

**MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS**

REPORT FOR:  
MONTH **March** YEAR **2014**

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  
**April 1, 2014**

*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.

Although a few spots received above normal precipitation this month, most of the HSA once again recorded below normal rainfall during March 2014. The month started off with wintery precipitation and ended with showers and thunderstorms. Normal precipitation for March ranges from 3.1 inches in Pawnee County to 4.3 inches in Le Flore County. In the Ozark region of northwest Arkansas, the normal precipitation for the month is 4.4 inches.

**Monthly Summary**

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 1a), rainfall totals for March 2014 ranged from around an inch in portions of western Osage and Pawnee Counties to around 5" in a triangle area from McAlester to Fayetteville to Fort Smith. The majority of the HSA received 2"-4" of rain this month. Most of the HSA received less than 90% of the normal rainfall for March, with most of Choctaw, Osage, Pawnee, and Washington Counties in eastern OK only reaching 25%-50% of normal (Fig. 1b). Isolated areas within the triangle from McAlester to Fayetteville to Fort Smith had above normal rainfall, with much of Pittsburg County recording 110% to 150% of the normal March precipitation.

Tulsa, OK (TSA): March, 2014 Monthly Observed Precipitation  
Valid at 4/1/2014 1200 UTC- Created 4/1/14 19:38 UTC

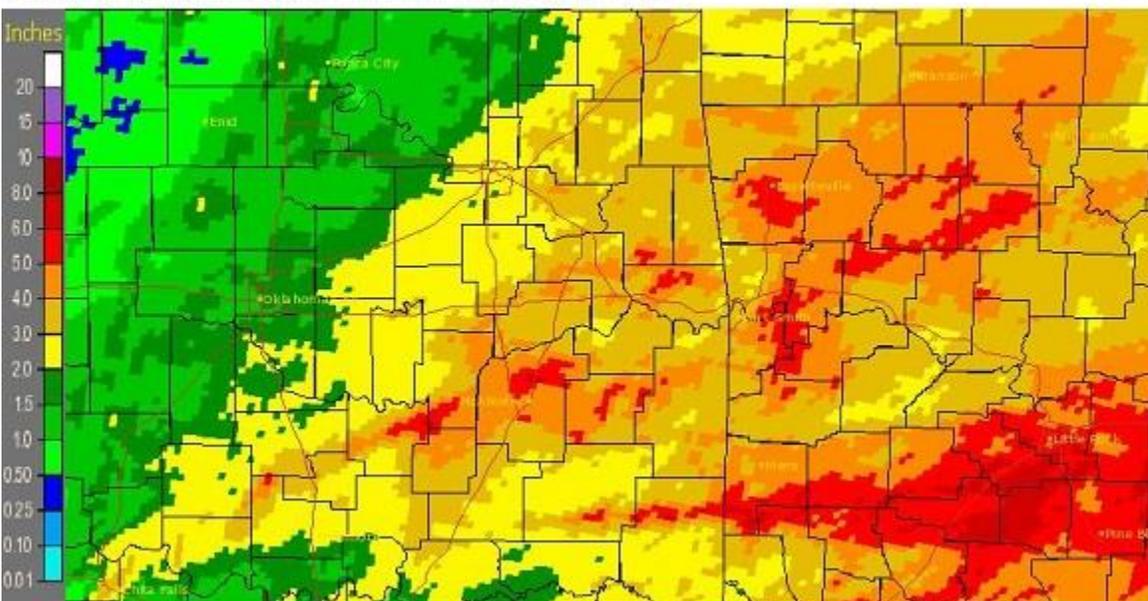


Fig. 1a. Estimated Observed Rainfall for March 2014

Tulsa, OK (TSA): March, 2014 Monthly Percent of Normal Precipitation  
 Valid at 4/1/2014 1200 UTC- Created 4/1/14 19:39 UTC

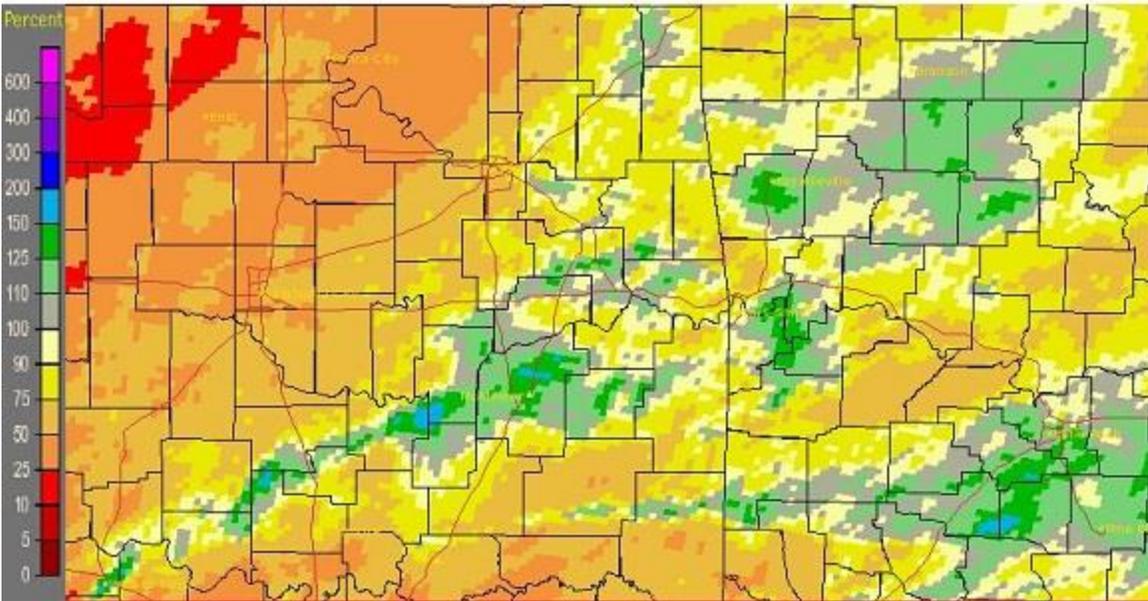


Fig. 1b. Estimated % of Normal Rainfall for March 2014

In Tulsa, OK, March 2014 ranked as the 19<sup>th</sup> coldest March (46.7°F, tied 1998; since records began in 1905), the 58<sup>th</sup> driest March (2.36"; since records began in 1888), and the 21<sup>st</sup> snowiest March (2.4"; since records began in 1900). Fort Smith, AR was the 43<sup>rd</sup> coldest March (50.1°F, tied 1934, 1964; since records began in 1883), the 47<sup>th</sup> wettest March (3.85"; since records began in 1883), and the 25<sup>th</sup> snowiest March (0.5"; since records began in 1884). Fayetteville, AR was the 7<sup>th</sup> coldest (43.4°F), the 14<sup>th</sup> wettest (5.58"), and the 12<sup>th</sup> snowiest (3.8") March since records began in 1950.

