma

U.S. Drought Monitor Arkansas

April 30, 2013
Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	80.00	20.00	5.85	0.00	0.00	0.00
Last Week (04/23/2013 map)	64.50	35.50	8.37	0.00	0.00	0.00
3 Months Ago (01/29/2013 map)	34.07	65.93	43.75	25.22	5.53	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 (04/24/2012 map)	100.00	0.00	0.00	0.00	0.00	0.00



Intensity:

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<http://droughtmonitor.unl.edu>



Released Thursday, May 2, 2013
Eric Luebbehusen, U.S. Department of Agriculture

Fig. 3. Drought Monitor for Arkansas

According to the [U.S. Drought Monitor](http://droughtmonitor.unl.edu) (USDM) from April 30, 2013 (Figs 2, 3), only a small portion of eastern OK remained in Moderate to Extreme drought. Several rainfall events this month helped to alleviate short term

drought conditions across much of the HSA. Extreme drought (D3) conditions were still affecting portions of northeast Kay and Osage Counties in eastern OK. Severe (D2) drought was present across parts of Osage, Pawnee, Washington, and Nowata Counties in eastern OK. Moderate (D1) conditions existed over sections of western Craig, southeast Nowata, Rogers, Tulsa, Creek, and Choctaw Counties in eastern OK. Abnormally dry conditions continued in portions of Craig, Mayes, Rogers, Tulsa, Okmulgee, and Okfuskee Counties in eastern OK and Crawford, Madison, and Carroll Counties in northwest AR.

After months of well-below normal lake levels, only 2 of the major reservoirs in the Tulsa HSA were operating below the top of their conservation pools as of April 30, 2013: Birch Lake 54% and Skiatook Lake 64%. Most of the reservoirs were operating within the flood pool. The following reservoirs were operating at $\geq 105\%$ of their pools as of April 30, 2013: Pensacola Lake 124%, Hudson Lake 113%, Oologah Lake 106%, Eufaula Lake 106%, Sardis Lake 106%, and Tenkiller Lake 105%.

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

Rank since 1921	April 2013	Spring-to-Date (Mar 1 – Apr 30)	Year-to-Date 2013 (Jan 1 – Apr 30)	Last 90 Days (Jan 31 – Apr 30)	Water Year-to-Date (Oct 1 – Apr 30)	Last 365 Days (May 1, 2012 – Apr 30, 2013)
Northeast OK	30 th wettest	44 th driest	29 th wettest	34 th wettest	33 rd driest	5 th driest
East Central OK	25 th wettest	35 th wettest	21 st wettest	22 nd wettest	27 th driest	6 th driest
Southeast OK	37 th wettest	39 th wettest	40 th wettest	35 th wettest	18 th driest	4 th driest
Statewide	28 th wettest	43 rd driest	24 th wettest	25 th wettest	21 st driest	1 st driest

Outlooks

The [Climate Prediction Center](#) (CPC) outlook for May 2013 (issued April 30, 2013) indicates a greatly enhanced chance for below normal temperatures across all of eastern OK and northwest AR. This outlook also indicates equal chances for above, near, and below median precipitation across all of northeast OK and northwest AR. This outlook is based primarily on short-range computer models, which suggest below-normal temperatures during at least the first ten days in May across much of the Plains.

For the 3-month period May-Jun-Jul 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 April 18, 2013). According to CPC, ENSO neutral conditions remained through April. ENSO neutral conditions are expected to continue through Summer 2013, followed by uncertain conditions in the ENSO state from late Summer 2013 and beyond. Therefore, this outlook is primarily based on dynamic computer model output, with some input from statistical forecast tools and long-term trends.

Summary of Precipitation Events

April 1-15

After a wet ending to March, the rainfall continued during the first few days of April, bringing much needed precipitation to the region. Isentropic lift in advance of a mid-level low brought widespread rain to eastern OK and northwest AR on the 1st - 3rd, and lift associated with the mid-level low itself causing additional rainfall late on the 3rd into the morning of the 4th. The heaviest rainfall occurred on the 2nd and into the early morning hours of the 3rd, with much of Pittsburg, southern McIntosh, southern Haskell, Latimer, northern Pushmataha, and Le Flore Counties receiving 2" to 4" of rain (see Figs. 4, 5). This is also the same region that had heavy rain over Easter weekend at the end of March, resulting in 5-day rainfall totals of 4" to 6" (see Fig. 6). The remainder of the HSA had 0.25" to around 1.5" of rain on the 2nd (Figs 4, 5). All of this rain fell slow and steady, exactly what is needed to provide drought relief. The slow, steady nature of the rain precluded flash flooding, though areal flooding resulted in the closure of two state highways in Pittsburg County. The heavy rain also caused the Poteau River near Panama to exceed flood stage (refer to the E3 report for details). This was the first time

since April 30-May 2, 2012 that river flooding has occurred in the HSA. Rises also occurred along the Poteau River near Poteau and the Kiamichi River near Antlers and near Clayton, though the rivers remained below flood stage in these areas.

24-hr rainfall measurements >2" ending 7am 4/3/13:

Talihina 4SE, OK	3.46	Clayton 4NNE, OK	3.45	McAlester 4S, OK	2.87
Hartshorne 3.9NNE, OK	2.69	Krebs 0.3WNW, OK	2.60	Hanobia 1S, OK	2.57
Clayton 1SE, OK	2.42	Daisy 4ENE, OK	2.08	Stuart 3SE, OK	2.03
Wilburton 2SW, OK	2.03				

Rainfall increased again on the 3rd, affecting most of eastern OK and northwest AR, with light rain lingering across southeast OK and west central AR during the day on the 4th. The highest rainfall totals from this last round of precipitation occurred over eastern OK, where many locations received an additional 0.5" to 1" of rain (see Figs. 7, 8).

Tulsa, OK (TSA): 4/3/2013 1-Day Observed Precipitation
Valid at 4/3/2013 1200 UTC- Created 4/3/13 16:06 UTC

