

**MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS**

REPORT FOR:

MONTH

**February**

YEAR

**2013**

SIGNATURE

**Steven F. Piltz**

(Meteorologist-in-Charge)

TO: Hydrometeorological Information Center, W/OH2  
NOAA / National Weather Service  
1325 East West Highway, Room 7230  
Silver Spring, MD 20910-3283

DATE

**March 1, 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.

Two widespread rain/snow events at the end of February 2013 helped to alleviate the ongoing drought conditions, at least in the short-term, across eastern OK and northwest AR. Normal precipitation across the Hydrologic Service Area (HSA) in February ranges from 1.8 inches in Osage County to 3.2 inches in Choctaw County. In the Ozark region of northwest Arkansas, the normal monthly precipitation is 2.9 inches.

**Monthly Summary**

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 1a), rainfall totals for February 2013 ranged from 2” to around 5”, with the highest totals in east central OK and west central AR. Far southeast OK and far northwest AR still ended the month with only 50%-90% of the normal February rainfall (Fig. 1b), though a large portion of the area did receive 125% to around 200% of the normal this month.

**Tulsa, OK (TSA): February, 2013 Monthly Observed Precipitation**  
Valid at 3/1/2013 1200 UTC - Created 3/1/13 15:41 UTC

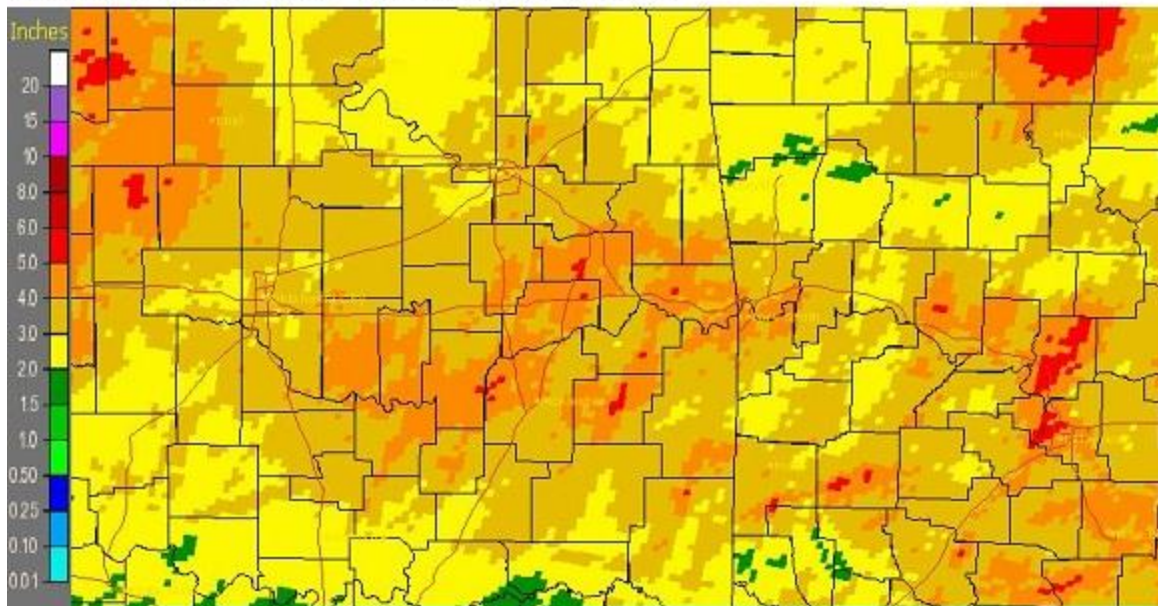


Fig. 1a. Estimated Observed Rainfall for February 2013

Tulsa, OK (TSA): February, 2013 Monthly Percent of Normal Precipitation  
 Valid at 3/1/2013 1200 UTC- Created 3/1/13 15:45 UTC

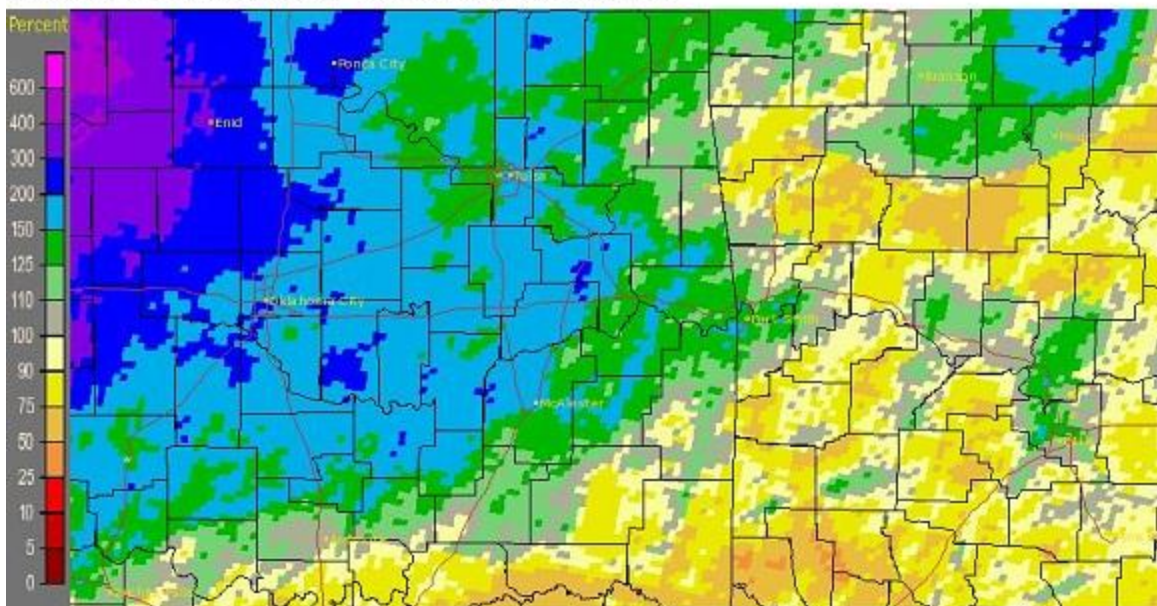


Fig. 1b. Estimated % of Normal Rainfall for February 2013

In Tulsa, OK, February 2013 ranked as the 48<sup>th</sup> coldest February (41.0°F; since records began in 1905), the 12<sup>th</sup> wettest February (3.18", tied 1903, 1913; since records began in 1888), and the 27<sup>th</sup> snowiest February (3.7"; since records began in 1900). Fort Smith, AR was the 53<sup>rd</sup> warmest February (44.6°F; since records began in 1883), the 25<sup>th</sup> wettest February (4.46"; since records began in 1883), and the 22<sup>nd</sup> snowiest February (4.0", tied 2010; since records began in 1884). Fayetteville, AR was the 26<sup>th</sup> coldest (38.4°F), the 29<sup>th</sup> wettest (2.82"), and the 27<sup>th</sup> snowiest February since records began in 1950.

