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
MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS	HYDROLOGIC SERVICE AREA (HSA): **Tulsa, Oklahoma (TSA)** REPORT FOR: MONTH **April** YEAR **2024**
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 **May 31, 2024**

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.**

Several rounds of heavy rain fell in April 2024, especially at the end of the month. Several tornadoes occurred as well, and temperatures were above normal on average across the area. Normal precipitation for the month of April ranges from 3.1 inches in Pawnee County to 4.7 inches in Latimer County. The Ozark region of northwest Arkansas averages 4.3 inches for the month. 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 April 2024 ranged from around 3" to 12" across eastern OK and northwest AR, with much of the area receiving 5"-8". These rainfall totals correspond to around 75% to 300% of the normal April rainfall (Fig. 1b).

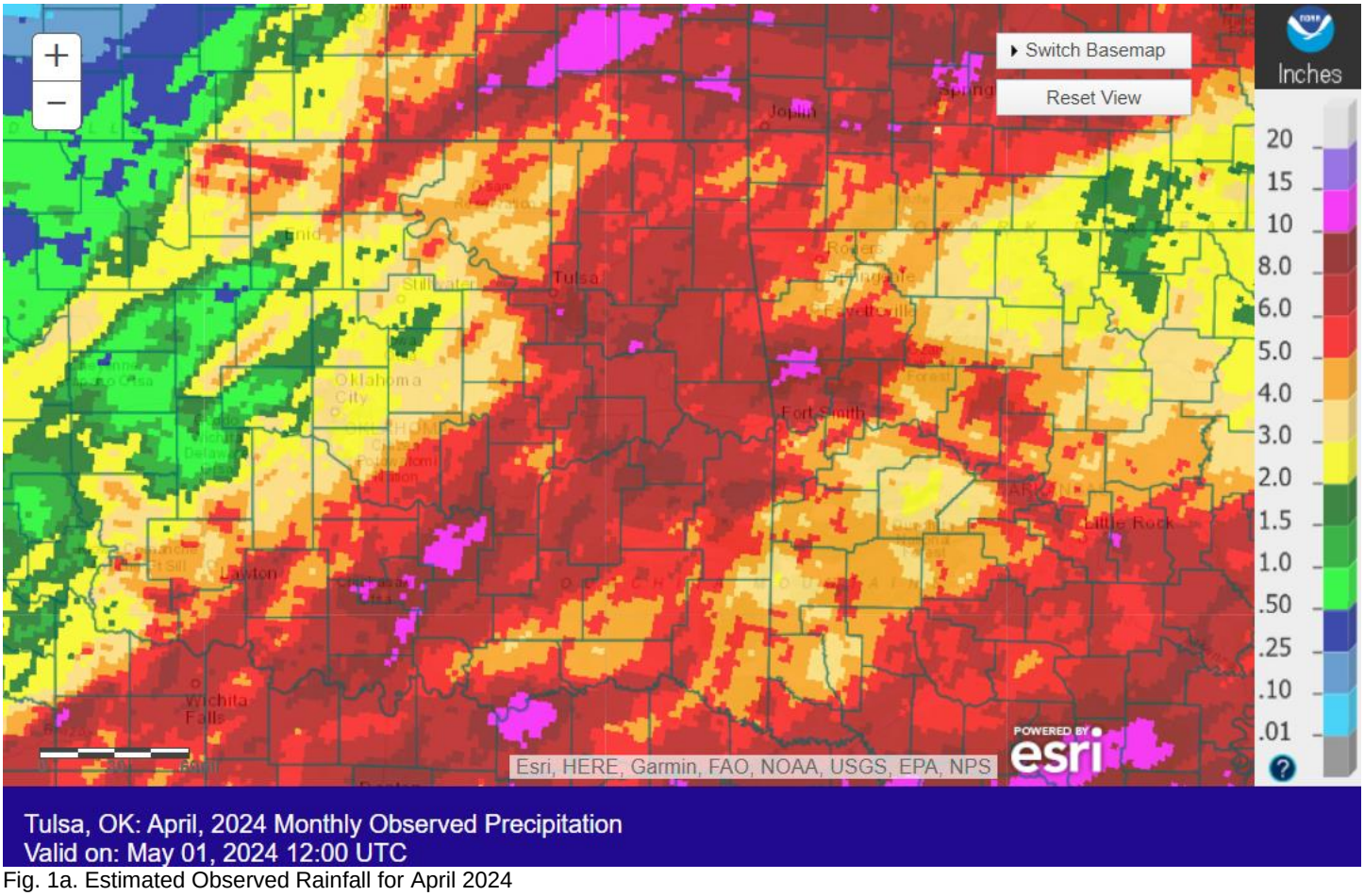


Fig. 1a. Estimated Observed Rainfall for April 2024

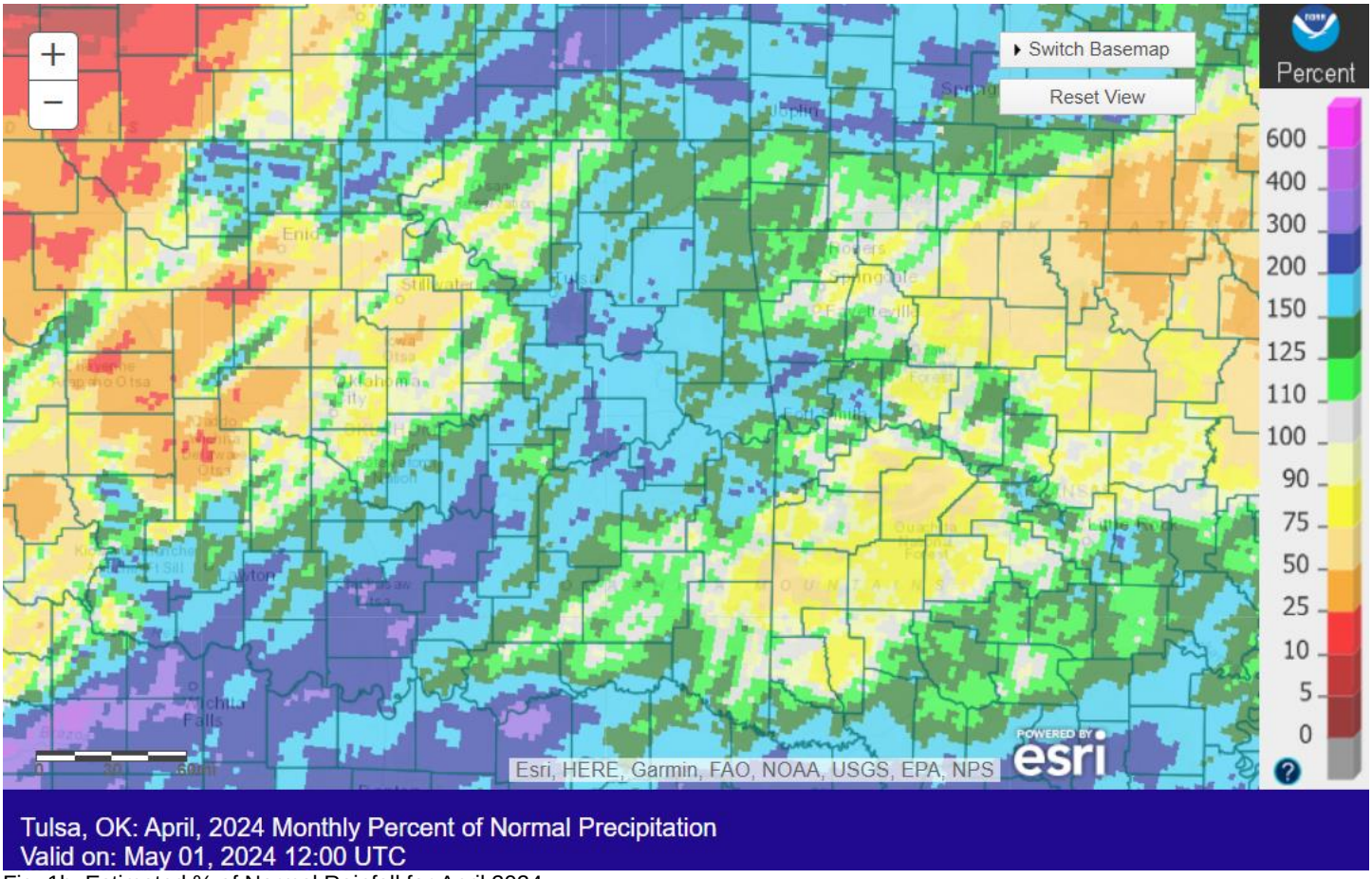


Fig. 1b. Estimated % of Normal Rainfall for April 2024

In Tulsa, OK, April 2024 ranked as the 19th warmest April (63.8°F, tied 1991, 1906; since records began in 1905) and the 22nd wettest April (6.31"; since records began in 1888). Fort Smith, AR had the 19th warmest April (65.0°F; since records began in 1883) and the 49th wettest April (4.81"; since records began in 1883). Fayetteville, AR had the 9th warmest (61.6°F, tied 2012) and the 36th wettest (4.30") April since records began in 1950.

Some of the larger precipitation reports (in inches) for April 2024 included:

Ozark, AR (coop)	9.38	Krebs 0.3WNW, OK (coco)	9.05	Uniontown 2.1ESE, AR (coco)	8.87
McAlester, OK (meso)	8.82	Winslow 7NE, AR (coop)	8.64	Wister 3.0NNE, OK (coco)	8.00
Okemah, OK (coco)	7.71	Upper Spavinaw Port, OK (coop)	7.59	Jenks Riverside Arpt (ASOS)	7.59

Some of the lowest precipitation reports (in inches) for December 2024 included:

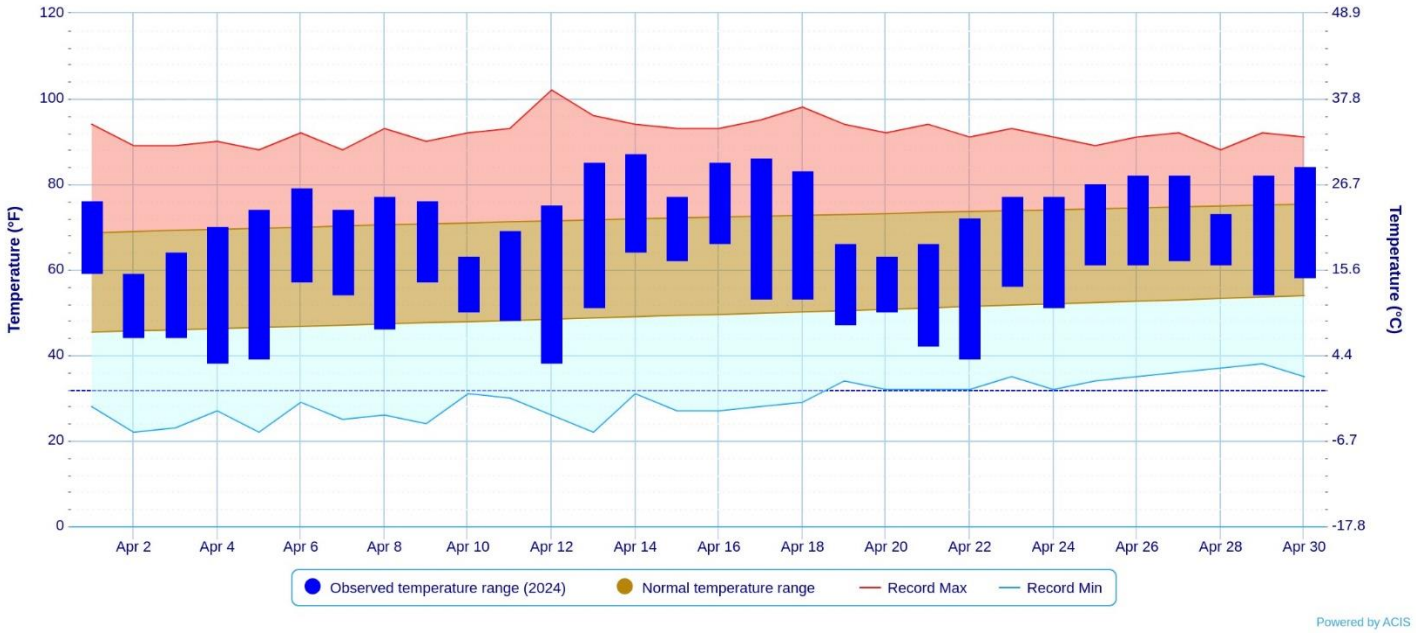
Bartlesville, OK (coop)	2.66	Terlton 3.7ESE, OK (coco)	2.92	Bartlesville, OK (ASOS)	3.05
Drumright 0.6SW, OK (coco)	3.38	Eureka Springs 1.4WSW, AR(coco)	3.52	Oilton, OK (meso)	3.52
Pawnee, OK (meso)	3.60	Viney Grove 2.4NW, AR (coco)	3.61	Fayetteville 4.2NW, AR (coco)	3.73

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

Rank since 1921	April 2024	Spring-to-Date (Mar 1 – Apr 30)	Water Year-to-Date (Oct 1, 2023 – Apr 30, 2024)	Year-to-Date (Jan 1 – Apr 30)	Last 180 Days (Nov 3 – Apr 30)	Last 365 Days (May 2, 2023 – Apr 30, 2024)
Northeast OK	24th wettest	48th wettest	51st driest	42nd wettest	51st driest	50th driest
East Central OK	26th wettest	33rd wettest	43rd wettest	37th wettest	50th wettest	51st driest
Southeast OK	44th wettest	28th wettest	51st driest	41st wettest	47th driest	47th driest
Statewide	36th wettest	52nd wettest	40th wettest	45th wettest	46th wettest	33rd wettest

Daily Temperature Data - Tulsa Area, OK (ThreadEx)

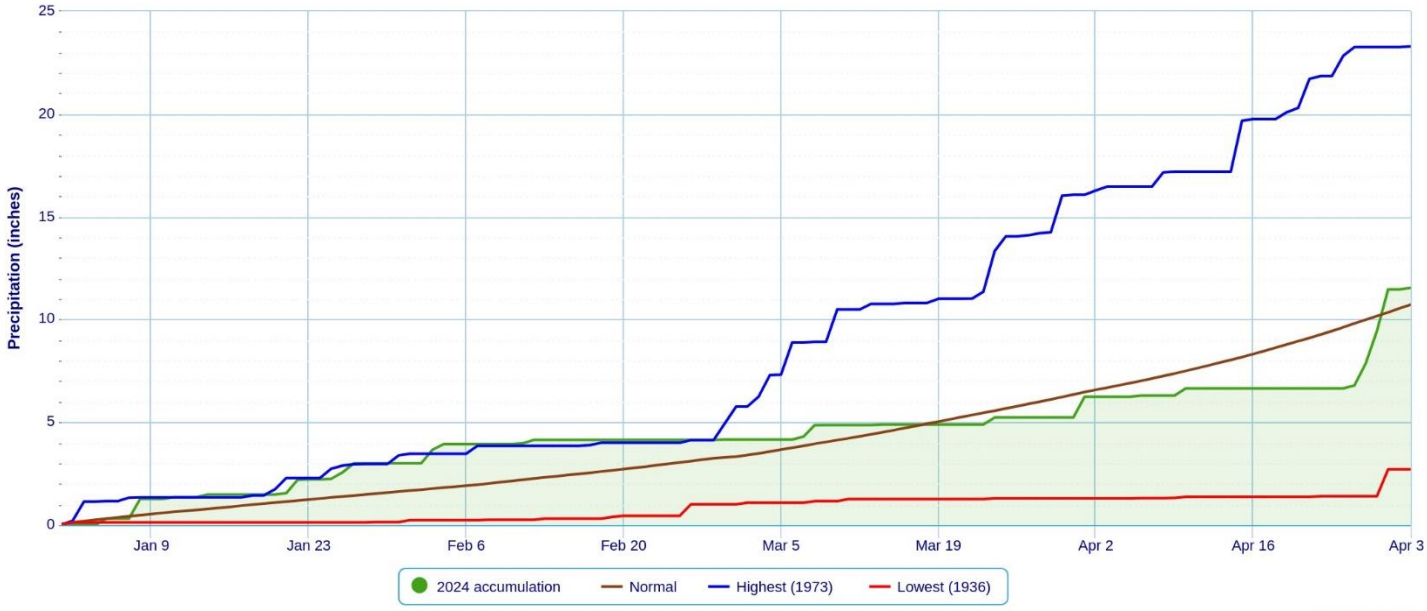
Period of Record - 1905-01-06 to 2024-05-09. Normals period: 1991-2020. Click and drag to zoom chart.



