

NWS FORM E-5 (11-88) (PRES. by NWS Instruction 10-924)	U.S. DEPARTMENT OF COMMERCE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE	HYDROLOGIC SERVICE AREA (HSA)	
		Tulsa, Oklahoma (TSA)	
MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS		REPORT FOR:	
		MONTH March	YEAR 2023
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 18, 2023	

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.

March 2023 brought heavy rain, with minor to moderate river flooding, to a large portion of eastern OK and northwest AR, while very little rain and severe to exceptional drought persisted to the northwest of I-44. 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. This report, past E-5 reports, and monthly hydrology and climatology summaries can be found at https://www.weather.gov/tsa/climo_summary_e5list.

Monthly Summary

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 1a), rainfall totals for March 2023 ranged from 0.25" to 15" from northwest to southeast across eastern OK and northwest AR, with a tight rainfall gradient along the I-44 corridor. These rainfall totals correspond to 10% to 90% of the normal March rainfall northwest of I-44 and 125% to 300% southeast of I-44 (Fig. 1b).

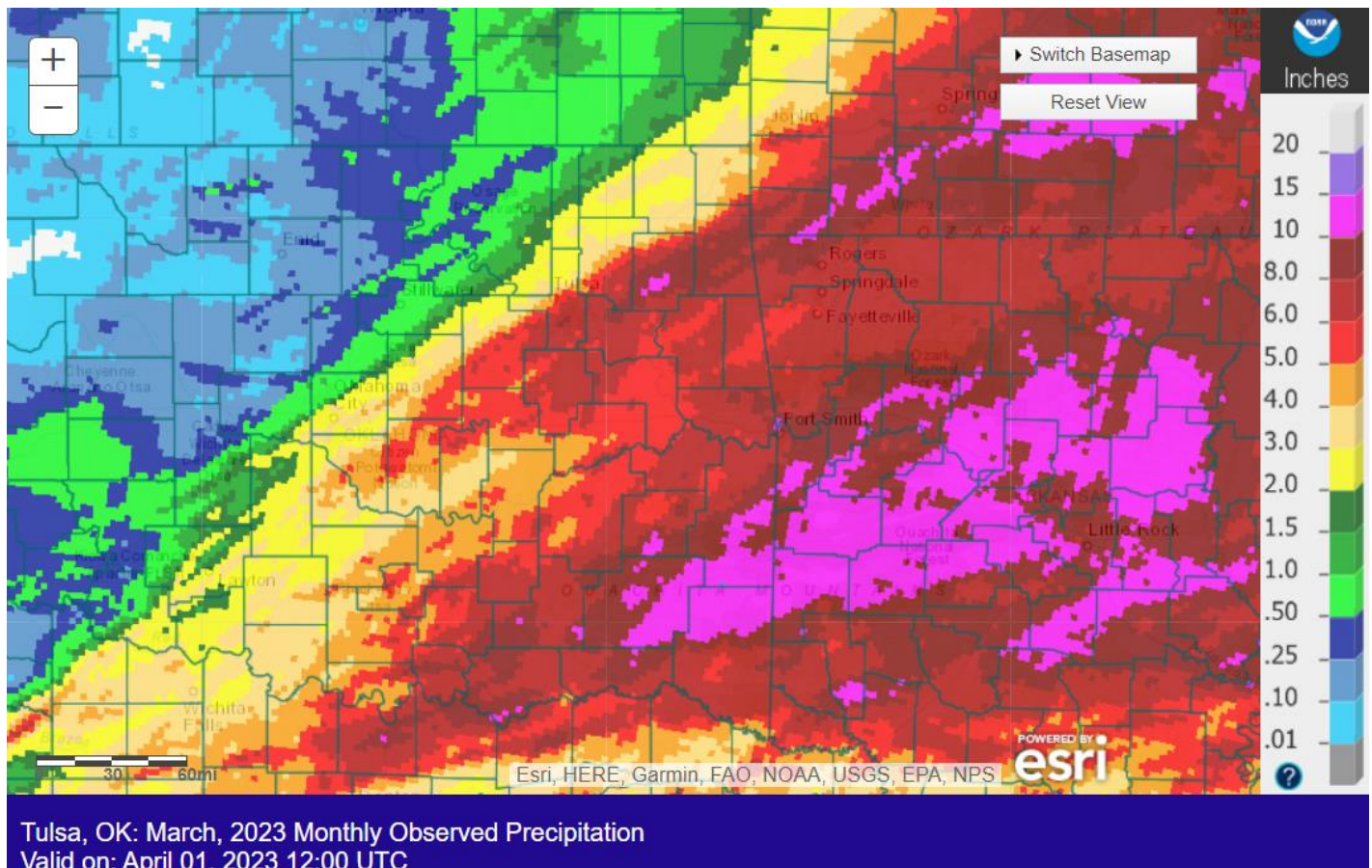


Fig. 1a. Estimated Observed Rainfall for March 2023

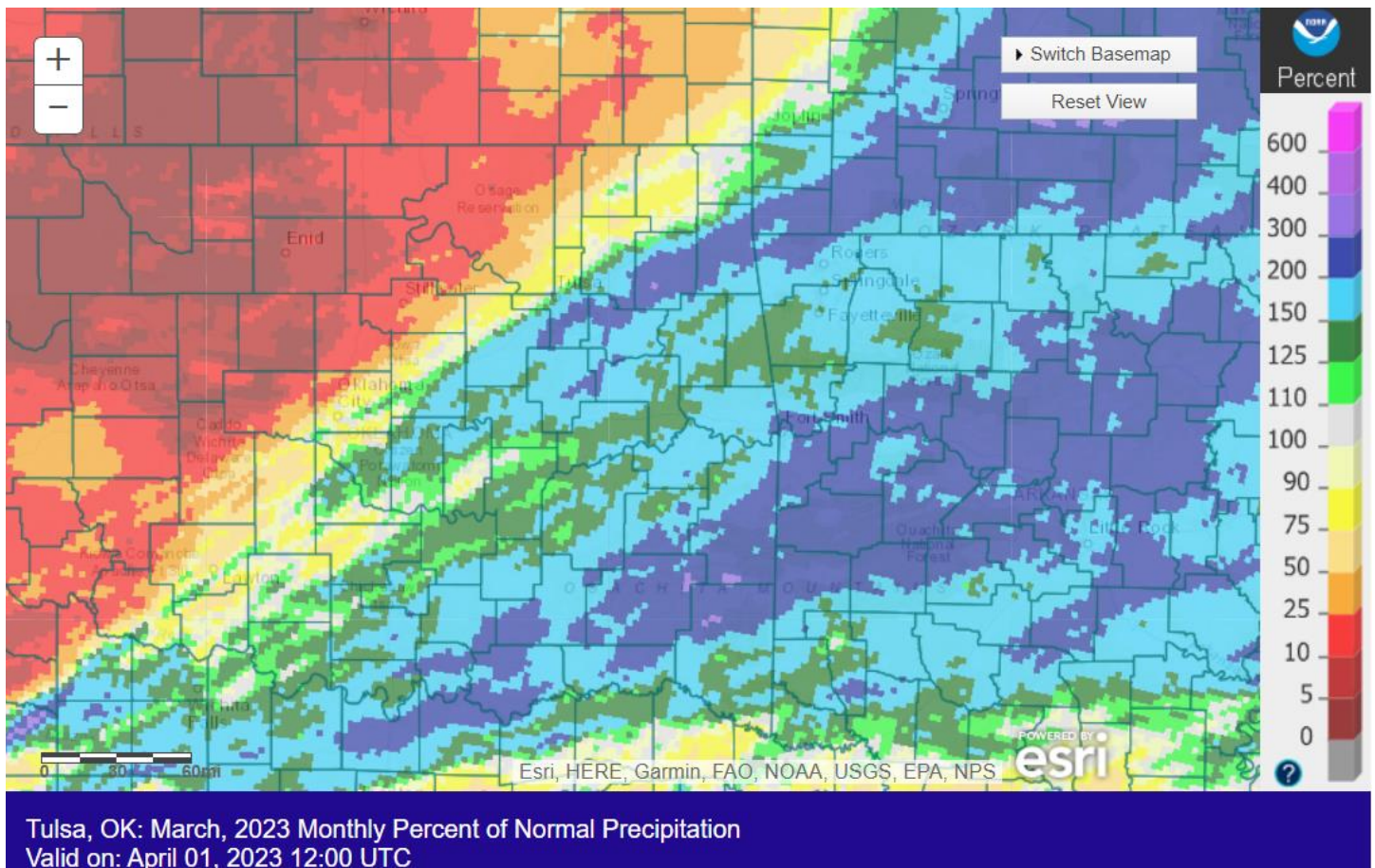


Fig. 1b. Estimated % of Normal Rainfall for March 2023

In Tulsa, OK, March 2023 ranked as the 52nd coldest March (50.2°F, tied 1942, 1930; since records began in 1905) and the 41st wettest March (3.71"; since records began in 1888). Fort Smith, AR had the 46th warmest March (54.0°F, tied 1995; since records began in 1883) and the 10th wettest March (7.74"; since records began in 1883). Fayetteville, AR had the 24th warmest (50.2°F) and the 4th wettest (7.50", tied 1953) March since records began in 1950.

Some of the larger precipitation reports (in inches) for March 2023 included:

Cloudy, OK (meso)	13.22	Bella Vista 2.2E, AR (coco)	10.92	Pryor 6.9ESE, OK (coco)	10.21
Hugo, OK (meso)	9.98	Spavinaw, OK (coop)	9.74	Clayton, OK (meso)	9.65
Greenwood 0.9S, AR (coco)	9.38	Hugo 1.9ENE, OK (coco)	9.22	Antlers, OK (meso)	9.15

Some of the lowest precipitation reports (in inches) for March 2023 included:

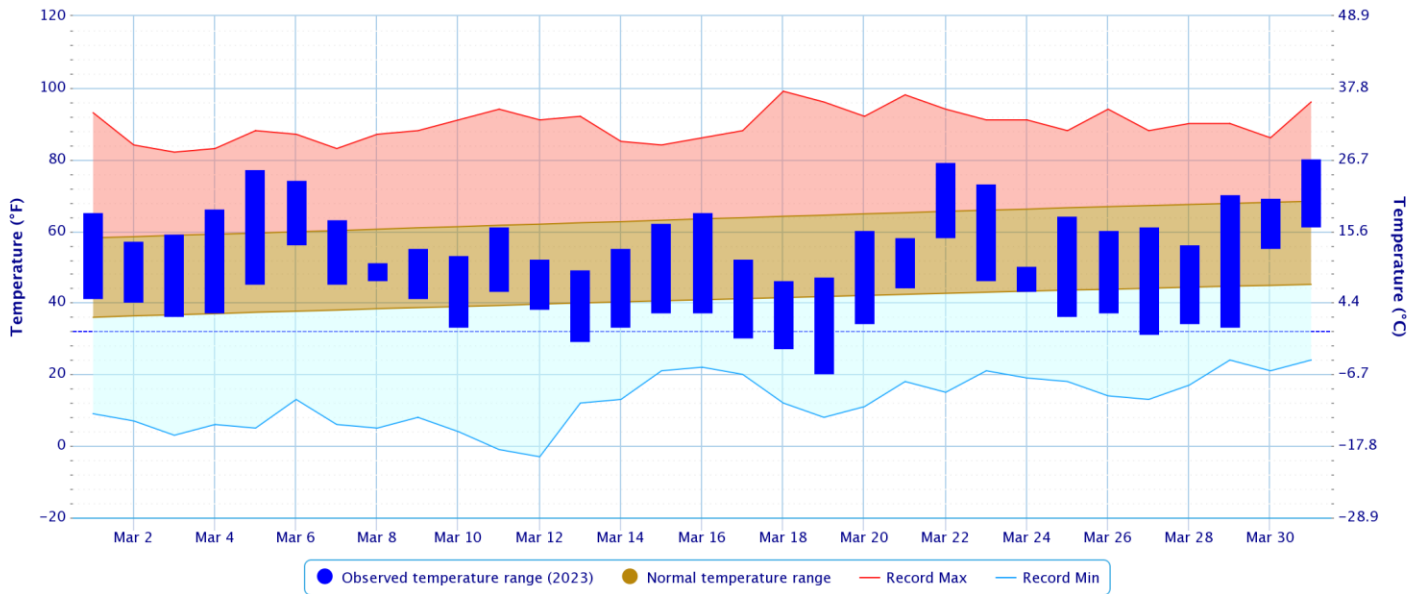
Foraker, OK (meso)	0.58	Burbank, OK (meso)	0.65	Bartlesville, OK (ASOS)	0.86
Pawnee, OK (meso)	0.88	Copan, OK (meso)	0.89	Wynona, OK (meso)	1.02
Skiatook, OK (meso)	2.44	Talala, OK (meso)	2.78	Oilton, OK (meso)	2.82

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

Rank since 1921	March 2023	Last 60 Days (Jan 31 – Mar 31)	Last 120 Days (Dec 2 – Mar 31)	Year-to-Date (Jan 1 – Mar 31)	Water Year-to-Date (Oct 1 – Mar 31)	Last 365 Days (Apr 1, 2022 – Mar 31, 2023)
Northeast OK	29 th driest	19 th wettest	26 th wettest	27 th wettest	40 th wettest	32 nd driest
East Central OK	10th wettest	9th wettest	10th wettest	9th wettest	13 th wettest	19 th wettest
Southeast OK	4th wettest	3rd wettest	11 th wettest	6th wettest	10th wettest	35 th wettest
Statewide	34 th wettest	22 nd wettest	35 th wettest	30 th wettest	35 th wettest	31 st driest

Daily Temperature Data – Tulsa Area, OK (ThreadEx)

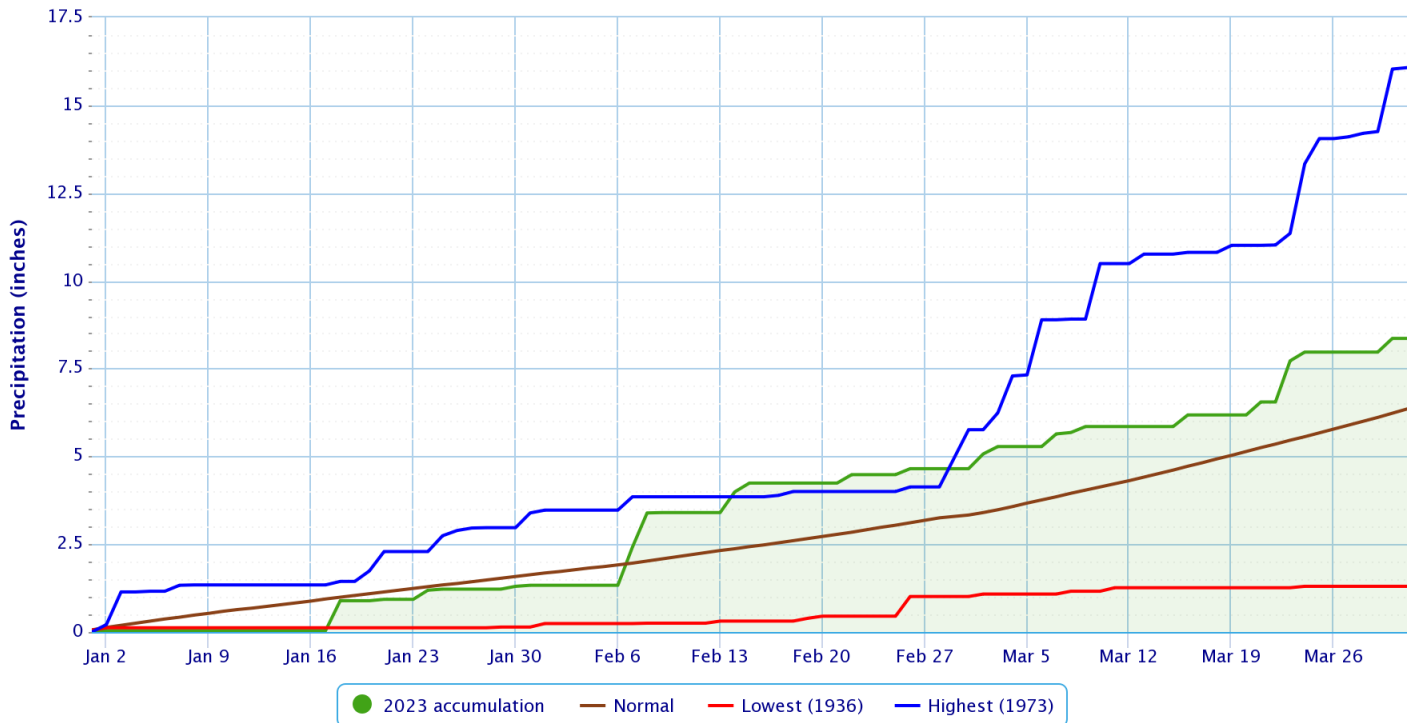
Period of Record – 1905-01-06 to 2023-04-02. Normals period: 1991-2020. Click and drag to zoom chart.



Powered by ACIS

Accumulated Precipitation – Tulsa Area, OK (ThreadEx)

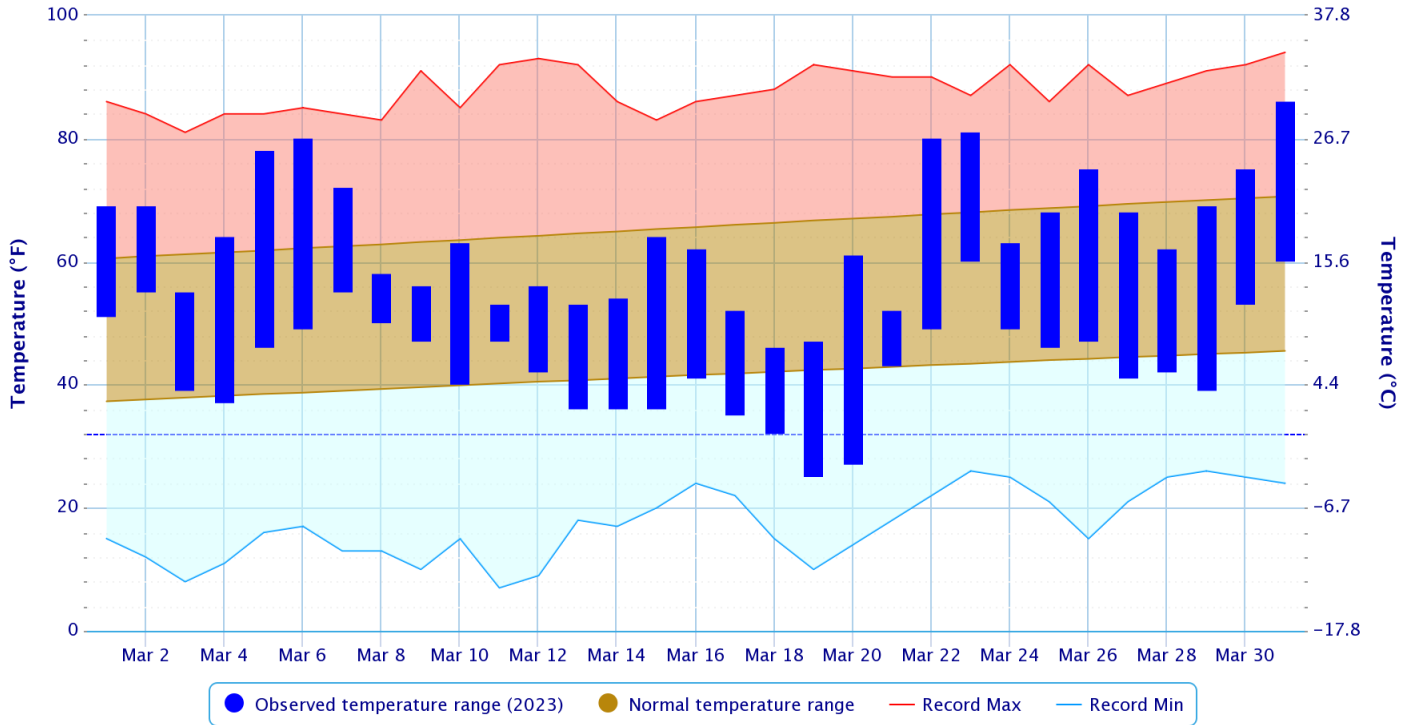
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

Daily Temperature Data – Fort Smith Area, AR (ThreadEx)

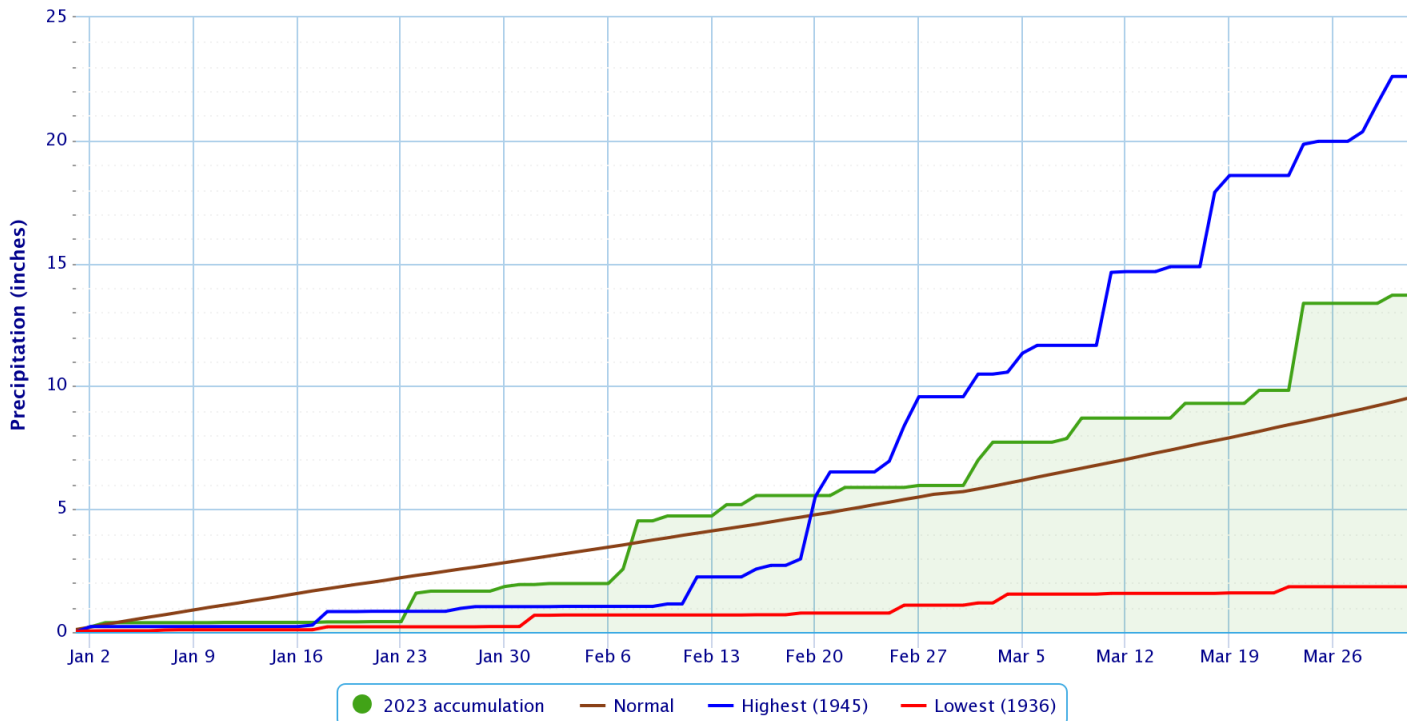
Period of Record – 1882-06-01 to 2023-04-02. Normals period: 1991-2020. Click and drag to zoom chart.