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

Oktaha, OK (coop)	4.49	Fort Smith, AR (ASOS)	4.46	Cookson, OK (meso)	4.35
Eufaula, OK (meso)	4.13	Wilburton, OK (meso)	4.12	Natural Dam, AR (coop)	4.04
McAlester, OK (meso)	4.02	Claremore 2ENE, OK (coop)	3.92	Antlers, OK (coop)	3.89

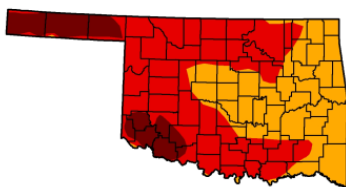
Some of the lowest precipitation reports (in inches) for February 2013 included:

Jay, OK (meso)	2.09	Miami, OK (meso)	2.19	NW Arkansas Regional Arpt (ASOS)	2.24
Westville, OK (meso)	2.43	Vinita, OK (meso)	2.76	Spavinaw, OK (coop)	2.79
Copan, OK (meso)	2.79	Hugo, OK (meso)	2.80	Fayetteville, AR (ASOS)	2.82

### U.S. Drought Monitor Oklahoma

February 26, 2013  
Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	100.00	61.65	11.80
Last Week (02/19/2013 map)	0.00	100.00	100.00	100.00	86.80	41.64
3 Months Ago (11/27/2012 map)	0.00	100.00	100.00	99.64	90.50	34.46
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 (02/21/2012 map)	24.91	75.09	66.46	41.79	19.03	3.78



**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.

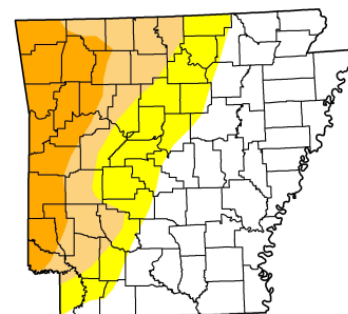
<http://droughtmonitor.unl.edu>

USDA National Drought Mitigation Center  
 Released Thursday, February 28, 2013  
 Brian Fuchs, National Drought Mitigation Center

### U.S. Drought Monitor Arkansas

February 26, 2013  
Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	50.22	49.78	31.54	16.23	0.00	0.00
Last Week (02/19/2013 map)	50.21	49.79	31.74	17.44	0.00	0.00
3 Months Ago (11/27/2012 map)	18.15	81.85	65.96	42.30	23.78	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 (02/21/2012 map)	94.01	5.99	1.16	0.05	0.00	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>

USDA National Drought Mitigation Center  
 Released Thursday, February 28, 2013  
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Fig. 2. Drought Monitor for Oklahoma

Fig. 3. Drought Monitor for Arkansas

According to the [U.S. Drought Monitor](http://droughtmonitor.unl.edu) (USDM) from February 26, 2013 (Figs 2, 3), all of eastern OK and northwest AR was in Severe to Extreme drought, except for Carroll County in Moderate drought. The rain and snow at the end of February helped reduce the drought impacts across the HSA, and for the first time since the

end of July 2012, exceptional (D4) drought was not affecting eastern OK or northwest AR. Extreme drought (D3) conditions were still affecting portions of Osage, Pawnee, Creek, western Tulsa, Washington, and western Nowata Counties in eastern OK. Severe (D2) drought was present across the remainder of the area, except for Carroll County, where Moderate (D1) conditions existed.

Many of the major reservoirs in the Tulsa HSA were operating below 90% of their conservation pools as of February 28, 2013. However, the two end-of-the-month rain/snow events caused a few reservoirs to be above their conservation pools: Hudson Lake 111%, Wister Lake 104%, Pensacola Lake 103%, Ft. Gibson Lake 103%, and Hugo Lake 102%. Reservoirs reporting conservation pool deficits below 90% as of February 28, 2013: Hulah Lake 48%, Birch Lake 50%, Skiatook Lake 64%, Beaver Lake 75% Eufaula Lake 76%, Tenkiller Lake 80%, Copan Lake 83%, Oologah Lake 84%, and Keystone Lake 87%.

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

Rank since 1921	Last 30 Days (Jan 30 – Feb 28)	Year-to-Date 2013 (Jan 1 – Feb 28)	Winter 2012-13 (Dec 1 – Feb 28)	Last 120 Days (Nov 1 – Feb 28)	Water Year-to-Date (Oct 1 – Feb 28)	Cool Growing Season (Sep 1 – Feb 28)	Last 365 Days (Mar 1, 2012 – Feb 28, 2013)
Northeast OK	<b>14<sup>th</sup> wettest</b>	<b>13<sup>th</sup> wettest</b>	33 <sup>rd</sup> wettest	37 <sup>th</sup> driest	27 <sup>th</sup> driest	22 <sup>nd</sup> driest	17 <sup>th</sup> driest
East Central OK	23 <sup>rd</sup> wettest	25 <sup>th</sup> wettest	40 <sup>th</sup> wettest	29 <sup>th</sup> driest	19 <sup>th</sup> driest	23 <sup>rd</sup> driest	<b>10<sup>th</sup> driest</b>
Southeast OK	26 <sup>th</sup> wettest	34 <sup>th</sup> wettest	44 <sup>th</sup> driest	18 <sup>th</sup> driest	<b>12<sup>th</sup> driest</b>	<b>6<sup>th</sup> driest</b>	<b>6<sup>th</sup> driest</b>
Statewide	<b>12<sup>th</sup> wettest</b>	<b>15<sup>th</sup> wettest</b>	29 <sup>th</sup> wettest	36 <sup>th</sup> driest	18 <sup>th</sup> driest	19 <sup>th</sup> driest	<b>10<sup>th</sup> driest</b>

### Winter 2012-13 (December, January, February)

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 4a), rainfall totals for Winter 2012-13 ranged from 4" to near 15" northwest to southeast across the HSA. Overall, most of the area was 50% to around 100% of normal rainfall for the winter time period (Fig. 4b), though a few areas ended the winter with above normal precipitation.