Powered by ACIS

Accumulated Precipitation - Tulsa Area, OK (ThreadEx)

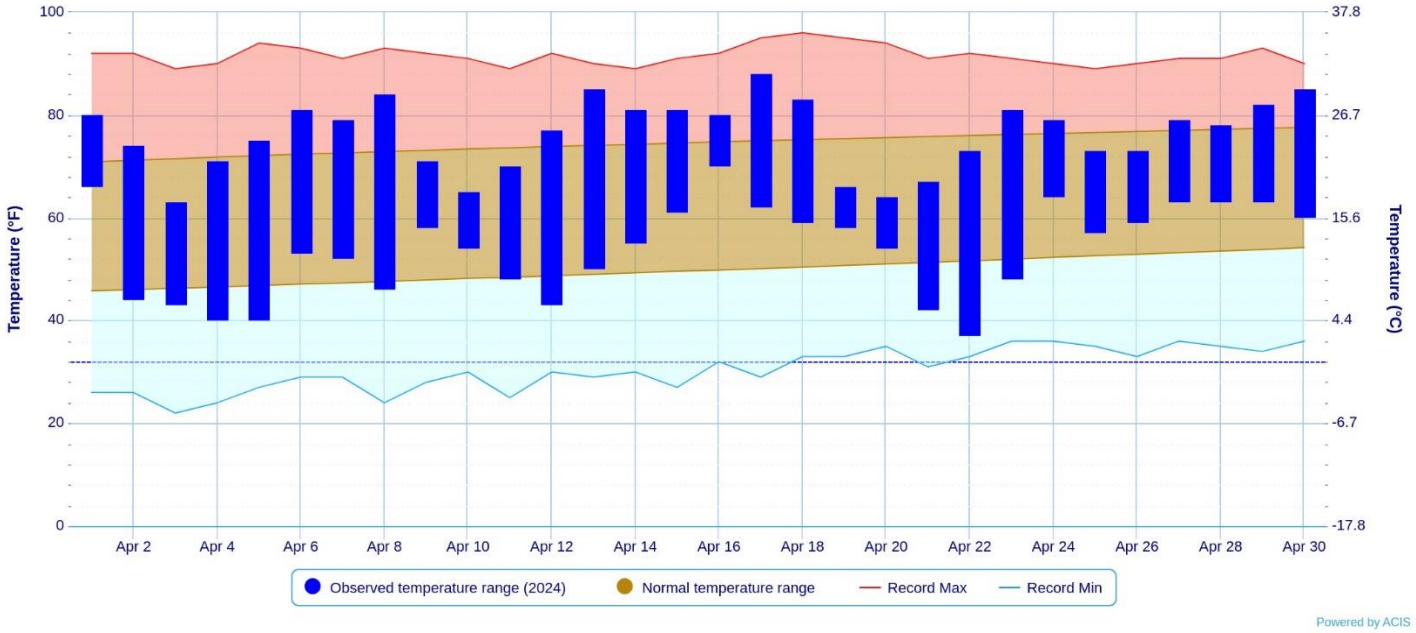
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

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

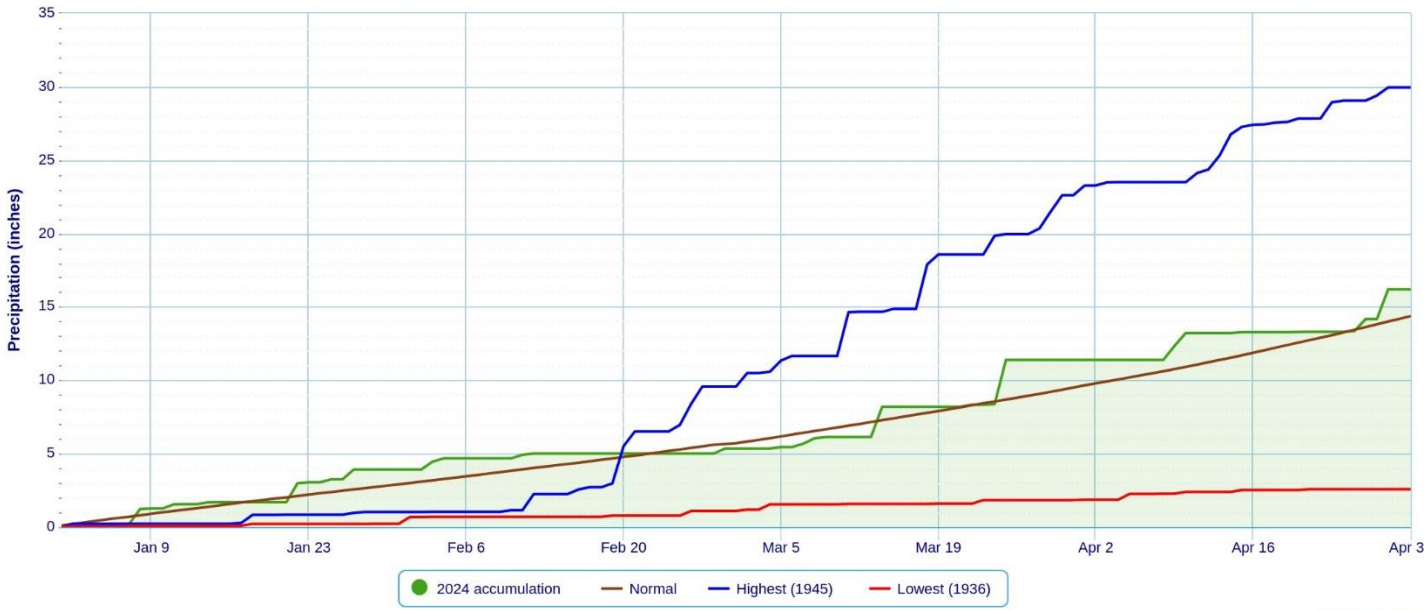
Period of Record - 1882-06-01 to 2024-05-09. Normals period: 1991-2020. Click and drag to zoom chart.



Powered by ACIS

Accumulated Precipitation - Fort Smith Area, AR (ThreadEx)

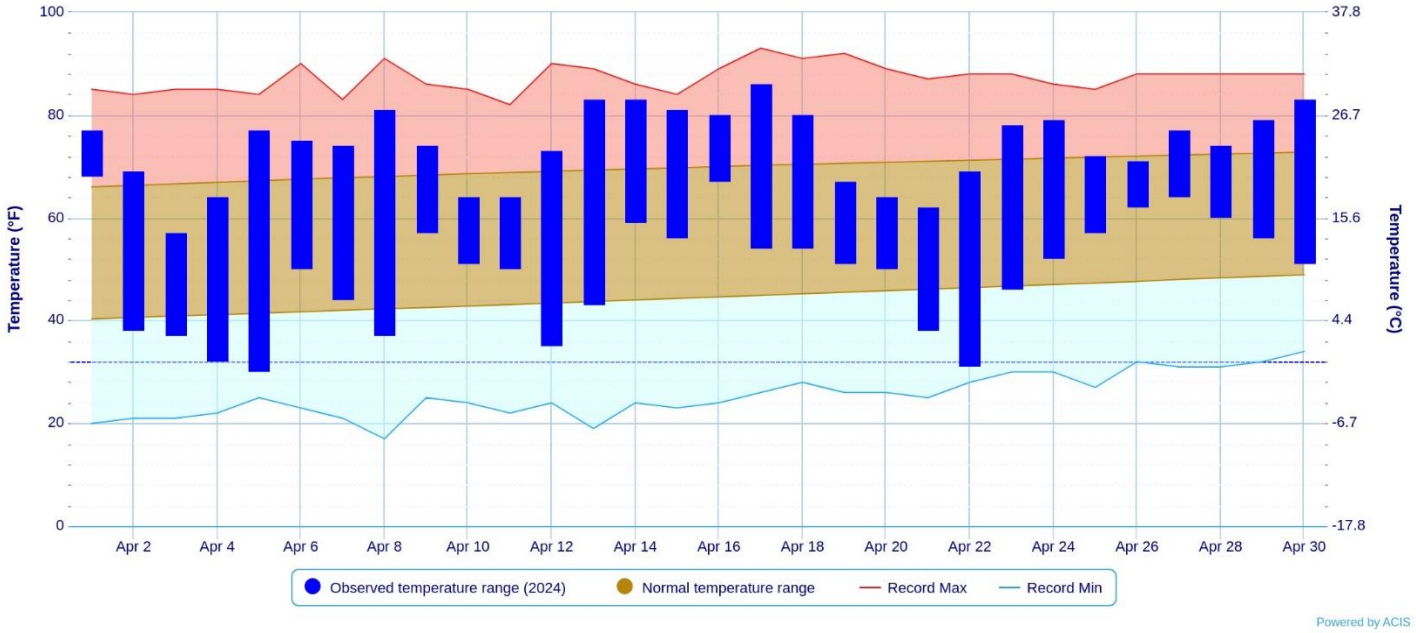
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

Daily Temperature Data - FAYETTEVILLE DRAKE FIELD, AR

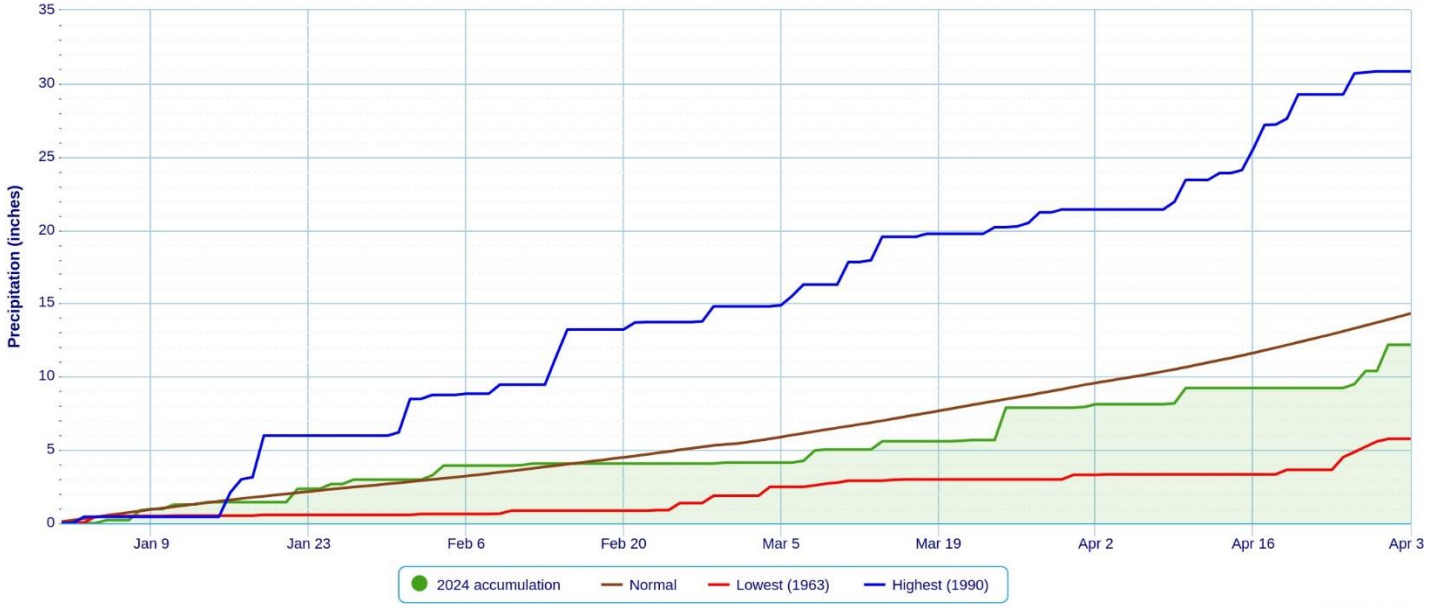
Period of Record - 1949-07-14 to 2024-05-09. Normals period: 1991-2020. Click and drag to zoom chart.



Powered by ACIS

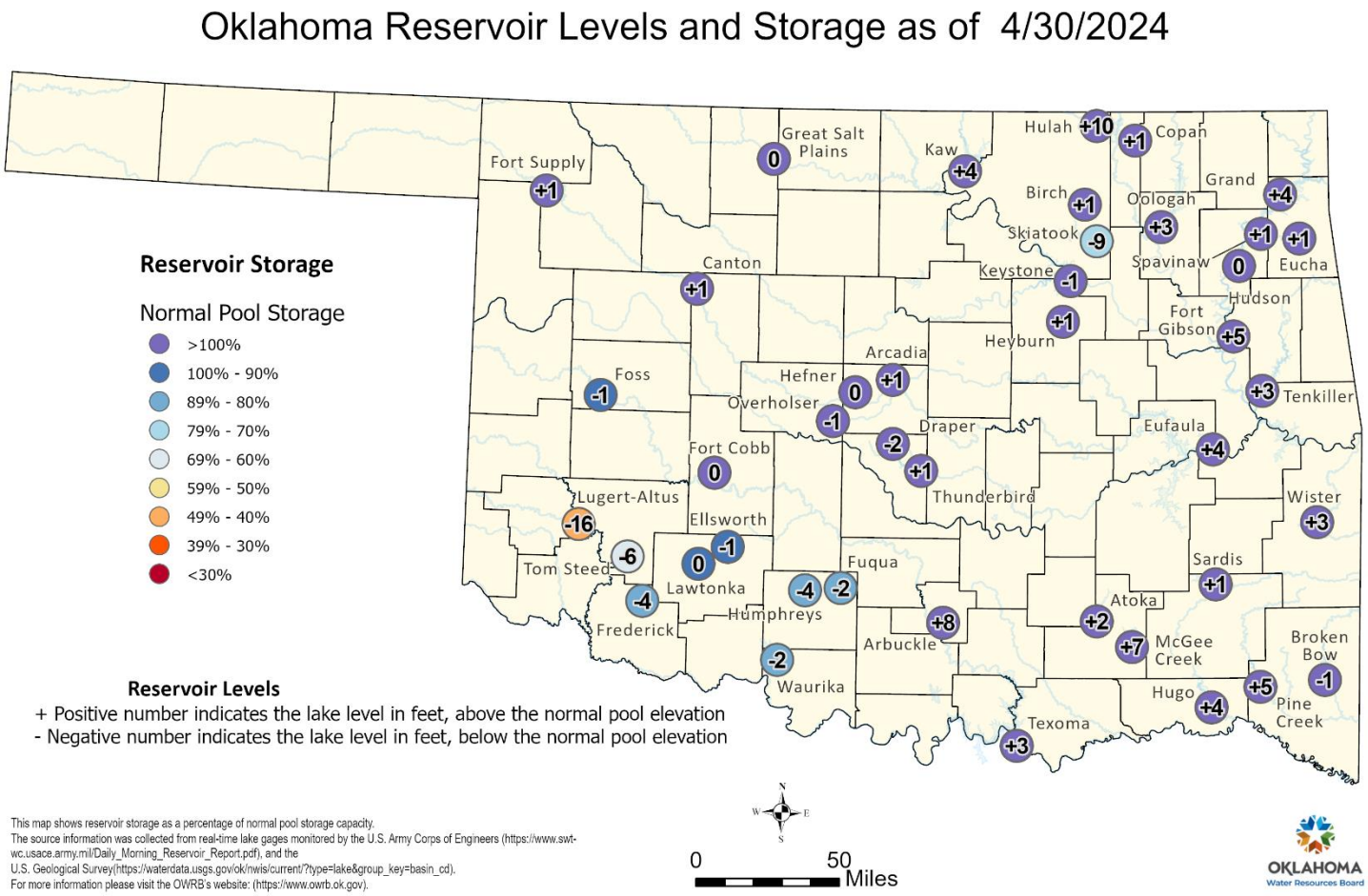
Accumulated Precipitation - FAYETTEVILLE DRAKE FIELD, AR

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



Powered by ACIS

Reservoirs



According to the USACE, a couple of the lakes in the HSA were below 3% of top of their conservation pools as of 4/30/2024: Skiatook Lake 74% and Keystone Lake 93%. Several lakes were above 3% of the top of their conservation pools: Tenkiller Lake 6%, Wister Lake 7%, Hugo Lake 7%, Kaw Lake 8%, Ft. Gibson Lake 11%, Oologah Lake 12%, Beaver Lake 12%, Hulah Lake 16%, Sardis Lake 17%, Grand Lake 30%, and Eufaula Lake 30%.

Drought

According to the U.S. Drought Monitor (USDM) from April 30, 2024 (Figs. 2, 3), Moderate (D1) Drought conditions were present in portions of Ottawa, Adair, Craig, Nowata, Washington, Osage, eastern Kay, Pawnee, and Creek Counties in eastern Oklahoma, and Benton, Washington, and Carroll Counties in northwest AR. Abnormally Dry (D0) but not in drought conditions were occurring in Ottawa, Craig, Nowata, Osage, eastern Kay, Pawnee, Creek, Tulsa, Rogers, Okfuskee, Okmulgee, Mayes, Wagoner, Delaware, Muskogee, Cherokee, Adair, Sequoyah, McIntosh, and Choctaw Counties in eastern OK, and Benton, Washington, Carroll, and Madison Counties in northwest AR.