Powered by ACIS

Accumulated Precipitation – Fort Smith Area, AR (ThreadEx)

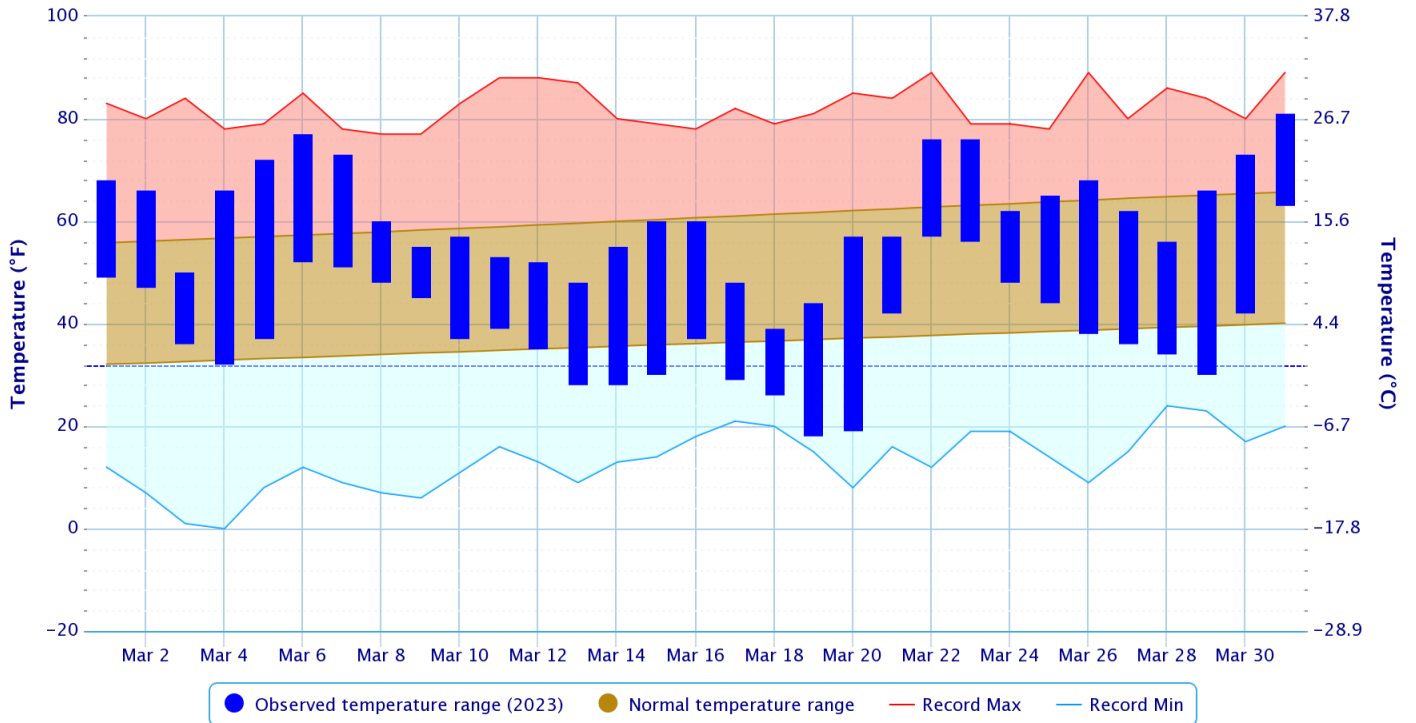
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

Daily Temperature Data – FAYETTEVILLE DRAKE FIELD, AR

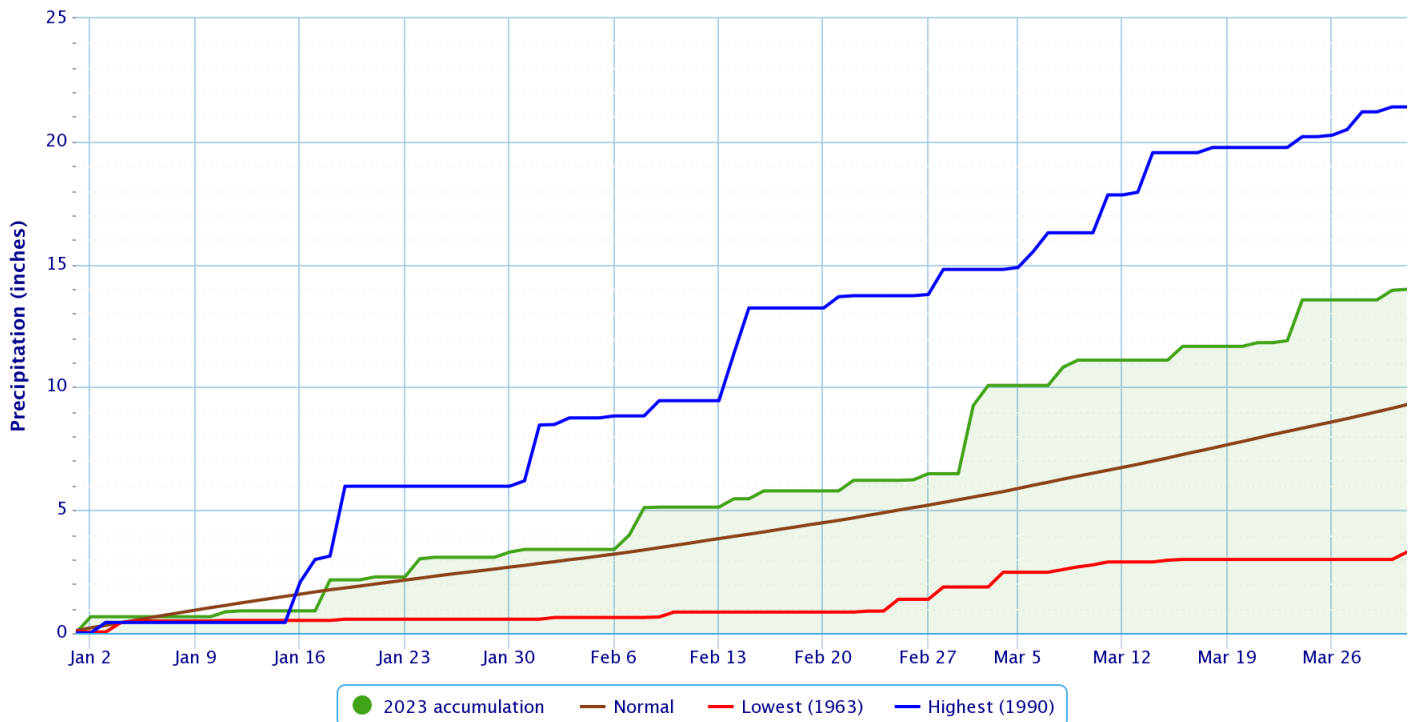
Period of Record – 1949–07–14 to 2023–04–02. Normals period: 1991–2020. Click and drag to zoom chart.



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Accumulated Precipitation – FAYETTEVILLE DRAKE FIELD, AR

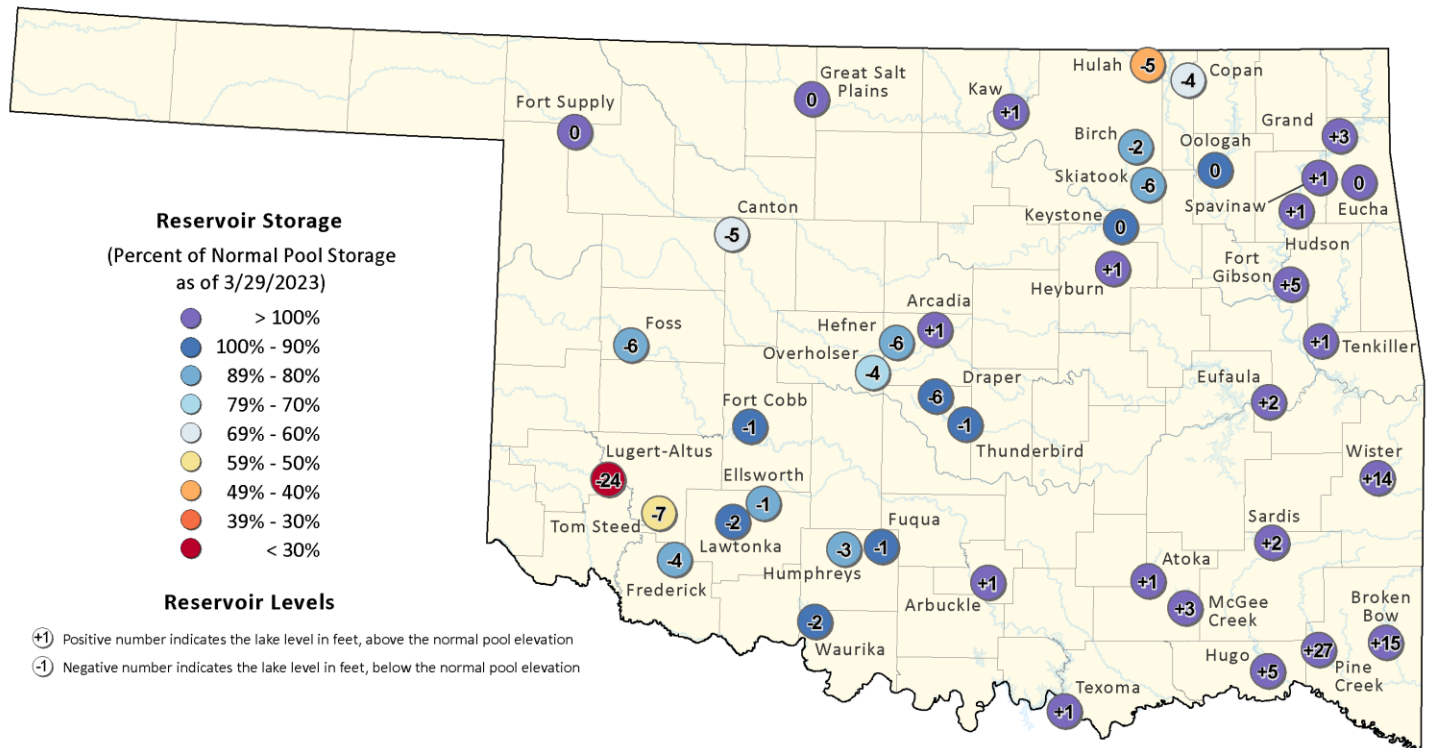
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



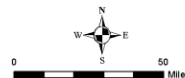
Powered by ACIS

Reservoirs

Oklahoma Reservoir Levels and Storage as of 3/29/2023



This map shows reservoir storage as a percentage of normal pool storage capacity. The source information was collected from real-time lake gages monitored by the U.S. Army Corps of Engineers (https://www.swt-wc.usace.army.mil/Daily_Morning_Reservoir_Report.pdf), and the U.S. Geological Survey (https://waterdata.usgs.gov/ok/nwis/current/?type=lake&group_key=basin_cd). For more information please visit the OWRB's website: (<https://www.owrb.ok.gov>).



According to the USACE, a few of the lakes in the HSA were below 3% of top of their conservation pools as of 03/31/2023: Hulah Lake 44%, Copan Lake 60%, Skiatook Lake 82%, and Birch Lake 84%. Several lakes were above 3% of the top of their conservation pools: Beaver Lake 90%, Wister Lake 37%, Grand Lake 19%, Sardis Lake 17%, Eufaula Lake 14%, Ft. Gibson Lake 7%, Hugo Lake 7%, and Hudson Lake 4%.

Drought

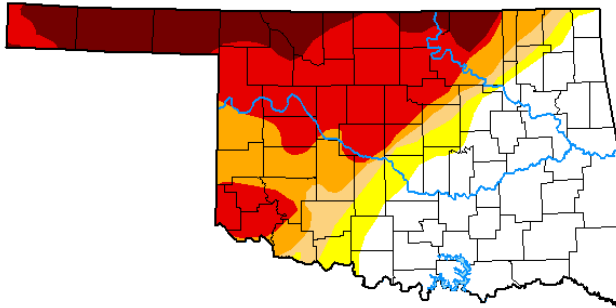
According to the [U.S. Drought Monitor](#) (USDM) from March 28, 2023 (Figs. 2, 3), Exceptional (D4) Drought conditions persisted across portions of eastern Kay and Osage Counties in eastern OK. Extreme (D3) Drought conditions were occurring in portions of eastern Kay, Osage, and Pawnee Counties in eastern Oklahoma. Severe (D2) Drought conditions exist in portions of Craig, Nowata, Washington, Osage, Pawnee, and Creek Counties in eastern Oklahoma. Moderate (D1) Drought conditions were present in portions of Craig, Nowata, Washington, Rogers, Tulsa, Osage, and Creek Counties in eastern OK. Abnormally Dry (D0) but not in drought conditions were occurring in Ottawa, Craig, Rogers, Tulsa, Osage, Creek, and Okfuskee Counties in eastern OK. No drought conditions were present in northwest AR.

U.S. Drought Monitor Oklahoma

March 28, 2023

(Released Thursday, Mar. 30, 2023)

Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	39.69	60.31	53.68	48.59	37.30	12.83
Last Week <small>03-21-2023</small>	34.39	65.61	59.07	50.12	36.64	11.21
3 Months Ago <small>12-27-2022</small>	1.82	98.18	89.73	80.92	56.13	11.65
Start of Calendar Year <small>01-03-2023</small>	1.82	98.18	89.73	80.92	56.13	11.65
Start of Water Year <small>09-27-2022</small>	0.00	100.00	99.88	94.44	64.44	17.25
One Year Ago <small>03-29-2022</small>	13.76	86.24	76.49	63.34	33.90	8.32

Intensity:



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

Curtis Riganti
National Drought Mitigation Center



droughtmonitor.unl.edu

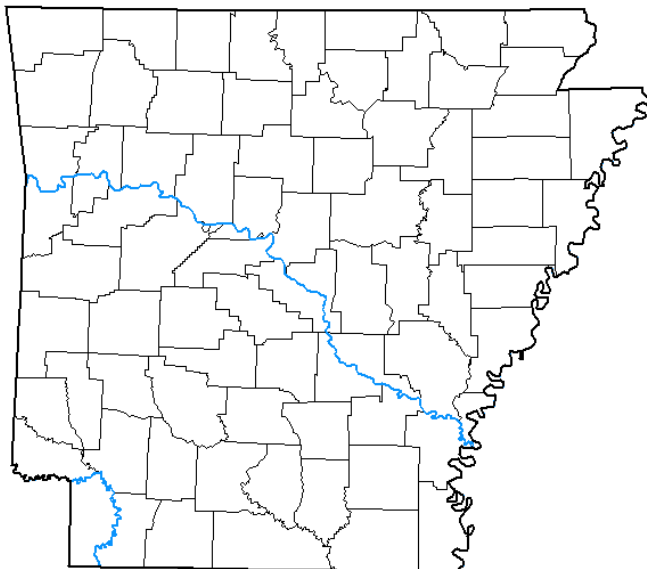
Fig. 2. Drought Monitor for Oklahoma

U.S. Drought Monitor Arkansas

March 28, 2023

(Released Thursday, Mar. 30, 2023)

Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	100.00	0.00	0.00	0.00	0.00	0.00
Last Week <small>03-21-2023</small>	100.00	0.00	0.00	0.00	0.00	0.00
3 Months Ago <small>12-27-2022</small>	17.03	82.97	41.38	0.00	0.00	0.00
Start of Calendar Year <small>01-03-2023</small>	53.09	46.91	2.26	0.00	0.00	0.00
Start of Water Year <small>09-27-2022</small>	4.99	95.01	69.68	39.30	2.96	0.00
One Year Ago <small>03-29-2022</small>	69.31	30.69	24.61	12.04	0.00	0.00

Intensity:



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

Curtis Riganti
National Drought Mitigation Center



droughtmonitor.unl.edu

Fig. 3. Drought Monitor for Arkansas

Outlooks

The [Climate Prediction Center](#) (CPC) outlook for April 2023 (issued March 31, 2023) indicates an enhanced chance for above normal temperatures across all of eastern OK and northwest AR. This outlook also calls for an enhanced chance for above normal precipitation across eastern OK and northwest AR southeast of Interstate 44, with an equal chance for above, near, and below median precipitation northwest of the interstate. This outlook was largely based on dynamical model output, residual atmospheric La Niña influence, and Madden-Julian Oscillation (MJO) influence.

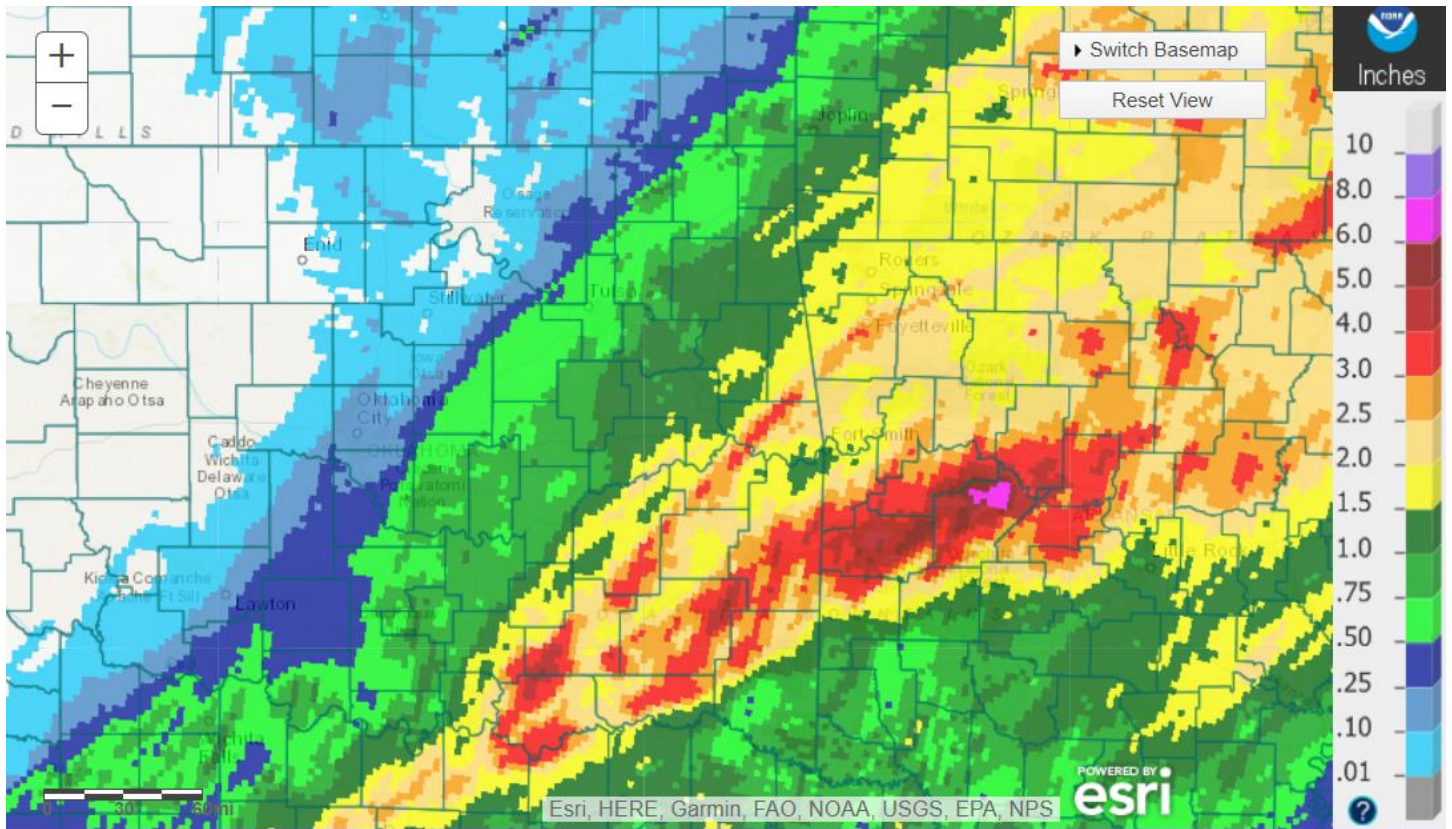
For the 3-month period April-May-June 2023, CPC is forecasting an enhanced chance for above normal temperatures and equal chance for above, near, and below median precipitation across eastern OK and northwest AR (outlook issued March 16, 2023). This outlook is based on long-term trends, ENSO state, soil moisture, and incorporates both statistical and dynamical forecast tools. According to CPC, La Niña has ended and ENSO-neutral is now present in the equatorial Pacific Ocean. ENSO-neutral conditions are expected to continue through the summer with a 60% chance of El Niño developing by this fall.