Tulsa, OK (TSA): Current 90-Day Observed Precipitation  
Valid at 3/1/2013 1200 UTC- Created 3/1/13 16:13 UTC

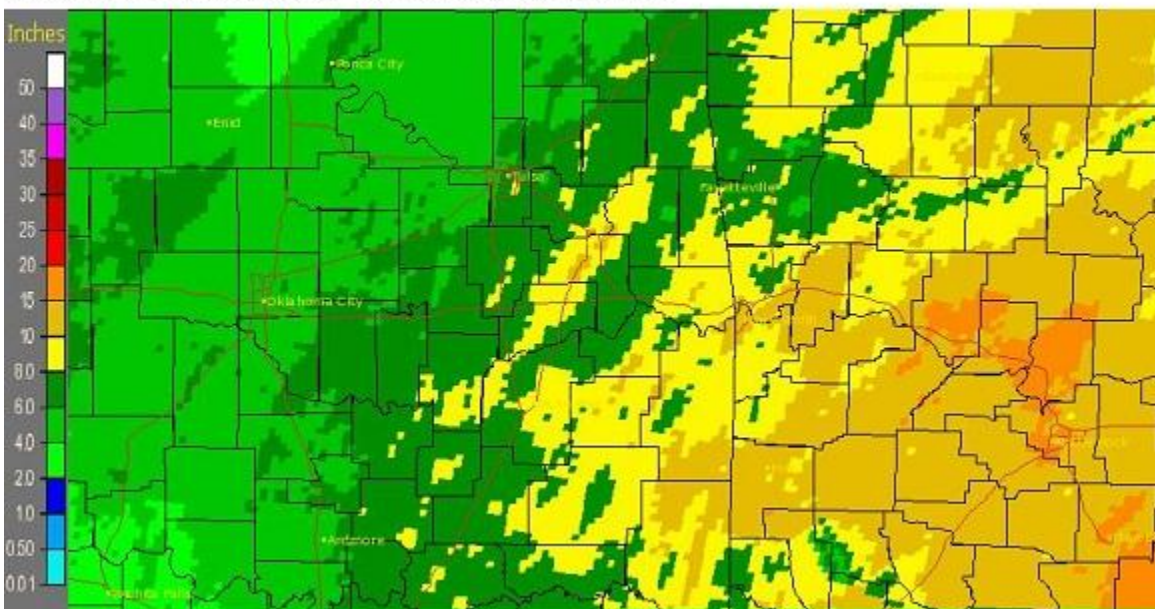


Fig. 4a. Estimated Observed Rainfall for Winter 2012-13

Tulsa, OK (TSA): Current 90-Day Percent of Normal Precipitation  
Valid at 3/1/2013 1200 UTC- Created 3/1/13 16:17 UTC

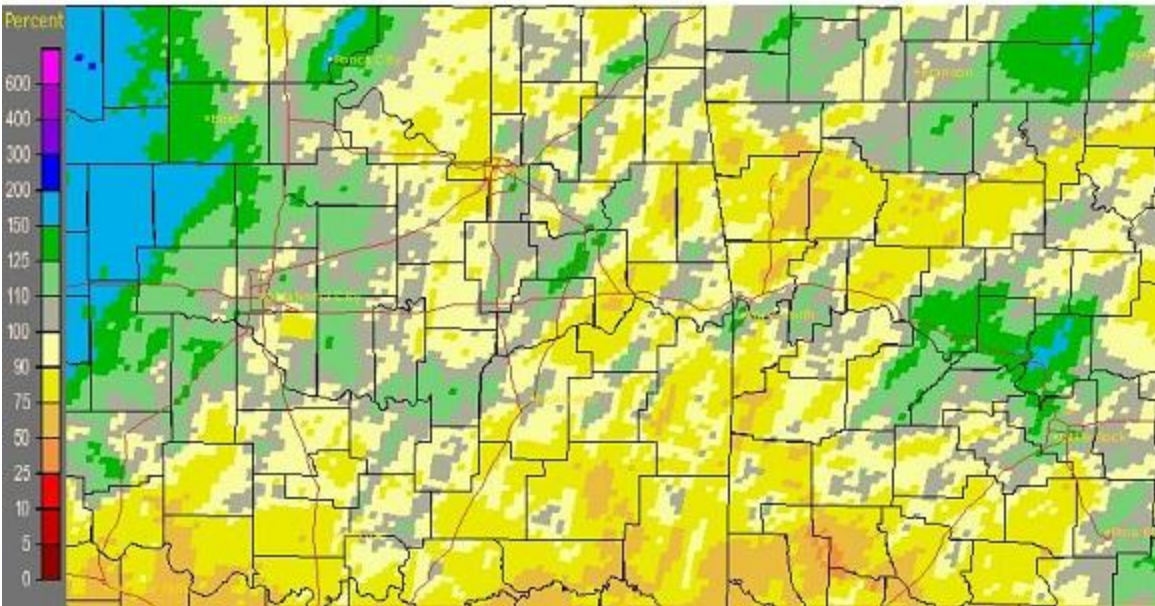


Fig. 4b. Estimated % of Normal Rainfall for Winter 2012-13

In Tulsa, OK, Winter 2012-13 ranked as the 25<sup>th</sup> warmest Winter (41.7°F, tied 1907-08; since records began in 1905-06) and the 55<sup>th</sup> wettest Winter (5.57"; since records began in 1888-89). 5.4" of snow was recorded December 2012 – February 2013 in Tulsa. Fort Smith, AR was the 16<sup>th</sup> warmest Winter (44.7°F; since records began in 1882-83) and the 21<sup>st</sup> wettest Winter (11.18"; since records began in 1882-83). 10.0" of snow was recorded December 2012 – February 2013 in Fort Smith. Fayetteville, AR was the 16<sup>th</sup> warmest (39.8°F) and the 23<sup>rd</sup> wettest (8.70") Winter since records began in 1949-50. 3.3" of snow was recorded December 2012 – February 2013 in Fayetteville.