Some of the larger precipitation reports (in inches) for March 2014 included:

|                        |      |                         |      |                             |      |
|------------------------|------|-------------------------|------|-----------------------------|------|
| Winslow 7NE, AR (coop) | 6.30 | Fayetteville, AR (ASOS) | 5.58 | Wilburton, OK (meso)        | 5.27 |
| Bengal, AR (coop)      | 5.01 | Fanshawe, AR (coop)     | 4.87 | St. Paul, AR (coop)         | 4.82 |
| Kingston, AR (coop)    | 4.73 | McAlester, OK (meso)    | 4.37 | Mountainburg, AR 2NE (coop) | 4.32 |

Some of the lowest precipitation reports (in inches) for March 2014 included:

|                    |      |                    |      |                         |      |
|--------------------|------|--------------------|------|-------------------------|------|
| Burbank, OK (meso) | 0.98 | Ralston, OK (coop) | 0.99 | Wynona, OK (meso)       | 1.19 |
| Foraker, OK (meso) | 1.29 | Pawnee, OK (meso)  | 1.32 | Bartlesville, OK (ASOS) | 1.38 |
| Copan, OK (meso)   | 1.40 | Nowata, OK (meso)  | 1.69 | Oktaha 2NE, OK (coop)   | 1.80 |

**U.S. Drought Monitor  
Oklahoma**

**March 25, 2014**  
 (Released Thursday, Mar. 27, 2014)  
 Valid 8 a.m. EDT

|  | Drought Conditions (Percent Area) |        |        |       |       |      |
|--|-----------------------------------|--------|--------|-------|-------|------|
|  | None                              | D0-D4  | D1-D4  | D2-D4 | D3-D4 | D4   |
| <b>Current</b>   | 4.05                              | 95.95  | 77.41  | 32.48 | 24.03 | 8.58 |
| <b>Last Week</b><br><small>3/18/2014</small>             | 4.05                              | 95.95  | 77.25  | 30.25 | 14.72 | 4.07 |
| <b>3 Months Ago</b><br><small>12/24/2013</small>         | 40.84                             | 49.16  | 38.17  | 18.99 | 4.84  | 2.40 |
| <b>Start of Calendar Year</b><br><small>1/2/2014</small> | 50.84                             | 49.16  | 38.17  | 18.99 | 4.84  | 2.40 |
| <b>Start of Water Year</b><br><small>10/2/2013</small>   | 21.74                             | 78.26  | 43.00  | 17.82 | 4.42  | 1.45 |
| <b>One Year Ago</b><br><small>3/26/2013</small>          | 0.00                              | 100.00 | 100.00 | 83.07 | 53.07 | 9.90 |

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

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

**Author:**  
 David Simeral  
 Western Regional Climate Center



<http://droughtmonitor.unl.edu/>

**U.S. Drought Monitor  
Arkansas**

**March 25, 2014**  
 (Released Thursday, Mar. 27, 2014)  
 Valid 8 a.m. EDT

|  | Drought Conditions (Percent Area) |       |       |       |       |      |
|--|-----------------------------------|-------|-------|-------|-------|------|
|  | None                              | D0-D4 | D1-D4 | D2-D4 | D3-D4 | D4   |
| <b>Current</b>   | 72.58                             | 27.42 | 0.29  | 0.00  | 0.00  | 0.00 |
| <b>Last Week</b><br><small>3/18/2014</small>             | 72.58                             | 27.42 | 0.00  | 0.00  | 0.00  | 0.00 |
| <b>3 Months Ago</b><br><small>12/24/2013</small>         | 96.56                             | 3.44  | 0.00  | 0.00  | 0.00  | 0.00 |
| <b>Start of Calendar Year</b><br><small>1/2/2014</small> | 96.56                             | 3.44  | 0.00  | 0.00  | 0.00  | 0.00 |
| <b>Start of Water Year</b><br><small>10/2/2013</small>   | 47.69                             | 52.31 | 23.96 | 11.67 | 3.34  | 0.00 |
| <b>One Year Ago</b><br><small>3/26/2013</small>          | 40.22                             | 59.78 | 26.49 | 5.49  | 0.00  | 0.00 |

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

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

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 David Simeral  
 Western Regional Climate Center



<http://droughtmonitor.unl.edu/>

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 March 25, 2014 (Figs 2, 3), Moderate Drought (D1)

conditions were present across a large portion of northeast OK, affecting Osage, Pawnee, Washington, Nowata, Craig, western Ottawa, Rogers, Tulsa, Creek, Okfuskee, western Okmulgee, Pushmataha, and Choctaw Counties. Abnormally Dry (D0), but not experiencing drought, conditions were occurring across the remainder of eastern OK, except for Pittsburg and Latimer Counties. In northwest AR, D0 conditions were affecting Benton, Carroll, western Washington, Crawford, and western Sebastian Counties.

According to the USACE, most of the major reservoirs in the HSA were operating within  $\pm 2\%$  of the top of their conservation pools as of 3/31/2014. A few lakes remained below normal: Skiatook Lake 72% and Birch Lake 91%. Several lakes had levels within their flood control pools: Wister Lake 110%, Ft. Gibson Lake 109%, Tenkiller Lake 106%, Hudson Lake 105%, and Eufaula Lake 104%.

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

| Rank since 1921 | March 2014               | Last 60 Days (Jan 31 – Mar 31) | Year-to-Date (Jan 1 – Mar 31) | Last 120 Days (Dec 2 – Mar 31) | Water Year-to-Date (Oct 1 – Mar 31) | Last 365 Days (Apr 1, 2013 – Mar 31, 2014) |
|-----------------|--------------------------|--------------------------------|-------------------------------|--------------------------------|-------------------------------------|--|
| Northeast OK    | 34 <sup>th</sup> driest  | <b>13<sup>th</sup> driest</b>  | <b>5<sup>th</sup> driest</b>  | <b>6<sup>th</sup> driest</b>   | 17 <sup>th</sup> driest             | 43 <sup>rd</sup> driest                    |
| East Central OK | 45 <sup>th</sup> wettest | 21 <sup>st</sup> driest        | <b>14<sup>th</sup> driest</b> | 18 <sup>th</sup> driest        | 30 <sup>th</sup> driest             | 39 <sup>th</sup> driest                    |
| Southeast OK    | 44 <sup>th</sup> driest  | 22 <sup>nd</sup> driest        | <b>10<sup>th</sup> driest</b> | <b>13<sup>th</sup> driest</b>  | 33 <sup>rd</sup> driest             | 39 <sup>th</sup> driest                    |
| Statewide       | 28 <sup>th</sup> driest  | <b>10<sup>th</sup> driest</b>  | <b>6<sup>th</sup> driest</b>  | <b>7<sup>th</sup> driest</b>   | <b>13<sup>th</sup> driest</b>       | 36 <sup>th</sup> driest                    |

According to OCS, “through March 31, the number of consecutive days without a reported tornado in Oklahoma rose to 236, the third longest stretch since accurate records began in 1950. The last reported tornado in Oklahoma occurred back on August 7, 2013, when a small EF0 twister touched down near Turpin in Beaver County. The longest tornado drought on record is 292 days from May 17, 2003, to March 3, 2004.”