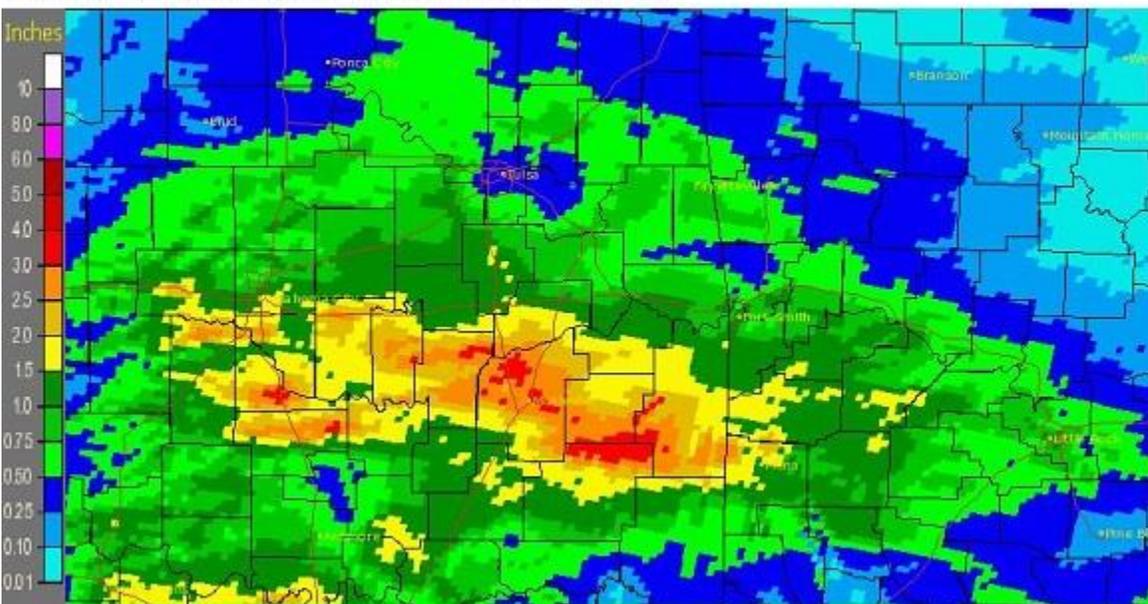
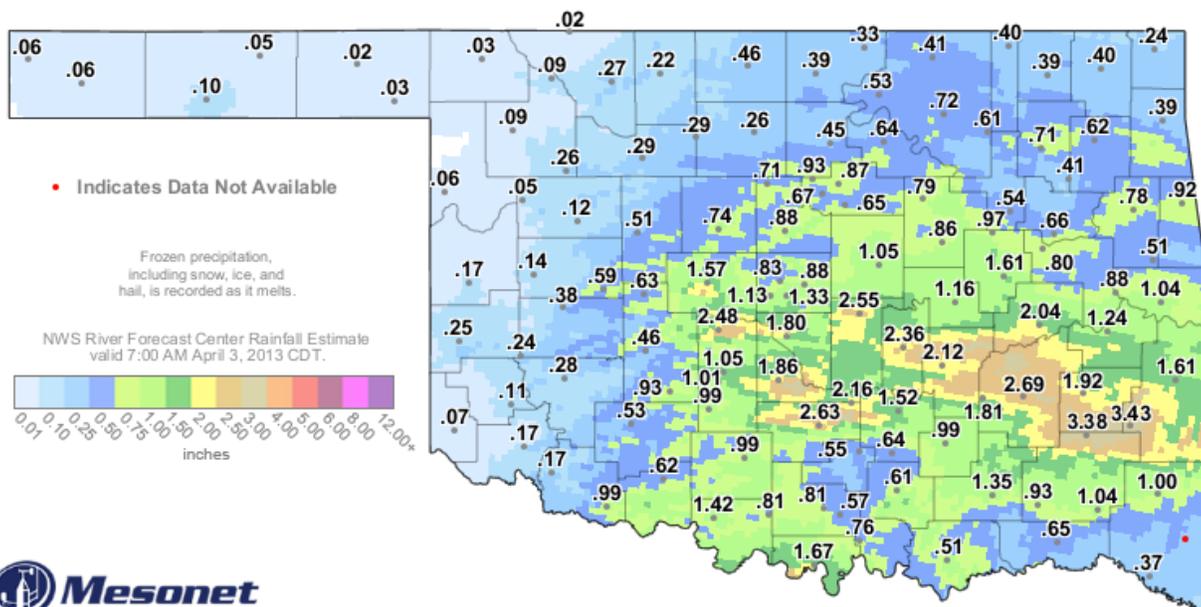


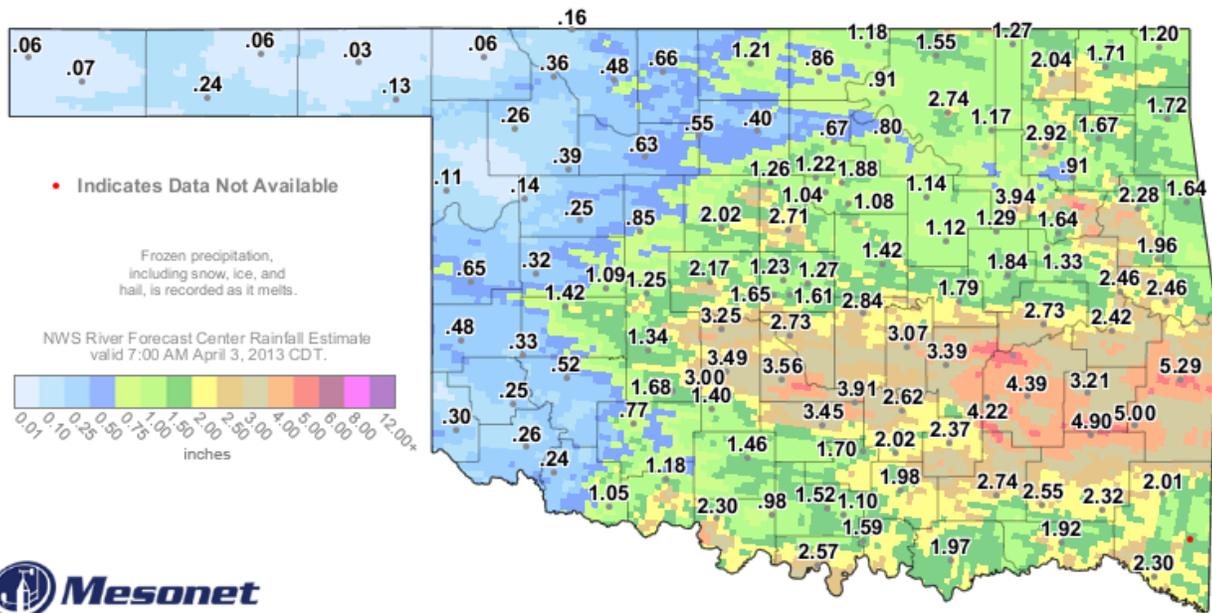
Fig. 4. Estimated Observed 24-hr Rainfall ending 7am April 3, 2013.



24-Hour Rainfall (inches)

Fig. 5. Estimated and observed 24-hr rainfall ending at 8:15am 4/3/2013.

8:15 AM April 3, 2013 CDT
Created 8:20:07 AM April 3, 2013 CDT. © Copyright 2013



8:15 AM April 3, 2013 CDT

Created 8:20:08 AM April 3, 2013 CDT. © Copyright 2013



5-Day Rainfall (inches)

Fig. 6. Estimated and observed 5-day rainfall ending at 8:15am 4/3/2013.

Tulsa, OK (TSA): 4/4/2013 1-Day Observed Precipitation
Valid at 4/4/2013 1200 UTC- Created 4/4/13 13:55 UTC