## **Outlooks**

The [Climate Prediction Center](#) (CPC) outlook for March 2013 (issued February 28, 2013) indicates equal chances for above, near, and below normal temperatures and equal chances for above, near, and below median precipitation across all of eastern OK and northwest AR. This outlook is based primarily on short-range computer models and recent snow, rain, and corresponding soil moisture impacts on temperatures in the short term.

For the 3-month period Mar-Apr-May 2013, CPC is forecasting a greatly 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 February 21, 2013). According to CPC, ENSO neutral conditions remained through February. ENSO neutral conditions are expected to continue well into Spring 2013, followed by uncertain conditions in the ENSO state beyond that time. 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**

### **February 1-14**

Light rain affected far eastern OK and western AR, generally along and east of McAlester to Jay line on the 4<sup>th</sup>. Most locations received around one tenth of an inch or less, though a few spots received around one quarter of an inch of rain.

Widely scattered showers and isolated thunderstorms affected portions of southeast OK during the afternoon and evening of the 6<sup>th</sup> ahead of a shortwave moving through TX. However, additional rain held off until the 7<sup>th</sup> as a cold front moved through the region. Locations near the KS/OK state line as well as east central/southeast OK and northwest AR received generally around 0.50" of rain (see Fig. 5). Isolated places received around 0.75" while other locations received less than 0.10".

Tulsa, OK (TSA): 2/8/2013 1-Day Observed Precipitation  
Valid at 2/8/2013 1200 UTC- Created 2/10/13 23:31 UTC

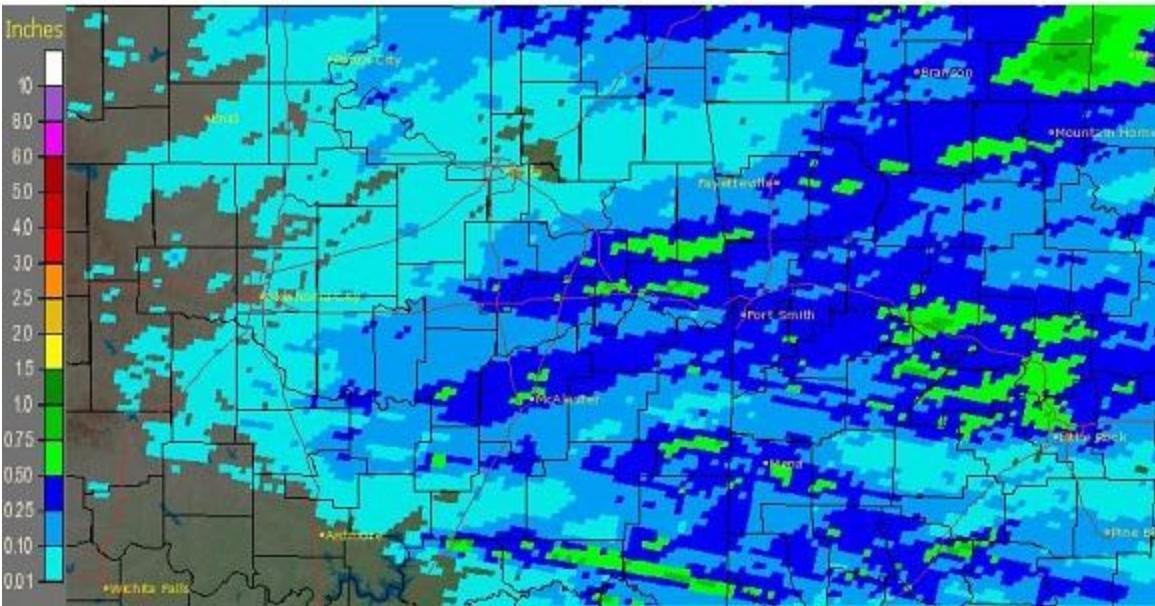


Fig. 5. Estimated Observed Rainfall for February 7, 2013

Showers and scattered thunderstorms developed across eastern OK and northwest AR late in the day on the 9<sup>th</sup> as a low pressure system moved out of the Rockies and into the central plains. This system brought widespread rain, with most of the area receiving 0.10" to 0.50". Higher totals of 0.50" to near 1.5" occurred from southeast OK into northwest AR (see Fig. 6).

Tulsa, OK (TSA): 2/10/2013 1-Day Observed Precipitation  
Valid at 2/10/2013 1200 UTC- Created 2/12/13 23:30 UTC