## Outlooks

The [Climate Prediction Center](#) (CPC) outlook for April 2014 (issued March 31, 2014) indicates a slightly enhanced chance for above median precipitation across northwest AR, with equal chances for above, near, and below median precipitation elsewhere across the area. This outlook also indicates equal chances for above, near, and below normal temperatures across all of eastern OK and northwest AR. This outlook is based on short-range forecasts of expected weather conditions, especially for the first few days of April.

For the 3-month period Apr-May-June 2014, CPC is forecasting a slightly enhanced chance for above normal temperatures and equal chances for above, near, and below median rainfall across all of eastern OK and northwest AR (outlook issued March 20, 2014). According to CPC, ENSO neutral conditions remained through March. ENSO neutral conditions are expected to continue through Spring 2014. However, an El Niño Watch has been issued, indicating conditions are favorable for El Niño development within the next 6 months. Therefore, this outlook is based on both statistical and dynamical forecast tools, as well as antecedent soil moisture, under ENSO neutral conditions.

## Summary of Precipitation Events

### March 1-15

A very cold arctic airmass moved into eastern OK and northwest AR on the 2<sup>nd</sup>. As a strong, fast-moving shortwave trough traversed the area, snow, sleet, and freezing rain affected the HSA. Frontogenetical bands of convection developed over the area, producing locally enhanced areas of sleet, and thundersleet was observed at times. The shallow nature of the cold air lead to freezing rain across far southeast OK and west central AR, before transitioning to sleet and snow as the deeper cold air moved further south. Most of this area

received 0.05"-0.10" of ice accumulation and 1"-1.5" of snow/sleet (Figs. 4a, 4b). The remainder of eastern OK and northwest AR saw a mixture of sleet and snow with this system, with only a brief period of freezing rain/drizzle at the onset. Sleet/snowfall totals were around 2" to around 5.5". Rainfall/water equivalent totals from this event ranged from around 0.25" to around 1.5", with the highest totals in Sebastian and Franklin Counties (Fig. 5).

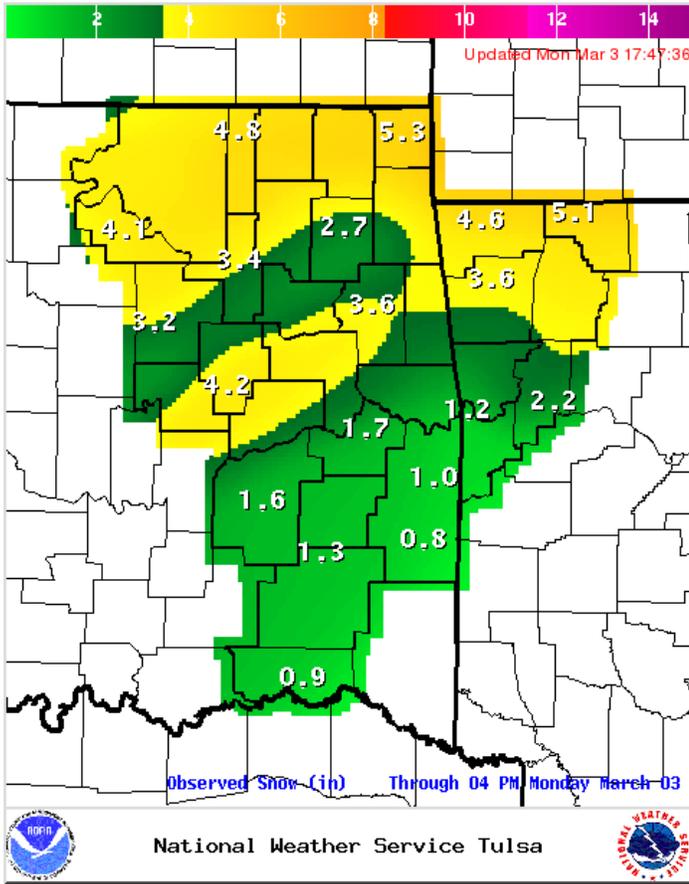


Fig. 4a. Sleet/snowfall estimate for Mar. 2, 2014.

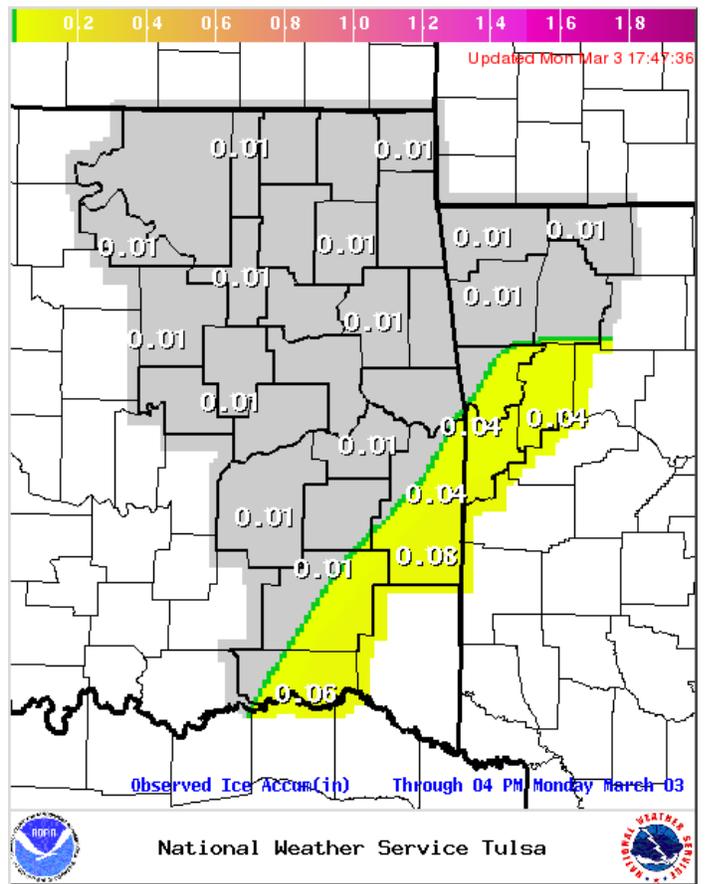


Fig. 4b. Ice accumulation estimate for Mar. 2, 2014.

Tulsa, OK (TSA): 3/3/2014 1-Day Observed Precipitation  
Valid at 3/3/2014 1200 UTC- Created 3/5/14 23:30 UTC