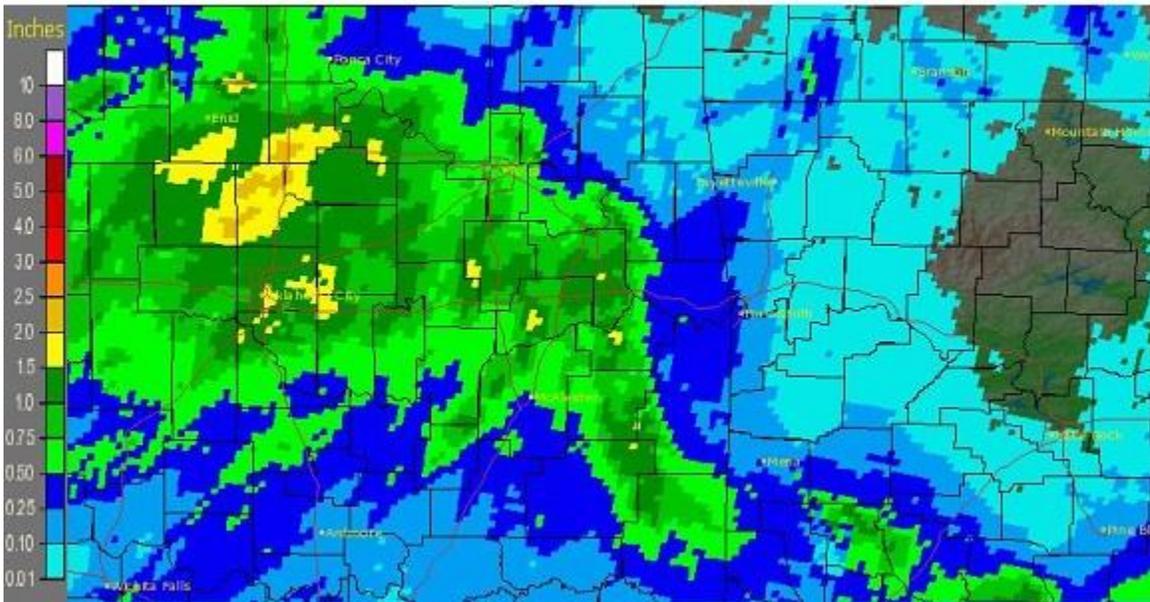
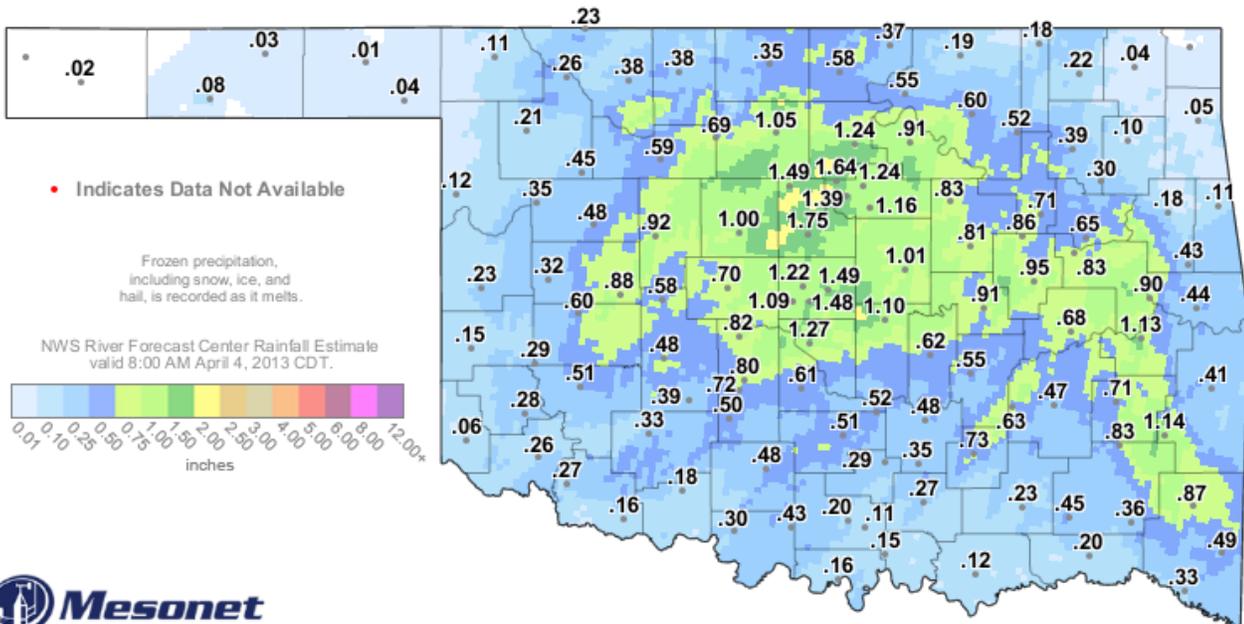


Fig. 7. Estimated Observed 24-hr Rainfall ending 7am April 4, 2013.



24-Hour Rainfall (inches)

9:35 AM April 4, 2013 CDT

Created 9:39:29 AM April 4, 2013 CDT. © Copyright 2013

Fig. 8. Estimated and observed 24-hr rainfall ending at 9:35am 4/4/2013.

The extended period of precipitation yielded some impressive rainfall totals, especially in southeast OK and west central AR (see Figs. 9, 10). Nearly the entire HSA received at least 1" of rain over the 7-day period from 1pm March 28, 2013 through 1pm April 4, 2013, with widespread totals in excess of 3" across southeast OK. Localized areas of southeast OK ended up with 5" to 6.5" of rain over the 7-day period.

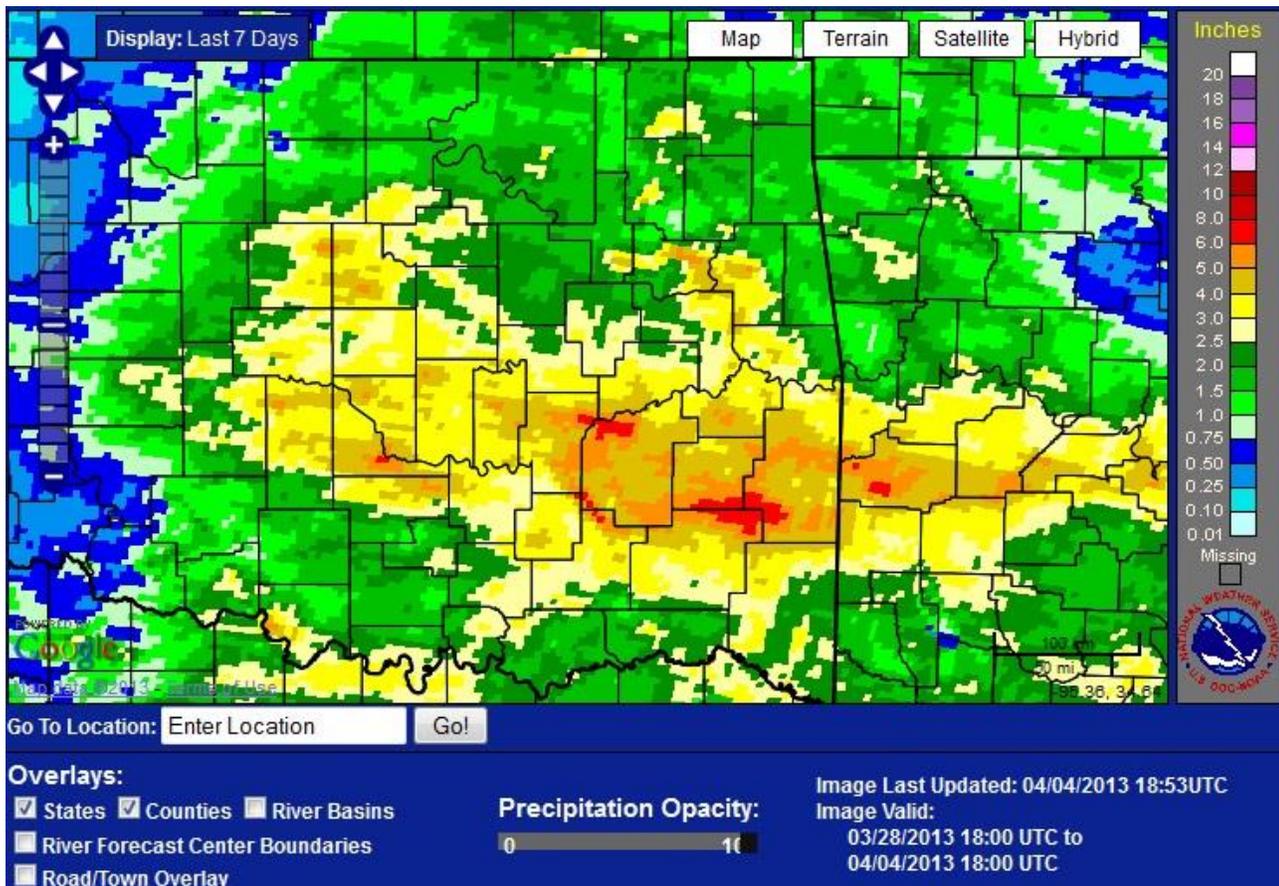
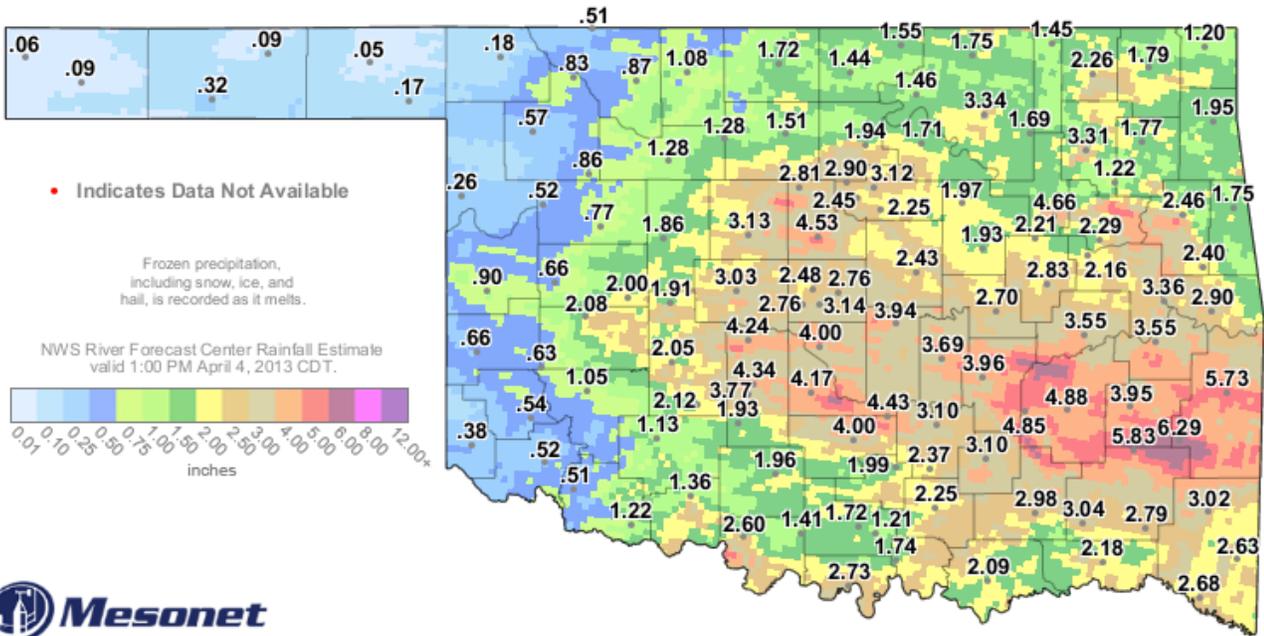