Summary of Heavy Precipitation Events Daily quality-controlled rainfall maps can be found at: http://water.weather.gov/precip/index.php?location_type=wfo&location_name=tsa

A low-level jet triggered scattered elevated convection north of I-40 during the late morning hours of the 2nd. These storms moved quickly to the north, exiting the area by mid-afternoon. Meanwhile, a potent upper-level low was approaching the region, drawing deeper moisture north into eastern OK and northwest AR. Precipitable water (PWAT) values were near the climatological maximum as more robust convection moved into southeast OK by late afternoon. Widespread showers and thunderstorms quickly overspread nearly all of eastern OK and northwest AR, which continued through the evening hours. This activity eventually became more scattered during the overnight hours, and the rain finally shifted east of the area by mid-morning of the 3rd. Locations along and northwest of I-44 received around 0.50" or less of rain, while along and southeast of I-44, rainfall totals ranged from around 0.50" to around 5" of rain (Figs. 4, 5). This rain caused minor flooding along the Illinois River, as well as minor to moderate flooding along the Poteau River (see E3 and preliminary hydrographs at the end of this report). Flash flooding was also reported in Le Flore County.

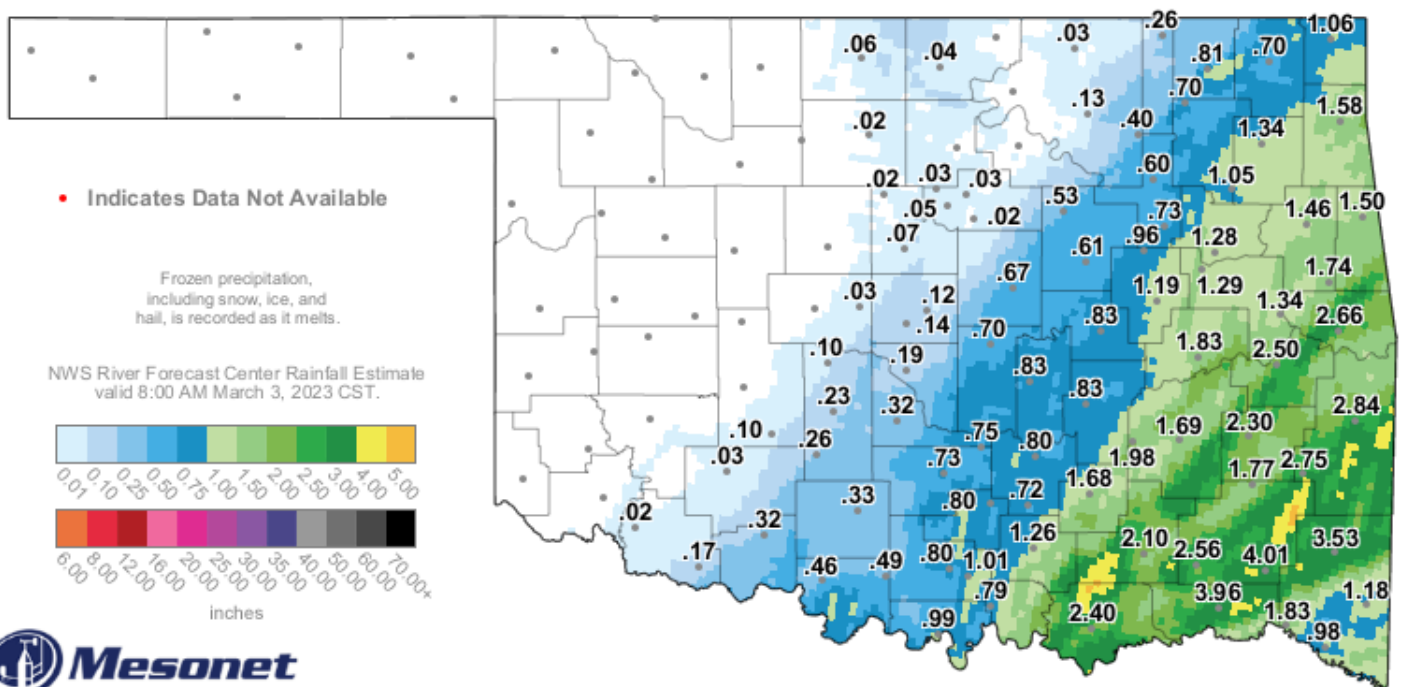
A warm front lifted north to near I-44 by evening of the 7th. Isentropic lift over the front resulted in the development of showers and thunderstorms near and north of the front across northeast OK. By midnight of the 8th, a band of widespread showers and thunderstorms was located over eastern OK and northwest AR between I-44 and I-40. The cold pool from these storms reinforced the cool side of the front, and the front began to shift south again as a cold front. The band of rain continued to shift south with the front as well, exiting the area around sunrise on the 8th. Rainfall totals ranged from a few hundredths of an inch to near 2.5" (Figs. 6, 7). The surface boundary then stalled near the Red River and by mid-evening, warm air advection intensified with isentropic lift maximized near and north of the front. This resulted in convection across southeast OK through the evening and overnight hours. By early morning, the rain had spread further east into west central AR as well. Most of this activity moved east of the region by mid-morning of the 9th, though scattered convection remained across eastern OK and northwest AR from mid-morning through late afternoon. By 6 am CST on the 9th, rainfall totals ranged from 0.5" to near 2.5" across southeast OK, with lesser amounts further north (Figs. 8, 9). An additional 0.25" to 2" of rain fell after 6 am (Fig. 10). While this rainfall didn't result in any river flooding, flows were high enough along the Illinois River that it was too dangerous for recreational activities.

Two upper-level waves moved across the region on the 16th. The first wave arrived ahead of a cold front, igniting showers and thunderstorms across southeast OK into west central AR during the late morning. Additional showers and thunderstorms then developed near the cold front further north in northeast OK shortly after noon. Storms became more widespread and linear along the front as the secondary wave approached the region. These storms continued to push southeast across eastern OK and northwest AR during the afternoon through evening hours. Rainfall totals ranged from around 0.10" to near 2" (Fig. 11).



Tulsa, OK: March 03, 2023 1-Day Observed Precipitation
 Valid on: March 03, 2023 12:00 UTC

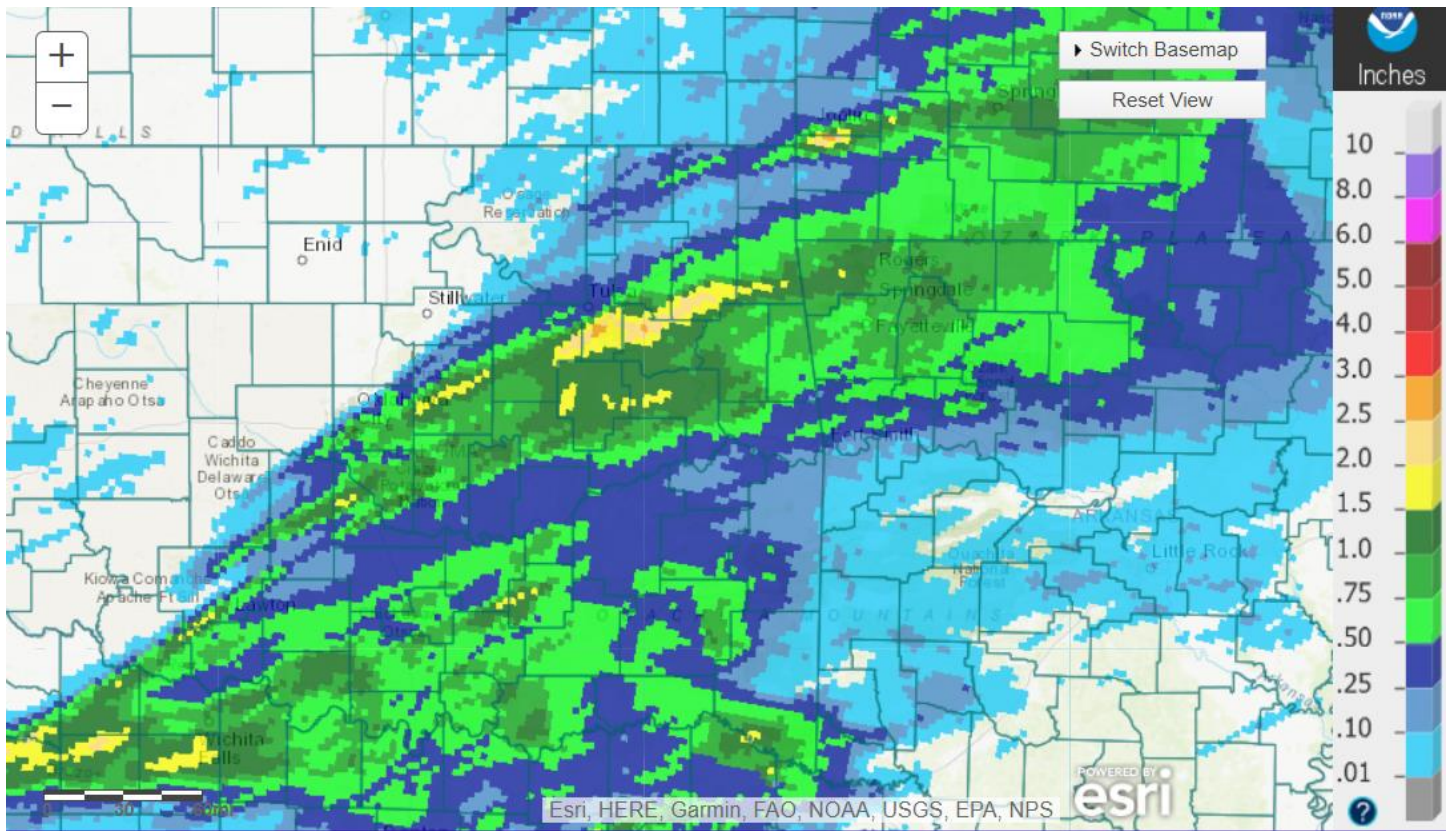
Fig. 4. 24-hour Estimated Observed Rainfall ending at 6am CST 3/03/2023.



2-Day Rainfall Accumulation (inches)

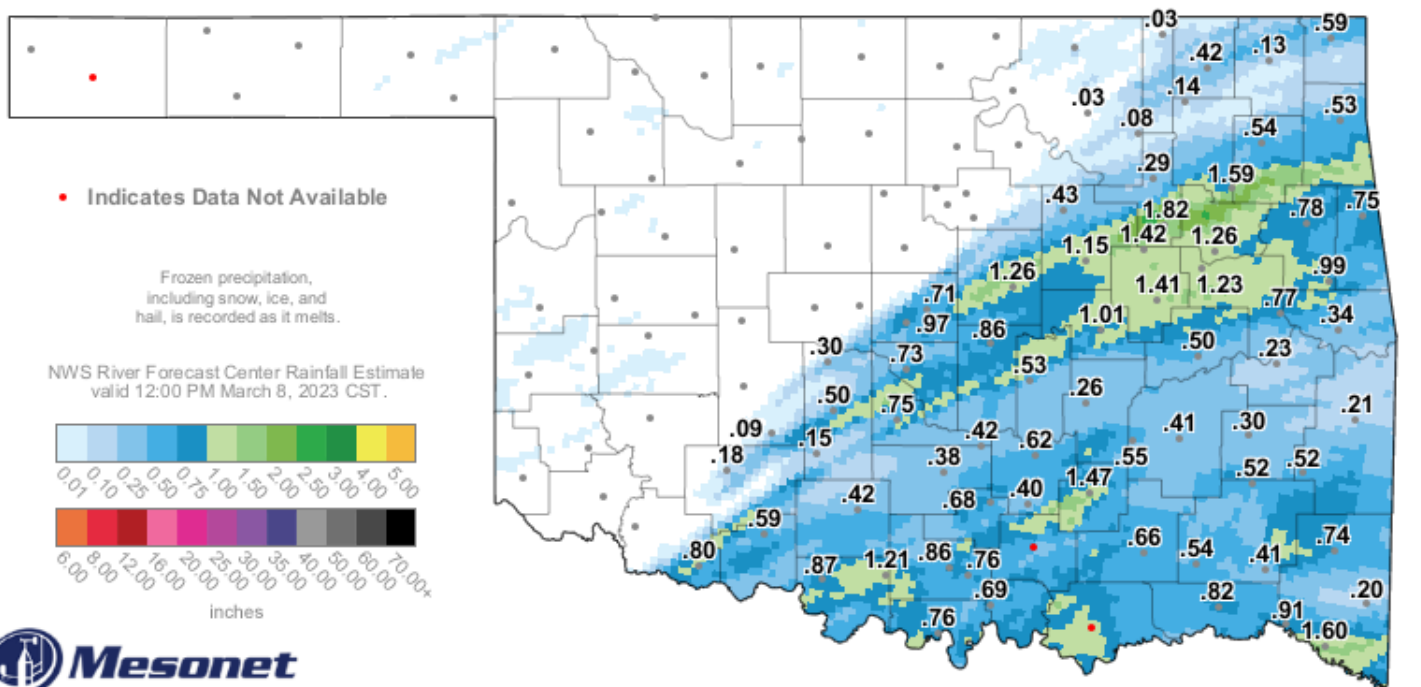
9:40 AM March 3, 2023 CST
 Created 9:44:33 AM March 3, 2023 CST. © Copyright 2023

Fig. 5. OK Mesonet (values) and NWS RFC rainfall estimate (image) 2-Day rainfall ending at 9:40 am CST 3/03/2023.



Tulsa, OK: March 08, 2023 1-Day Observed Precipitation
Valid on: March 08, 2023 12:00 UTC

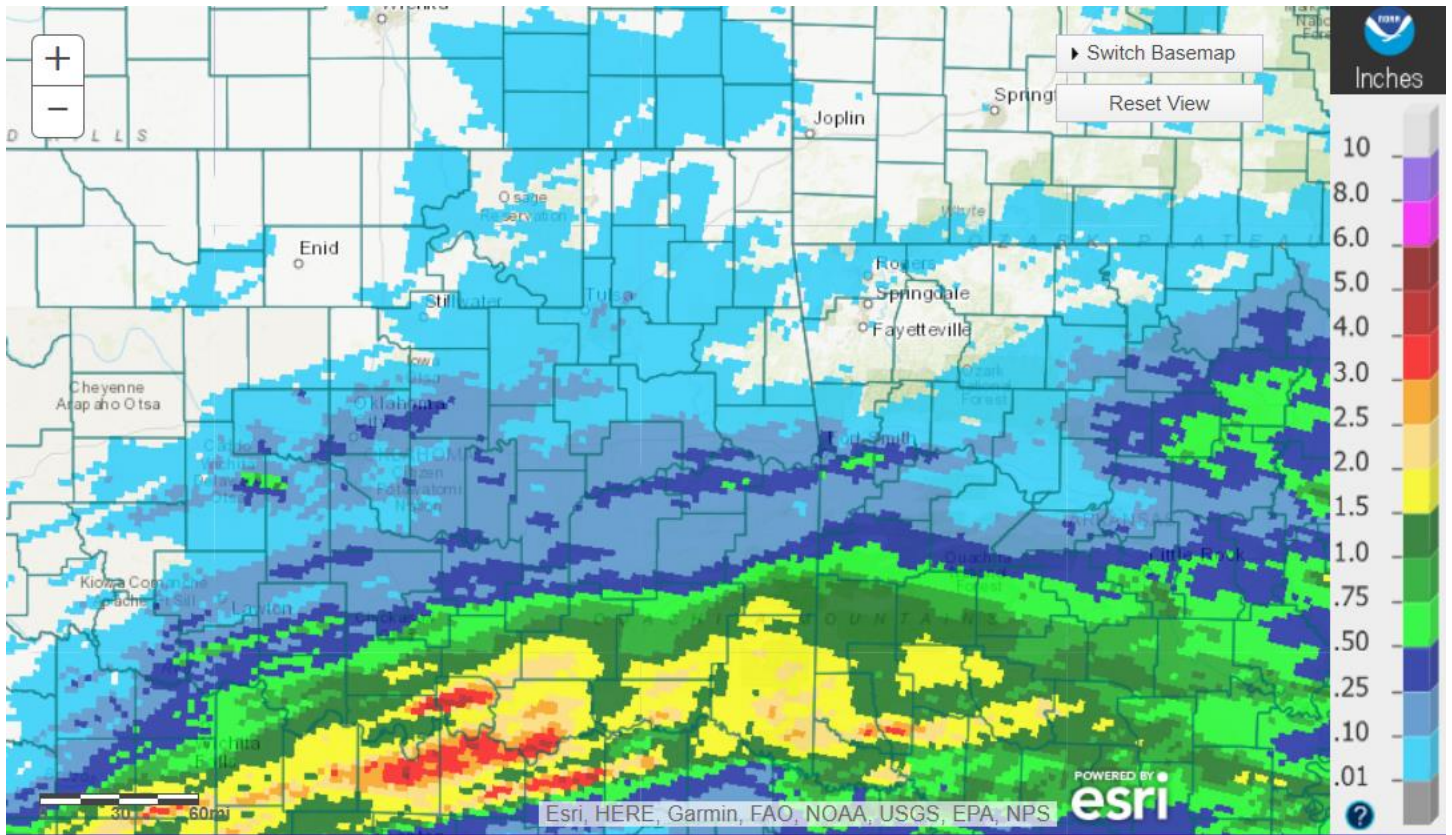
Fig. 6. 24-hour Estimated Observed Rainfall ending at 6am CST 3/08/2023.



24-Hour Rainfall Accumulation (inches)

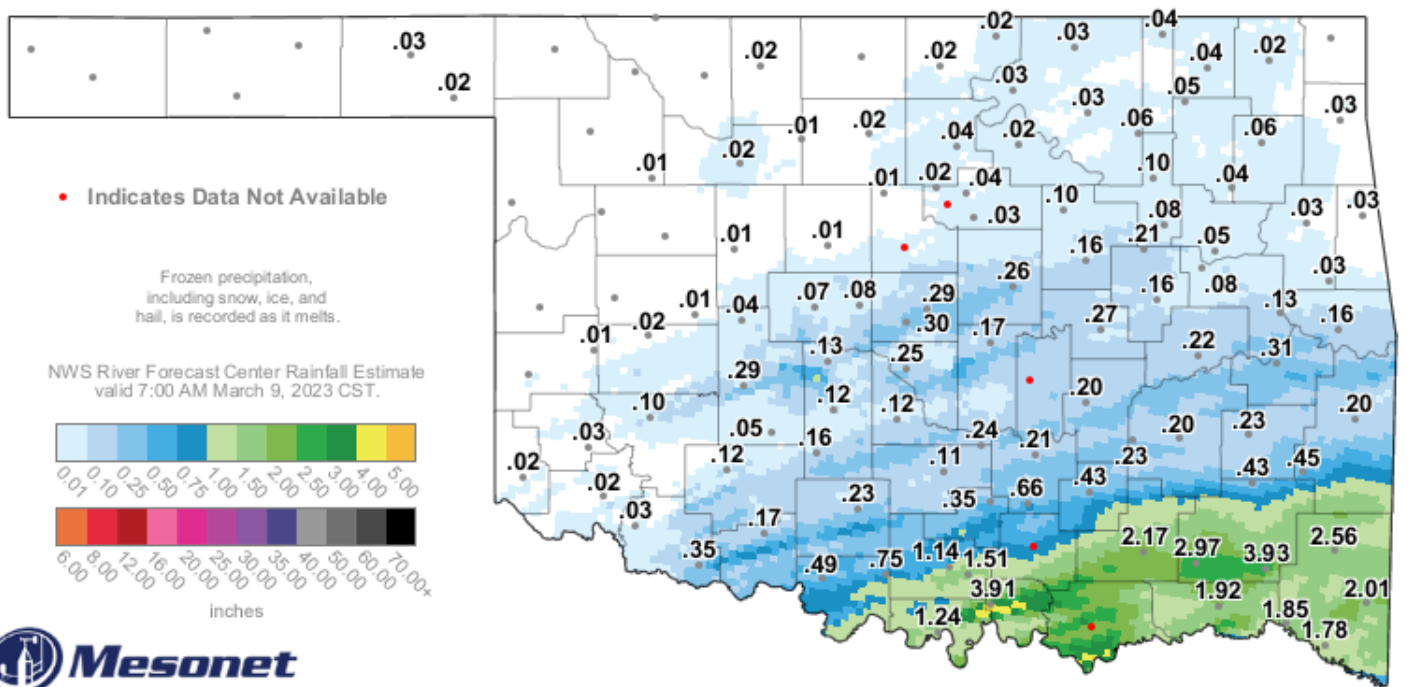
1:25 PM March 8, 2023 CST
Created 1:29:20 PM March 8, 2023 CST. © Copyright 2023

Fig. 7. OK Mesonet (values) and NWS RFC rainfall estimate (image) 24-hour rainfall ending at 1:25 pm CST 3/08/2023.