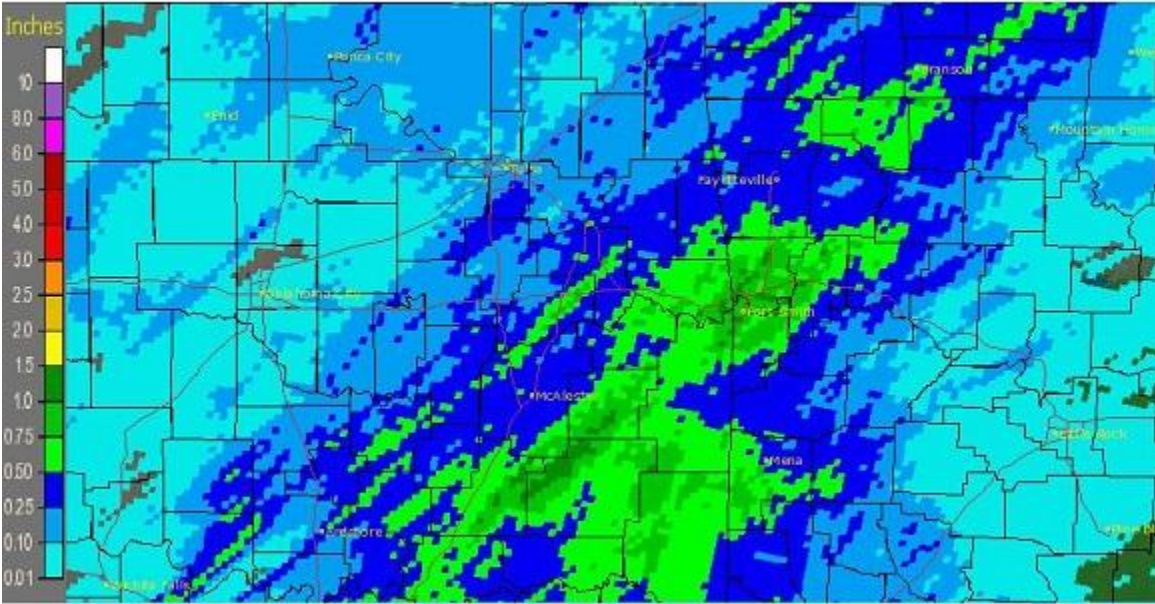


Fig. 6. Estimated Observed Rainfall for February 9, 2013

Rain affected all of eastern OK and northwest AR on the 12<sup>th</sup> in advance of an approaching upper-level low. By mid-morning, temperatures had cooled enough for a change over to snow across the western portions of Osage and Pawnee Counties. As the cold core low moved into northeast OK during the evening, the rain to snow transition continued from west to east across primarily the northern half of the HSA. Near surface temperatures remained at or above freezing, allowing the precipitation to go back and forth between rain and snow. The above normal temperatures also caused the snow to melt quickly despite being heavy at times. The highest snowfall report was 3" near Grainola, OK (Osage Co.) and near Kingston, AR (Madison Co). The remainder of the reports indicated around 0.5" to 1.5" of snow, primarily in the northern portions of Osage,

Washington, Nowata, and Ottawa Counties, and the higher elevations of northwest AR. Tulsa recorded 0.1" of snow, making this the latest first measureable snow of the cold season since 1931-32 (first measureable snow for the 1931-32 season was on March 7, 1932). Up to 0.5" of snow was reported around the Tulsa metro area. Rainfall and snow liquid equivalent totals from this event ranged from around 0.25" to around 1" (see Fig. 7), with the highest amounts across southeast OK.

Tulsa, OK (TSA): 2/13/2013 1-Day Observed Precipitation  
Valid at 2/13/2013 1200 UTC- Created 2/13/13 15:40 UTC

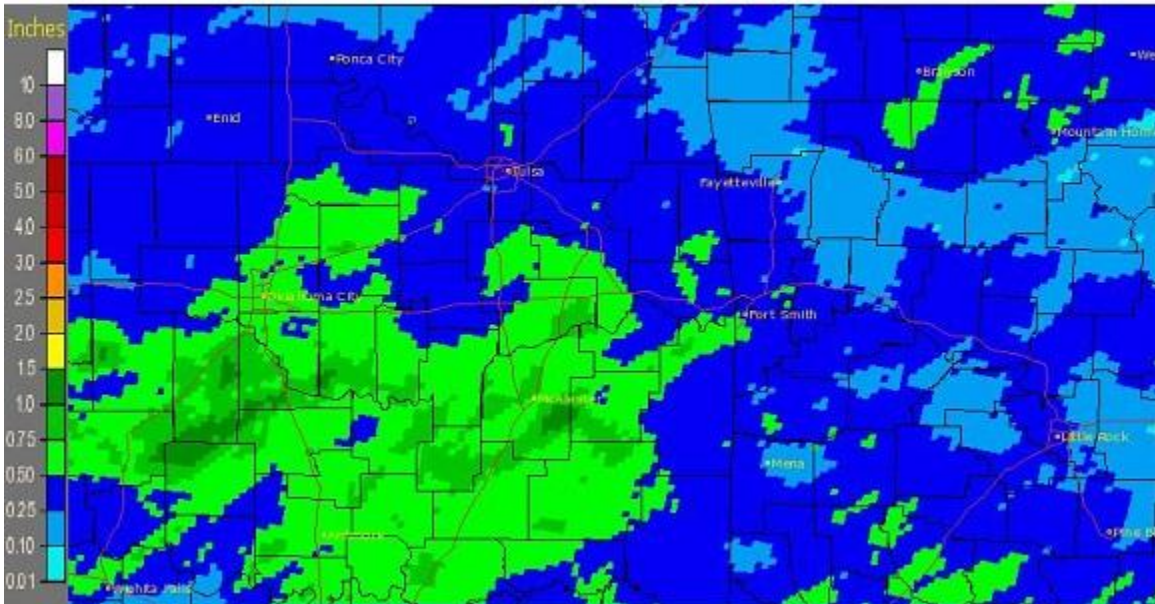


Fig. 7. Estimated Observed Rainfall/Liquid Equivalent for February 12, 2013

## **February 15-28**

A strong low-level jet aided in increasing the moisture across eastern OK and northwest AR ahead of a cold front that moved into the area on the 18<sup>th</sup>. Showers and isolated thunderstorms developed during the late morning hours across far eastern OK, along and east of a Vinita to Muskogee to Hugo line, and then spread east through western AR. Due to the fast moving storms, most locations received less than 0.50" of rainfall.