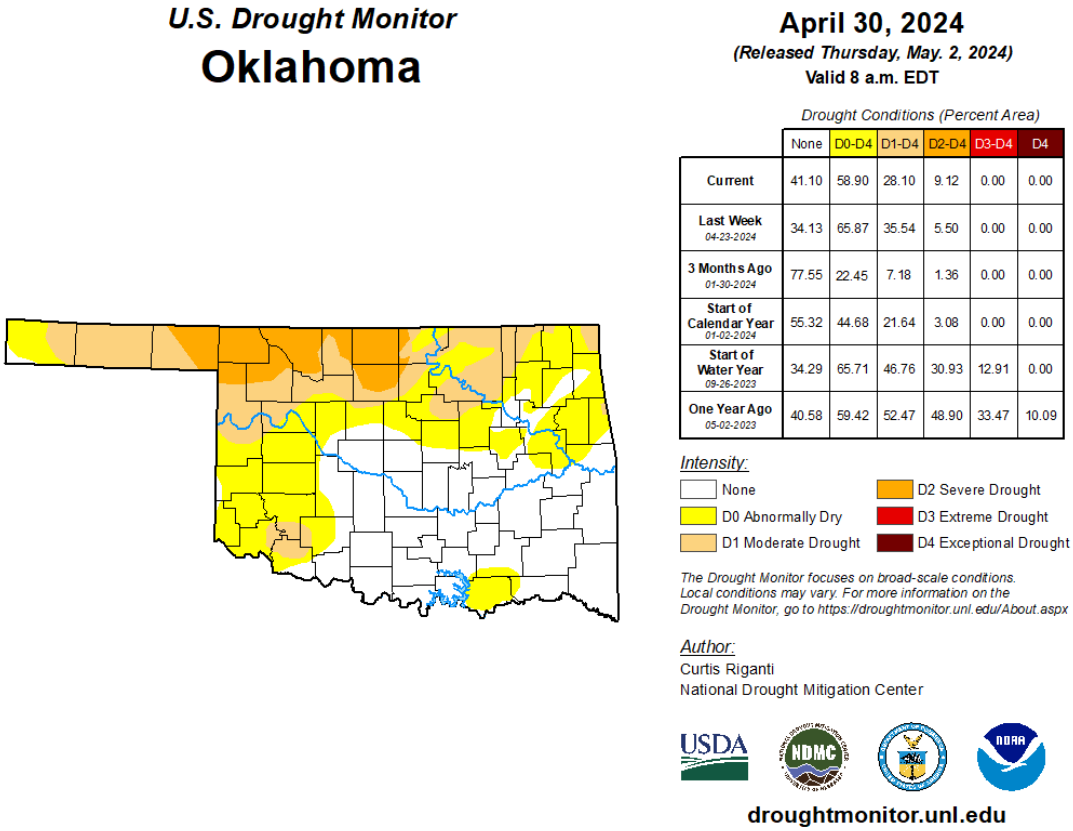


Fig. 2. Drought Monitor for Oklahoma

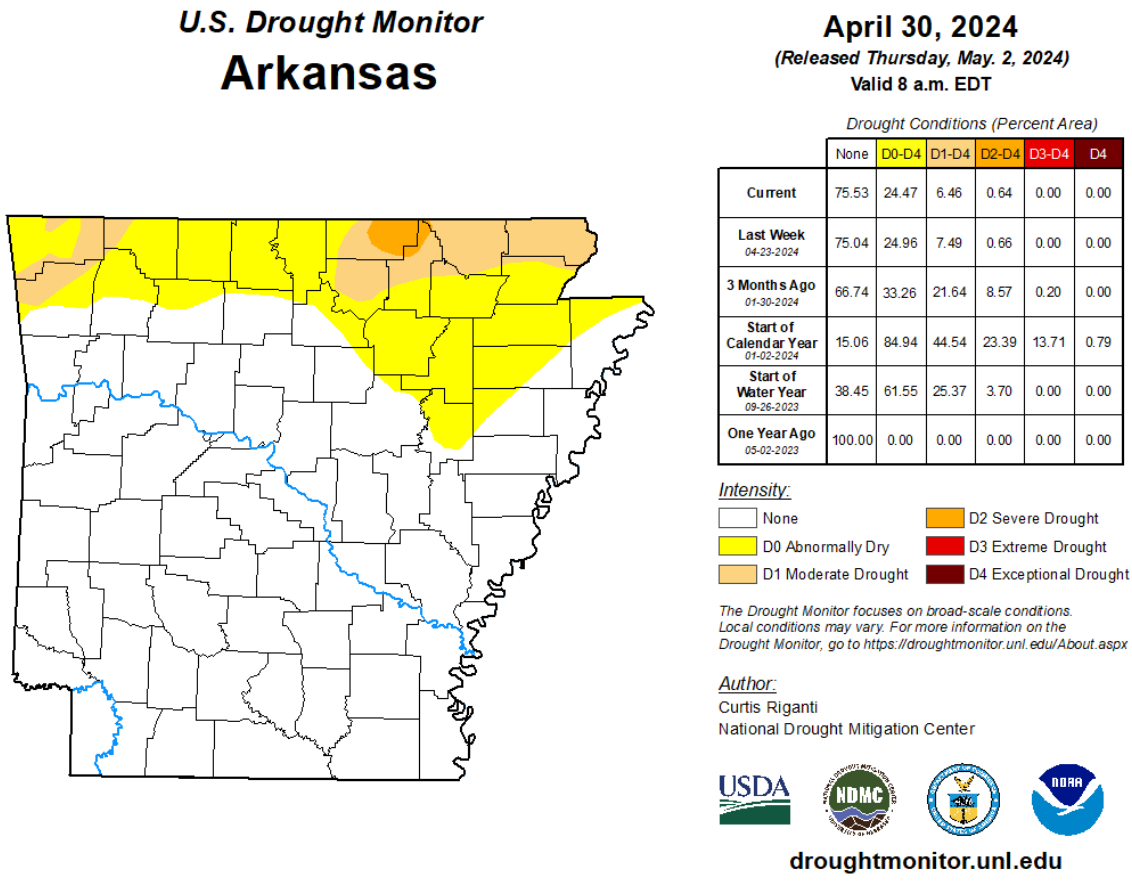


Fig. 3. Drought Monitor for Arkansas

Outlooks

The Climate Prediction Center (CPC) outlook for May 2024 (issued April 30, 2024) indicates an enhanced chance for above normal temperatures and above median precipitation across all of eastern OK and northwest AR. This outlook was based on dynamical model output, the Madden-Julian Oscillation (MJO), and ENSO.

For the 3-month period May-June-July 2024, CPC is forecasting an enhanced chance for above normal temperatures and an equal chance for above, near, and below median precipitation across eastern OK and northwest AR (outlook issued April 18, 2024). This outlook is based on long-term trends, ENSO state, and incorporates both statistical and dynamical forecast tools. According to CPC, El Niño conditions are present in the equatorial Pacific Ocean, but rapidly fading. El Niño will continue to weaken and transition to ENSO-neutral by the April-June 2024 season (85% chance). There are increasing odds (60% chance) for a return of La Niña conditions this summer. CPC continues the El Niño Advisory and La Niña Watch.

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

Scattered showers and thunderstorms impacted northeast OK during the morning and afternoon hours of April 1. By mid-afternoon, isolated thunderstorms developed over Osage and Kay Counties in north central OK and moved to the east-northeast as a potent upper-level wave ejected out from the southern Rockies. During the early evening, a cold front and dry line surged east and the cap weakened, allowing for thunderstorms to develop northwest of I-44 from central into northeast OK. These storms filled in and became a line of storms along I-44 during the late evening, and propagated eastward across northeast and east central OK and northwest AR. One supercell produced 5 tornadoes in northeast OK (see https://arcg.is/0eHLf0 for details). A bowing line segment produced damaging straight-line winds and 2 tornadoes in northwest AR (see https://arcg.is/0eHLf0 for details). Across southeast OK, the storms were more scattered. The storms moved east of the area in the pre-dawn hours of the 2nd. Rainfall totals ranged from 0.25” to around 3” for most of the area (Figs. 4, 5). A Tulsa woman sleeping in a storm drain was swept away and drowned as the storms went through the area.

A solar eclipse happened on the afternoon of 8th, with the path of totality across southeast OK into northwest AR. During the time of the eclipse, the temperature dropped 3°-5°F (Fig. 6) in many locations.

Around midnight of the 9th, an area of showers and thunderstorms moved northwest out of the ARLATX and into southeast OK and west central AR. Widespread showers and thunderstorms continued to spread north across eastern OK and northwest AR during the overnight hours within a warm air advection regime and coupled upper-level jet over the region. The area of rain then began to shift eastward before dawn, and exited the area soon after sunrise. Rainfall totals ranged from 0.25” to around 4” across southeast and east central OK and northwest AR (Figs. 7, 8).

While not producing any appreciable rainfall, a strong cold front moved rapidly across the area on the 18th. A significant temperature drop of around 20° was observed as the front passed (Fig. 9).

A series of strong storm systems brought several rounds of rain and severe weather to the area from the 24th-29th. The rain began at noon on the 24th as showers developed over eastern OK due to an approaching mid-level disturbance. These showers quickly moved east during the afternoon hours. Strong warm air advection and a low-level jet during the overnight hours resulted in a cluster of thunderstorms. These storms moved southeast from northeast OK into northwest AR during the early morning hours. Rainfall totals ranged from 0.25” to around 3” (Fig. 10).

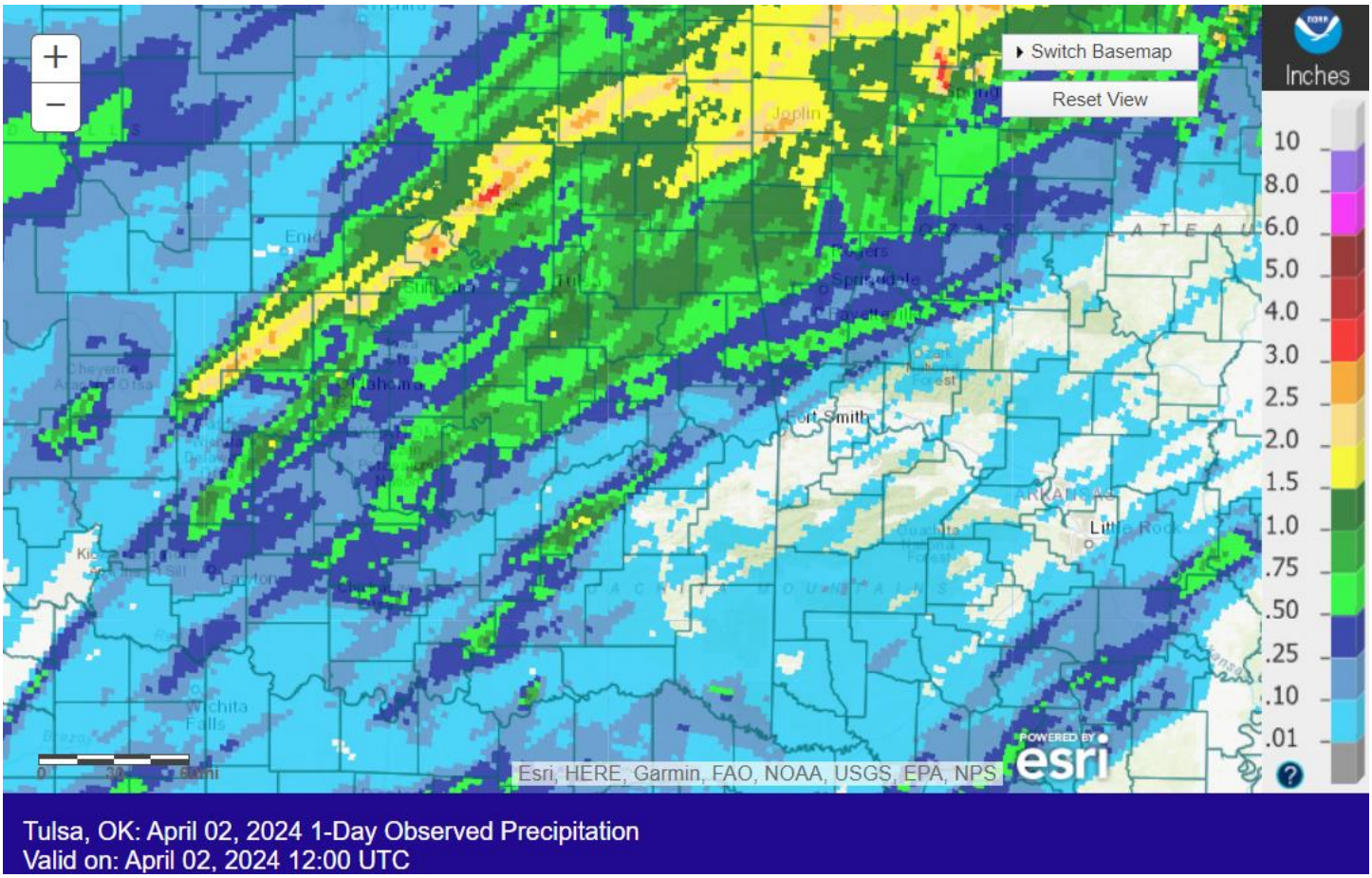


Fig. 4. 24-hour Estimated Observed Rainfall ending at 7am CDT 4/02/2024.

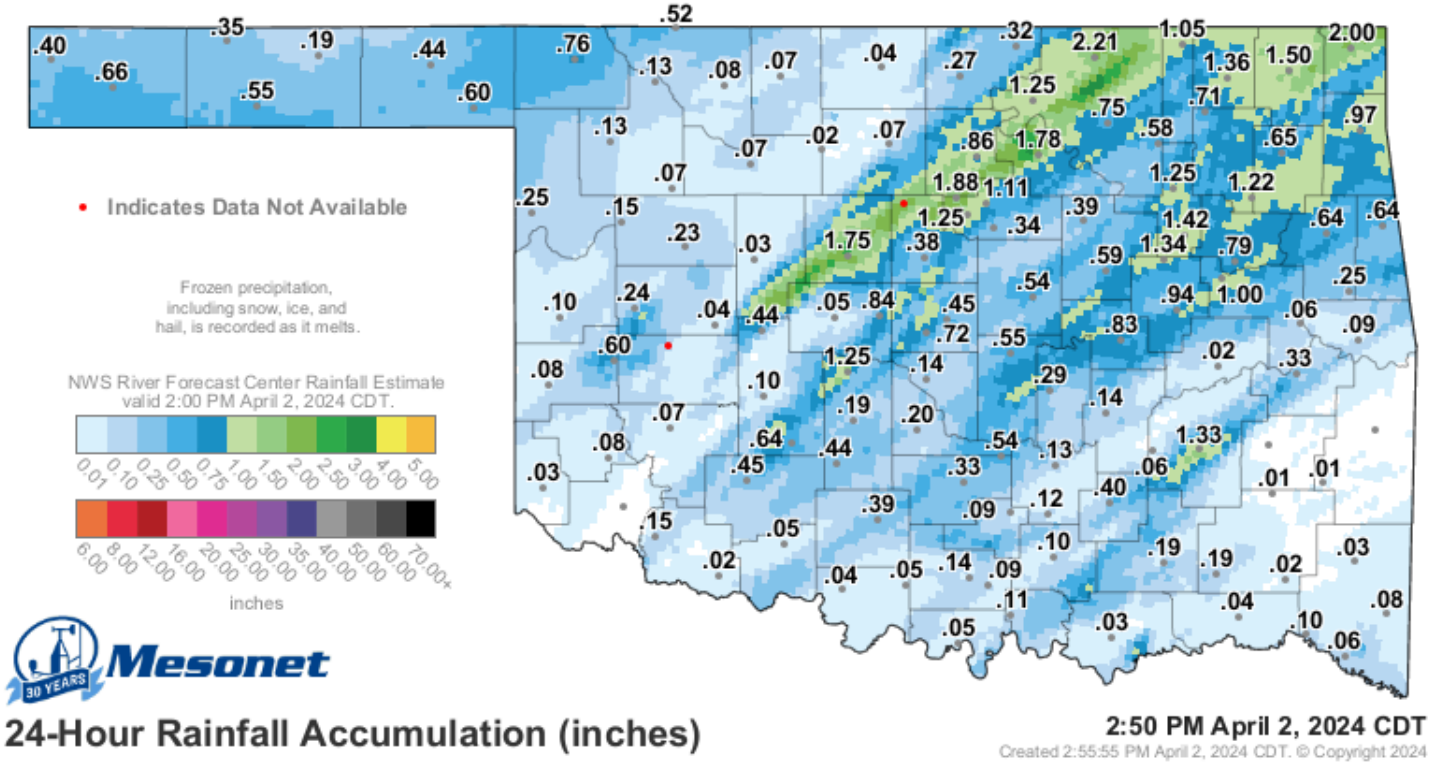


Fig. 5. OK Mesonet (values) and NWS RFC rainfall estimate (image) 24-hour rainfall ending at 2:50 pm CDT 4/02/2024.