Tulsa, OK: March 09, 2023 1-Day Observed Precipitation
Valid on: March 09, 2023 12:00 UTC

Fig. 8. 24-hour Estimated Observed Rainfall ending at 6am CST 3/9/2023.

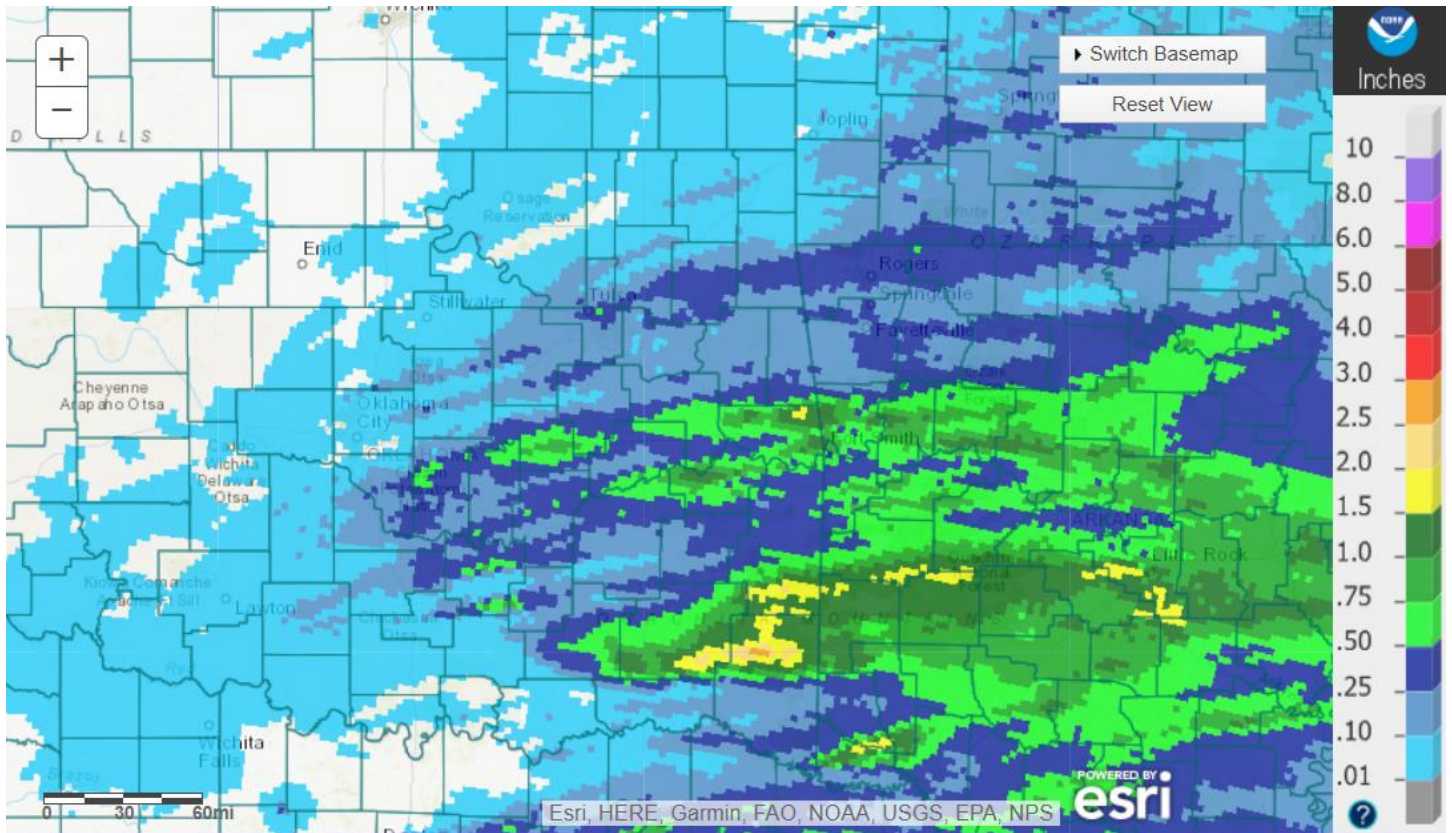


24-Hour Rainfall Accumulation (inches)

7:55 AM March 9, 2023 CST

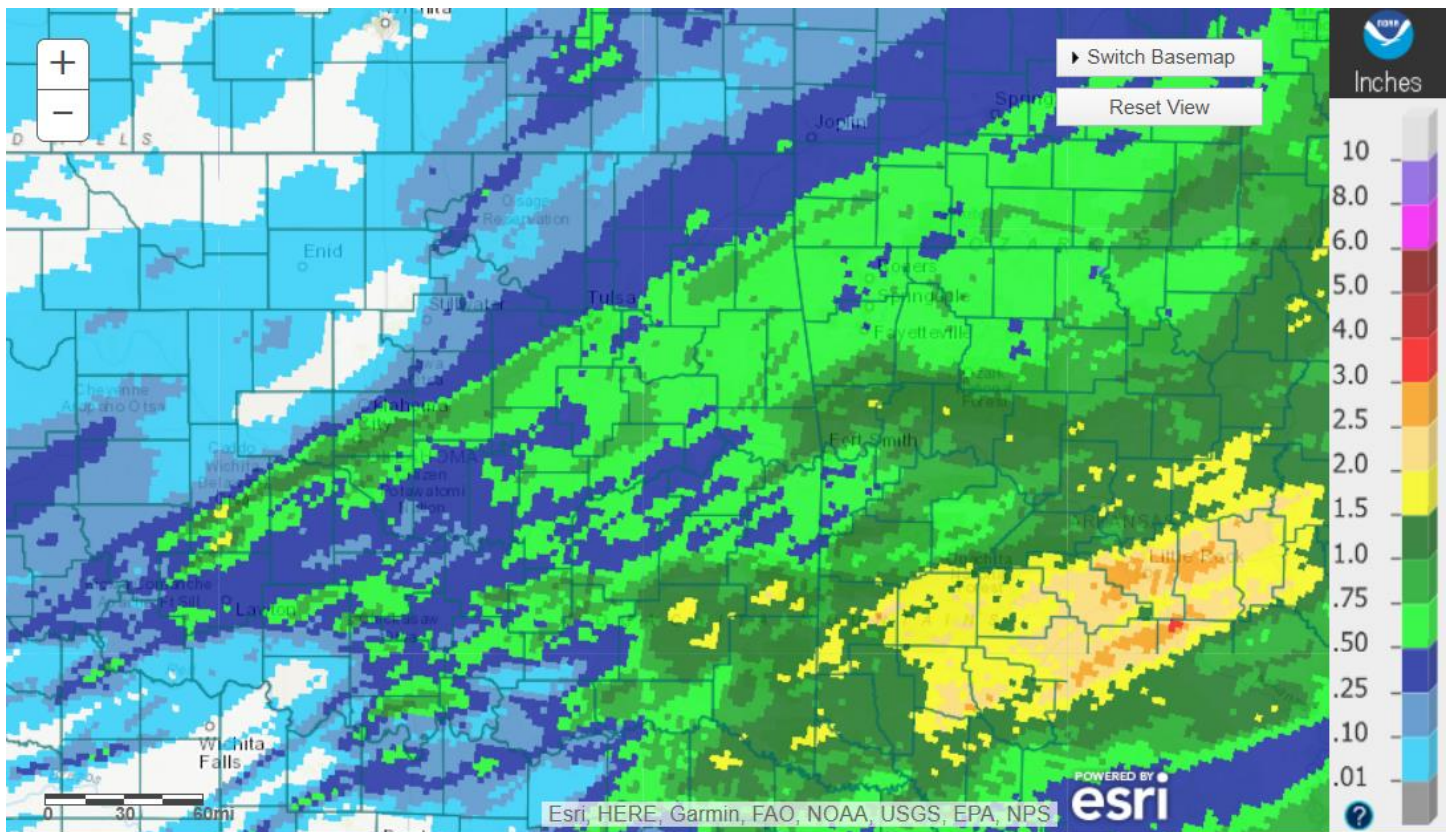
Created 8:01:30 AM March 9, 2023 CST. © Copyright 2023

Fig. 9. OK Mesonet (values) and NWS RFC rainfall estimate (image) 24-hour rainfall ending at 7:55 am CST 3/9/2023.



Tulsa, OK: March 10, 2023 1-Day Observed Precipitation
Valid on: March 10, 2023 12:00 UTC

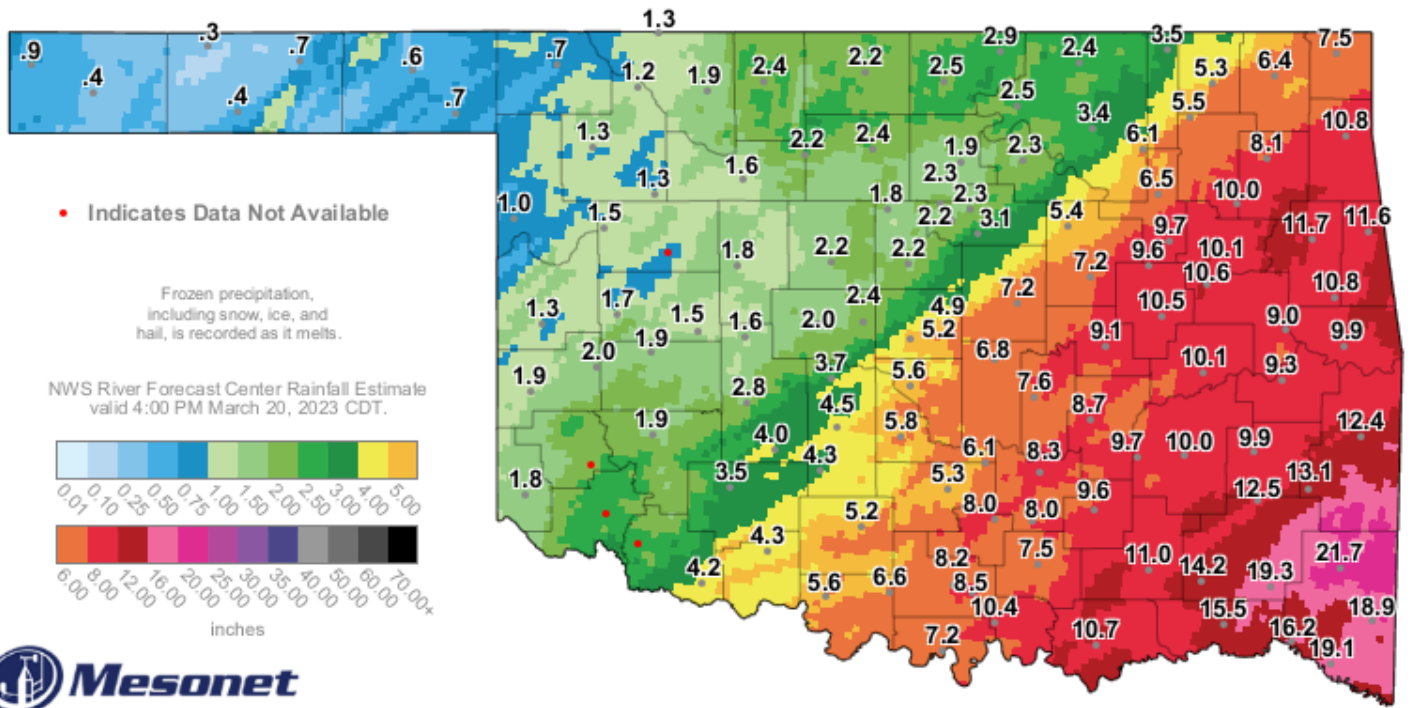
Fig. 10. 24-hour Estimated Observed Rainfall ending at 6am CST 3/10/2023.



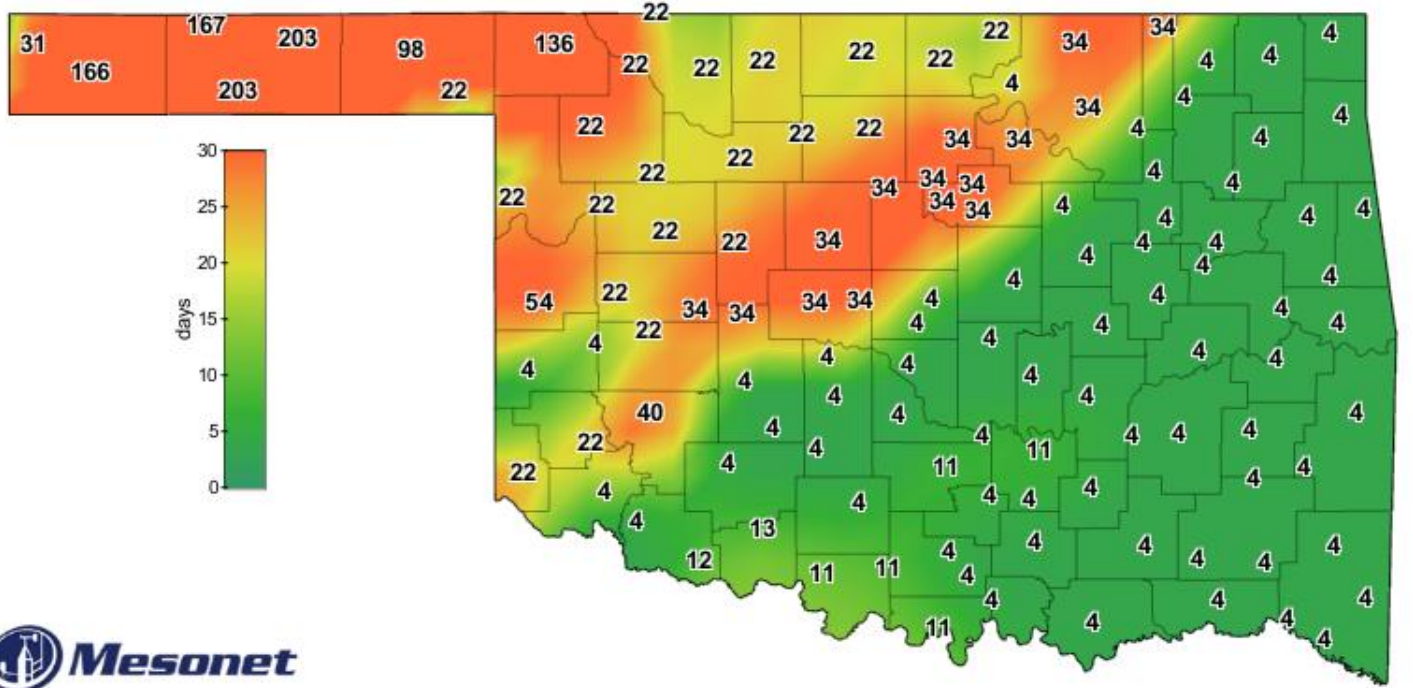
Tulsa, OK: March 17, 2023 1-Day Observed Precipitation
Valid on: March 17, 2023 12:00 UTC

Fig. 11. 24-hour Estimated Observed Rainfall ending at 7am CDT 3/17/2023.

By mid-month, a significant 90-day rainfall gradient existed near the I-44 corridor (Fig. 12). Across the HSA, the gradient ranged from around 2.5" in Osage County to near 20" in Le Flore County. Across the entire state of OK, the rainfall ranged from around 0.25" to near 22"! Significant improvement in the drought conditions occurred along and southeast of I-44, while exceptional drought remained to the northwest where the area had gone over a month of consecutive days with less than a 0.25" of rain through the 20th (Fig. 13). All four categories of drought were present across Osage County by the end of the month.



90-Day Rainfall Accumulation (inches) 5:10 PM March 20, 2023 CDT
Created 5:15:58 PM March 20, 2023 CDT. © Copyright 2023
 Fig. 12. OK Mesonet (values) and NWS RFC rainfall estimate (image) 90-Day rainfall ending at 5:10 pm CDT 3/20/2023.



Consecutive Days With Less Than 0.25" Rainfall March 20, 2023
Created 7:15:04 AM March 21, 2023 CDT. © Copyright 2023
 Fig. 13. OK Mesonet consecutive days with less than 0.25" of rain through 3/20/2023.

Showers and thunderstorms developed across northeast OK and far northwest AR near a cold front during the late afternoon and early evening hours of the 23rd. The storm motion was parallel to the front, and the front remained nearly stationary through the evening hours. This resulted in the training of storms over the same area for hours, producing significant rainfall. After midnight, the cold front and associated storms began to slowly move southeast and was draped across southeast OK into west central AR by sunrise of the 24th. Rainfall totals through 7 am on the 24th ranged from around 0.25" to 5" across most of eastern OK and northwest AR (Figs. 14, 15). The heaviest corridor of rain was located from southern Creek County/northern Okfuskee County northeast through Delaware and Benton Counties. Another pocket of heavy impacted Latimer, northern Pushmataha, and Le Flore Counties. Widespread showers and thunderstorms continued across a large portion of the area through the remainder of the morning before shrinking in area and becoming more confined to near the stalled frontal zone from southeast OK into northwest AR by noon. The front and storms finally pushed east of the area by late afternoon after bringing an additional 0.25" to 4" of rain (Fig. 16). In total, 0.50" to 7" of rain fell along and south of the I-44 corridor with this storm system (Figs. 17, 18). Flash flooding closed many roads and at least one swift water rescue was reported in Mayes County. Additionally, moderate river flooding occurred along the Poteau River, and minor flooding occurred along the Illinois River, the Arkansas River at Ozark L&D, and the Kiamichi River near Antlers (see E3 and preliminary hydrographs at the end of this report).

An 850 mb wind max from southwest into north central OK was mixed down to the surface behind a dryline to produce non-thunderstorm wind gusts of 50 to 65 mph in portions of northeast OK on the 31st (Fig. 19). Relative humidity values of only 10%-15% across western Osage and western Pawnee Counties, combined with the high winds, resulted in dangerous fire weather conditions, with numerous fire starts across the area.