Fig. 9. Estimated Observed 7-day Rainfall ending 1ap April 4, 2013.



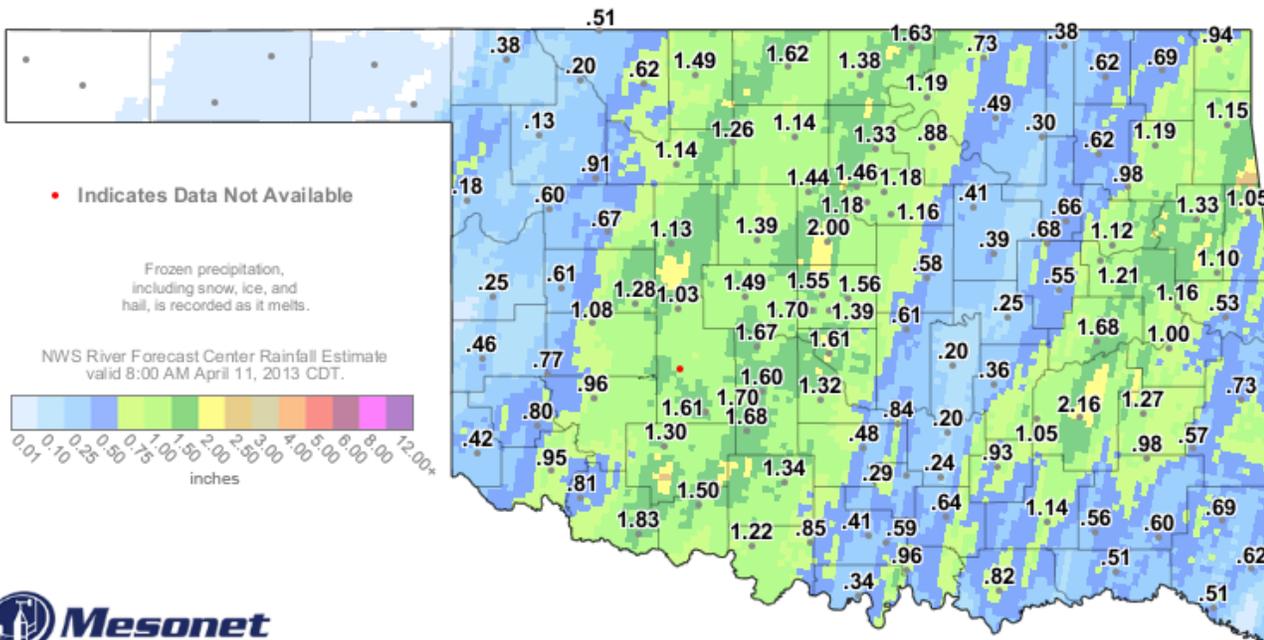
7-Day Rainfall (inches)

1:45 PM April 4, 2013 CDT

Created 1:49:09 PM April 4, 2013 CDT. © Copyright 2013

Fig. 10. Estimated and observed 7-day rainfall ending at 1:45 pm 4/4/2013.

A very strong cold front moved across eastern OK and northwest AR on the 10th. Temperatures dropped significantly as the front passed. In one hour, the temperature at McAlester dropped 26°F, at Tulsa, Bartlesville, and Muskogee dropped 18°F, and at Fort Smith and Fayetteville 11°F! Showers and thunderstorms developed along the front, with rain continuing behind the front. The individual storms were moving to the north-northeast as the front shifted eastward. This led to higher totals where the strongest thunderstorms trained, with rainfall totals of 1" to 2" across a larger portion of eastern OK and far northwest AR (see Figs. 11, 12). A few isolated locations in Pittsburg, Cherokee, Benton, and far southeast Delaware Counties received 2" to 2.5". The remainder of the area received 0.25" to 1" of rain from this event. The air reached freezing while it was still raining along the Kay-Osage County line, with reports of tiny icicles tree branches on Kaw Lake. However, the higher ice accumulations and related power outages remained west of the HSA.



2-Day Rainfall (inches)

8:55 AM April 11, 2013 CDT

Created 8:59:30 AM April 11, 2013 CDT. © Copyright 2013

Fig. 11. Estimated and observed rainfall for April 10 (image 2-day rainfall ending at 8:55 am 4/11/2013).