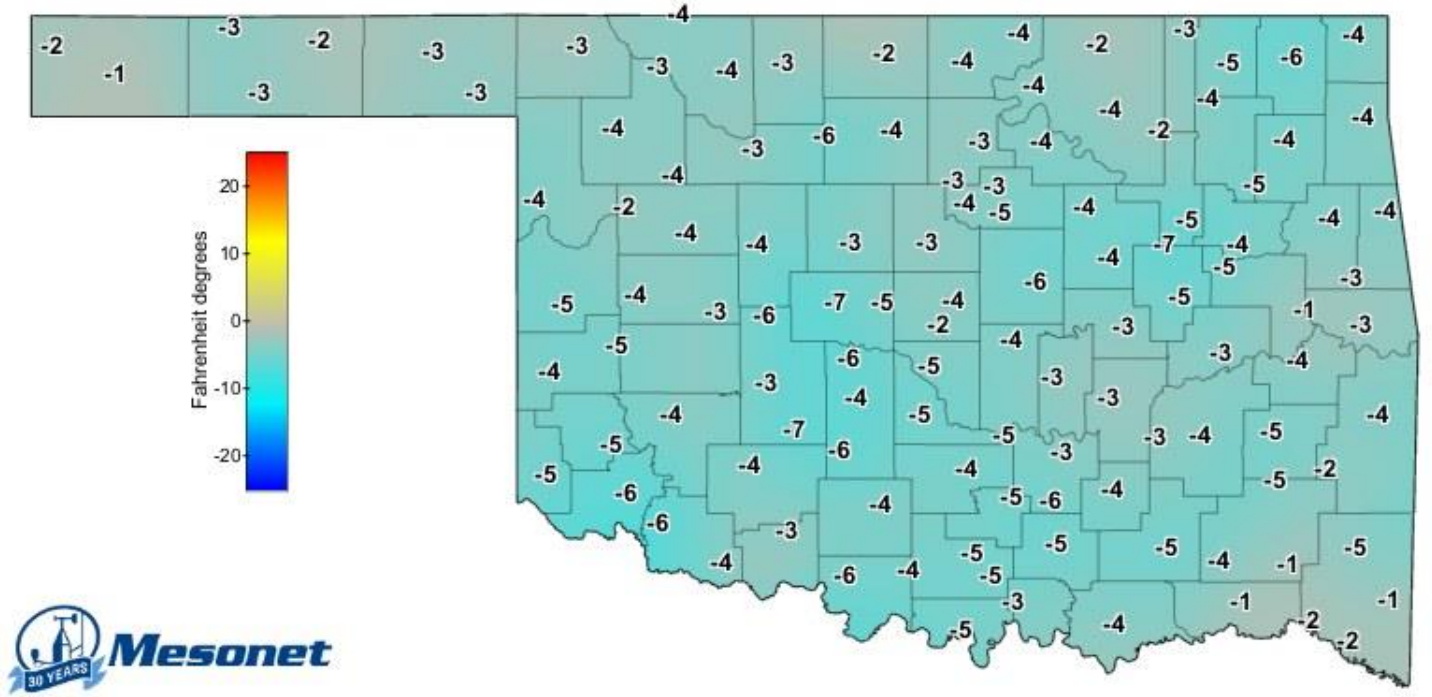


Fig. 6. OK Mesonet 1-hour air temperature change at 1:50 pm CDT 4/08/2024 during the time of the solar eclipse.

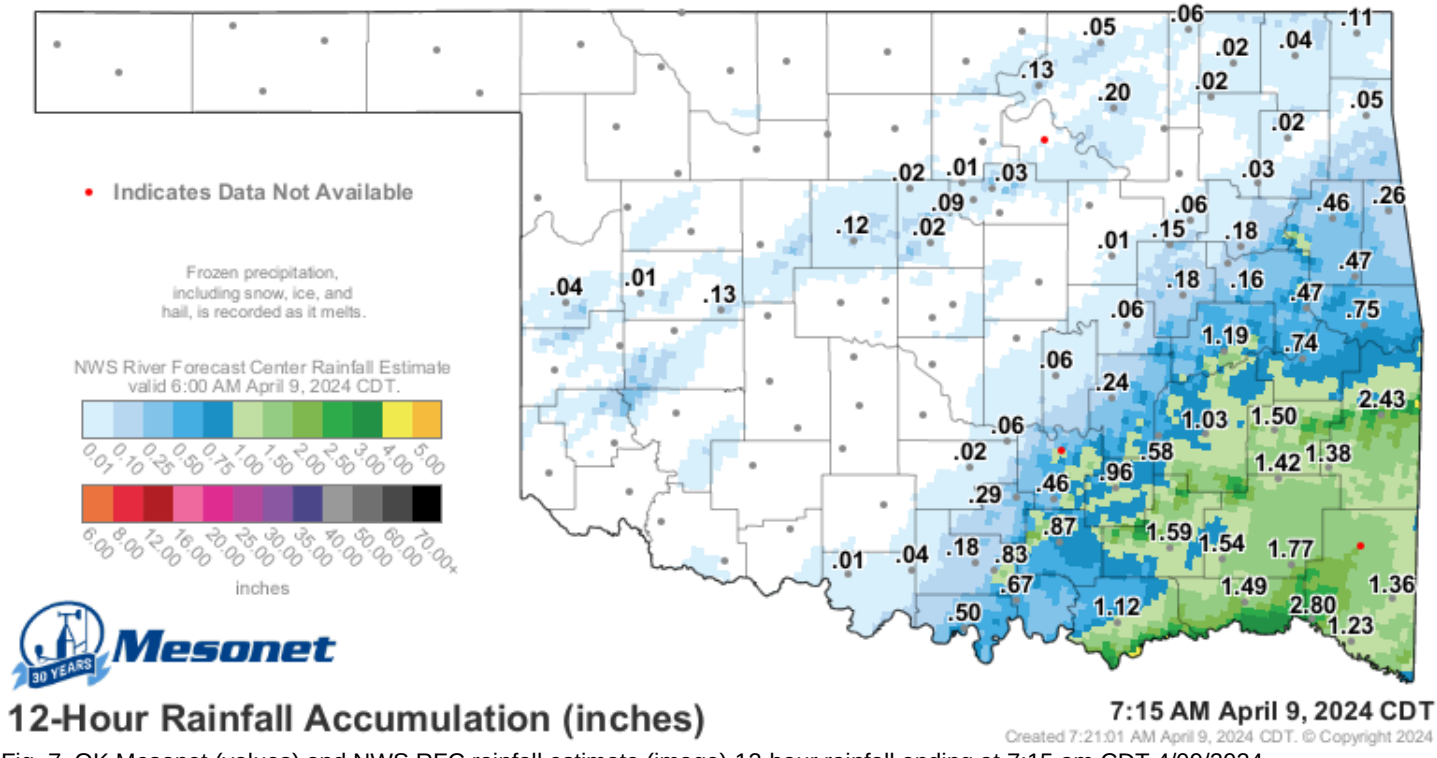


Fig. 7. OK Mesonet (values) and NWS RFC rainfall estimate (image) 12-hour rainfall ending at 7:15 am CDT 4/09/2024.

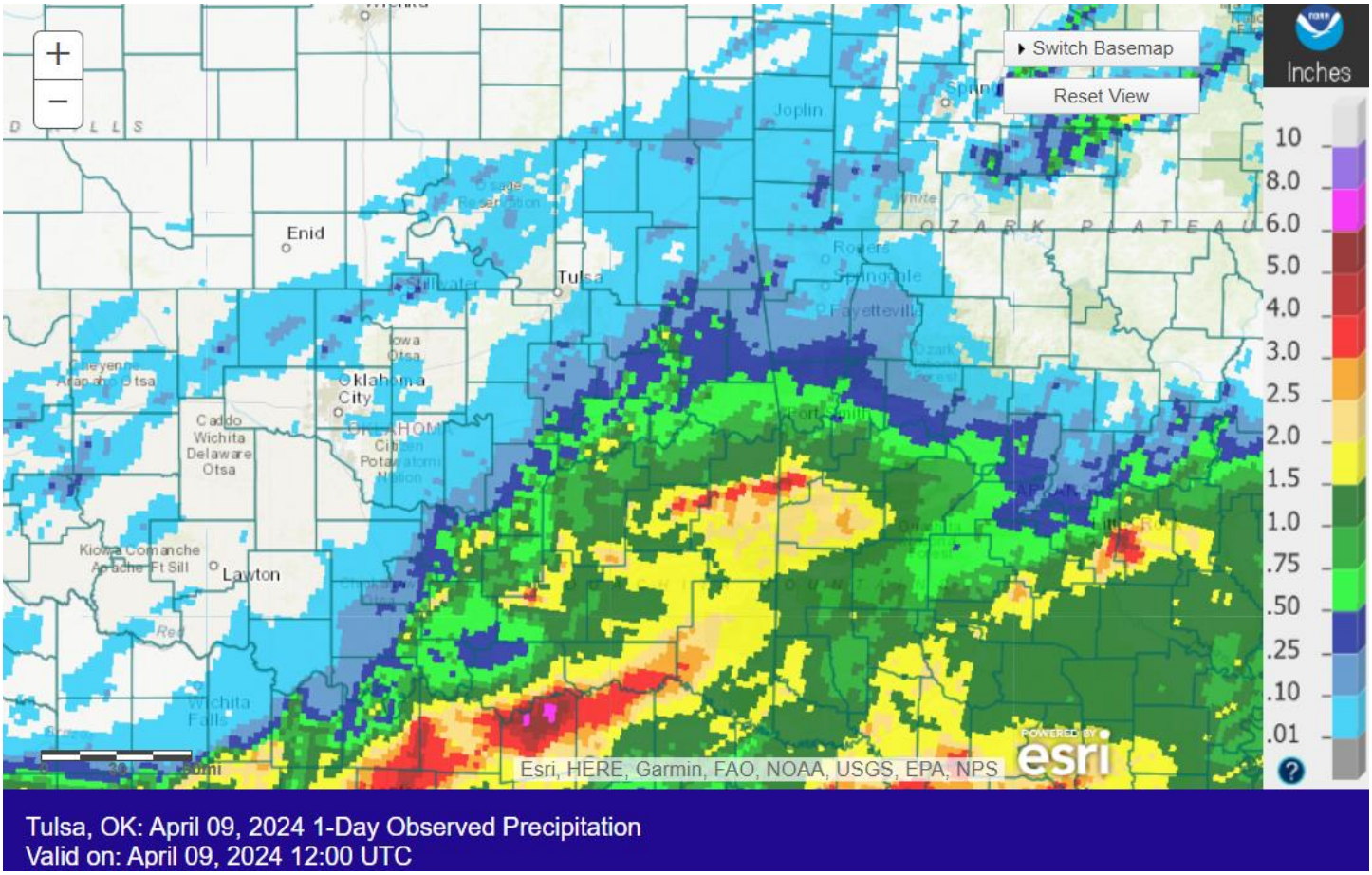


Fig. 8. 24-hour Estimated Observed Rainfall ending at 7am CDT 4/09/2024.

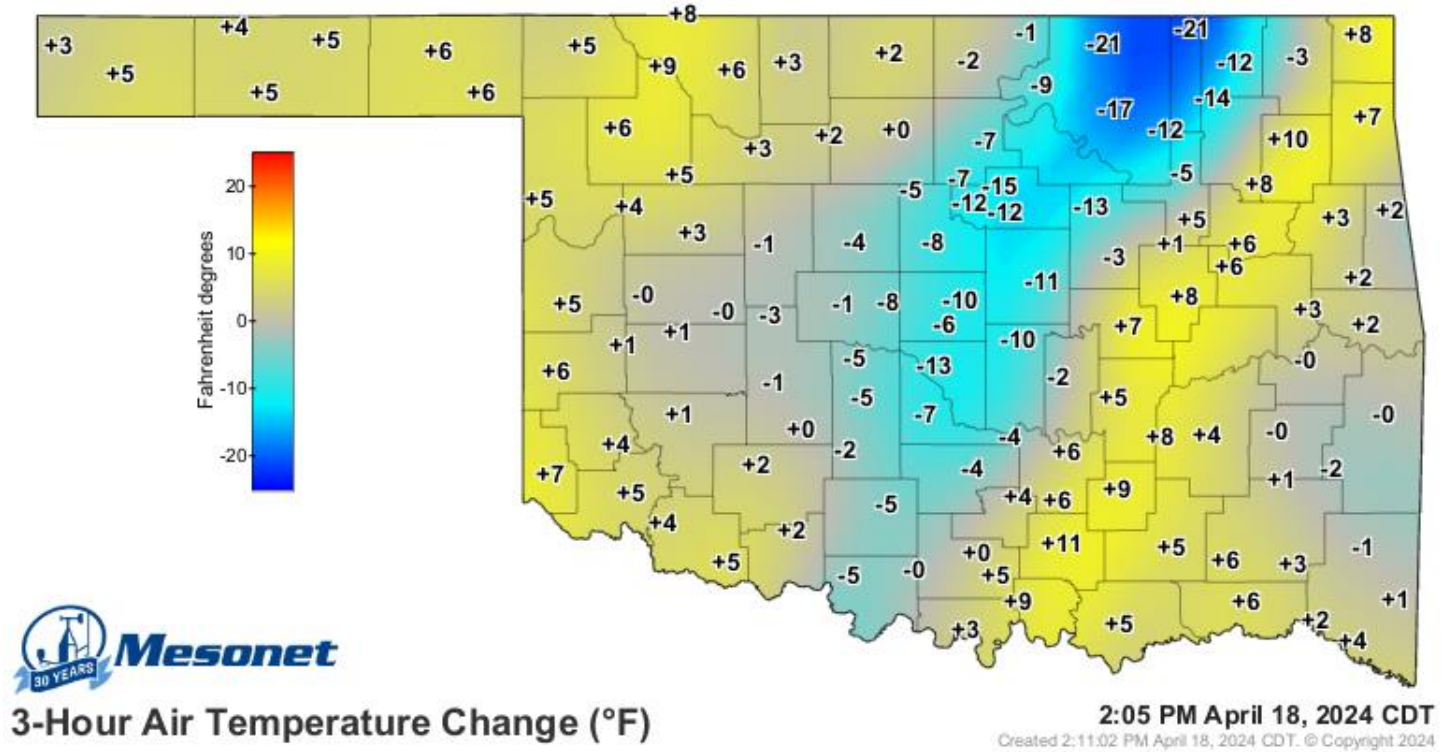


Fig. 9. OK Mesonet 3-hour air temperature change at 2:05 pm CDT 4/18/2024

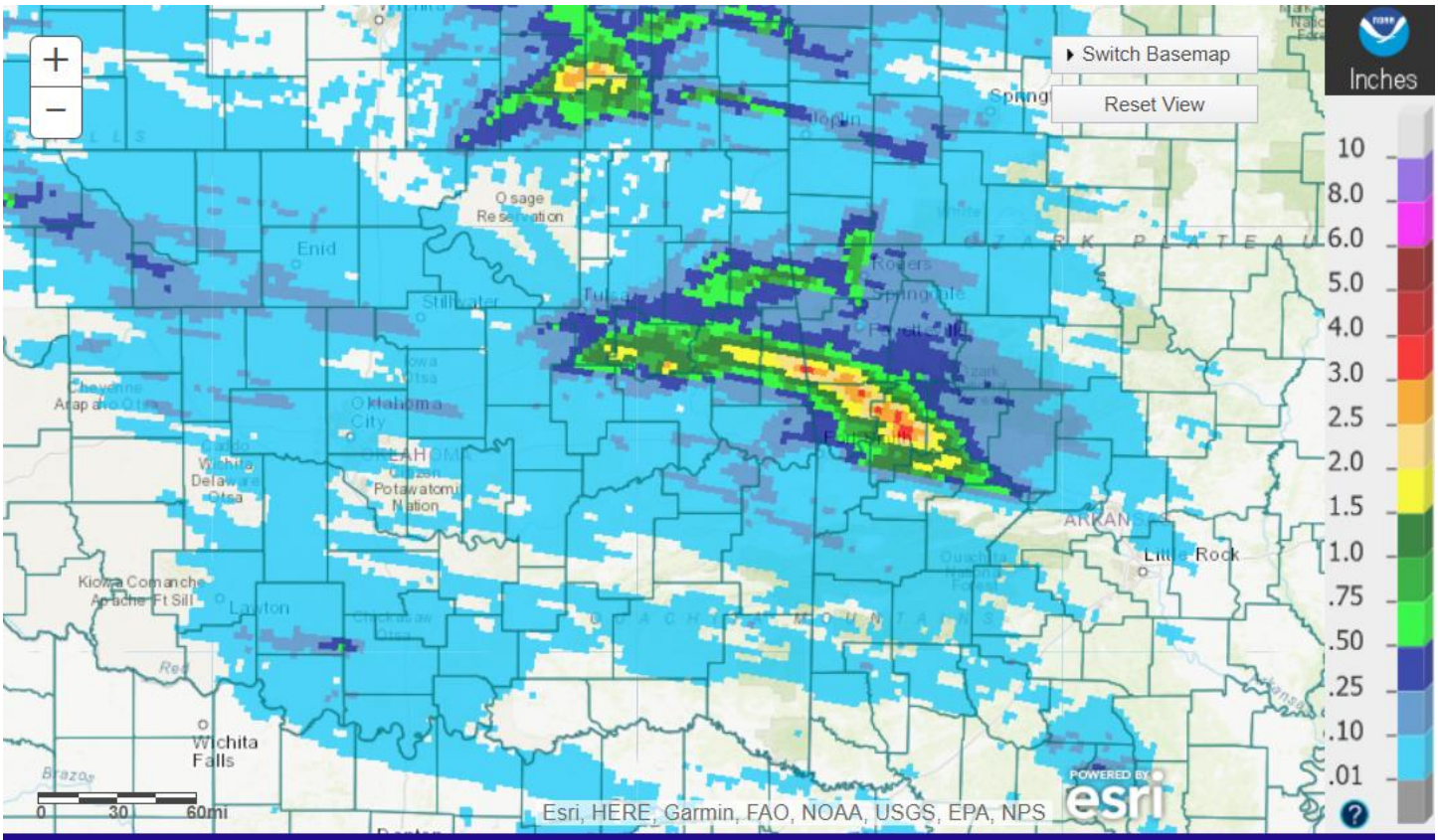


Fig. 10. 24-hour Estimated Observed Rainfall ending at 7am CDT 4/25/2024.