A winter storm on February 20-21 brought most precipitation types to eastern OK and northwest AR: snow, sleet, freezing rain, rain, and even hail! The precipitation began mainly as snow and sleet during the morning hours of the 20<sup>th</sup> due to isentropic lift north of a warm front that was located near the Red River. Temperatures across the region were generally a few degrees either side of freezing. This caused the precipitation type to transition back and forth between rain, snow, and sleet throughout the day, and allowed for significant melting to occur. The snow accumulated primarily on grassy surfaces. Roads became more impacted during the periods of heaviest snowfall, but the snow then quickly melted once the snowfall rates eased. The snow/sleet totals ranged from 0.5" to 4", with the highest totals occurring near and to the north of I-40 (see Fig. 8). By the mid-evening hours of the 20<sup>th</sup>, the precipitation was making a transition to more liquid and/or freezing rain as warmer aloft moved into the region. Locations with subfreezing surface temperatures began to experience ice accumulation on elevated surfaces by late evening. Scattered showers and thunderstorms continued through the overnight hours, bringing rain, freezing rain, sleet, and hail. A line of thunderstorms moved quickly east across the region during the morning hours, bringing the last of the precipitation for this event. Icing conditions were worst across the OK counties that border KS, as well as near the OK/AR state line and into northwest AR. The highest ice accumulation reported was 0.50" in Carroll and Washington AR Counties, causing small limbs to break off of trees. Liquid precipitation totals for the 2-day event were 0.75" to 1.5" over most of eastern OK and northwest AR (see Figs. 9, 10).

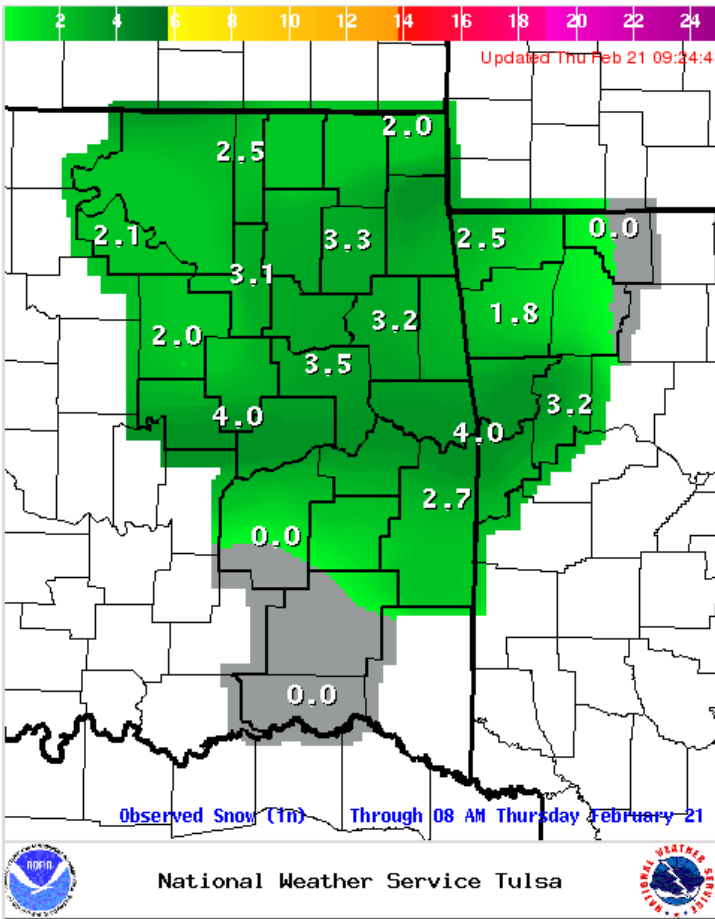


Fig. 8. Estimated and observed snowfall total map through 8am Feb. 21, 2013.

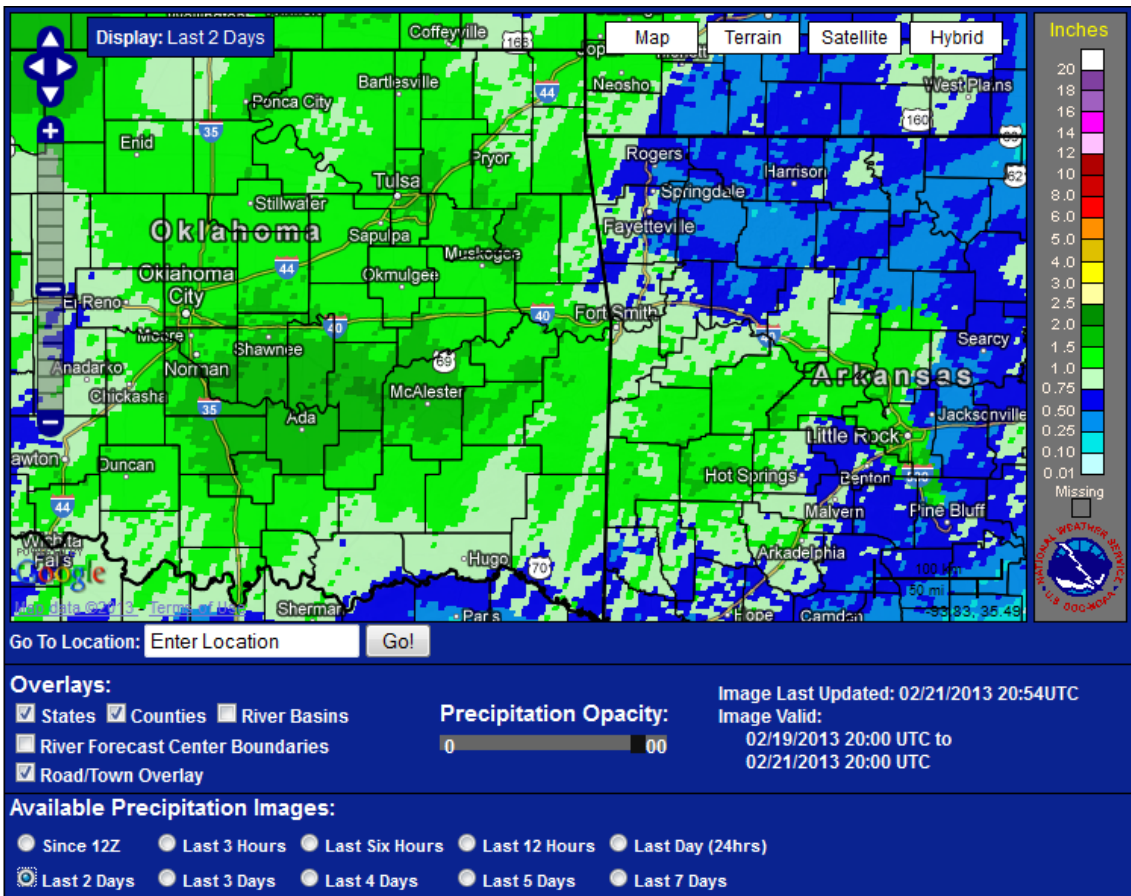


Fig. 9. Estimated and observed liquid total map through 2pm Feb. 21, 2013.