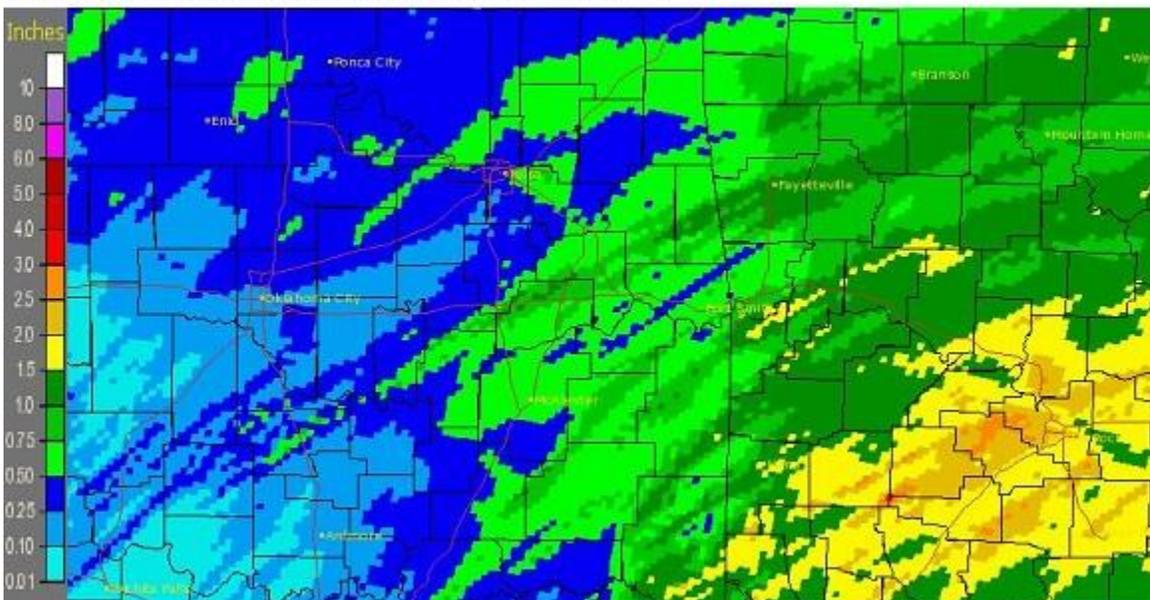


Fig. 5. Estimated Observed Rainfall for March 2, 2014.

An upper-level trough brought rain to the area on the 5<sup>th</sup>. Overall, rainfall totals were light, with 0.10"-0.50" primarily west of a Tulsa to Tahlequah to McAlester line. The precipitation dissipated as the system moved eastward.

A cold front moved southeast across eastern OK and northwest AR on the 8<sup>th</sup>. Precipitation developed along and behind the front, with the greatest rainfall over northeast OK. Temperatures across northeast OK were cold enough that some locations saw some snow/sleet as well; however little to no accumulation occurred. Rainfall totals across northeast OK and far northwest AR ranged from 0.10" to near 1.5", with less than 0.10" across the remainder of eastern OK and northwest AR.

A cold front and compact upper-level system brought thunderstorms and heavy rain to eastern OK and northwest AR during evening and overnights hours of the 15<sup>th</sup>. The entire HSA received around 0.50" to around 1.5", with higher totals of 2"-4" south of I-40 in southeast OK and west central AR (Fig. 6). Isolated areas of 2"-2.5" also occurred across Ottawa, Delaware, Benton, and Cherokee Counties. The OK Mesonet site at Wilburton measured 4.33" of rain during this event (Fig. 10). The heavy rain across southeast OK led to moderate river flooding along the Poteau River near Panama. The Poteau River near Poteau, as well as the Illinois River near Watts and Tahlequah, and the Mulberry River near Mulberry saw rises, but remained just below flood stage.

As the surface low traversed southeast OK and west central AR and colder air moved in behind the cold front, the rain changed over to sleet and snow during the morning and afternoon of the 16<sup>th</sup> across northeast OK and northwest AR. No accumulations were reported across northeast OK, but northwest AR received a dusting to 5.5" of snow (Figs. 7, 8). Rainfall and liquid equivalent totals for the 16<sup>th</sup> were a few hundredths to around 0.50" in northeast OK and 0.25" to 1.5" in northwest AR (Fig. 9). Over the 2-day period, locations southeast of I-44 received a total of 1.3" to around 4", while the area northwest of I-44 received 0.50" to around 1" of rainfall (Fig. 10).

Tulsa, OK (TSA): 3/16/2014 1-Day Observed Precipitation  
Valid at 3/16/2014 1200 UTC- Created 3/17/14 17:32 UTC

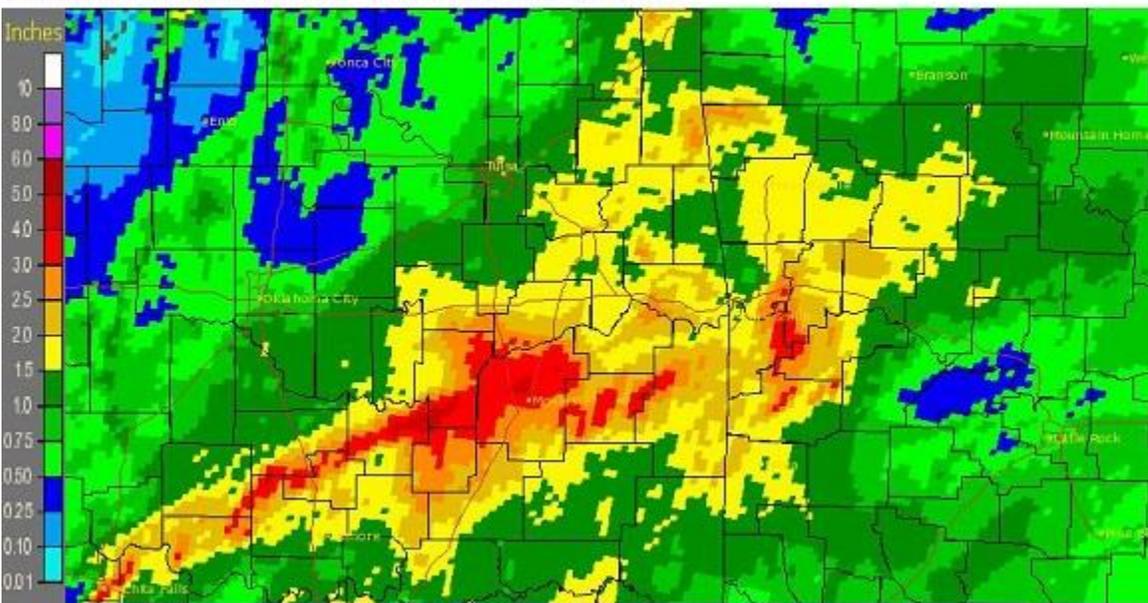


Fig. 6. Estimated Observed Rainfall for March 15, 2014.