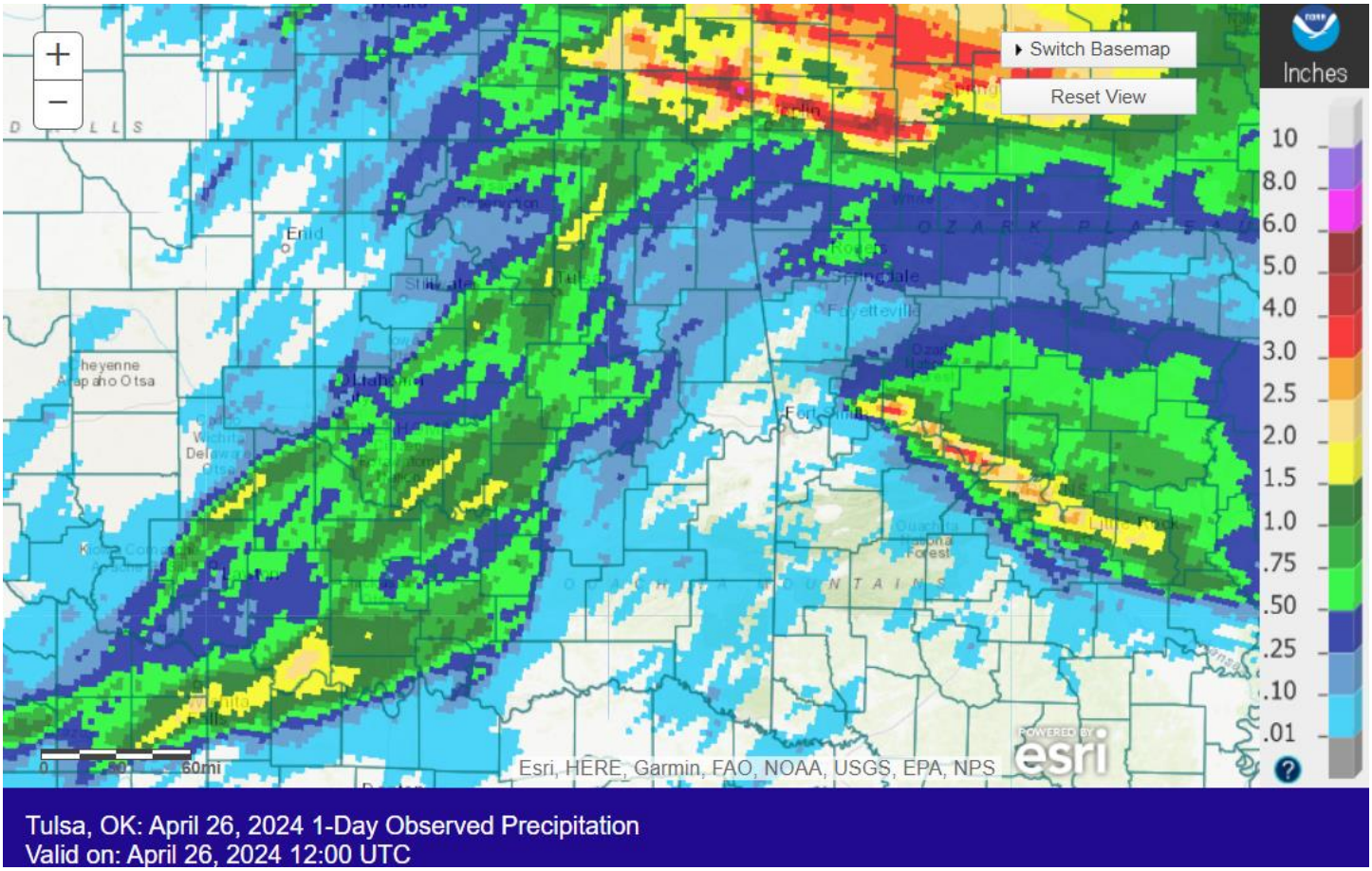


Fig. 11. 24-hour Estimated Observed Rainfall ending at 7am CDT 4/26/2024.

Thunderstorms developed near the OK/KS state line north of a warm front around noon on the 25th and moved east along the border. After a dry evening, widely scattered convection redeveloped over eastern OK around midnight of the 26th as the low-level jet increased over the region. More showers and thunderstorms developed in the early morning hours within deep warm and moist advection collocated with diffluence aloft beneath an advancing jet streak, and a line of thunderstorms moved into eastern OK from the west around sunrise. This line of storms produced three tornadoes (see https://arcg.is/0eHLf0 for details). By 7 am on the 26th, the 24-hour rainfall totals ranged from 0.10" to near 2" (Fig. 11). The line of storms continued to move eastward through the remainder of the morning and early afternoon hours of the 26th, affecting all of eastern OK and northwest AR with the exception of far southeast OK. However, by mid-afternoon, additional showers and thunderstorms developed over southeast OK and west central AR, which then spread northeast. A few isolated thunderstorms developed and moved across northeast OK during the late afternoon and early evening as well. All of the rain exited the region by late evening. However, a lone thunderstorm did move across eastern Choctaw through southern LeFlore County from midnight to about 2 am on the 27th. Additional rainfall through 7am on the 27th ranged from 0.25" to near 3" (Fig. 12).

Thunderstorms developed over north central OK during the afternoon and early evening hours of the 27th, impacting primarily eastern Kay and northern Osage Counties. A strong line of thunderstorms then moved east into eastern OK during the late evening hours and continued eastward across all of eastern OK and western Arkansas though the overnight and morning hours of the 28th. Plentiful moisture, strong and deep instability, and wind shear were in place over the region, allowing for heavy rain and severe weather. This line of storms produced 8 tornadoes (see https://arcg.is/0eHLf0 for details). At 7 am on the 28th, the 24-hour rainfall totals were around 0.50" to around 5" (Figs. 13, 14), making the 3-day rainfall totals a widespread 3"-6" (Fig. 15). This heavy rain also extended into southeast KS over the Neosho River basin, and as a result, flooding was observed near Commerce (see E3 and preliminary hydrographs at the end of this report). Rises occurred across several river basins, but remained below flood stage. The rain finally shifted east and dissipated during the early afternoon hours.

Thunderstorms redeveloped over eastern OK during the late afternoon of the 28th in advance of a cold front and dryline. These storms moved northeast, impacting eastern OK and western AR through the evening and late-night hours. The atmosphere remained supportive of severe weather and heavy rain, and 4 additional tornadoes occurred (see https://arcg.is/0eHLf0 for details). The storms finally shifted east of the region during the early morning hours of the 29th. The 24-hour rainfall totals as of 7 am on the 29th ranged from 0.10" to around 2.5" (Fig. 16). While this rain caused additional rises on area rivers, the rivers still remained below flood stage, with the exception of the Neosho River near Commerce, which remained in flood.

The active last week of April brought a total of 1"-6" of rain to nearly all of eastern OK and northwest AR (Fig. 17, 18).

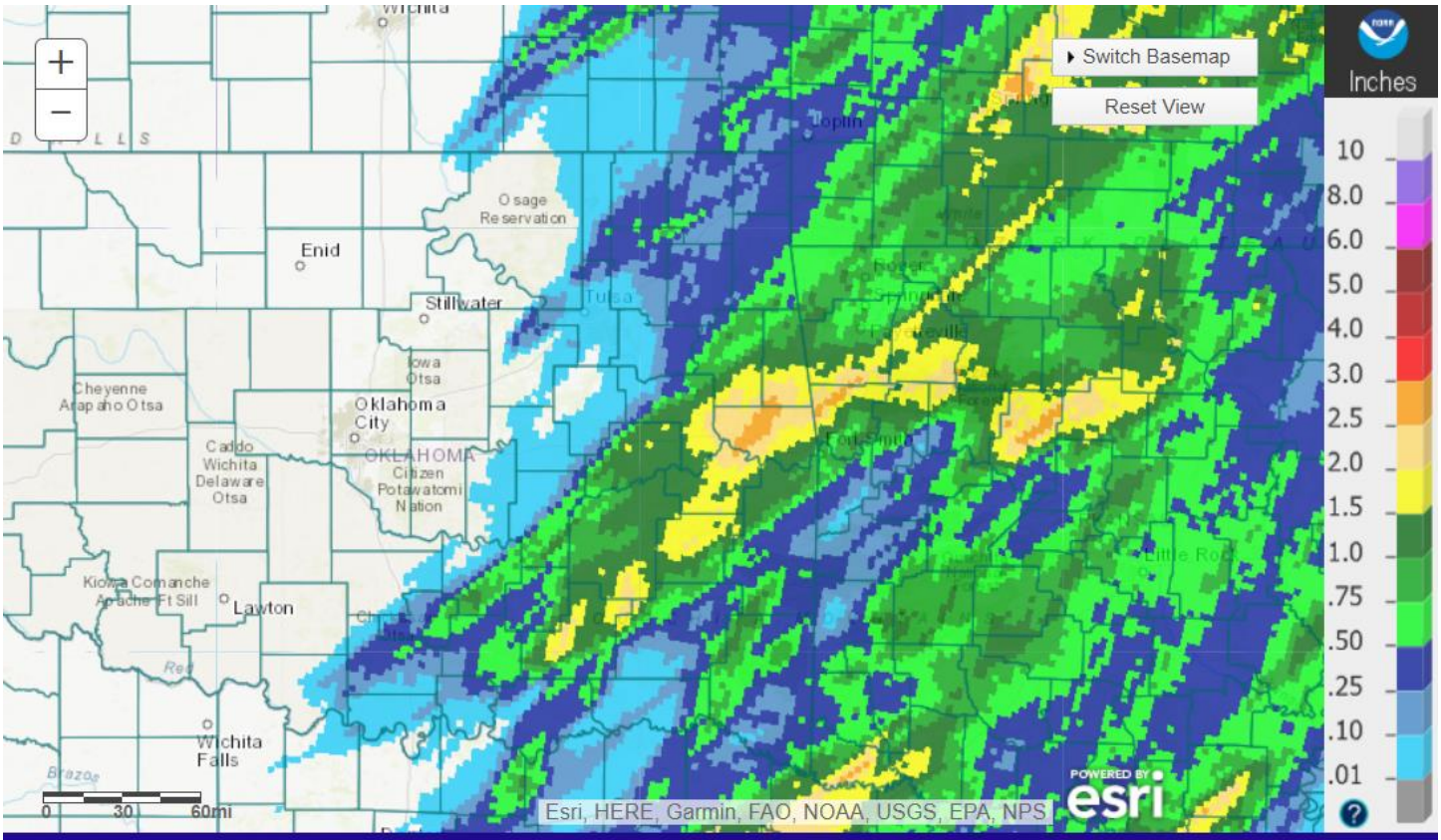


Fig. 12. 24-hour Estimated Observed Rainfall ending at 7am CDT 4/27/2024.

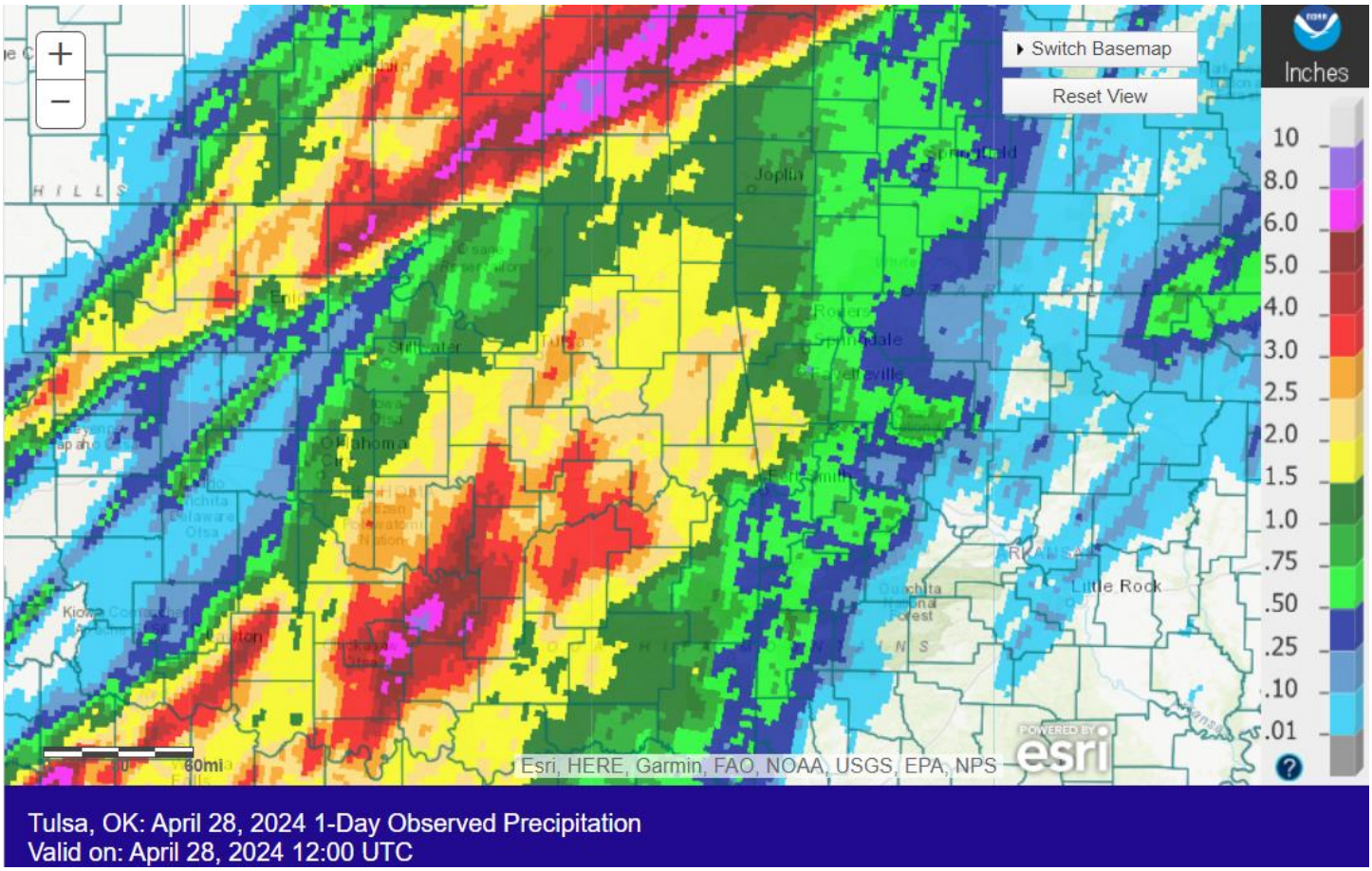


Fig. 13. 24-hour Estimated Observed Rainfall ending at 7am CDT 4/28/2024.

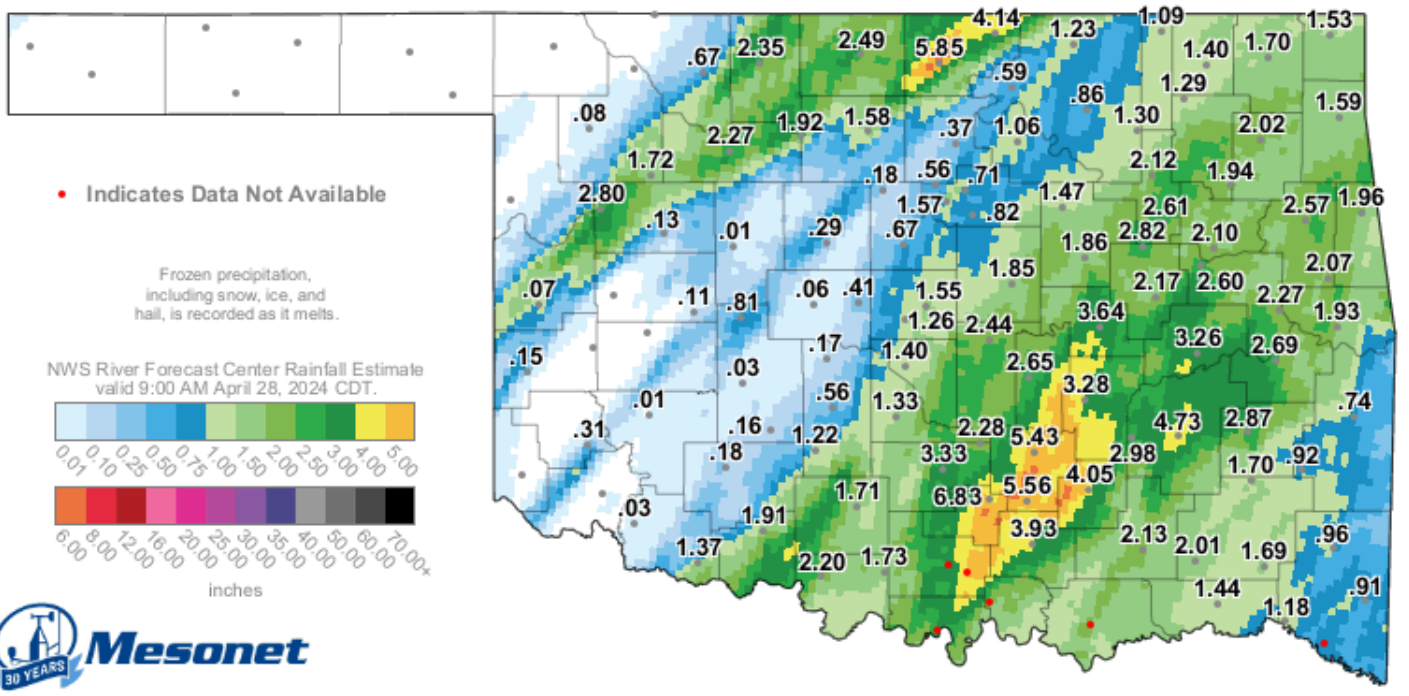


Fig. 14. OK Mesonet (values) and NWS RFC rainfall estimate (image) 24-hour rainfall ending at 10:30 am CDT 4/28/2024.