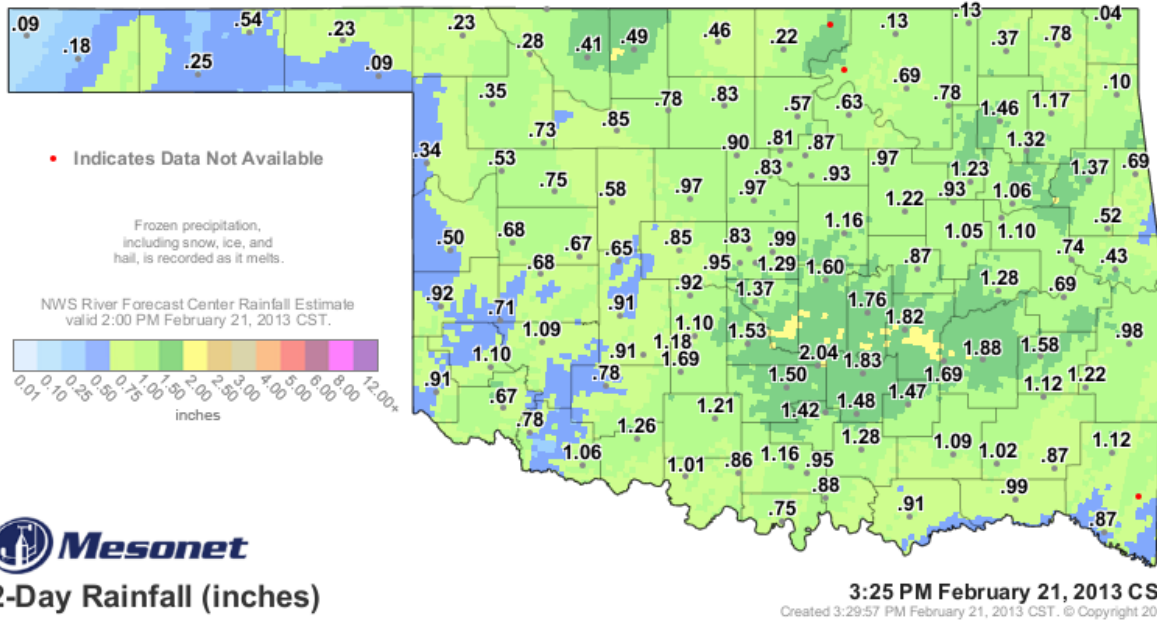


Fig. 10. Estimated and observed liquid total map through 3:25pm Feb. 21, 2013.

A powerful low pressure system moved across northern TX on the 25<sup>th</sup> before lifting northeast over AR on the 26<sup>th</sup>. Showers and thunderstorms initially affected eastern OK and western AR during the day on the 25<sup>th</sup>, with pea to nickel sized hail reported with the stronger thunderstorms. By late afternoon, the rain began to transition to snow across north central OK, with some sleet mixing with rain in northeast OK. The precipitation finally transitioned to snow across all of northeast OK and northwest AR during the overnight and early morning hours.

A combination of temperatures near freezing and dry air being entrained into the dendritic growth region (the part of the cloud where snowflakes initially form) limited the overall snowfall accumulations. Snowfall totals ranged from 1"-3" along the I-44 corridor, with 3"-5" in Osage and Washington Counties. Elsewhere, snowfall totals were generally 0.5"- 1.5" (see Fig. 13). The snow mainly accumulated on grassy surfaces and melted on roadways, limiting the overall impact. Light snow lingered across far northeast OK and northwest AR during the morning of the 26<sup>th</sup> before the system moved east of the region. (Western/northwestern OK did not fare as well, with blizzard conditions causing zero visibilities, snow accumulations of 12"-18", widespread power outages, and closed interstates.) Storm total rainfall/liquid equivalent values were 0.50" to 1.5" across most of eastern OK and northwest AR (see Figs. 11, 12).

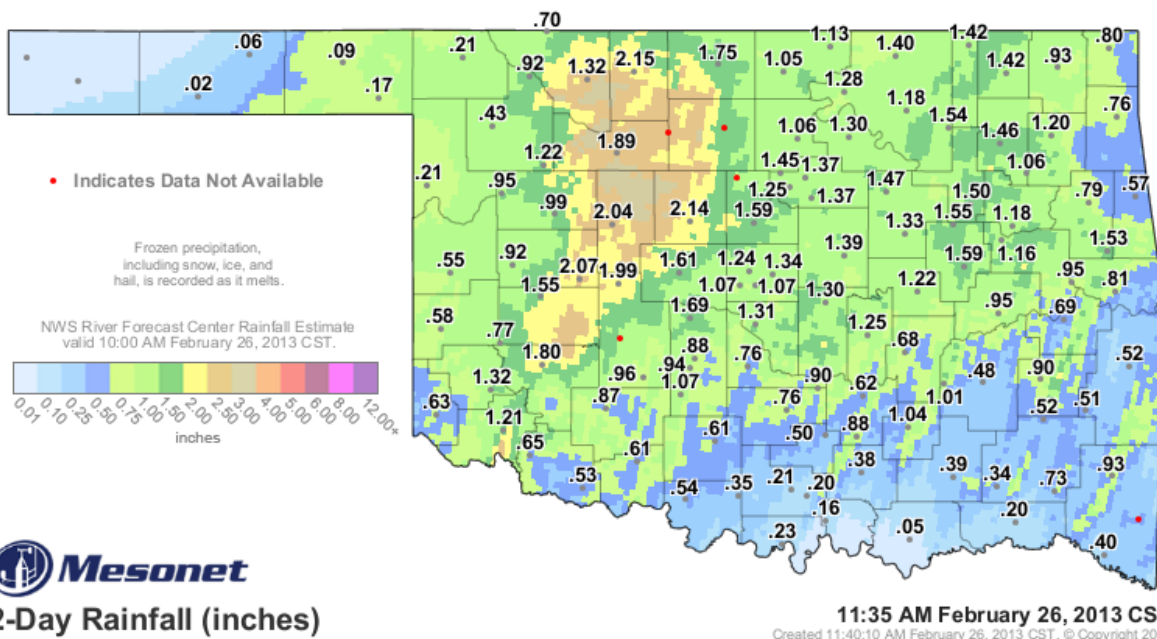


Fig. 11. Estimated and observed liquid total map through 11:35am Feb. 26, 2013 **NOTE:** measured values in the panhandle and western OK are not representative due to precipitation still being frozen. The colored image, however, does include the liquid estimate.