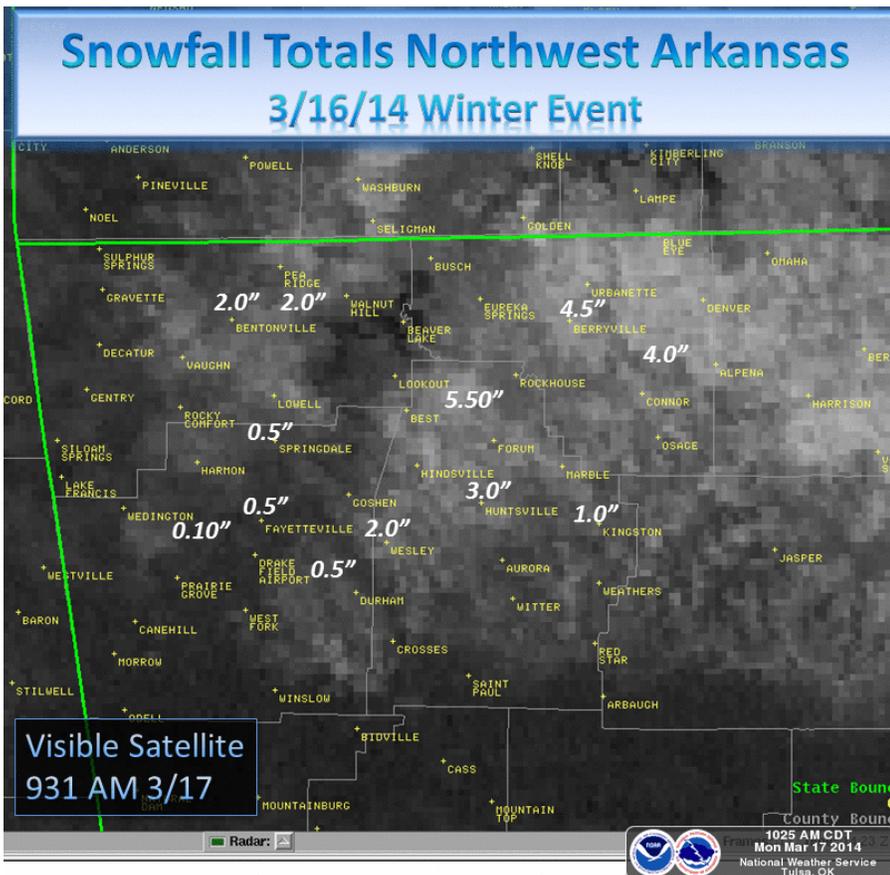


Fig. 7. Visible satellite image from 9:31am CDT 3/17/2014 showing snow on the ground across northwest AR. Observed snowfall totals are included.

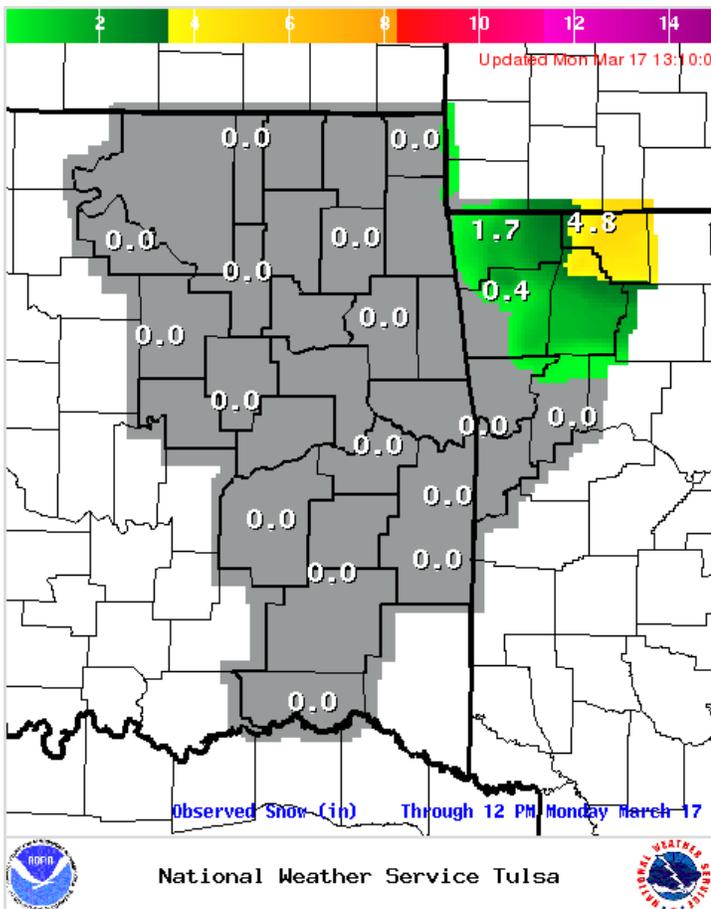


Fig. 8. Observed Snowfall for March 17, 2014

Tulsa, OK (TSA): 3/17/2014 1-Day Observed Precipitation  
 Valid at 3/17/2014 1200 UTC- Created 3/17/14 17:37 UTC

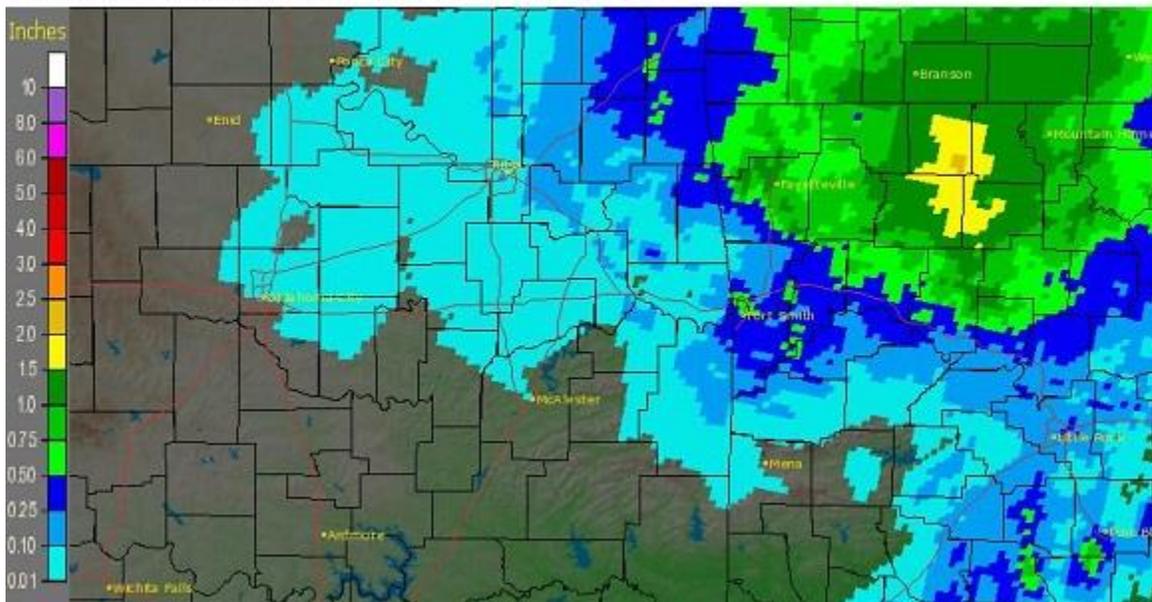


Fig. 9. Estimated Observed Rainfall for March 16, 2014.