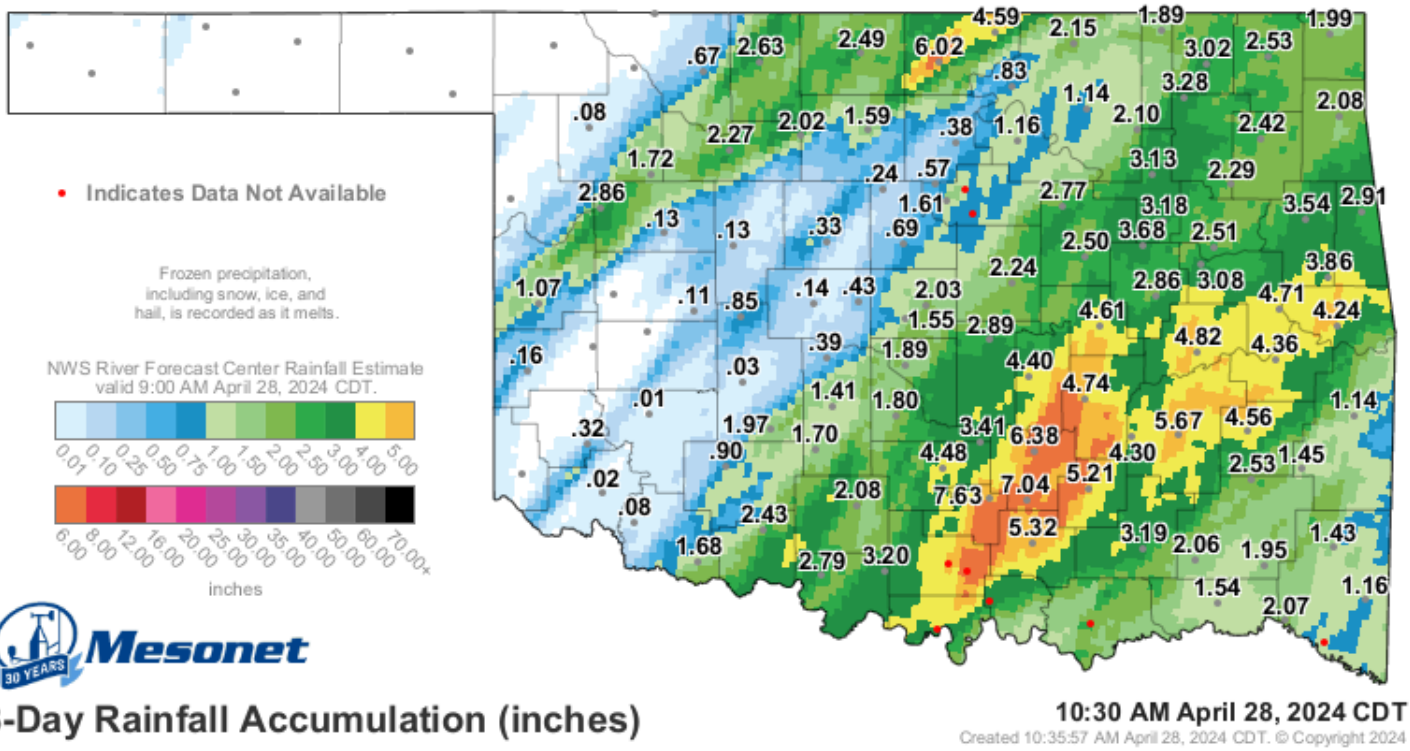


Fig. 15. OK Mesonet (values) and NWS RFC rainfall estimate (image) 3-day rainfall ending at 10:30 am CDT 4/28/2024.

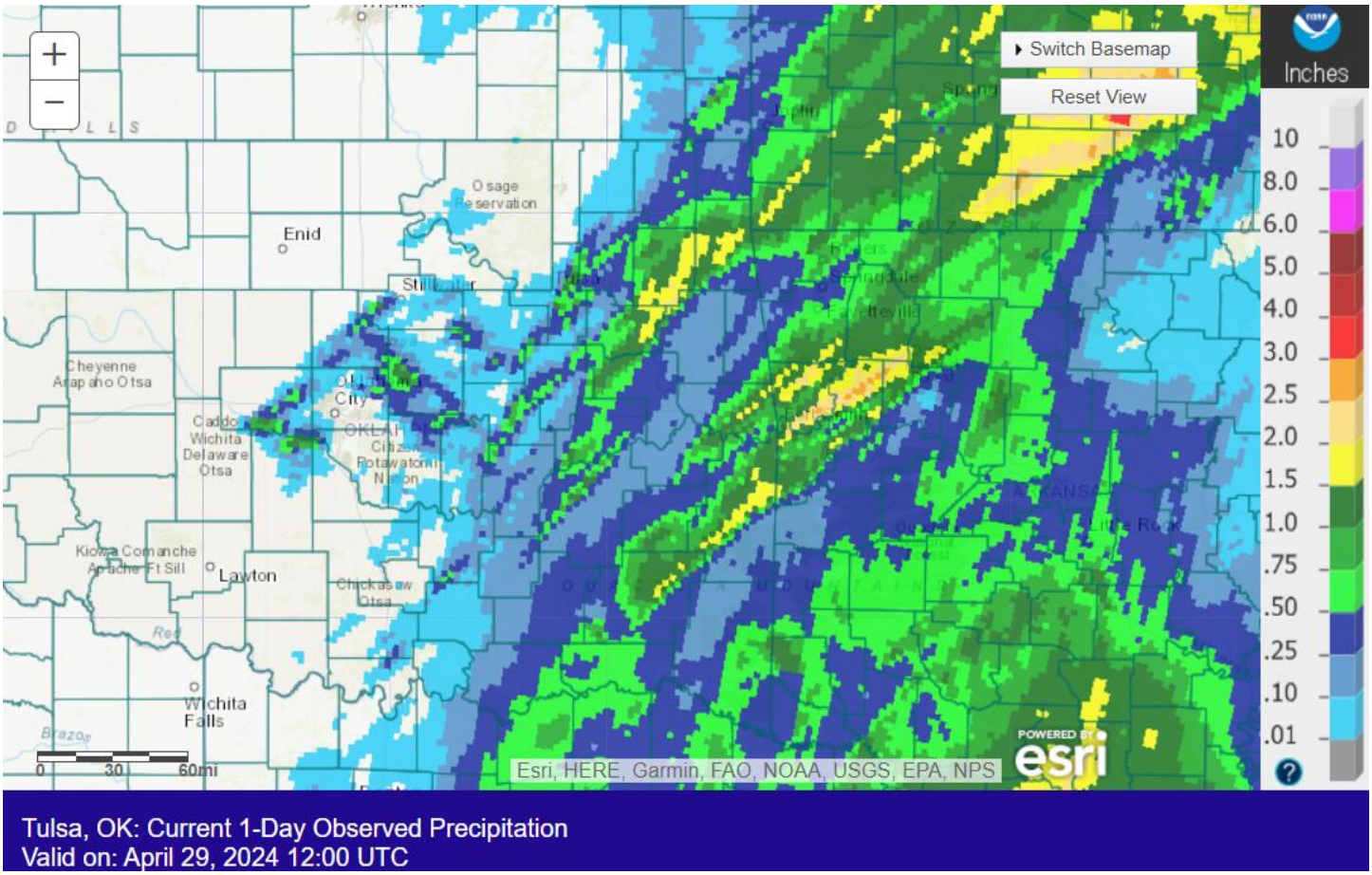


Fig. 16. 24-hour Estimated Observed Rainfall ending at 7am CDT 4/29/2024.

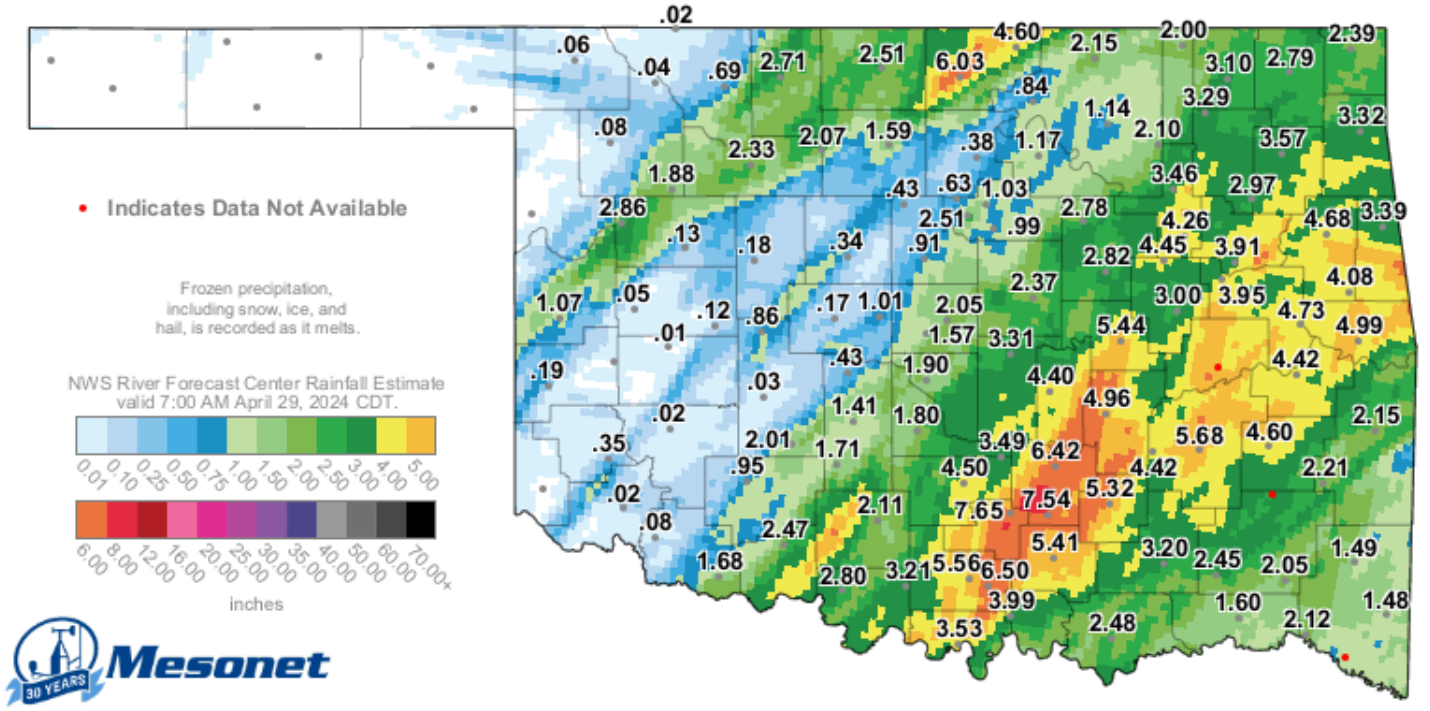


Fig. 17. OK Mesonet (values) and NWS RFC rainfall estimate (image) 7-day rainfall ending at 8:05 am CDT 4/29/2024.

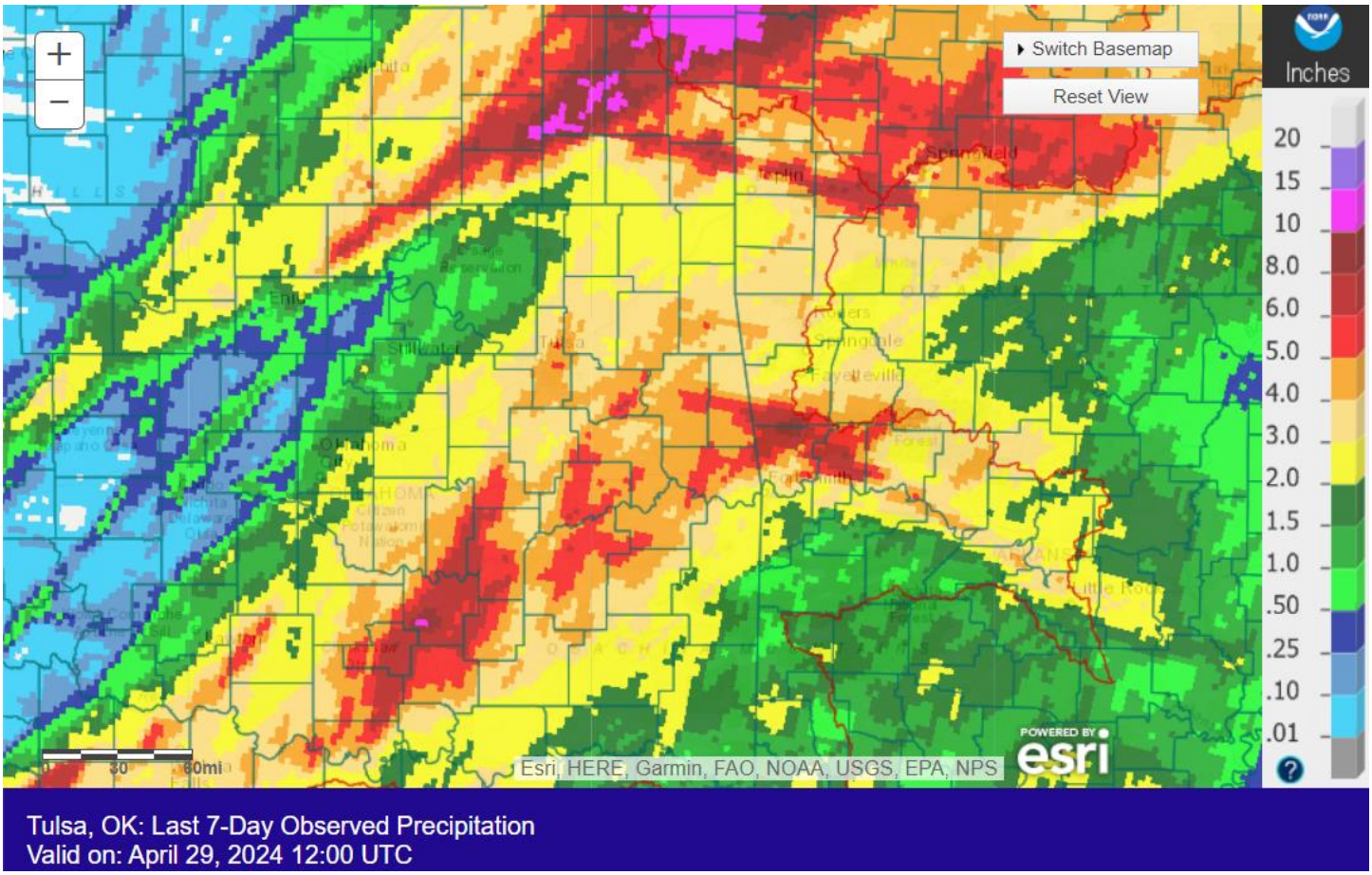


Fig. 18. 24-hour Estimated Observed Rainfall ending at 7am CDT 4/29/2024.