Tulsa, OK (TSA): Current 7-Day Observed Precipitation
 Valid at 4/12/2013 1200 UTC- Created 4/12/13 18:37 UTC

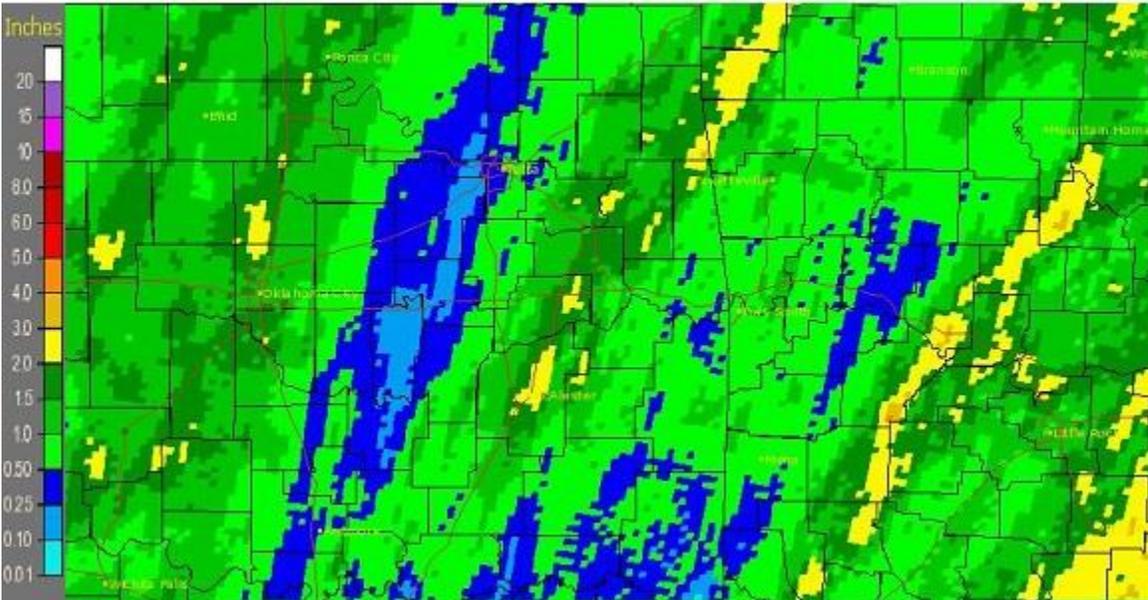


Fig. 12. Estimated Observed 7-day Rainfall ending 7am April 12, 2013.

Weak impulses in the upper-level flow brought isolated light rain April 12 through 14. Locations affected by the isolated showers received a trace to around 0.25". On the 15th, an isolated strong thunderstorm developed along a cold front and moved into southern Okfuskee County. This storm produced 0.25" to near 0.75" in far south Okfuskee County.

April 16-30

A quasi-stationary front stretched from near Oklahoma City to western Osage County during the afternoon of the 17th. Thunderstorms began to develop along the front once it started to move eastward as a cold front during the early evening hours. As additional storms developed, they congealed into a line of storms with the individual storms primarily moving north-northeast while the entire line and front shifted eastward. This led to training of storms during the late evening with widespread flash flooding reported in the area of highest rainfall totals. A corridor of widespread 3"-5" of rain occurred from Shawnee to Wagoner to Bentonville (see Figs. 13, 14). A CoCoRaHS Observer measured 7.00" 4.1ESE of Wagoner! Several State Highways were impassible due to high water, as well as many smaller city, town, and county roads. Water rescues were reported in Rogers, AR and a truck was reported stranded near Mazie, OK. Most locations northwest of I-44 received 1"-1.5", while elsewhere, rainfall totals were generally around 0.50" to around 1.5". However, isolated rainfall totals of around 2" did occur in east central OK and northwest AR. This heaviest rain fell over the Illinois River basin, causing flooding along the Flint Creek near Kansas and the Illinois River near Watts and Tahlequah (see the E3 report for further information; hydrographs available at the end of this report). A bowing segment within the line of storms over eastern OK also produced 9 tornados in Broken Arrow, Inola, Spavinaw, Salina, and Butler. [More information about this event is available.](#)

24-hr rainfall measurements >3.50" ending 7am 4/18/13:

Wagoner 4.1ESE, OK	7.00	Haskell 2E, OK	4.99	Locust Grove 4S, OK	4.67
Kansas 6ESE, OK	4.66	Pea Ridge, AR	4.58	Little Flock 2NNE, AR	4.20
Bristow 4SSE, OK	4.12	West Siloam Springs, OK	4.06	Bentonville 0.9NW, AR	4.00
Decatur 2.6ESE, AR	3.96	Bentonville 2.8SSW, AR	3.90	Porter 3ESE, OK	3.85
Bella Vista 1ESE, AR	3.80	Centerton 0.8SW, AR	3.65	Inola 6SSW, OK (L&D 18)	3.60
Colcord 4N, OK	3.56	Jay 3.3 NNE, OK	3.50		

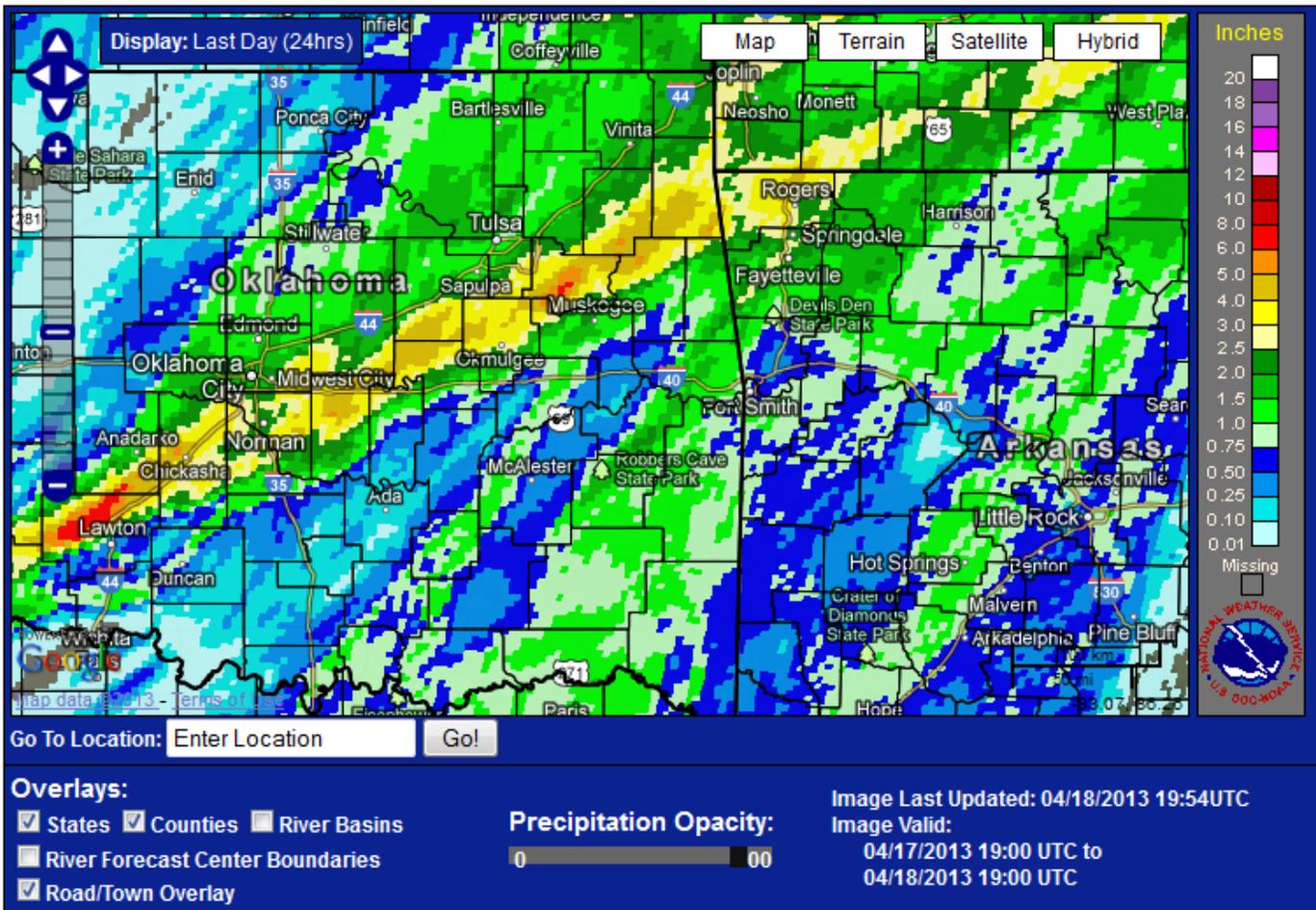
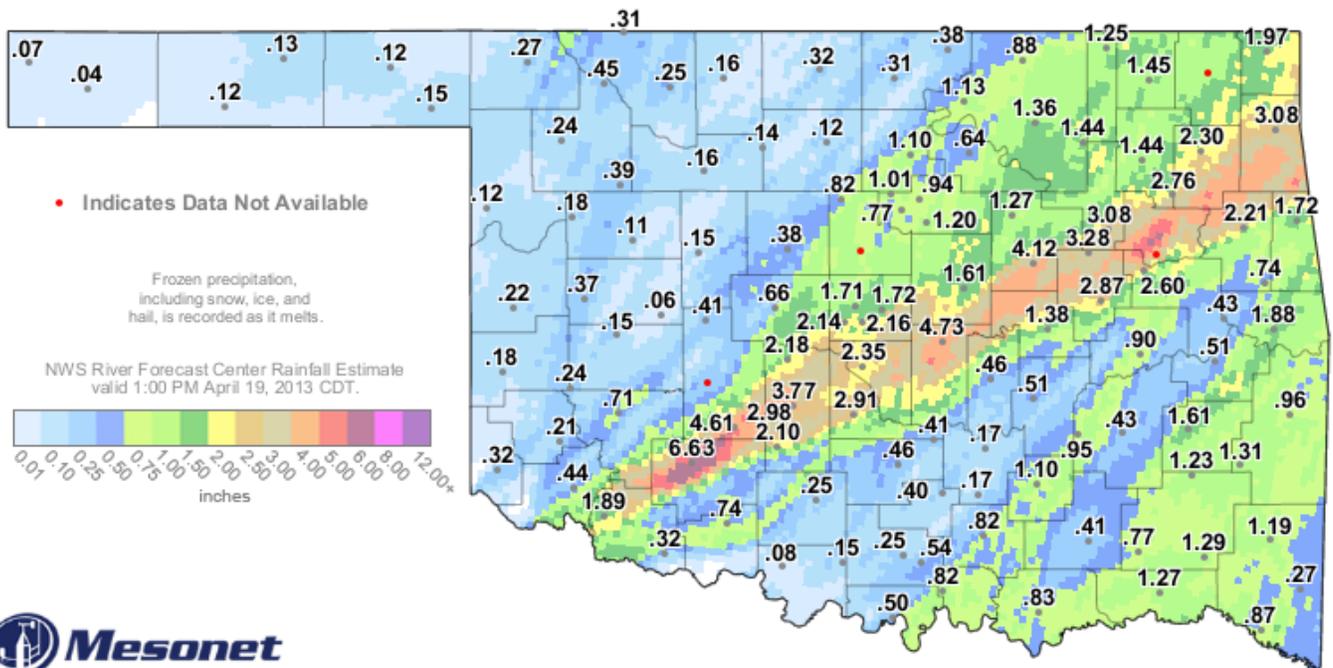