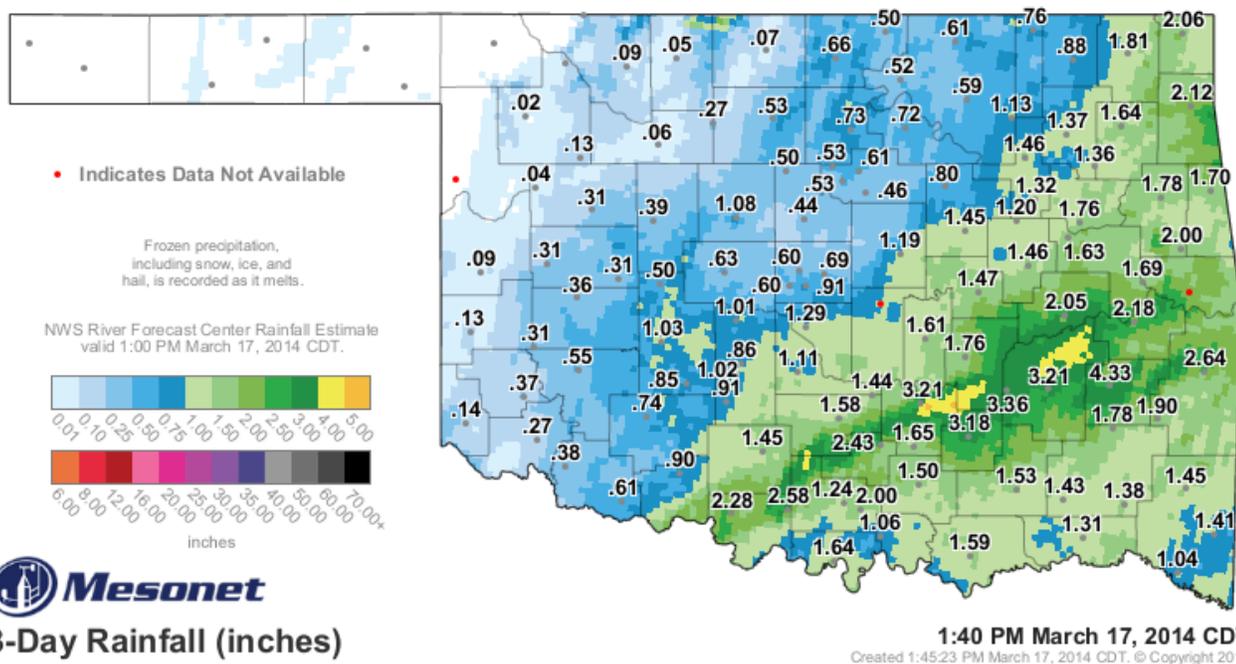


Fig. 10. Estimated Observed Rainfall for March 15-16, 2014

### March 17-31

Scattered showers and thunderstorms developed ahead of a cold front on the 21<sup>st</sup>, affecting portions of southeast and east central OK and west central and northwest AR. Most of the affected area received a few hundredths to around 0.50" of rain, with higher totals of 0.50" to near 1" in isolated locations of southeast OK. The cold front then stalled just south of the Red River in northern TX. Isentropic lift north of the front led to additional storm development during the afternoon and evening of the 22<sup>nd</sup>. Most locations southeast of I-44 received some light rainfall, from few hundredths to around 0.25". However, southern Pushmataha County received heavy rainfall, with totals of 0.50" to near 3". A secondary cold front moved through the area, bringing an end to the precipitation.

A large area of light rain in association with a shortwave trough moved into eastern OK and northwest AR during the afternoon of the 26<sup>th</sup>. A large portion of the area received 0.10" to less than 0.50" of rain from this activity, with several areas only receiving a few hundredths of an inch of rainfall.

A cold front merged with a dryline over far eastern OK and northwest AR during the evening of the 27<sup>th</sup>, bringing scattered showers and thunderstorms to east central OK and northwest AR. Rainfall amounts ranged from 0.10"-0.50" in most of the affected locations. Slightly higher totals of 0.50"-0.75" affected parts of Sequoyah and Sebastian Counties. A few of these storms did produce hail. Most reports indicated hail to the size of pennies (0.75") and nickels (0.88"), though there were a few quarter sized (1") hailstones near Fayetteville.

Scattered showers and thunderstorms, some of which became severe, developed during the afternoon of the 28<sup>th</sup> north of a stalled front located across southeast OK into west central AR. Rainfall affected locations between I-44 and I-40, with most of this area receiving 0.10" to around 1" of rain.

A narrow line of showers and thunderstorms developed during the morning of the 31<sup>st</sup> in the low-level jet axis and area of isentropic lift, affecting locations southeast of I-44 through the afternoon hours. Additional showers and thunderstorms developed during the early evening hours along the cold front near I-44 and progressed southeast across eastern OK and northwest AR. Rainfall totals from the first line of storms were generally around 0.10" or less. The later storms brought 0.25" to around 1.5" of rain to scattered locations along and between Interstates 44 and 40.

Written by:

Nicole McGavock  
Service Hydrologist  
WFO Tulsa

#### **Products issued in March 2014:**

\*MLBA4 and OZGA4 transferred to NWS Tulsa HSA February 5, 2014

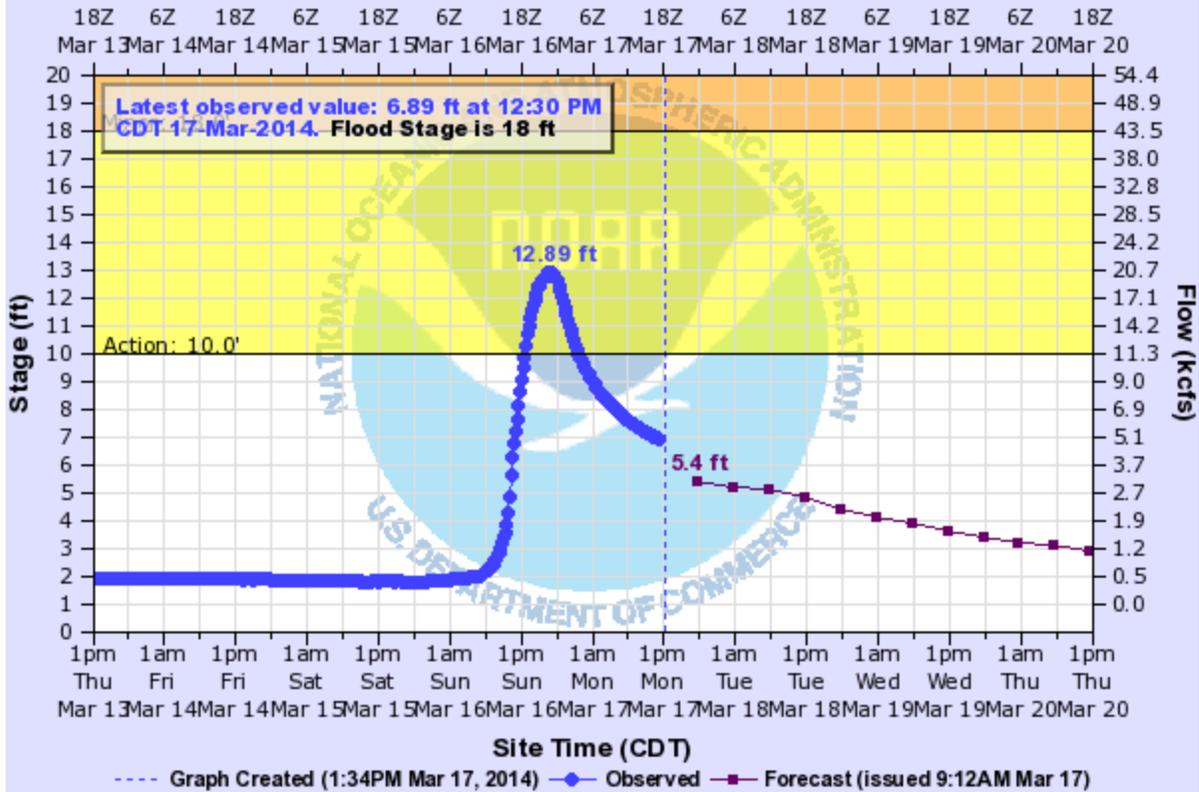
\*Mixed case River Flood products began July 31, 2013