Written by:

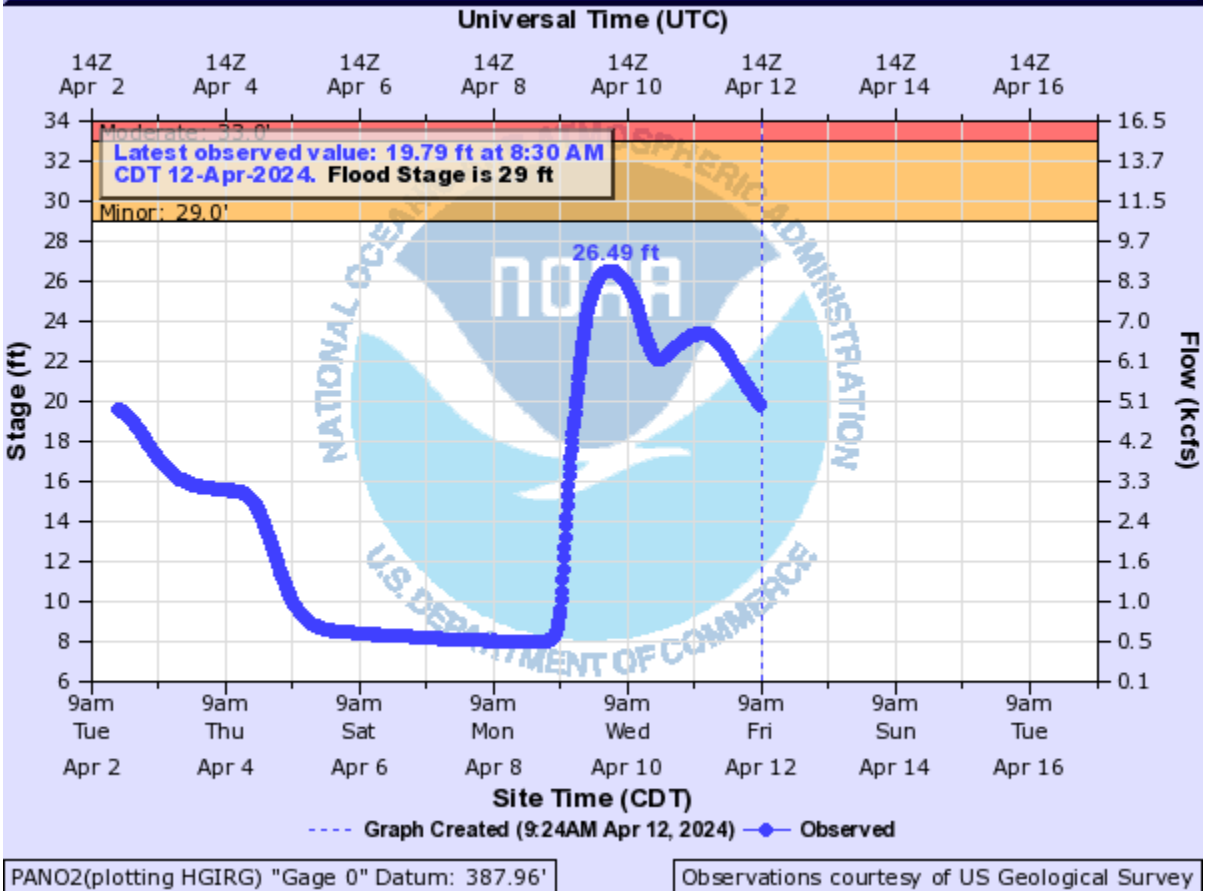
Nicole McGavock
Service Hydrologist
WFO Tulsa

Products issued in April 2024:

1	Flash Flood Warnings (FFW)
1	Flash Flood Statements (FFS)
2	Flash/Areal Flood Watches (FFA) (5 Watch FFA CON/EXT/EXA/EXB/CAN)
23	Urban and Small Stream Advisories (FLS)
0	Areal Flood Warnings (FLW)
0	Areal Flood Statements (FLS)
7	River Flood Warnings (FLW) (includes category increases)
37	River Flood Statements (FLS)
7	River Flood Advisories (FLS) (35 Advisory FLS CON/EXT/CAN)
0	River Flood Watches (FFA) (0 Watch FFA CON/EXT/CAN)
0	River Statements (RVS)
0	Hydrologic Outlooks (ESF)
0	Drought Information Statements (DGT)

Preliminary Hydrographs:

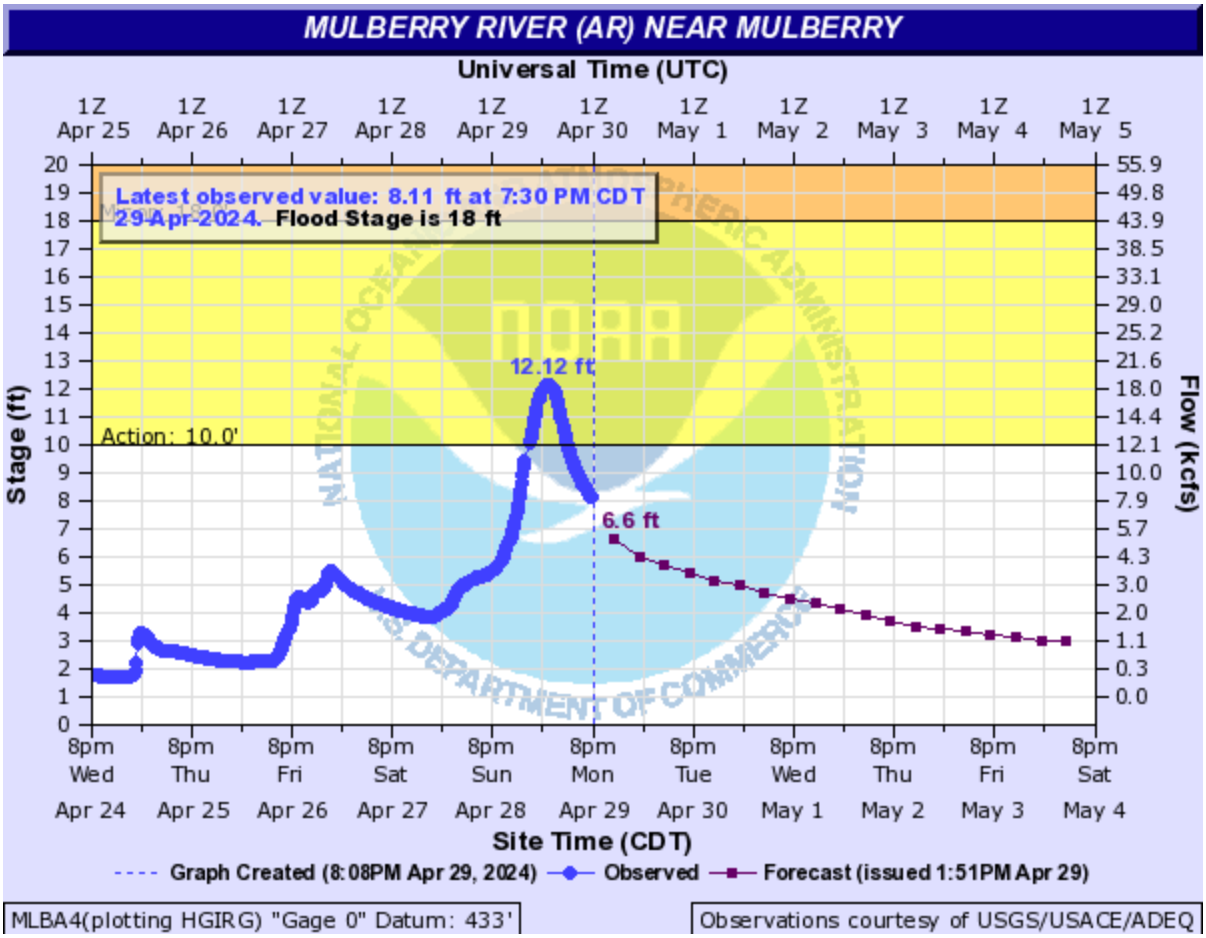
POTEAU RIVER NEAR PANAMA



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

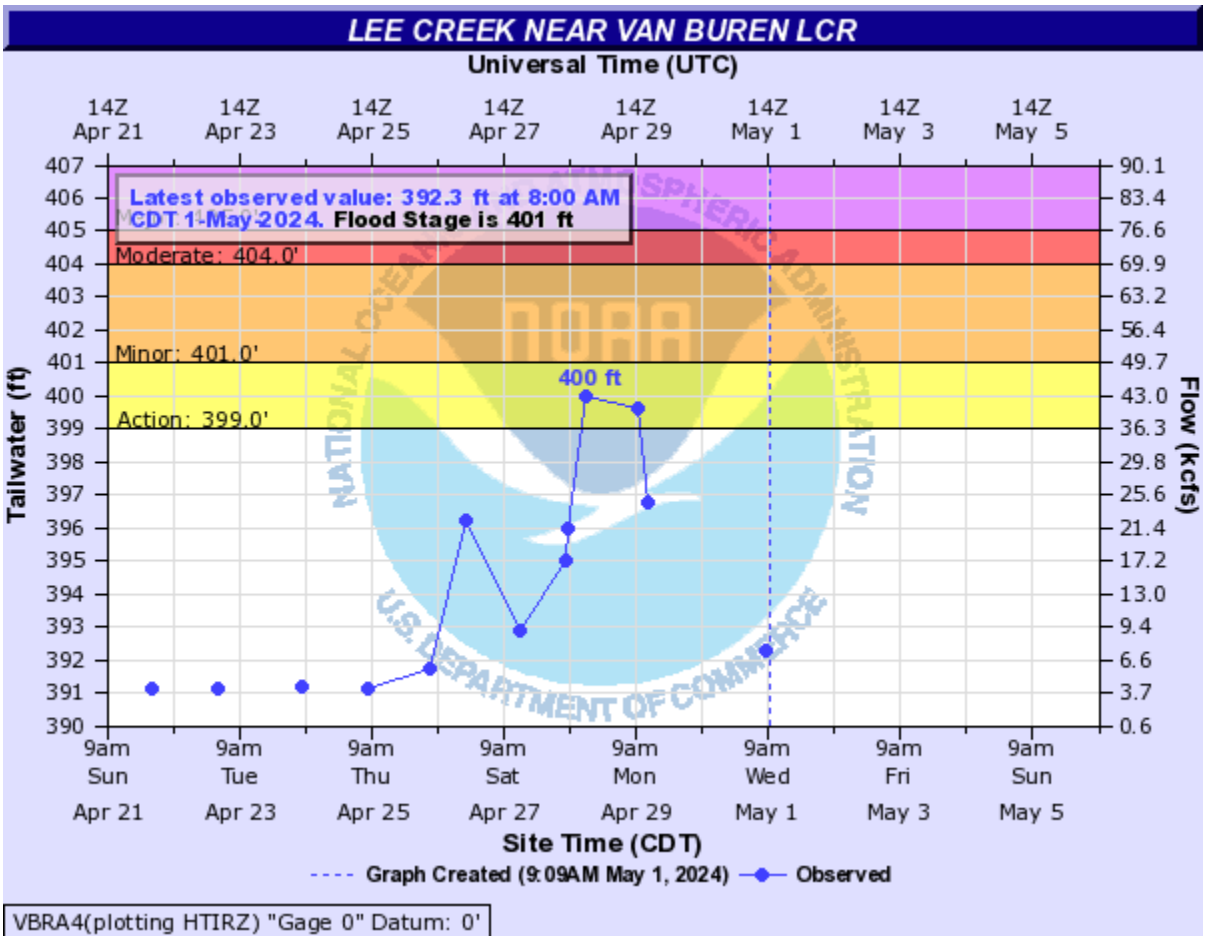
Observations courtesy of US Geological Survey

MULBERRY RIVER (AR) NEAR MULBERRY

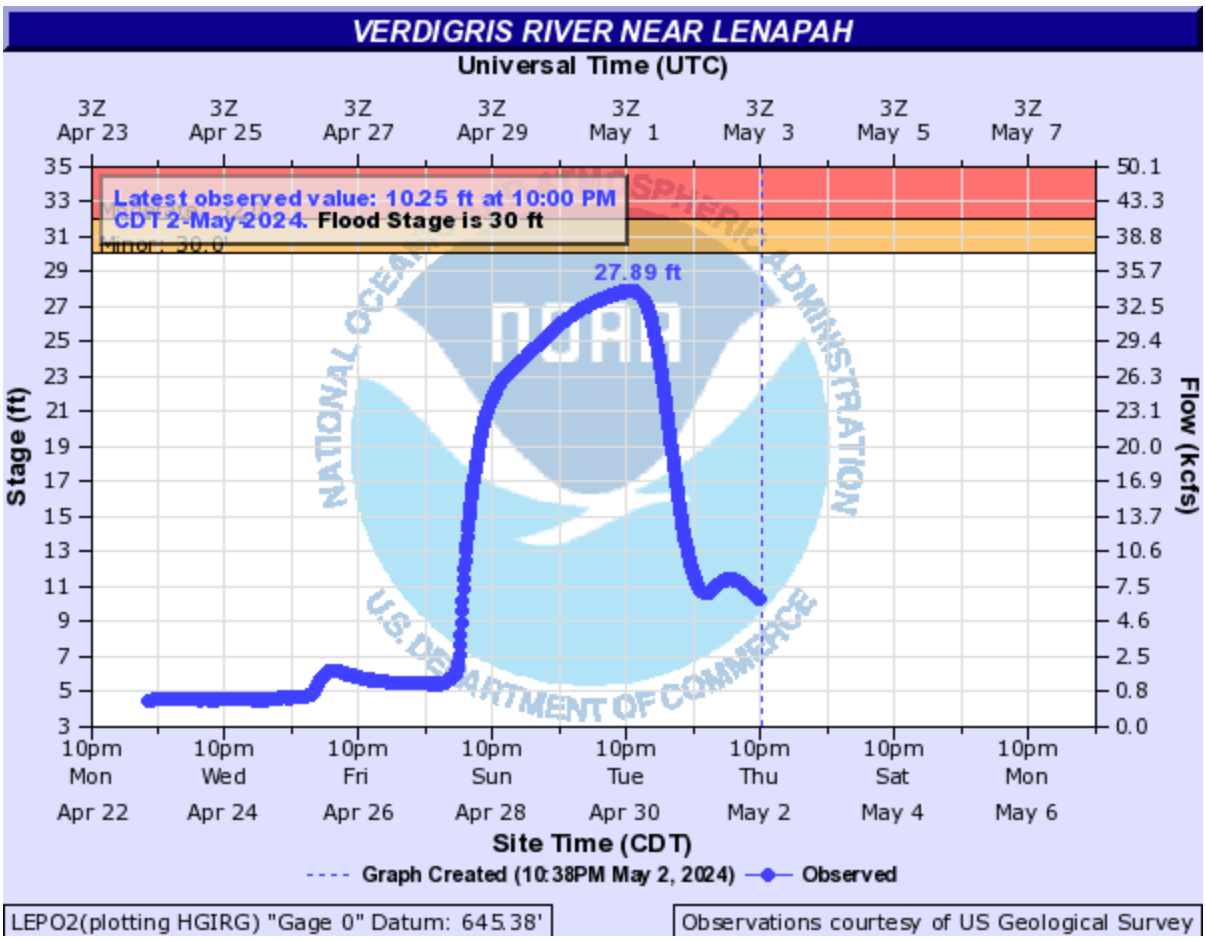


MLBA4(plotting HGIRG) "Gage 0" Datum: 433'