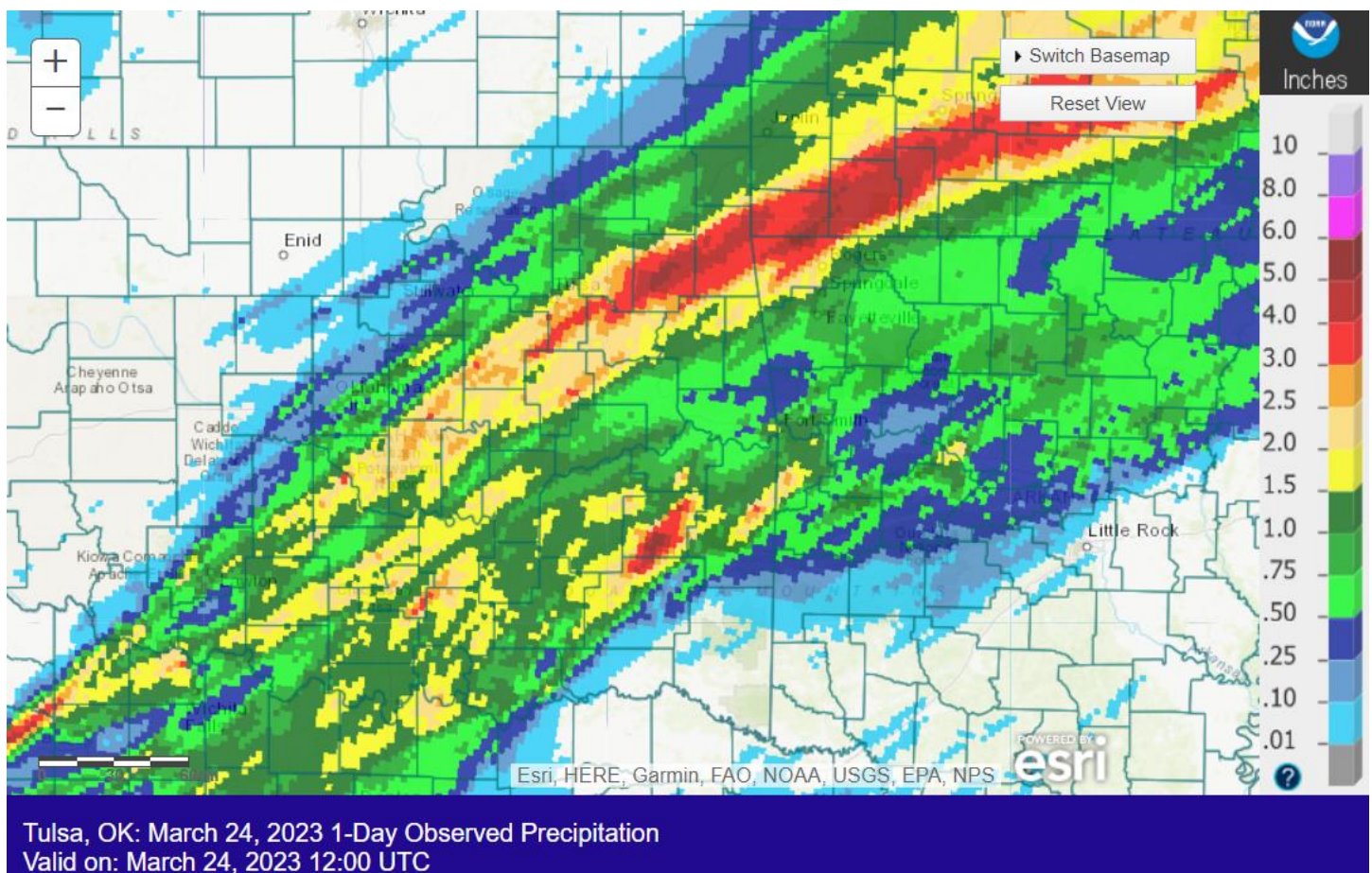
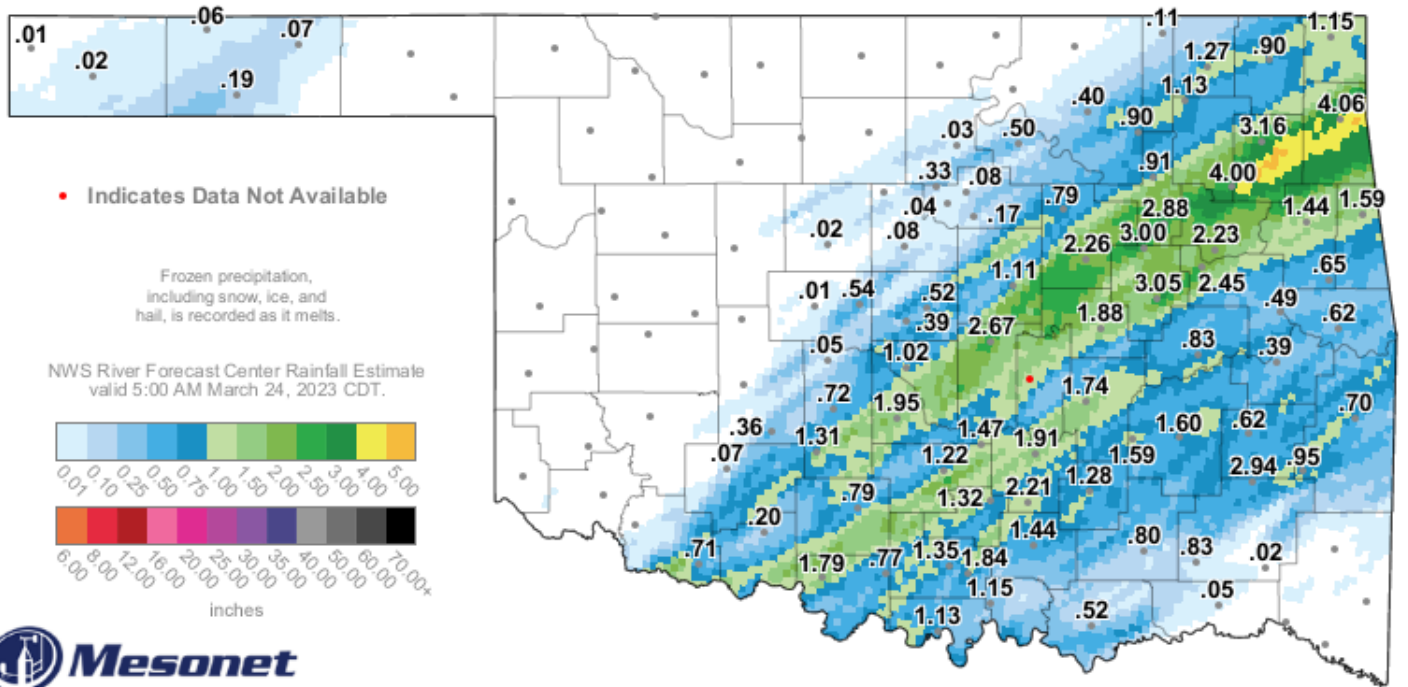


Fig. 14. 24-hour Estimated Observed Rainfall ending at 7am CDT 3/24/2023.

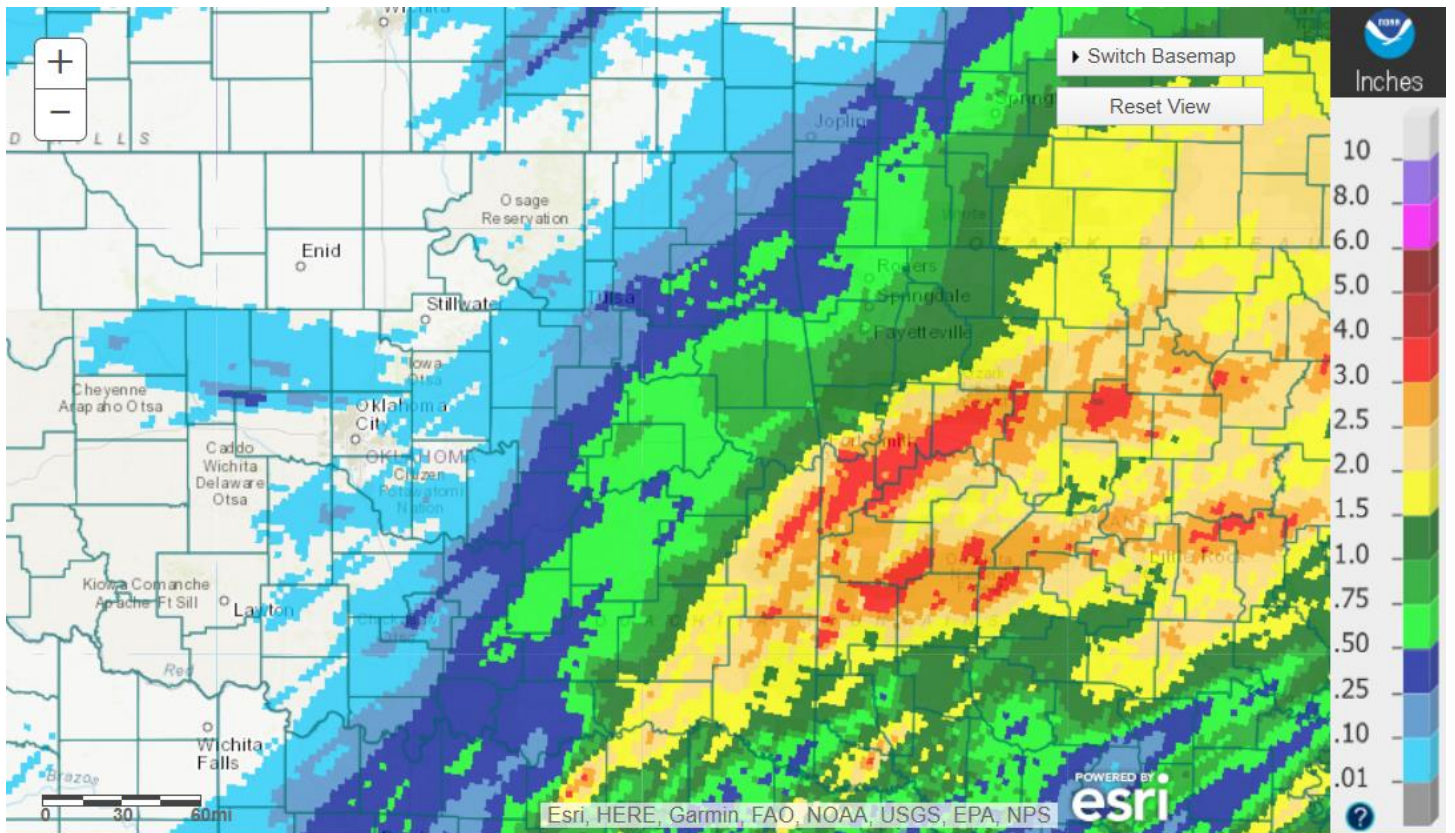


24-Hour Rainfall Accumulation (inches)

6:35 AM March 24, 2023 CDT

Created 6:40:58 AM March 24, 2023 CDT. © Copyright 2023

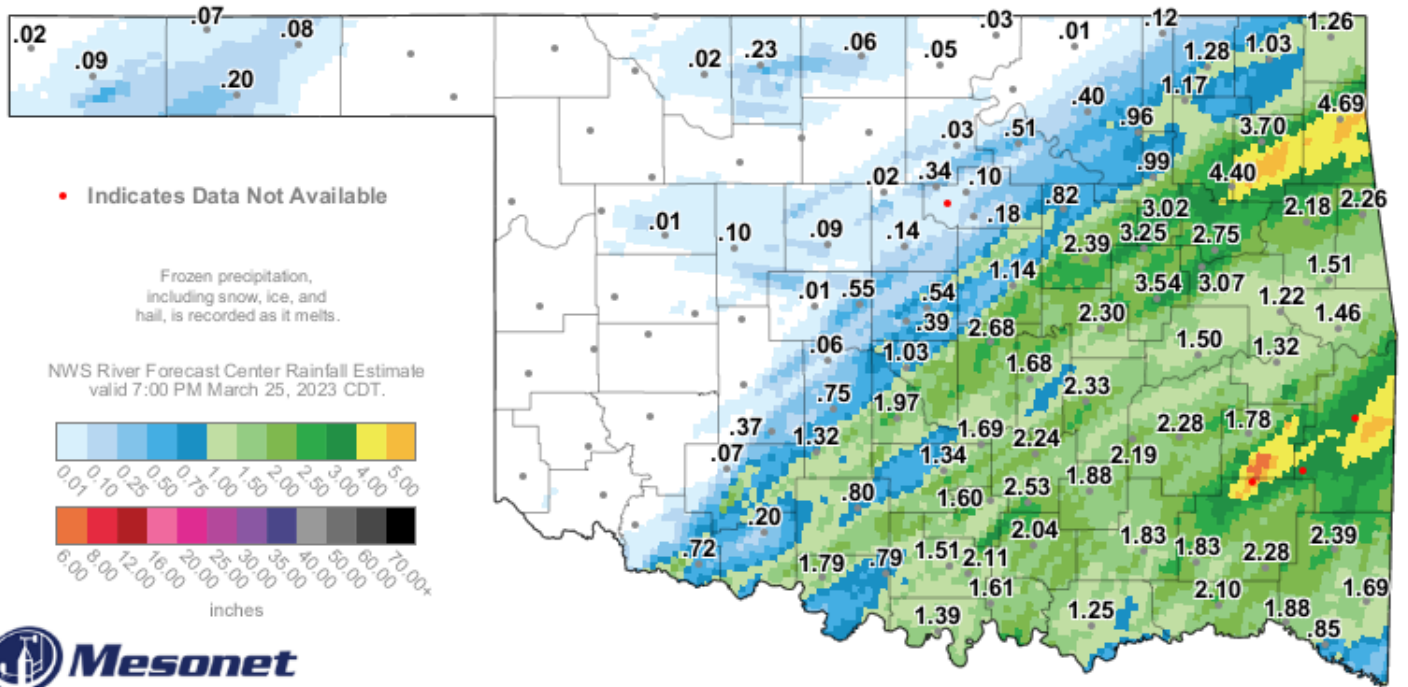
Fig. 15. OK Mesonet (values) and NWS RFC rainfall estimate (image) 24-hour rainfall ending at 6:35 am CDT 3/24/2023.



Tulsa, OK: March 25, 2023 1-Day Observed Precipitation

Valid on: March 25, 2023 12:00 UTC

Fig. 16. 24-hour Estimated Observed Rainfall ending at 7am CDT 3/25/2023.



3-Day Rainfall Accumulation (inches)

8:25 PM March 25, 2023 CDT

Created 8:30:46 PM March 25, 2023 CDT. © Copyright 2023

Fig. 17. OK Mesonet (values) and NWS RFC rainfall estimate (image) 3-Day rainfall ending at 8:25 pm CDT 3/25/2023.

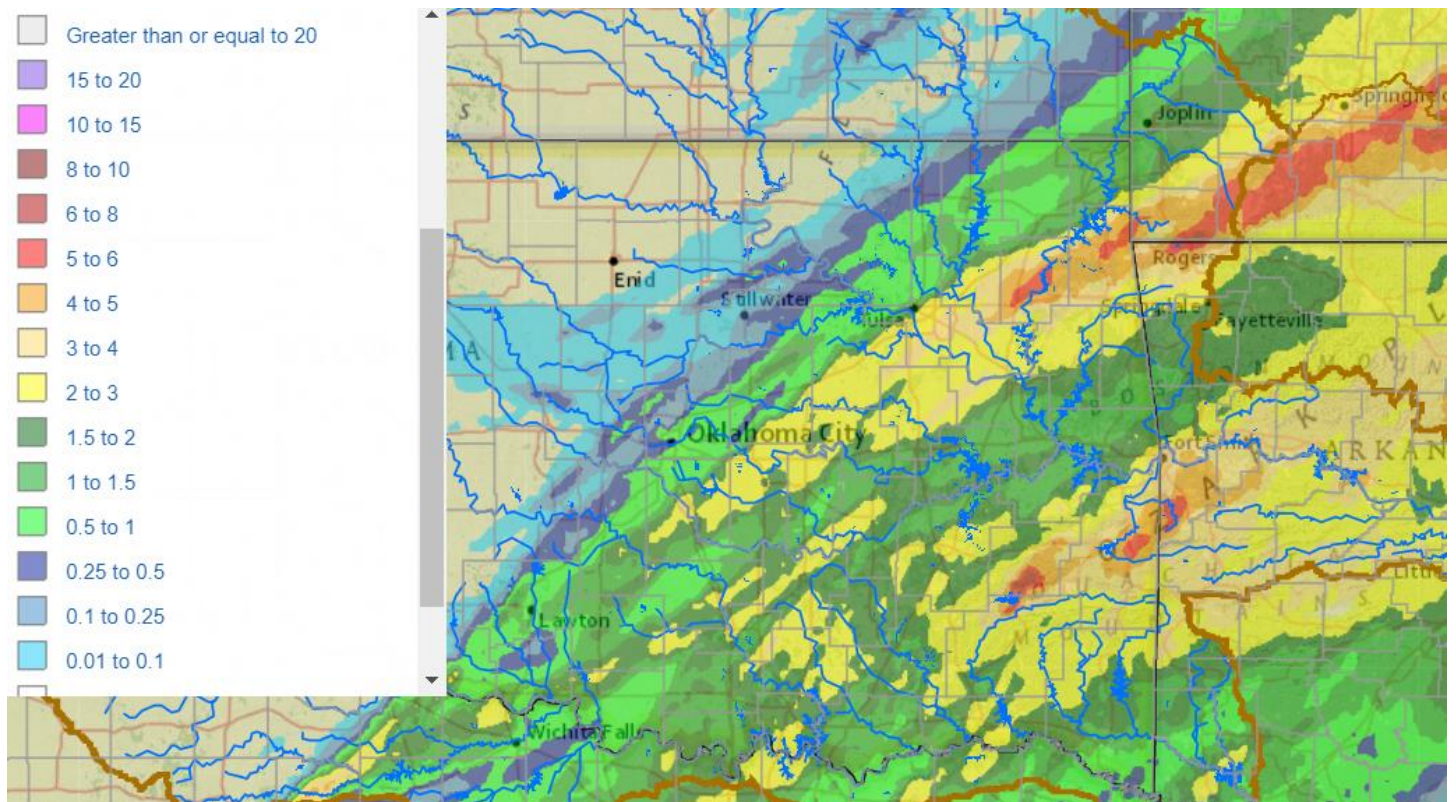
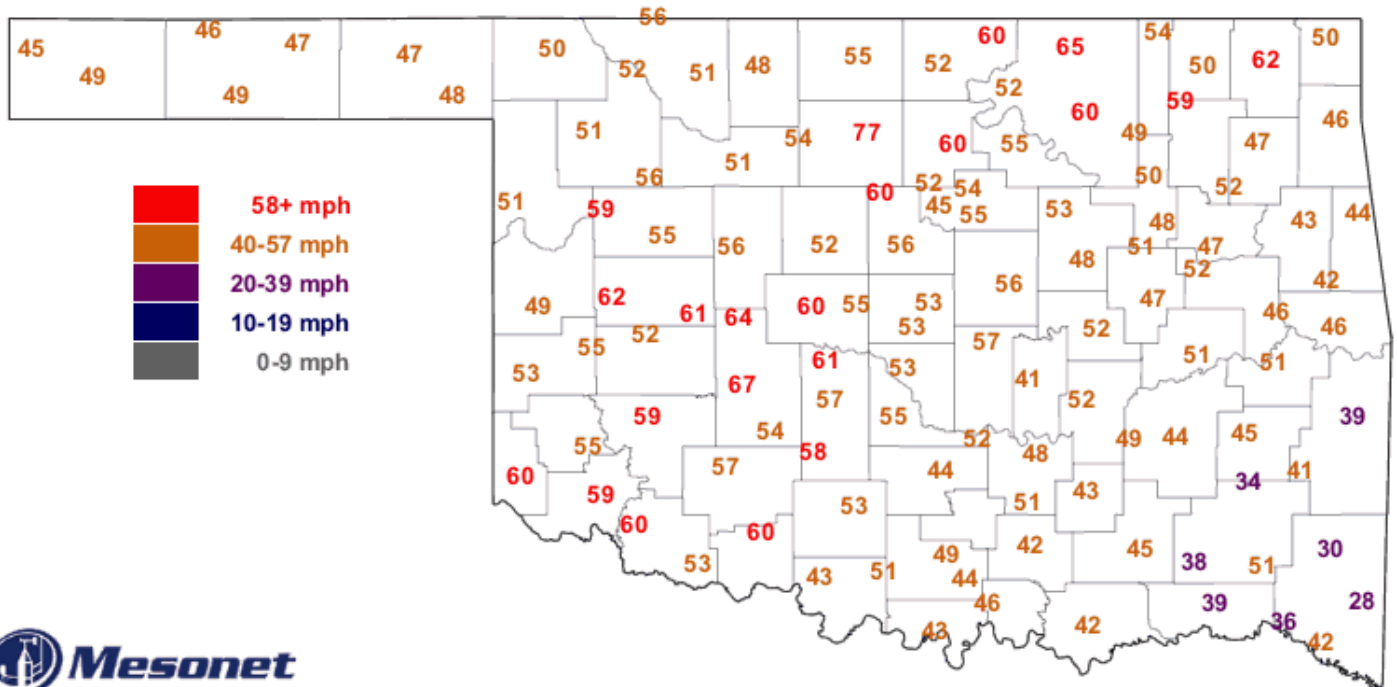


Fig. 18. 48-hour Estimated Observed Rainfall ending at 7am CDT 3/25/2023.



Today's Maximum Wind Gusts (mph)
 Fig. 19. OK Mesonet maximum wind gusts (mph) for 03/31/2023 through 3:35 pm CDT.