- 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)
- 2 River Flood Warnings (FLW)
- 5 River Flood Statements (FLS)
- 2 River Flood Advisories (FLS) (7 Advisory FLS CON/EXT/CAN)
- 0 River Flood Watches (FFA) (0 Watch FFA CON/EXT/CAN)
- 0 River Statements (RVS)
- 1 Hydrologic Outlooks (ESF)
- 0 Drought Information Statements (DGT)

#### **Preliminary Hydrographs:**

## MULBERRY RIVER NEAR MULBERRY

Universal Time (UTC)

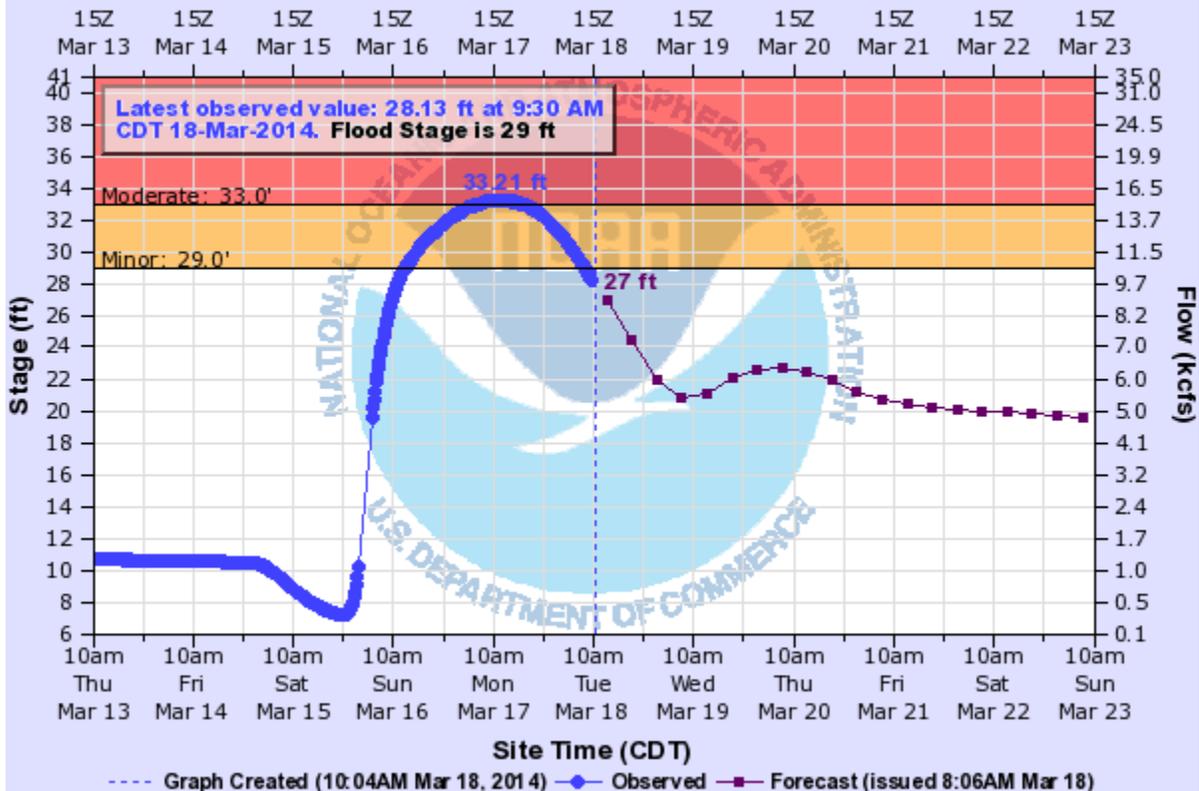


MLBA4(plotting HGIRG) "Gage 0" Datum: 432.75'

Observations courtesy of USGS/USACE/ADEQ

## POTEAU RIVER NEAR PANAMA

Universal Time (UTC)

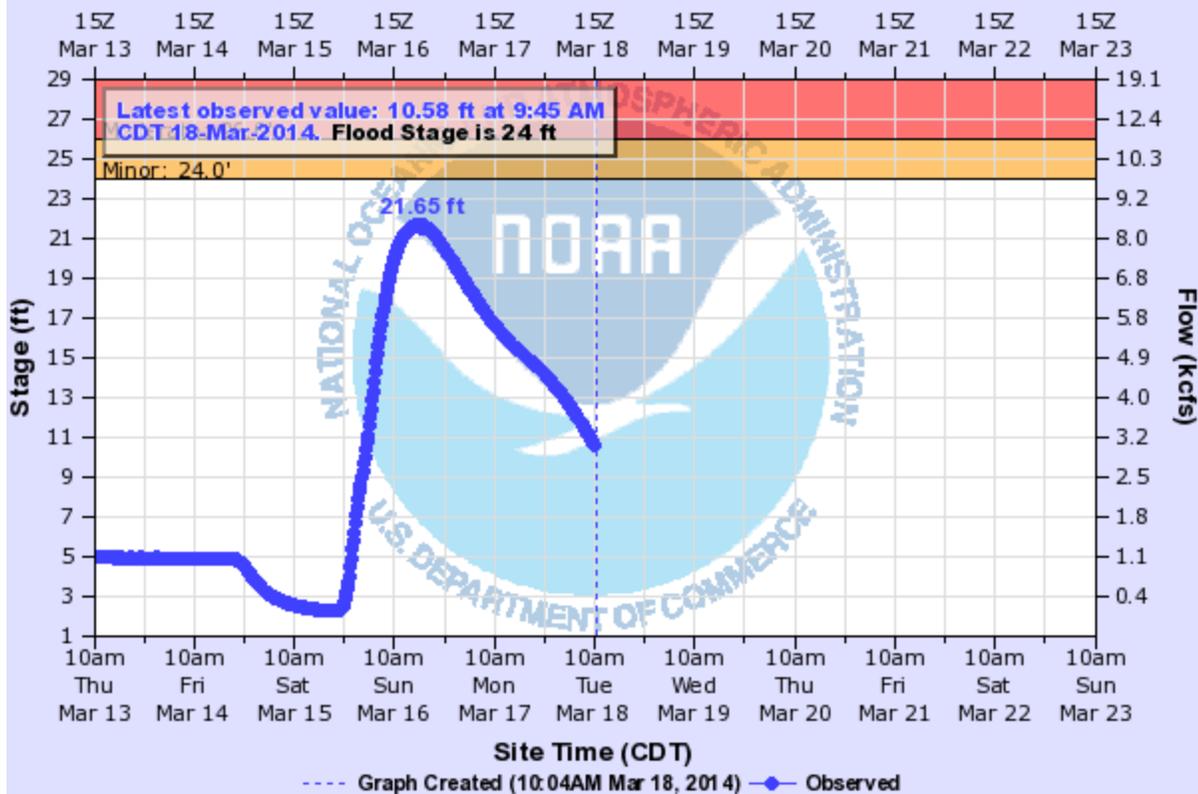


PANO2(plotting HGIRG) "Gage 0" Datum: 387.97'