Fig. 13. Estimated Observed 2-day Rainfall ending 2pm CDT April 18, 2013.



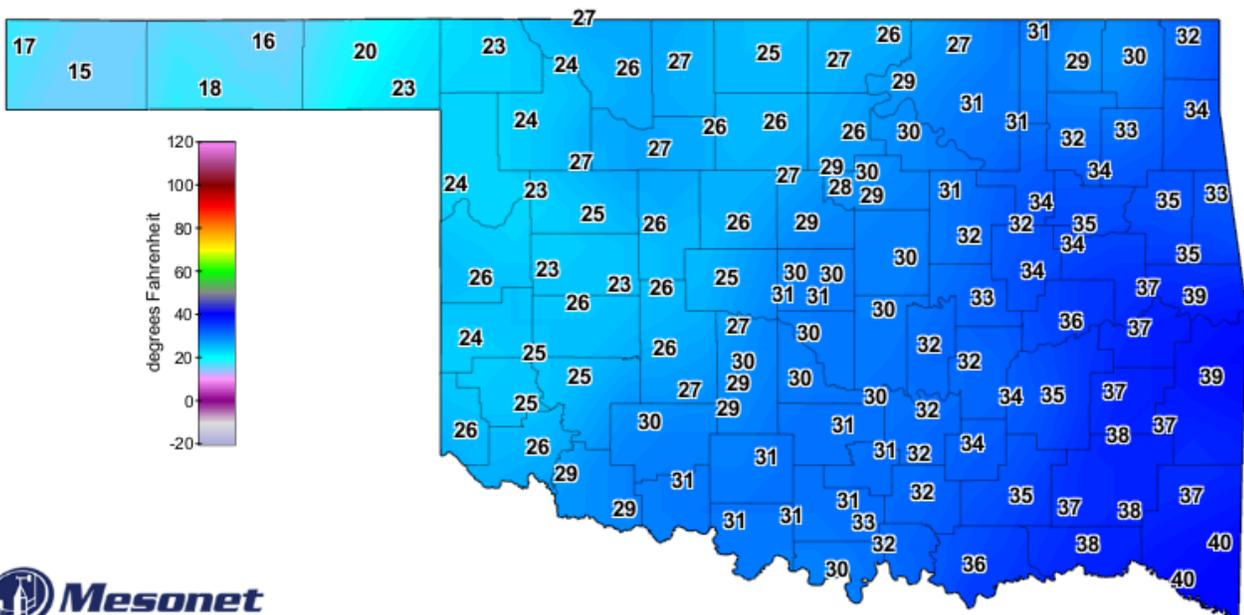
3-Day Rainfall (inches)
 Fig. 14. Estimated and Observed 3-day Rainfall ending 2pm CDT April 19, 2013.

2:00 PM April 19, 2013 CDT
 Created 2:05:06 PM April 19, 2013 CDT. © Copyright 2013



Fig. 15. Flint Creek 1.5 miles from the Twisters gas station on Hwy 412, 10 miles east of Siloam Springs, AR. Submitted at 10am CDT 4/18/2013 by Michael J Craddock via NWS Tulsa Facebook.

Scattered showers and isolated thunderstorms developed during the afternoon of the 22nd over northeast OK ahead of an approaching cold front. Additional thunderstorms developed along the cold front later in the evening and moved northeast across northeast OK. This activity brought 0.10" to near 0.75" of rain to locations along and north of I-44 plus portions of Okmulgee and Okfuskee Counties. As the front continued to move southeast on the 23rd, post-frontal light rain and drizzle persisted. Locations southeast of a McAlester to Bentonville line received 0.10" to around 0.50", with less than 0.10" elsewhere. Even a few snow flurries occurred in Osage County as significantly colder air, especially for April, moved in behind the front. Temperatures fell below freezing across northeast OK on the morning of the 24th (see Fig. 16).