3:35 PM March 31, 2023 CDT
 Created 3:41:20 PM March 31, 2023 CDT. © Copyright 2023

Written by:
 Nicole McGavock
 Service Hydrologist
 WFO Tulsa

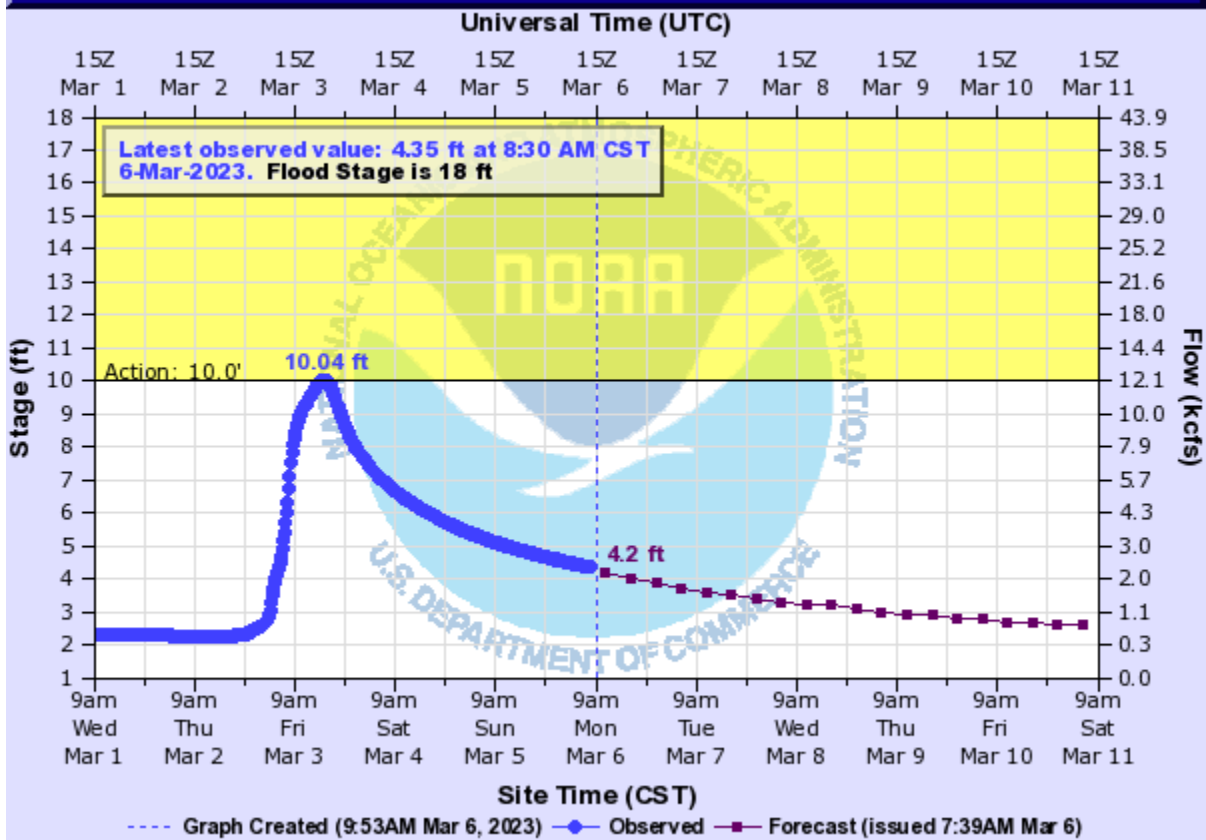
Products issued in March 2023:

- *CWYO2 became a daily river forecast point September 7, 2016
- *MLBA4 and OZGA4 transferred to NWS Tulsa HSA February 5, 2014
- *Mixed case River Flood products began July 31, 2013

- 11 Flash Flood Warnings (FFW)
- 11 Flash Flood Statements (FFS)
- 2 Flash/Areal Flood Watches (FFA) (13 Watch FFA CON/EXT/EXA/EXB/CAN)
- 13 Urban and Small Stream Advisories (FLS)
- 6 Areal Flood Warnings (FLW)
- 2 Areal Flood Statements (FLS)
- 16 River Flood Warnings (FLW) (includes category increases)
- 113 River Flood Statements (FLS)
- 12 River Flood Advisories (FLS) (50 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:

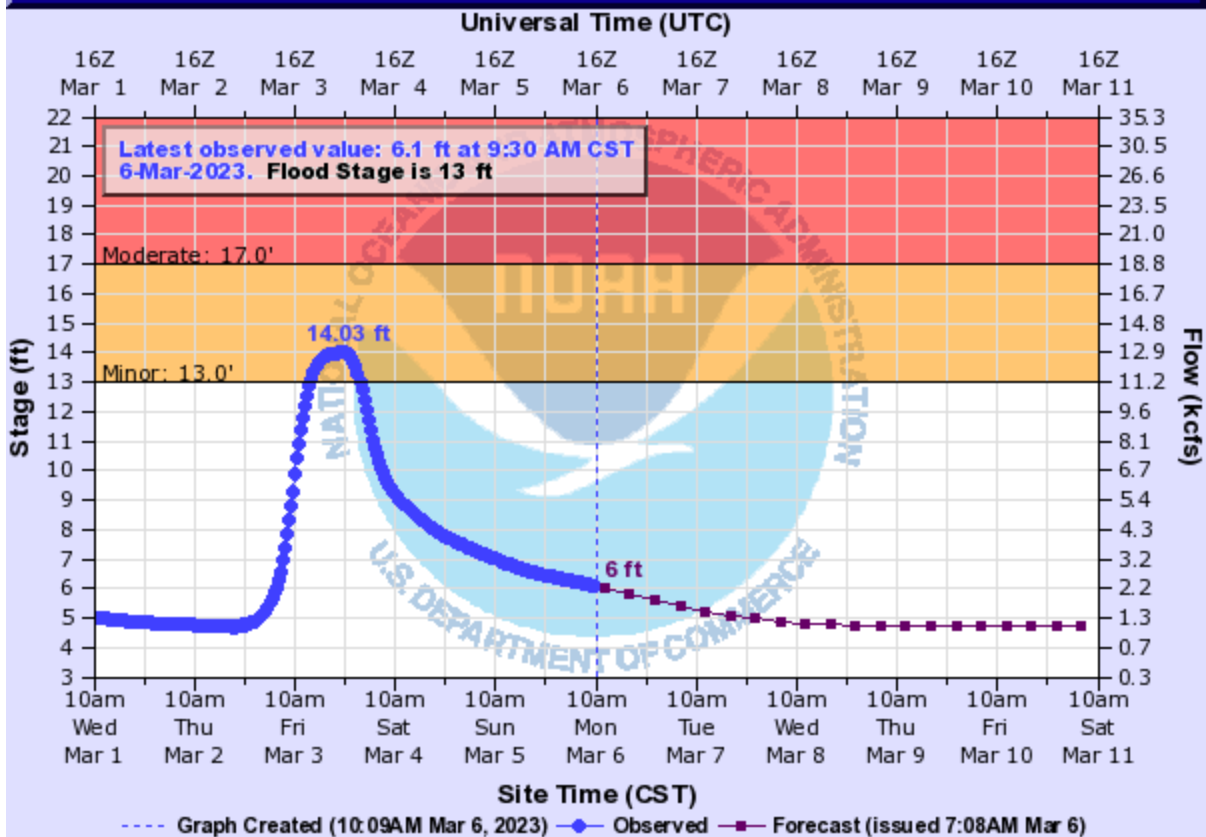
MULBERRY RIVER (AR) NEAR MULBERRY



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

Observations courtesy of USGS/USACE/ADEQ

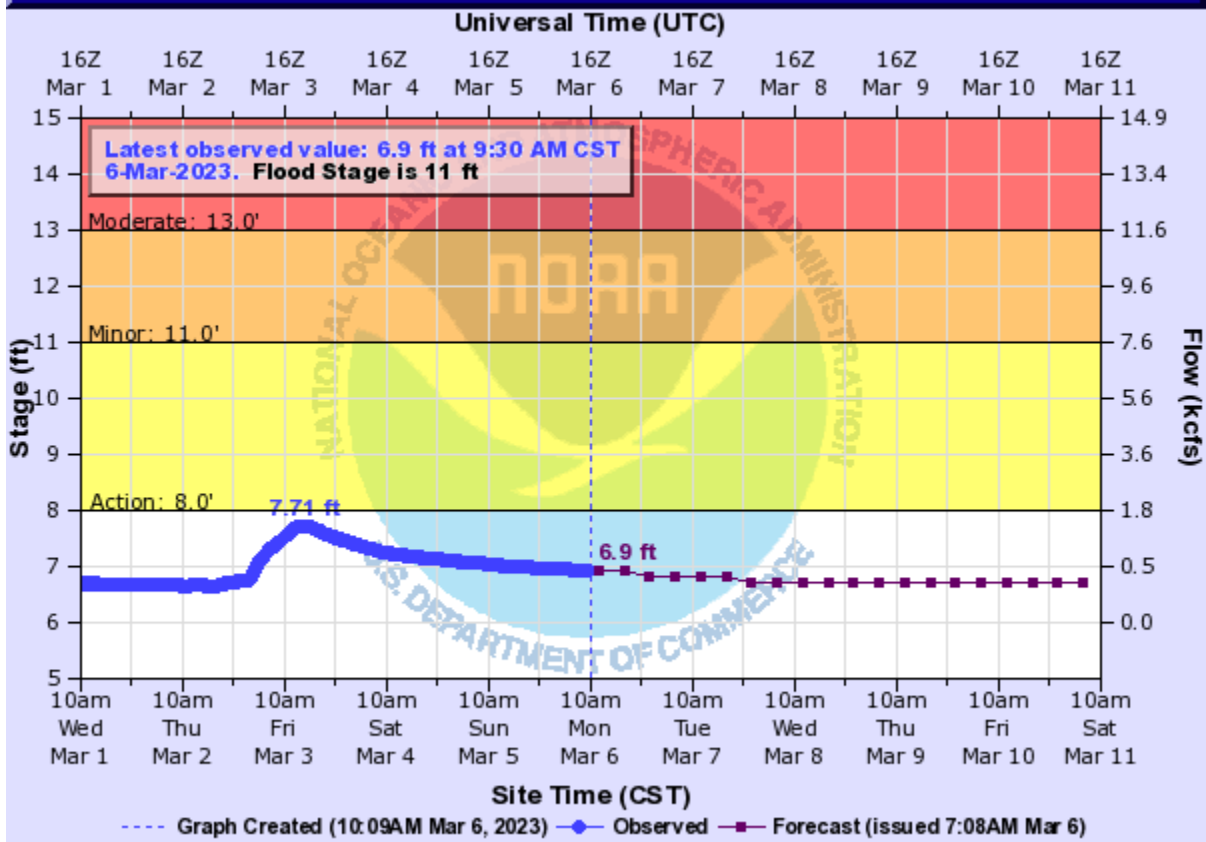
ILLINOIS RIVER (AR OK) NEAR WATTS



WT02(plotting HGIRG) "Gage 0" Datum: 893.78'

Observations courtesy of US Geological Survey

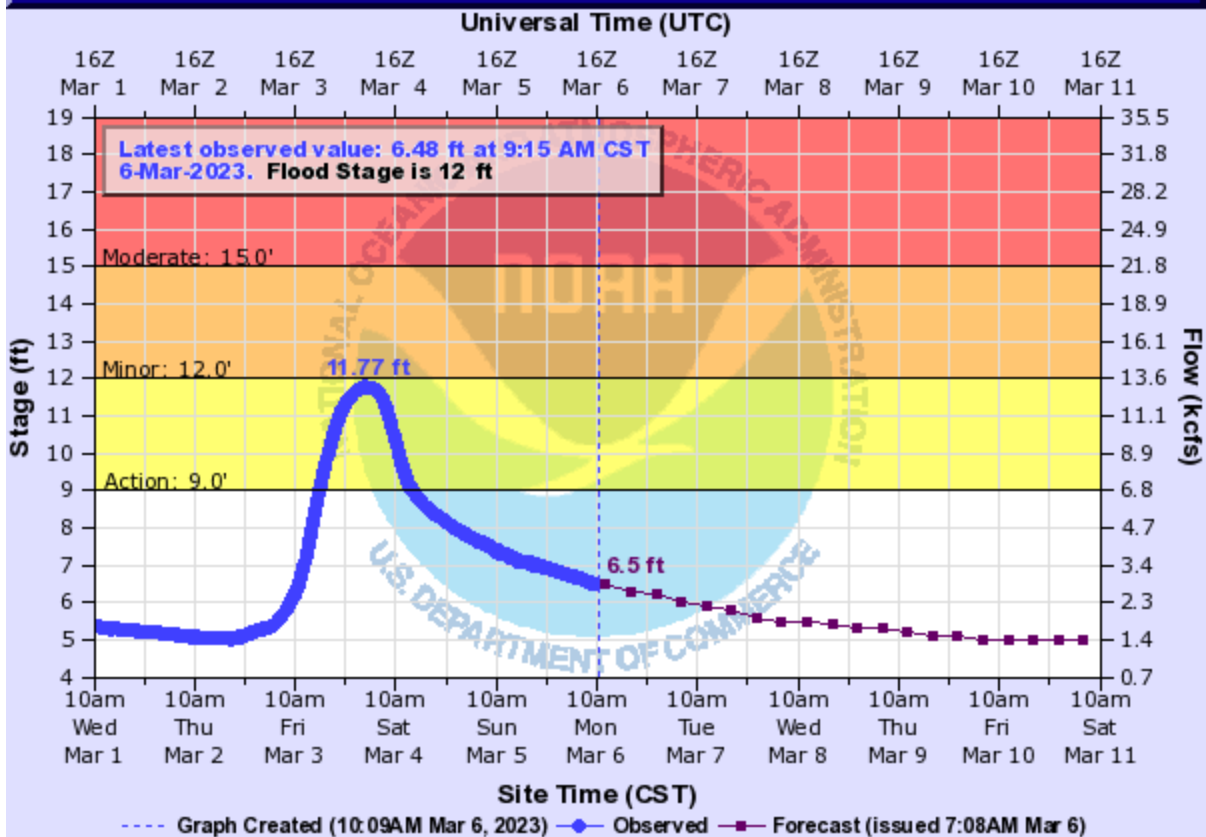
FLINT CREEK (OK) NEAR KANSAS



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

Observations courtesy of US Geological Survey

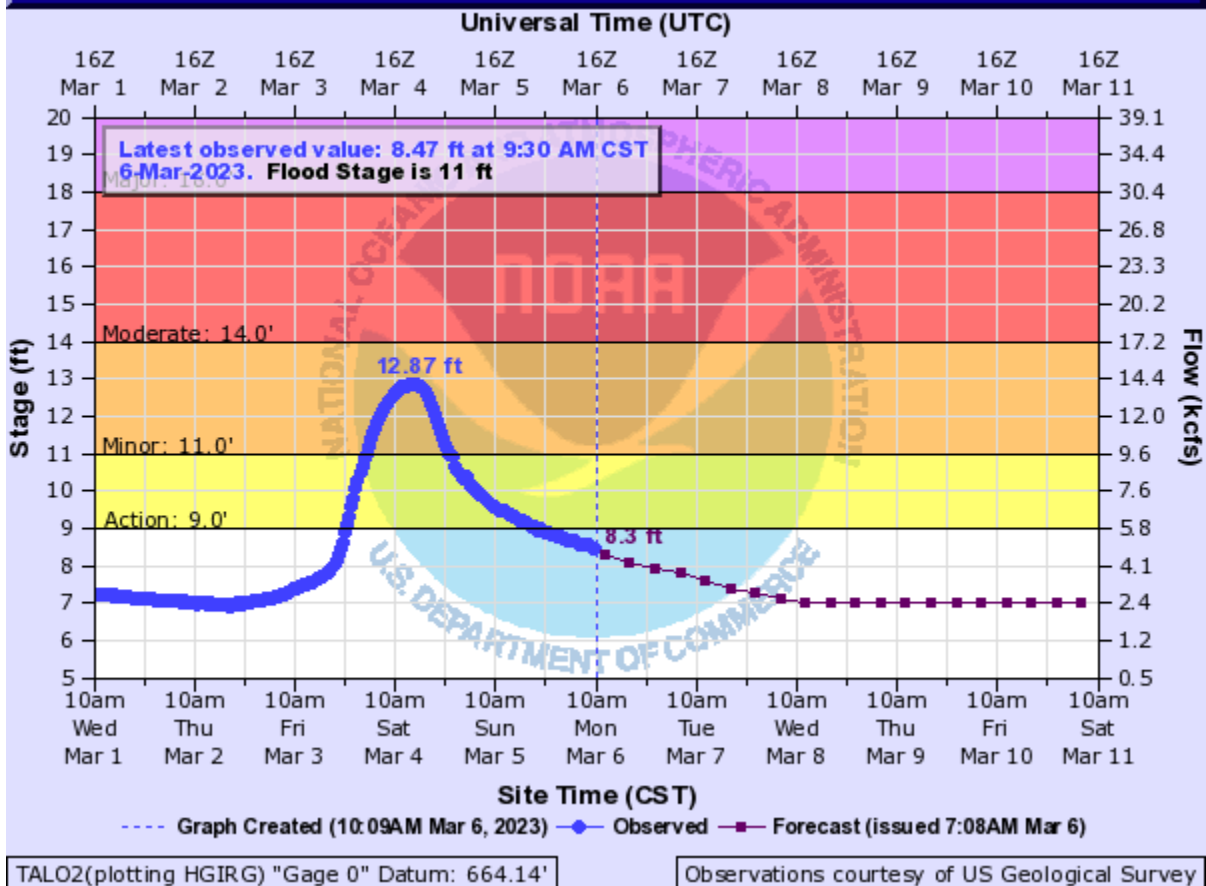
ILLINOIS RIVER (AR OK) AT CHEWEY



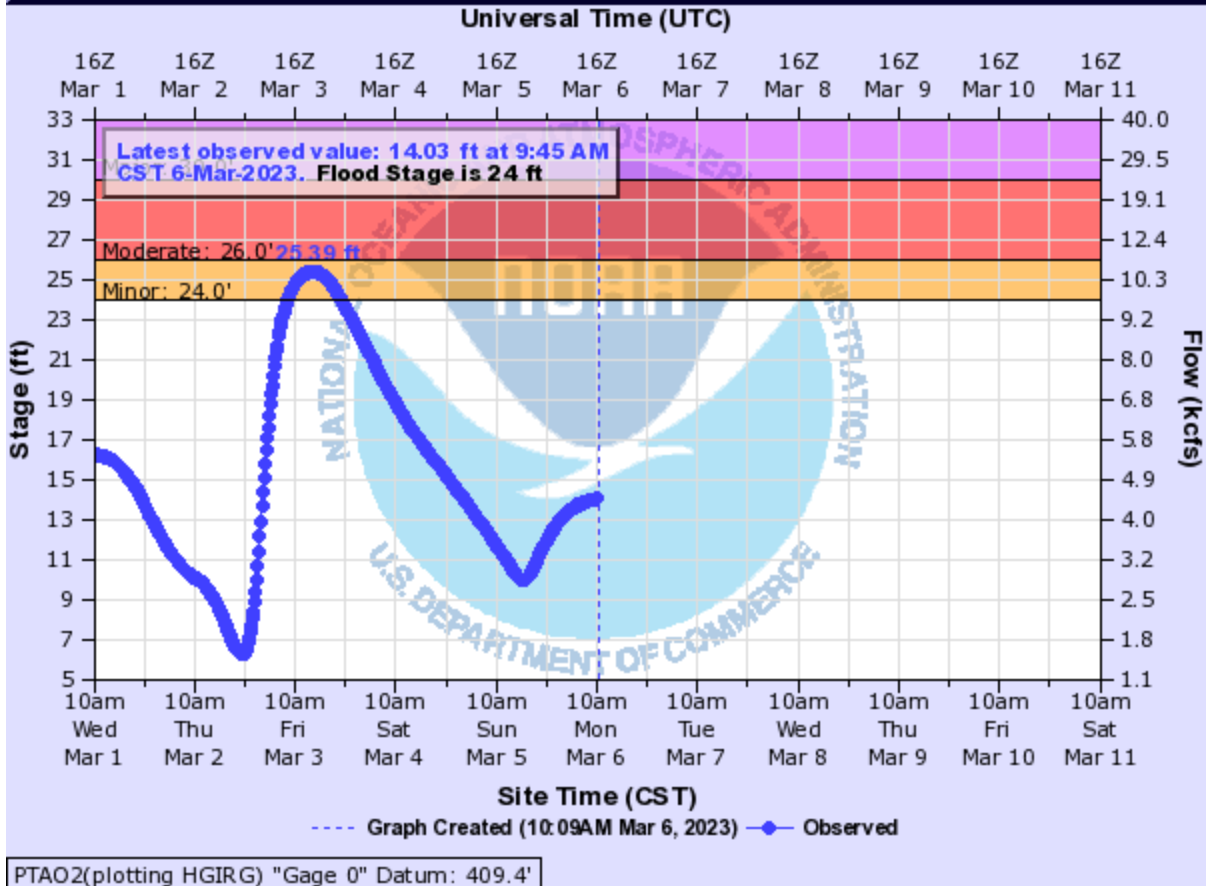
CWYO2(plotting HGIRG) "Gage 0" Datum: 800.88'