Observations courtesy of US Geological Survey

## POTEAU RIVER NEAR POTEAU

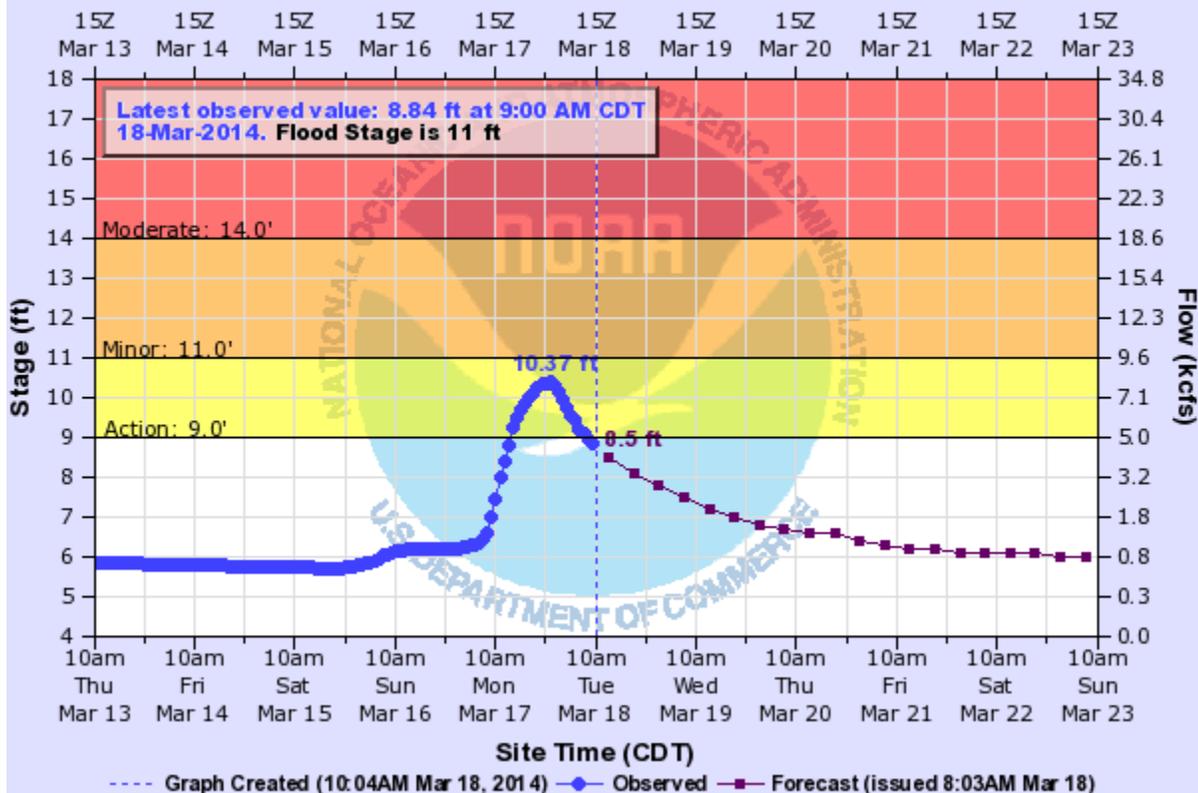
Universal Time (UTC)



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

## ILLINOIS RIVER NEAR TAHLEQUAH

Universal Time (UTC)

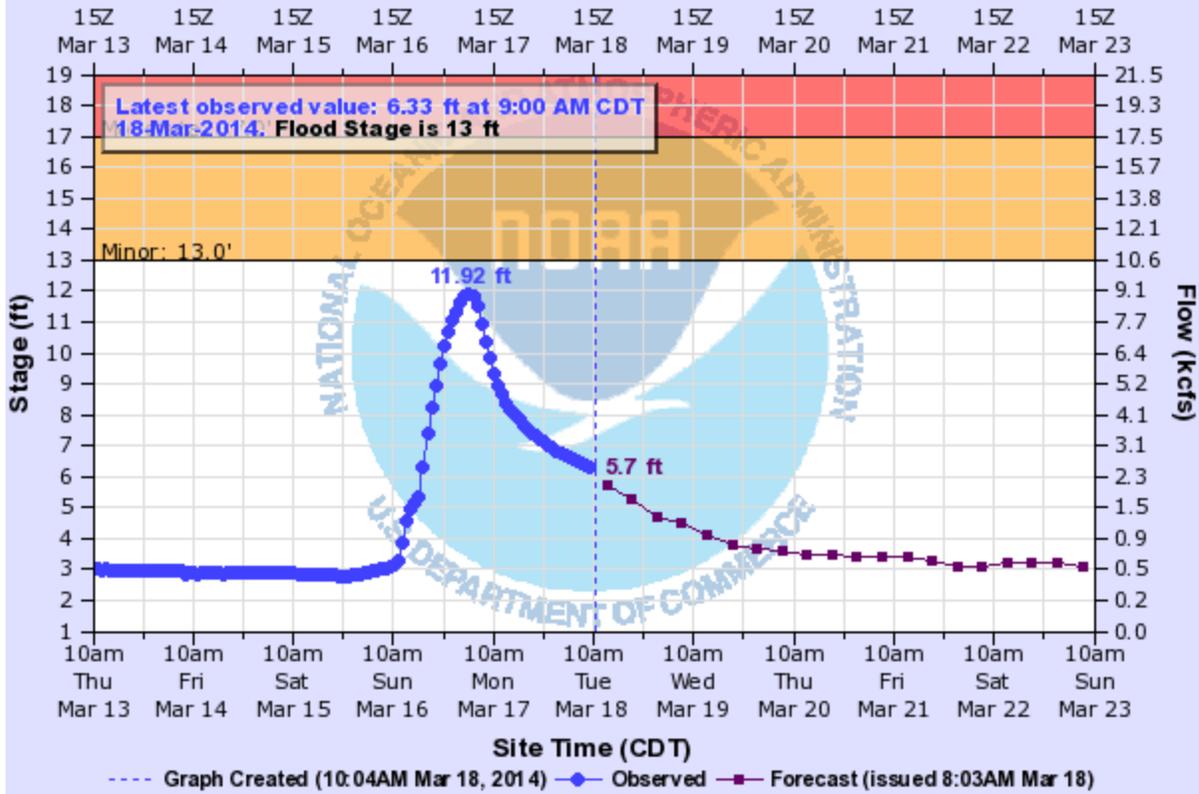


TALO2(plotting HGIRG) "Gage 0" Datum: 664.14'

Observations courtesy of US Geological Survey

# ILLINOIS RIVER NEAR WATTS

Universal Time (UTC)



WT02(plotting HGIRG) "Gage 0" Datum: 893.77'

Observations courtesy of US Geological Survey