Tulsa, OK (TSA): 2/26/2013 1-Day Observed Precipitation  
 Valid at 2/26/2013 1200 UTC- Created 2/26/13 17:41 UTC

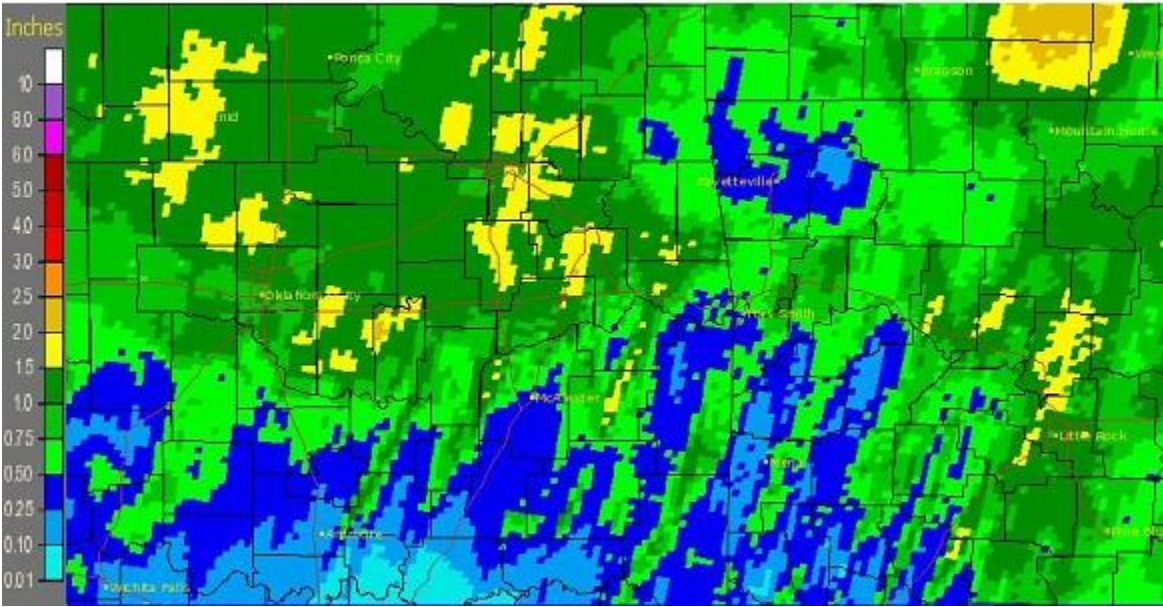


Fig. 12. Estimated Observed Rainfall/Liquid Equivalent for February 25-26, 2013

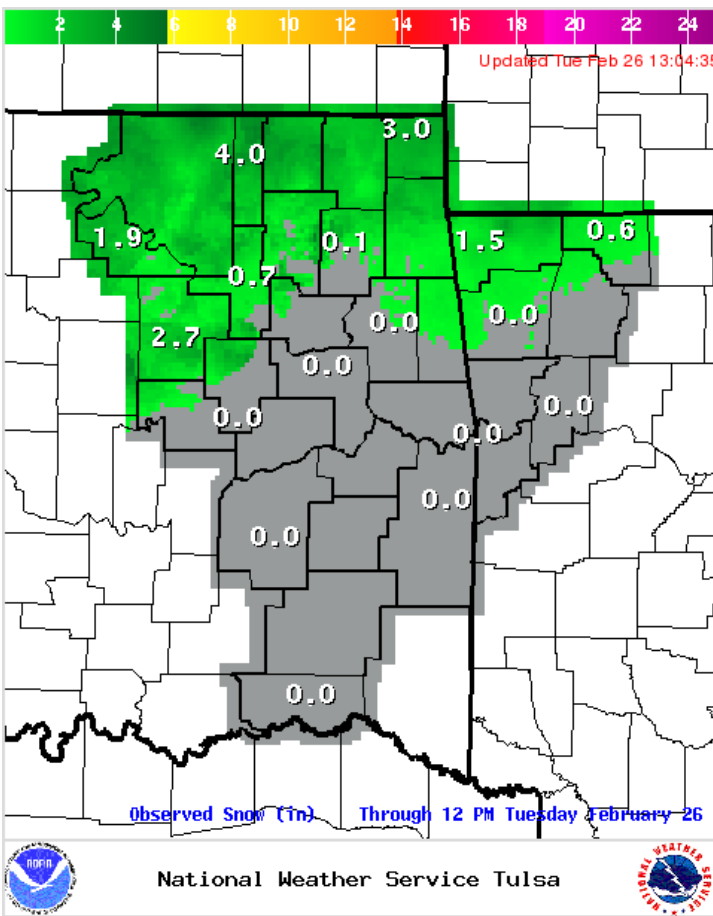


Fig. 13. Estimated and observed snowfall total map for Feb. 25-26, 2013

Written by:  
 Nicole McGavock  
 Service Hydrologist  
 WFO Tulsa

**Products issued in February 2013:**

- 0 Flash Flood Warnings (FFW)
- 0 Flash Flood Statements (FFS)
- 0 Flash/Areal Flood Watches (FFA) (0 Watch FFA CON/EXT/CAN)
- 0 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:**

No river flooding occurred this month.