Observations courtesy of US Geological Survey

ILLINOIS RIVER (AR OK) NEAR TAHLEQUAH

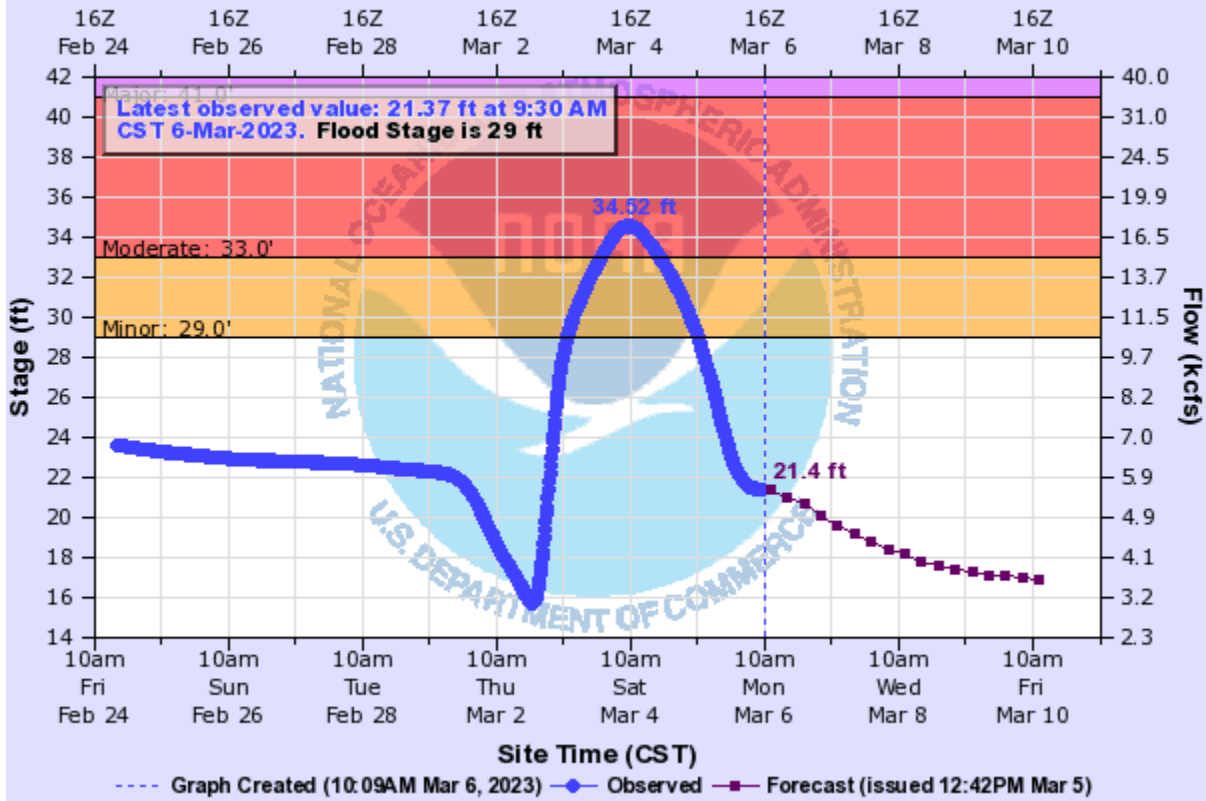


POTEAU RIVER NEAR POTEAU



POTEAU RIVER NEAR PANAMA

Universal Time (UTC)

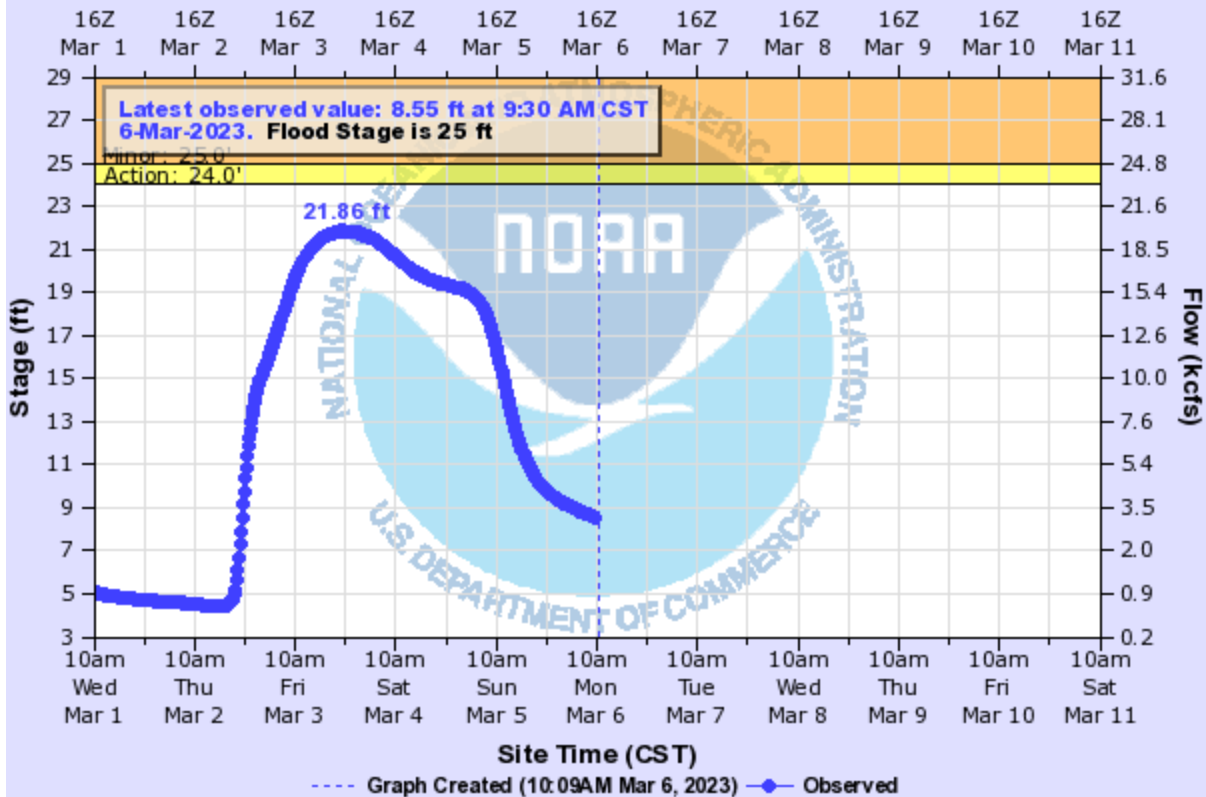


PANO2(plotting HGIRG) "Gage 0" Datum: 387.96'

Observations courtesy of US Geological Survey

KIAMICHI RIVER NEAR ANTLERS

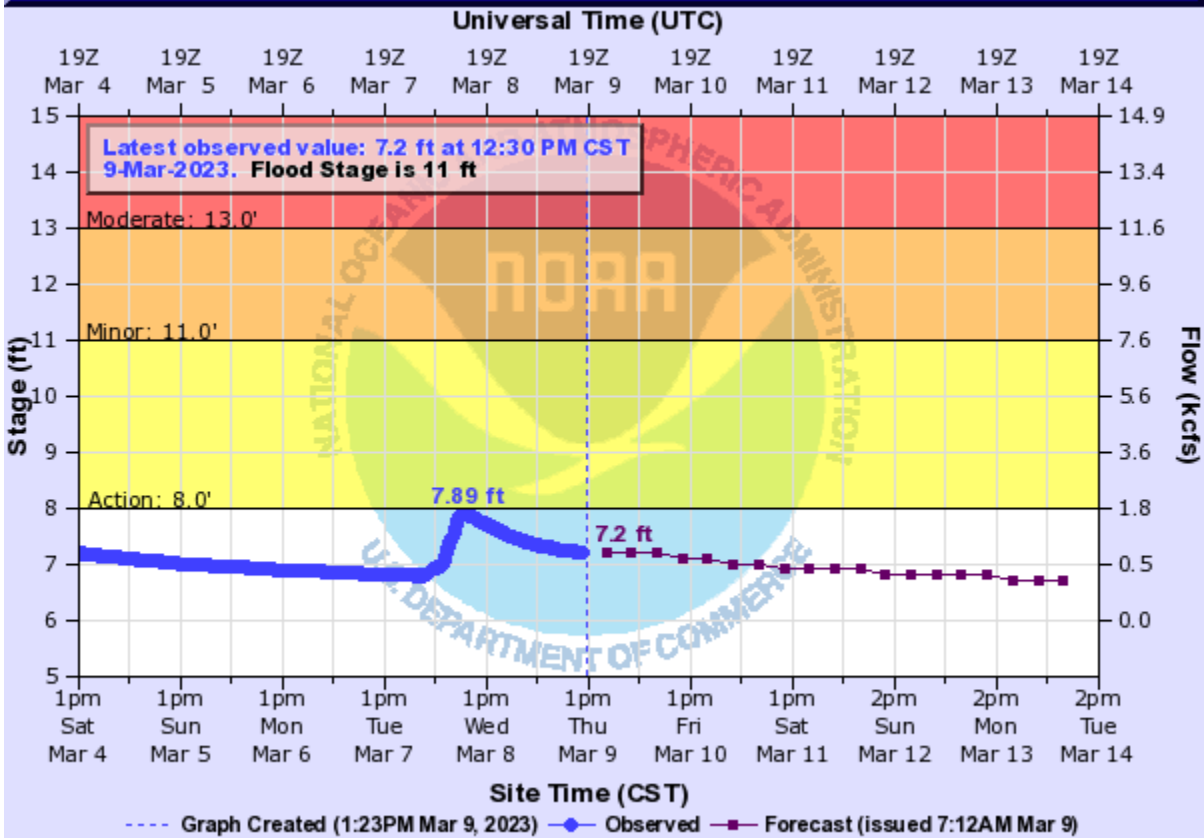
Universal Time (UTC)



ANTO2(plotting HGIRG) "Gage 0" Datum: 420.1'

Observations courtesy of US Geological Survey

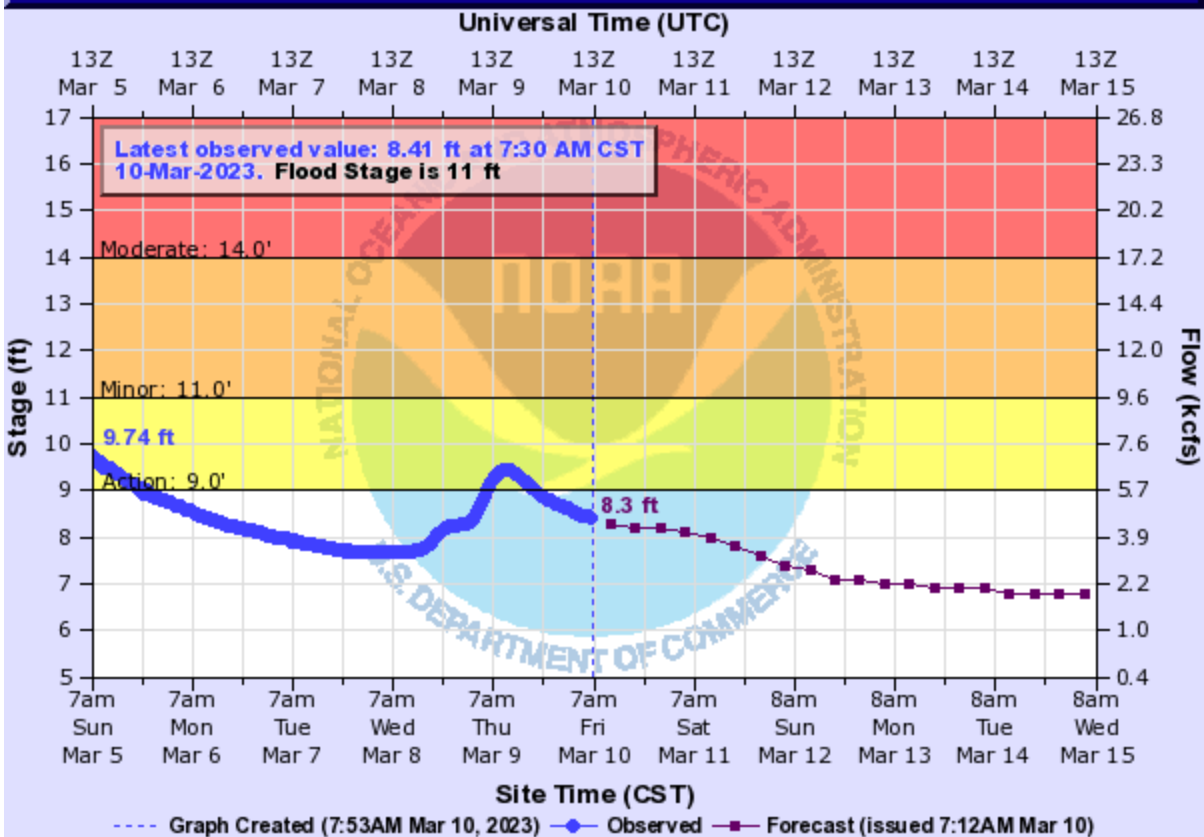
FLINT CREEK (OK) NEAR KANSAS



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

Observations courtesy of US Geological Survey

ILLINOIS RIVER (AR OK) NEAR TAHLEQUAH

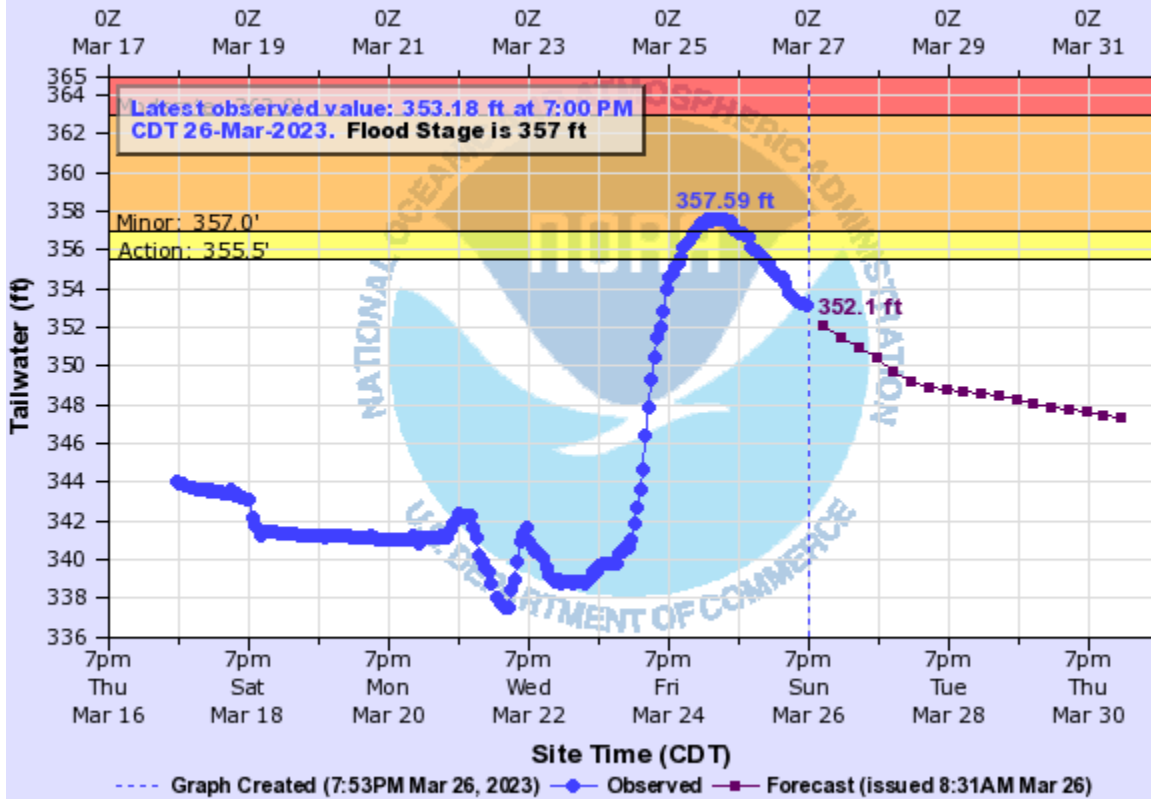


TALO2(plotting HGIRG) "Gage 0" Datum: 664.14'

Observations courtesy of US Geological Survey

ARKANSAS RIVER AT OZARK L/D TAILWATER

Universal Time (UTC)

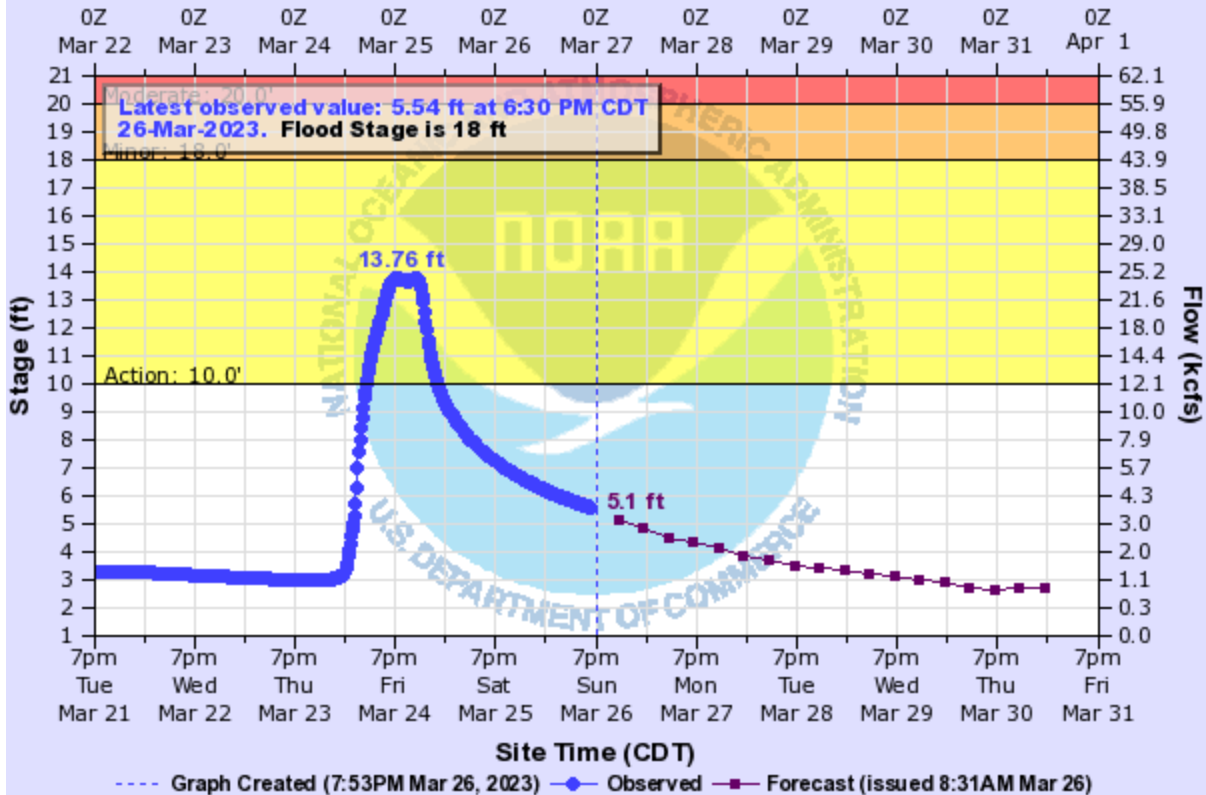


0ZGA4(plotting HTIRG) "Gage 0" Datum: 0'

Observations courtesy of US Army Corps of Engineers - LRD

MULBERRY RIVER (AR) NEAR MULBERRY

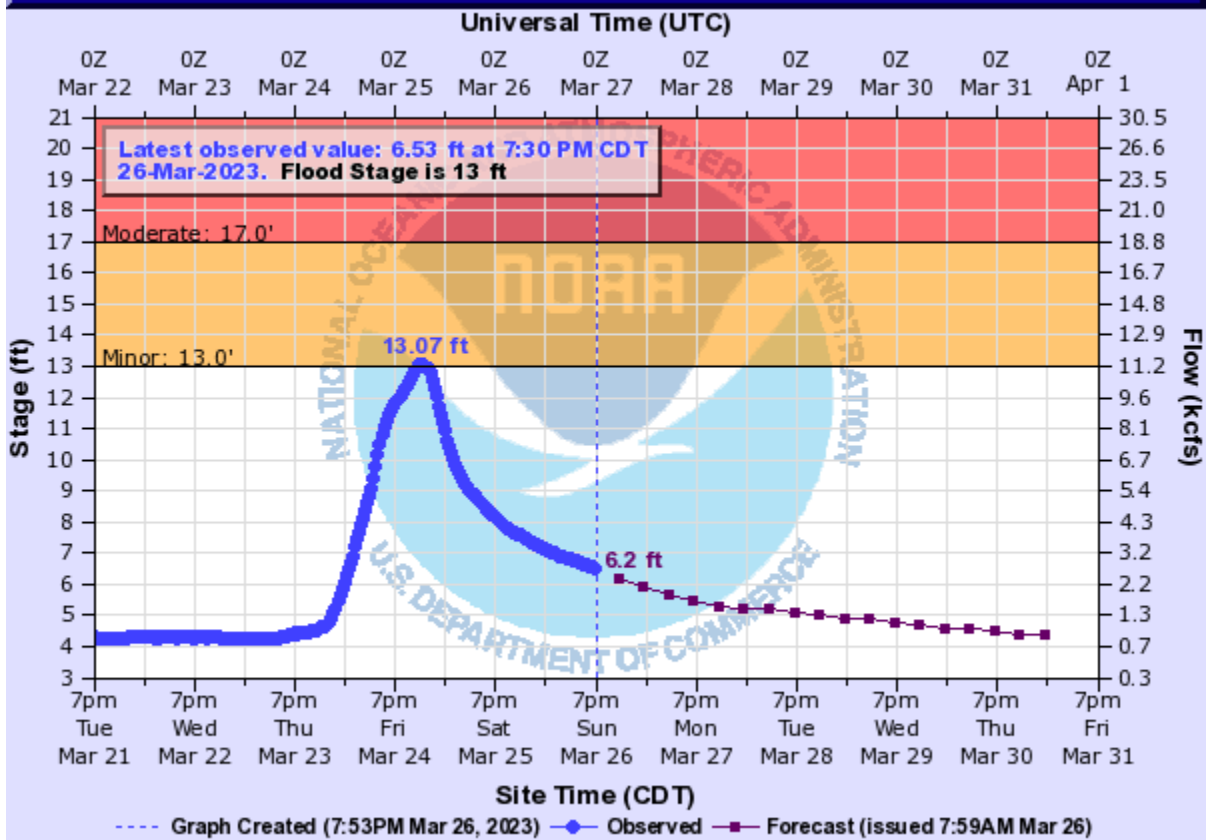
Universal Time (UTC)