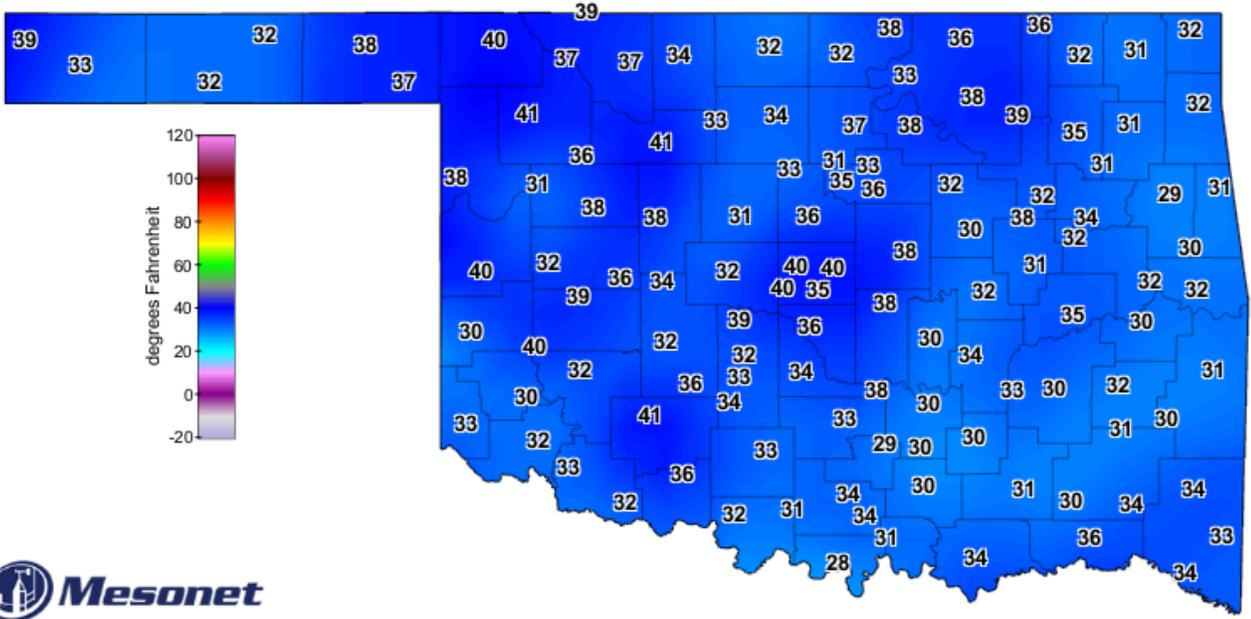


Minimum Air Temperature Since Midnight (°F)

8:45 AM April 24, 2013 CDT

Created 8:50:03 AM April 24, 2013 CDT. © Copyright 2013

Fig. 16. OK Mesonet low temperatures on the morning of April 24, 2013.



Minimum Air Temperature Since Midnight (°F)

7:45 AM April 25, 2013 CDT

Created 7:49:09 AM April 25, 2013 CDT. © Copyright 2013

Fig. 17. OK Mesonet low temperatures on the morning of April 25, 2013.

High pressure and light winds over the region allowed temperatures to fall into the 30s on the morning of the 25th, with near to below freezing temperatures across portions of eastern OK and far northwest AR (see Fig. 17). Showers and thunderstorms affected northeast OK and northwest AR early on the 26th as strong isentropic lift developed in advance of a short-wave trough. This activity continued through the day and spread over all of eastern OK and northwest AR before ending on the 27th as the wave moved east of the region. A line of strong to severe thunderstorms extended from northwest AR into southeast OK, bringing locally heavy rain. Rainfall totals from this event ranged from around 0.25" to near 2" (see Fig. 18).

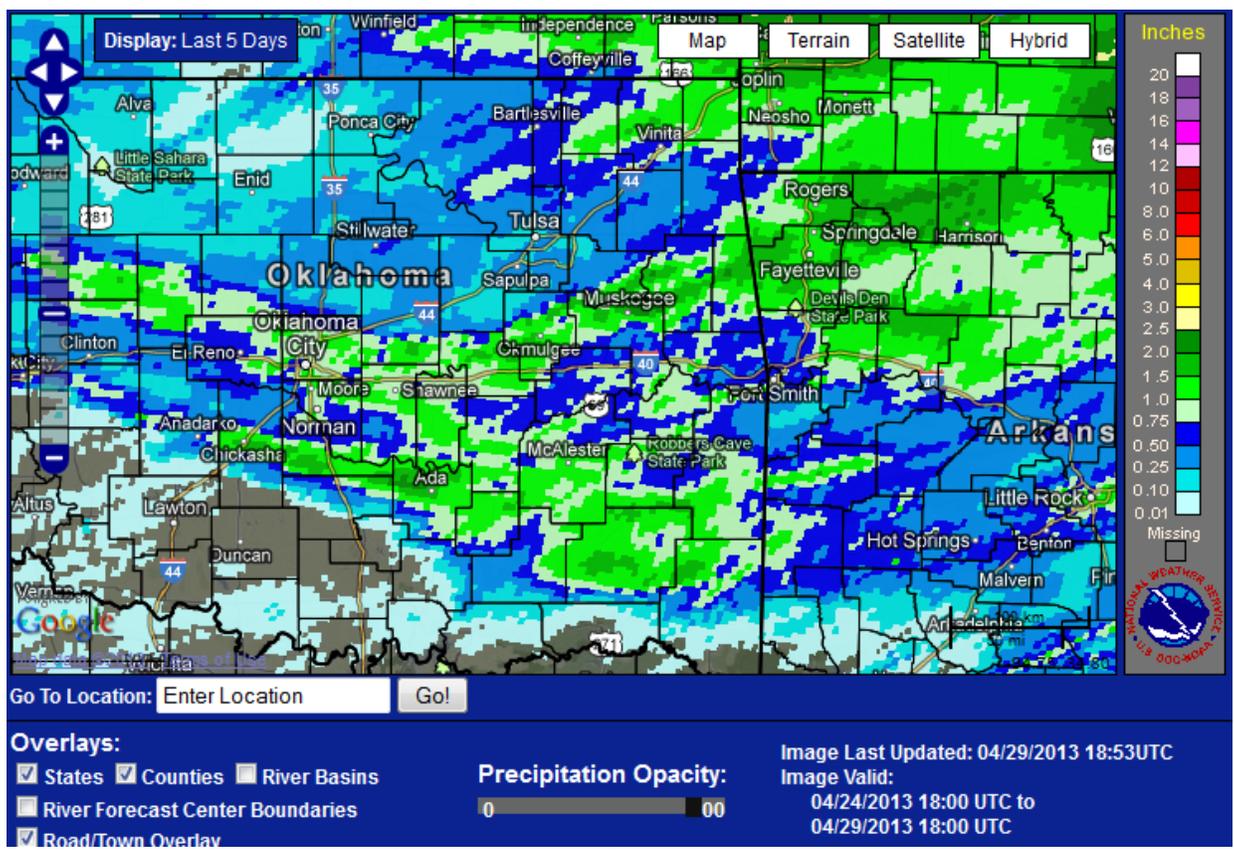


Fig. 18. Estimated Observed 5-day Rainfall ending 1pm CDT April 29, 2013

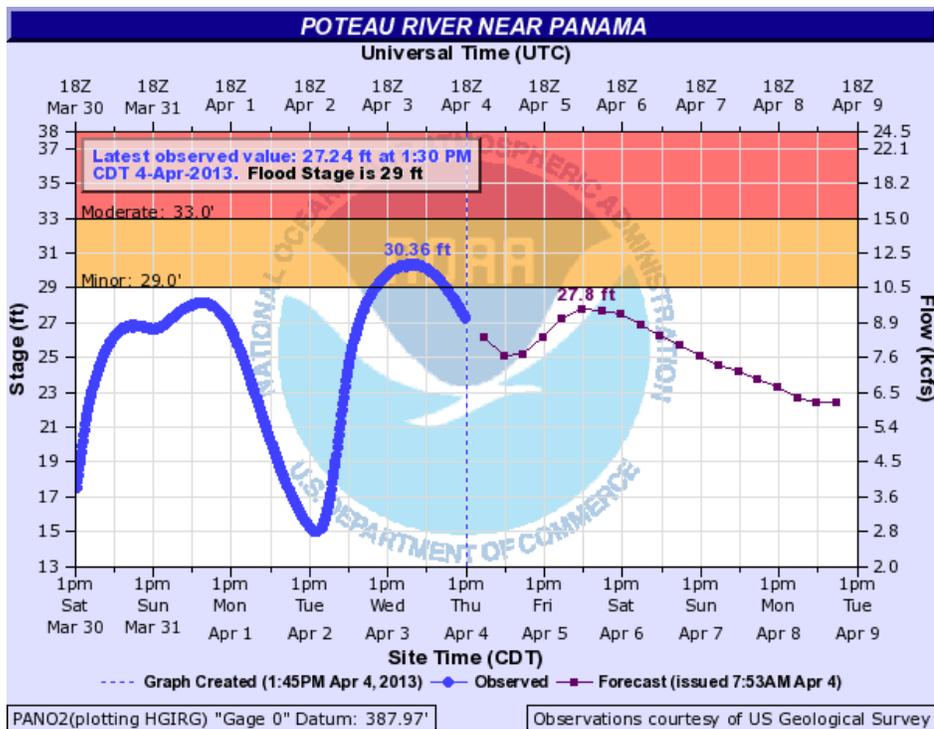
Written by:

Nicole McGavock
Service Hydrologist
WFO Tulsa

Products issued in April 2013:

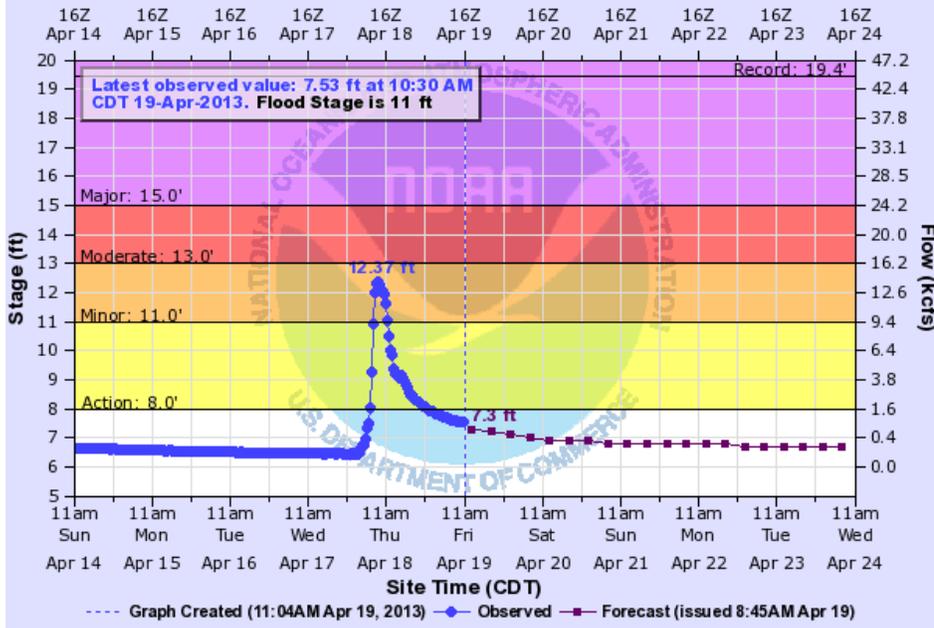
- 3 Flash Flood Warnings (FFW)
- 1 Flash Flood Statements (FFS)
- 2 Flash/Areal Flood Watches (FFA) (5 Watch FFA CON/EXT/CAN)
- 0 Urban and Small Stream Advisories (FLS)
- 10 Areal Flood Warnings (FLW)
- 5 Areal Flood Statements (FLS)
- 8 River Flood Warnings (FLW)
- 21 River Flood Statements (FLS)
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

Preliminary Hydrographs:



FLINT CREEK NEAR KANSAS

Universal Time (UTC)

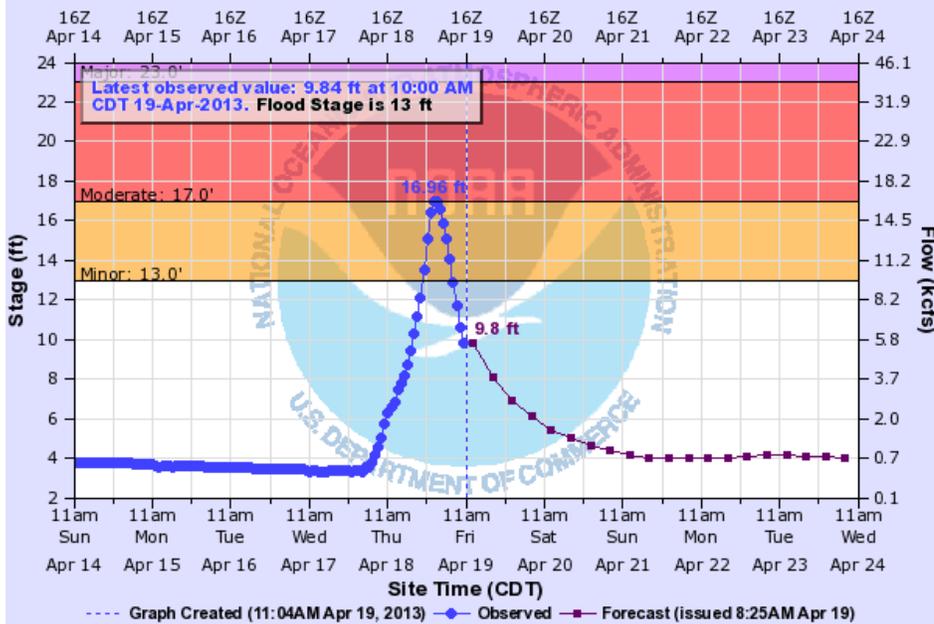


KNSO2(plotting HGIRG) "Gage 0" Datum: 854.59'

Observations courtesy of US Geological Survey

ILLINOIS RIVER NEAR WATTS

Universal Time (UTC)

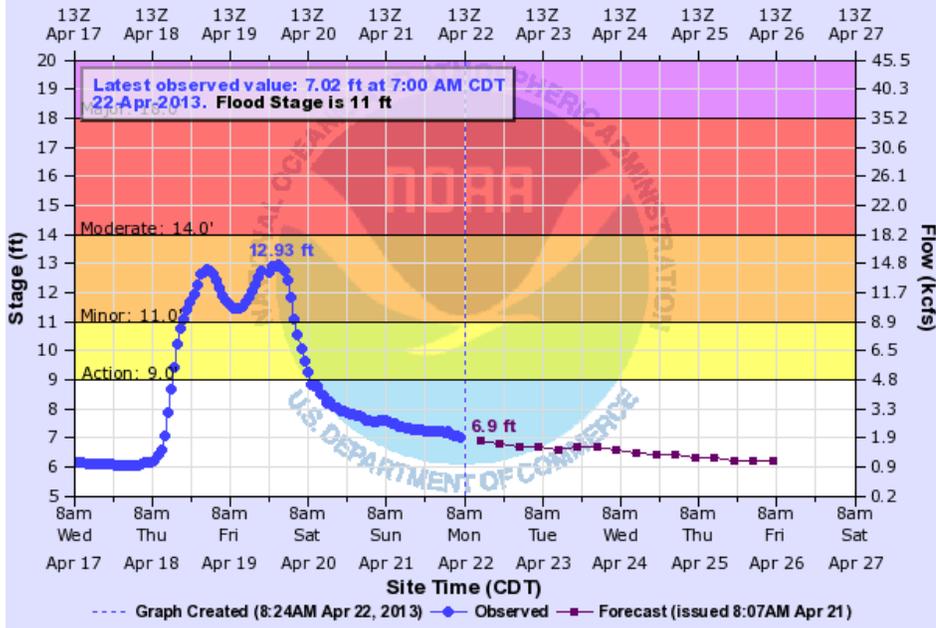


WTO2(plotting HGIRG) "Gage 0" Datum: 893.77'

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