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

Observations courtesy of USGS/USACE/ADEQ

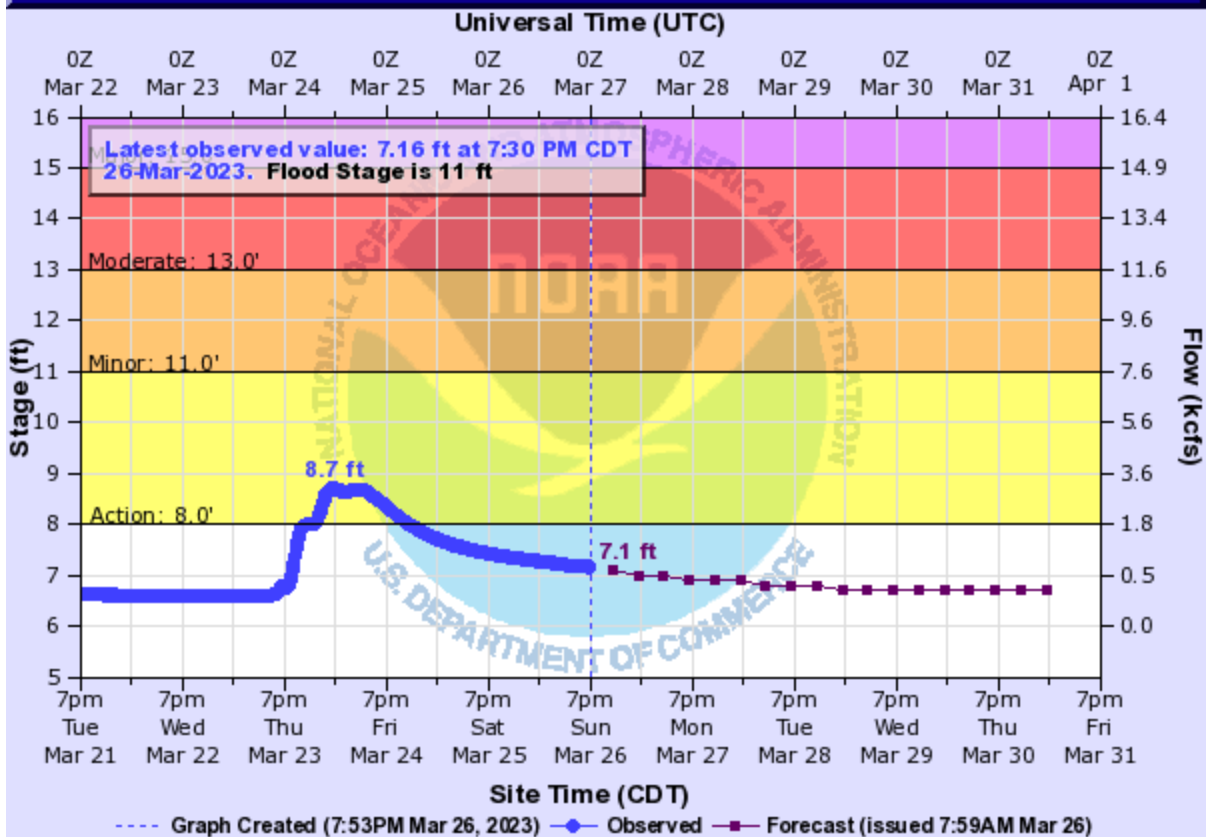
ILLINOIS RIVER (AR OK) NEAR WATTS



WT02(plotting HGIRG) "Gage 0" Datum: 893.78'

Observations courtesy of US Geological Survey

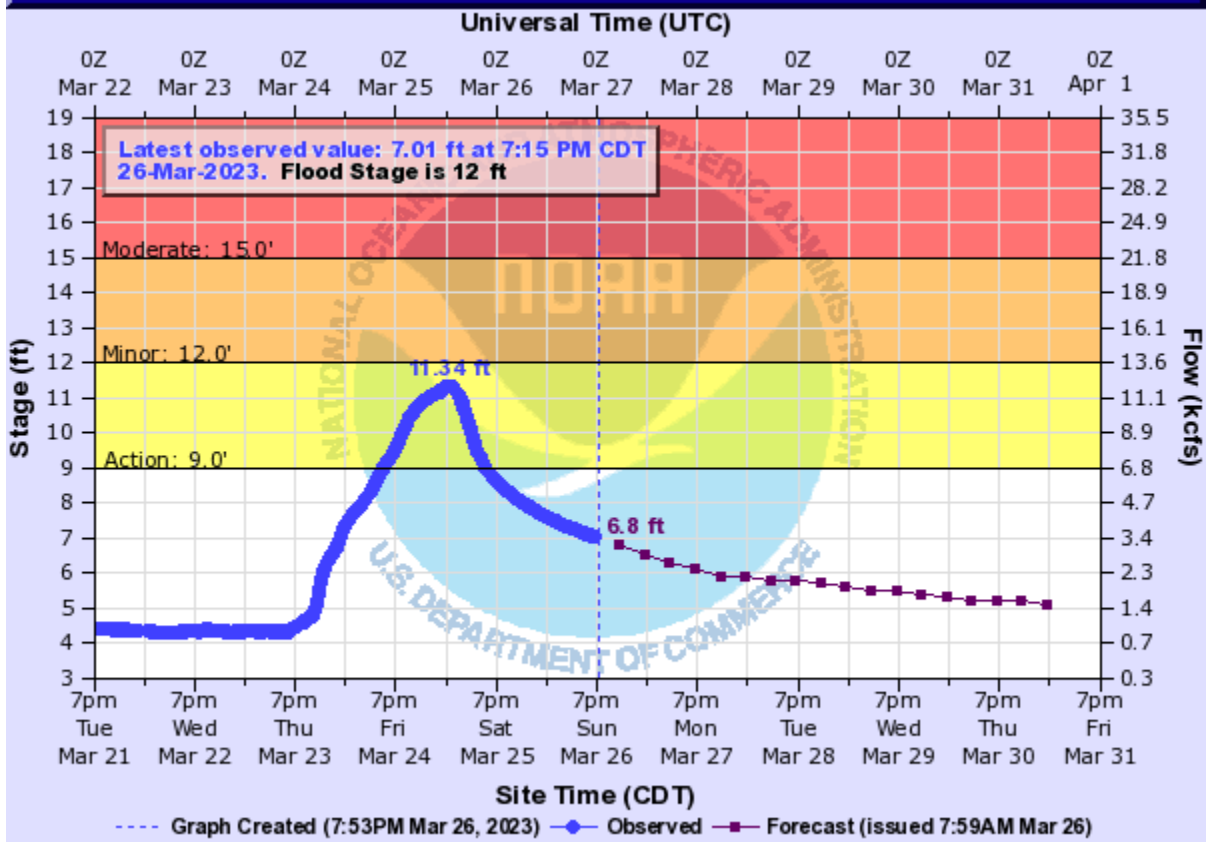
FLINT CREEK (OK) NEAR KANSAS



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

Observations courtesy of US Geological Survey

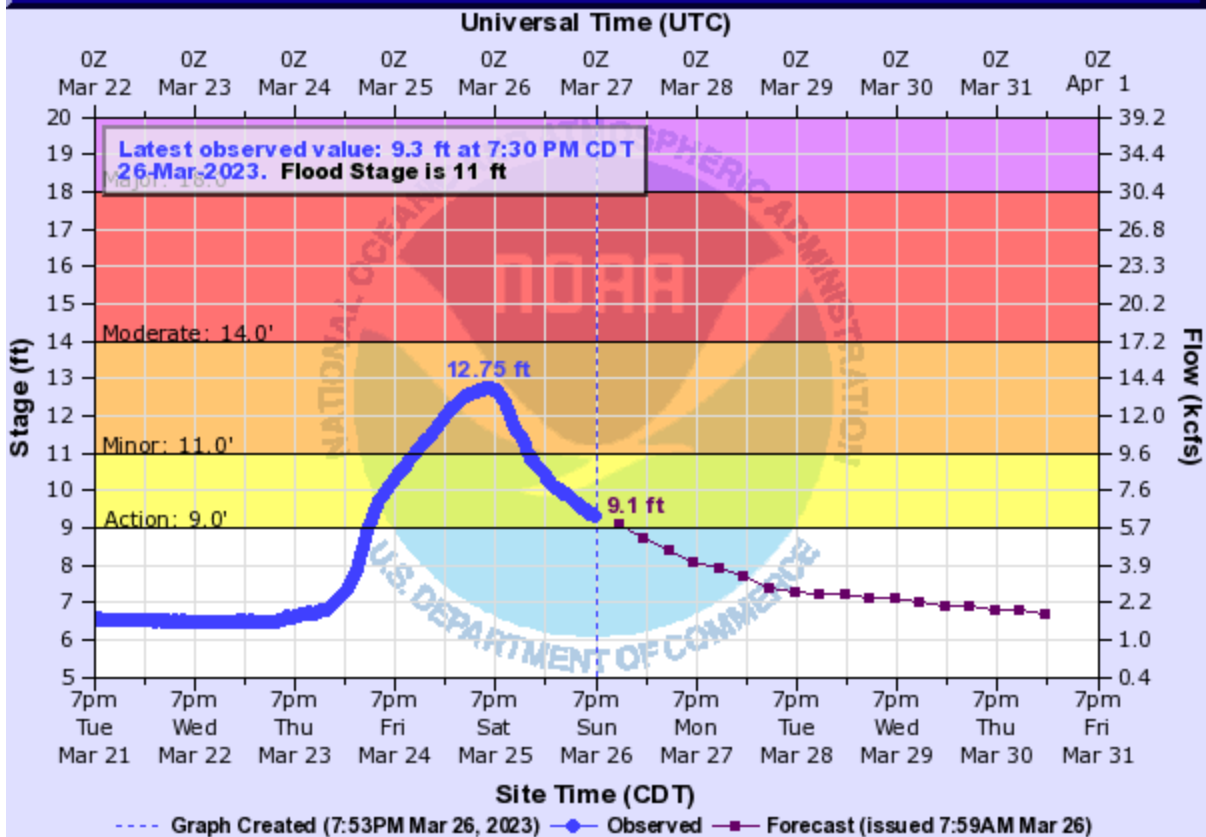
ILLINOIS RIVER (AR OK) AT CHEWEY



CWY02(plotting HGIRG) "Gage 0" Datum: 800.88'

Observations courtesy of US Geological Survey

ILLINOIS RIVER (AR OK) NEAR TAHLEQUAH

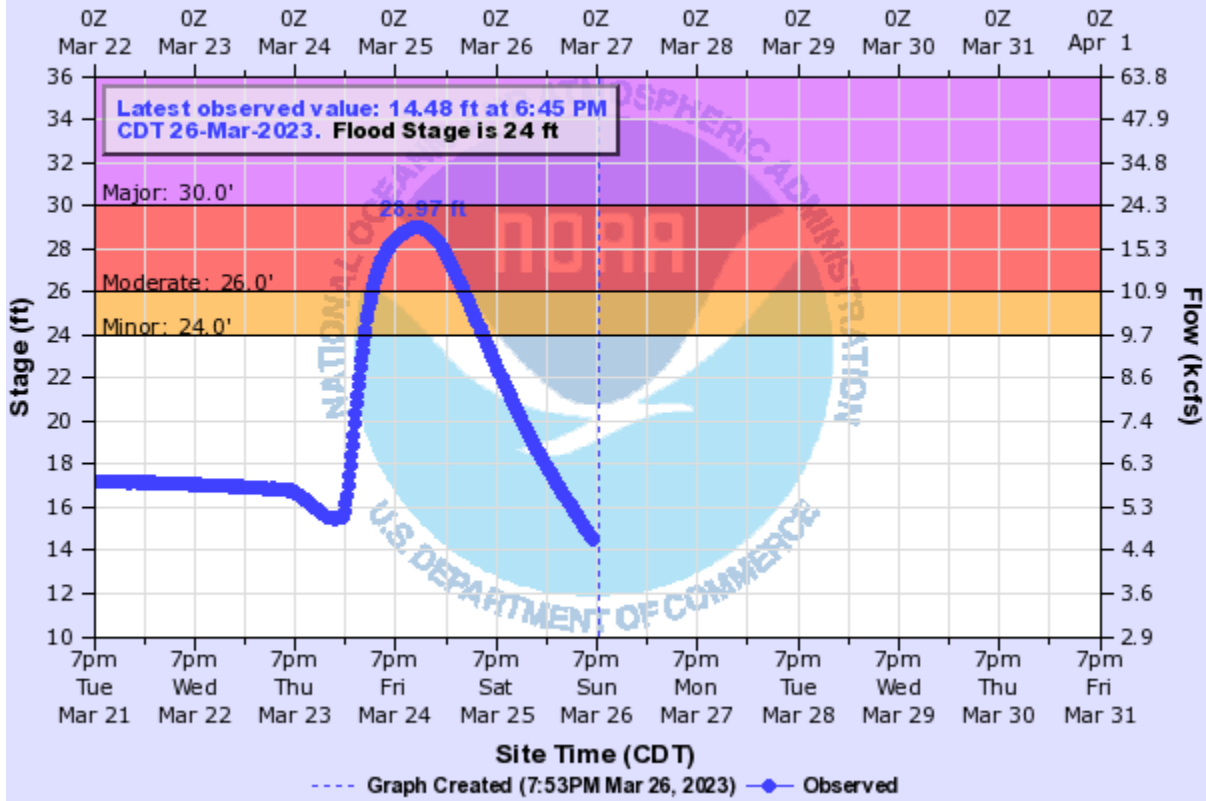


TAL02(plotting HGIRG) "Gage 0" Datum: 664.14'

Observations courtesy of US Geological Survey

POTEAU RIVER NEAR POTEAU

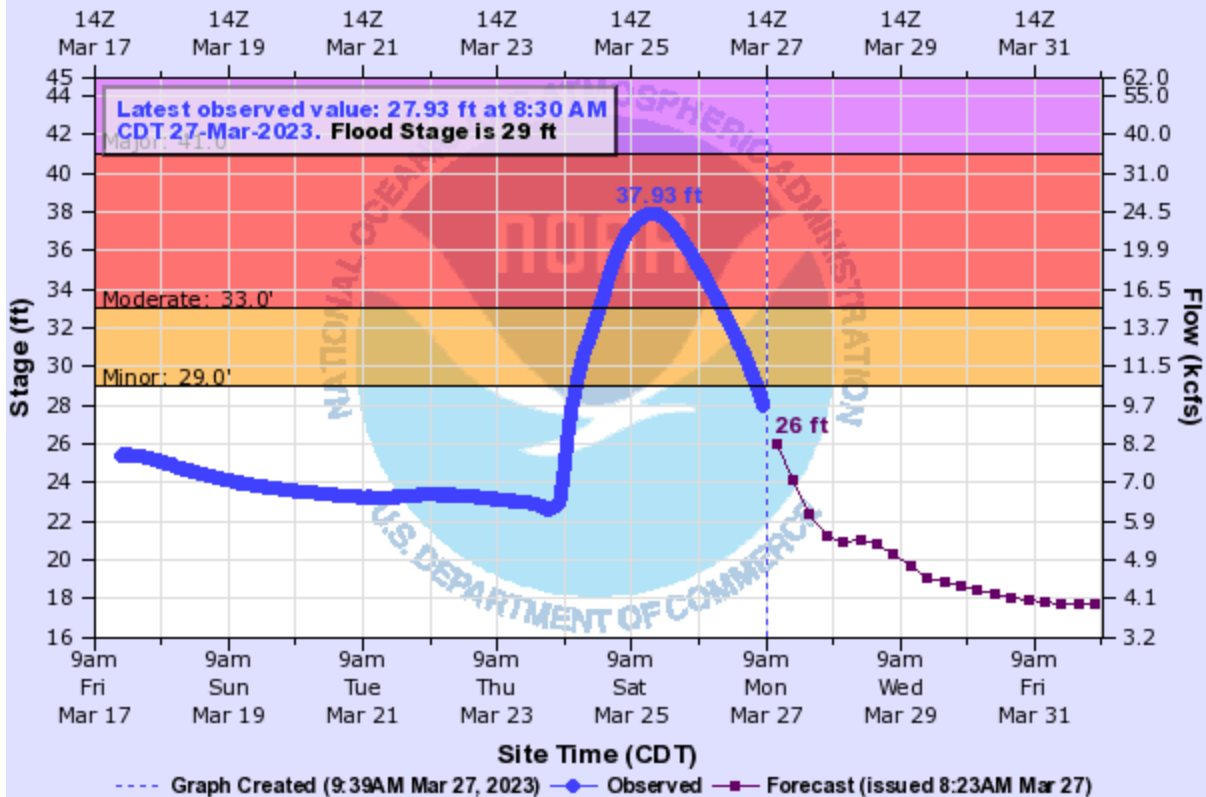
Universal Time (UTC)



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

POTEAU RIVER NEAR PANAMA

Universal Time (UTC)

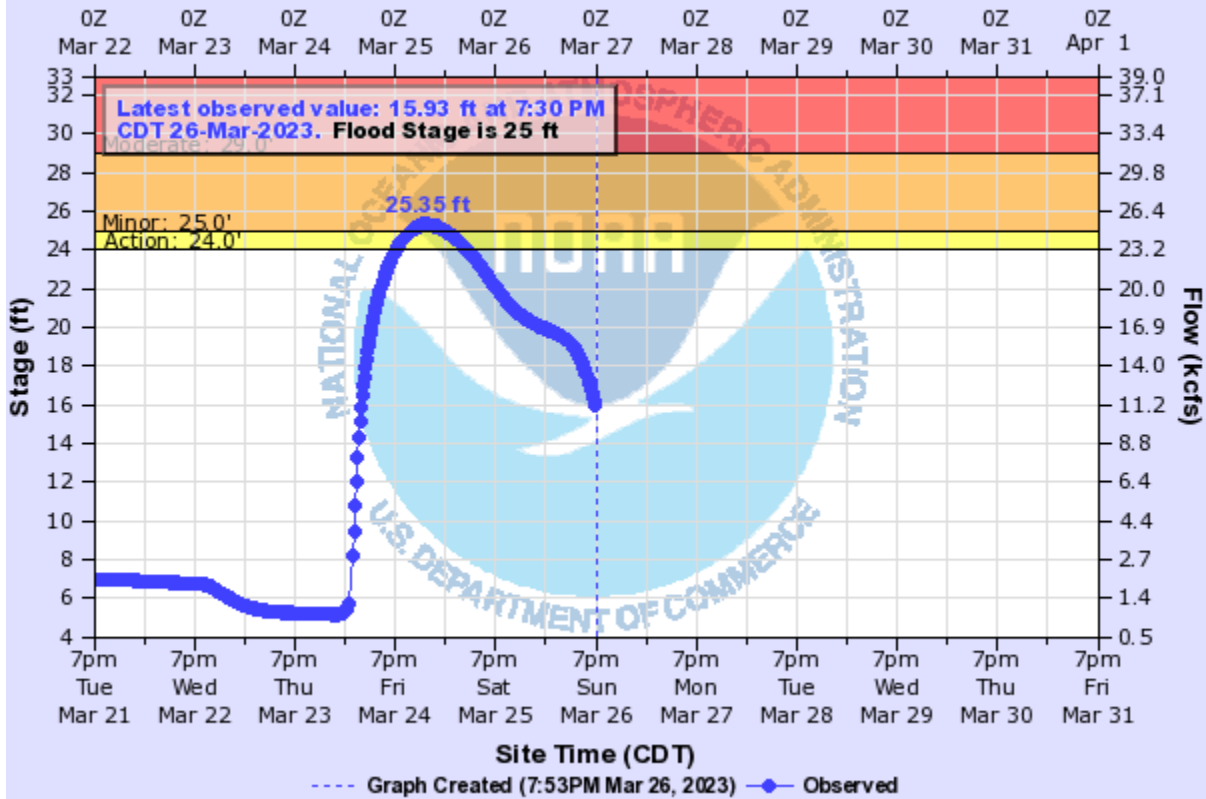


PAO2(plotting HGIRG) "Gage 0" Datum: 387.96'

Observations courtesy of US Geological Survey

KIAMICHI RIVER NEAR ANTLERS

Universal Time (UTC)



ANTO2(plotting HGIRG) "Gage 0" Datum: 420.1'

Observations courtesy of US Geological Survey