Observations courtesy of USGS/USACE/ADEQ

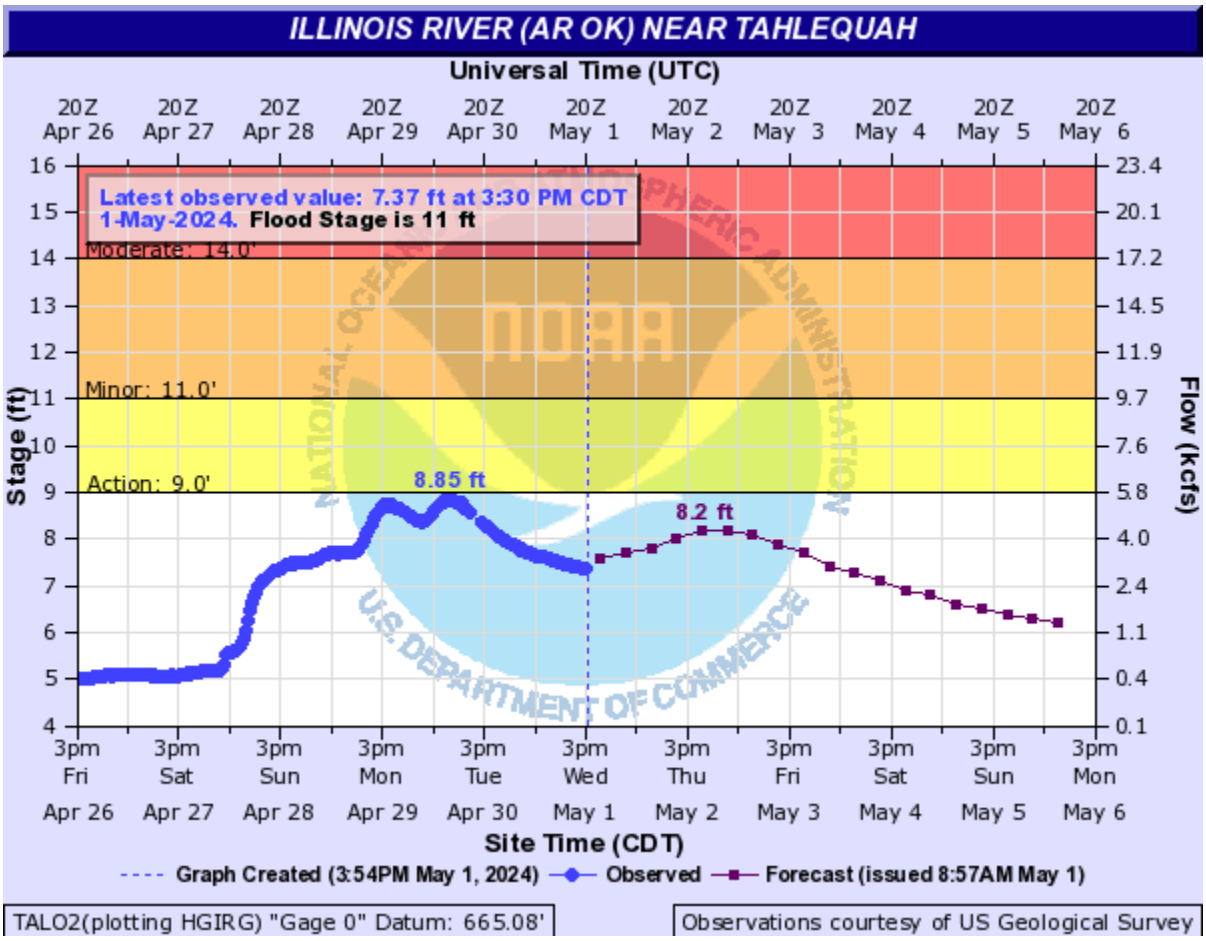


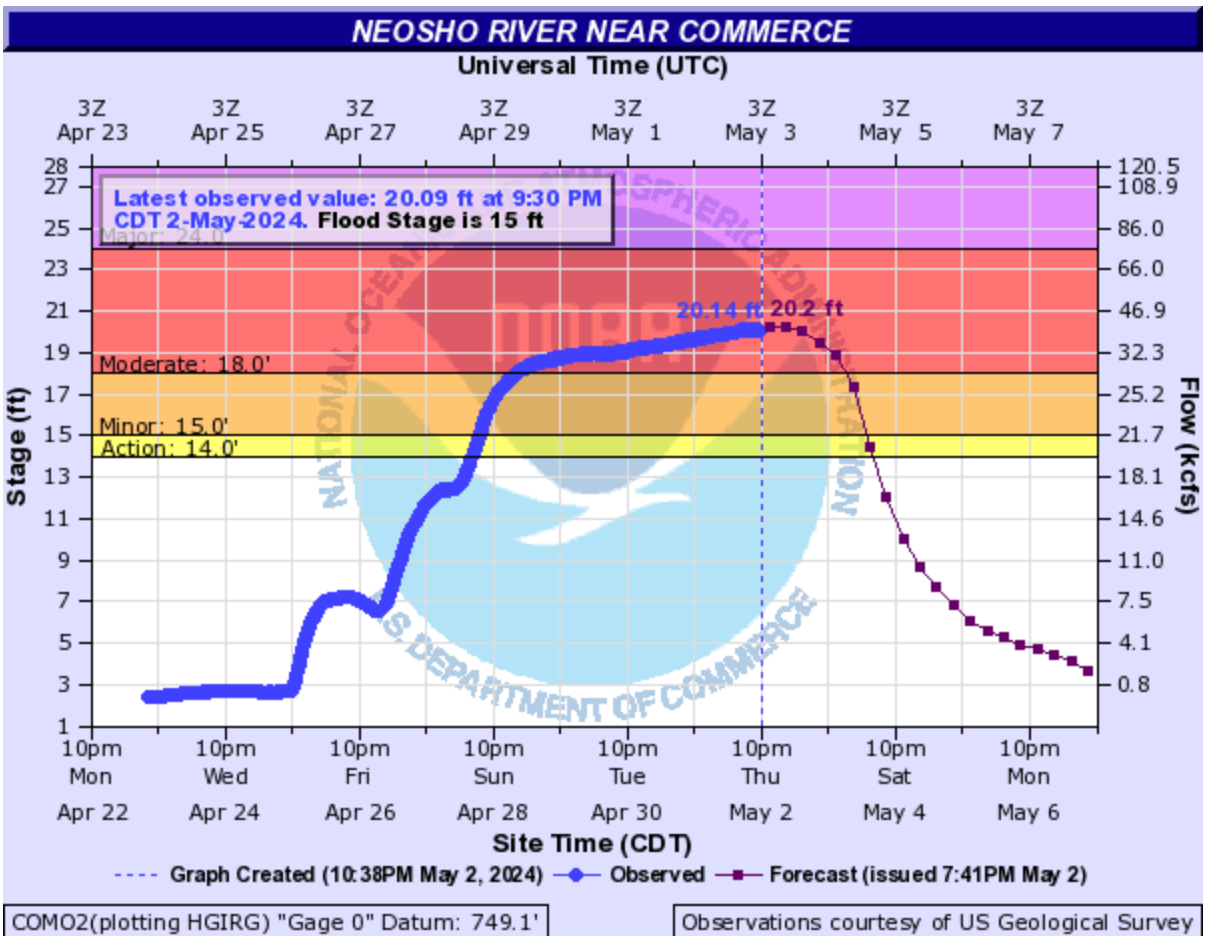
VBRA4(plotting HTIRZ) "Gage 0" Datum: 0'

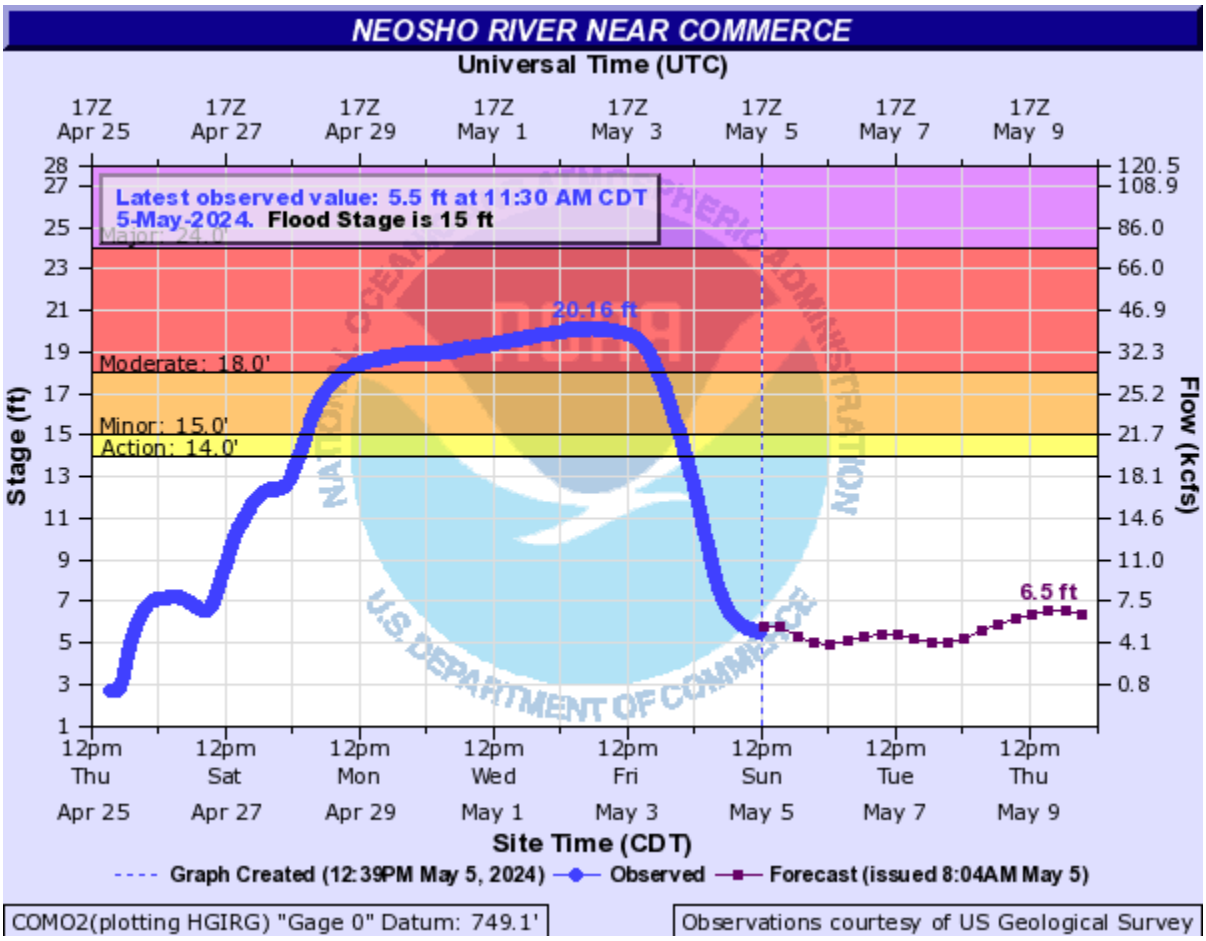


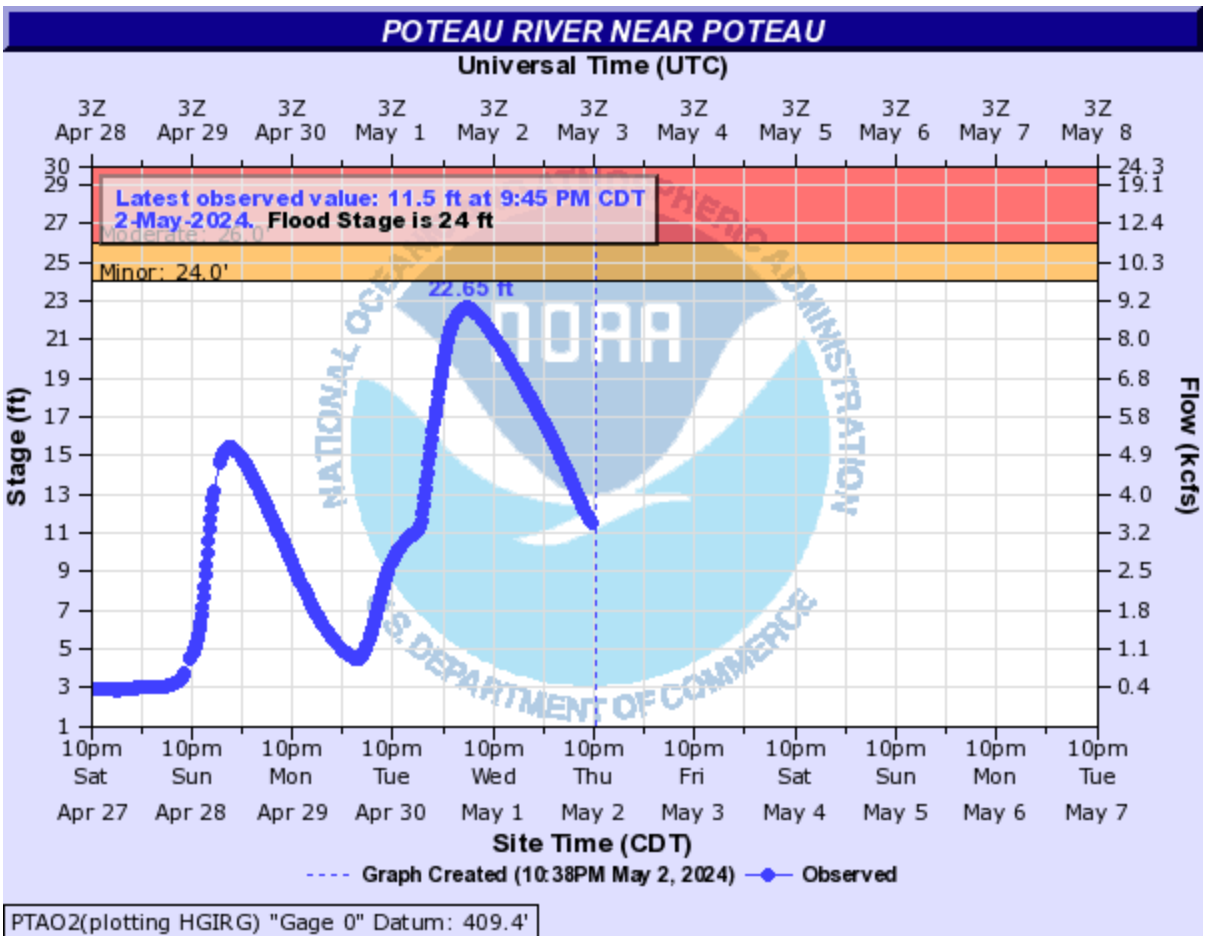
LEPO2(plotting HGIRG) "Gage 0" Datum: 645.38'

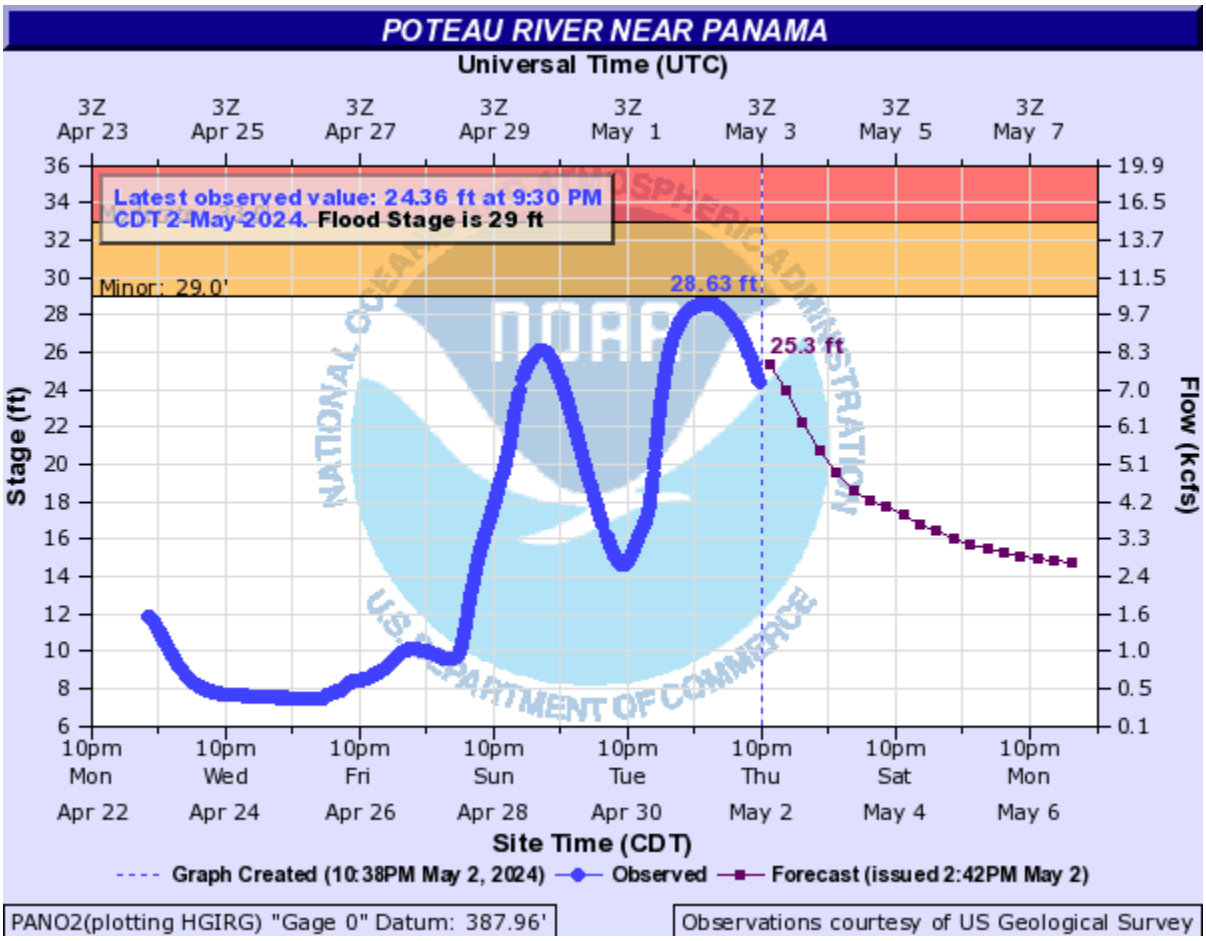
Observations courtesy of US Geological Survey


ILLINOIS RIVER (AR OK) NEAR TAHLEQUAH
Universal Time (UTC)
20Z Apr 26
20Z Apr 27
20Z Apr 28
20Z Apr 29
20Z Apr 30
20Z May 1
20Z May 2
20Z May 3
20Z May 4
20Z May 5
20Z May 6
Latest observed value: 7.37 ft at 3:30 PM CDT 1-May-2024. Flood Stage is 11 ft
Moderate: 14.0'
Minor: 11.0'
Action: 9.0'
8.85 ft
8.2 ft
Stage (ft)
Flow (kcfs)
16
15
14
13
12
11
10
9
8
7
6
5
4
23.4
20.1
17.2
14.5
11.9
9.7
7.6
5.8
4.0
2.4
1.1
0.4
0.1
3pm Fri Apr 26
3pm Sat Apr 27
3pm Sun Apr 28
3pm Mon Apr 29
3pm Tue Apr 30
3pm Wed May 1
3pm Thu May 2
3pm Fri May 3
3pm Sat May 4
3pm Sun May 5
3pm Mon May 6
Site Time (CDT)
Graph Created (3:54PM May 1, 2024)
Observed
Forecast (issued 8:57AM May 1)
TALO2(plotting HGIRG) "Gage 0" Datum: 665.08'
Observations courtesy of US Geological Survey


NEOSHO RIVER NEAR COMMERCE
Universal Time (UTC)
3Z Apr 23
3Z Apr 25
3Z Apr 27
3Z Apr 29
3Z May 1
3Z May 3
3Z May 5
3Z May 7
Latest observed value: 20.09 ft at 9:30 PM CDT 2-May-2024. Flood Stage is 15 ft
Major: 24.0'
Moderate: 18.0'
Minor: 15.0'
Action: 14.0'
20.14 ft
20.2 ft
Stage (ft)
Flow (kcfs)
28
27
25
23
21
19
17
15
13
11
9
7
5
3
1
120.5
108.9
86.0
66.0
46.9
32.3
25.2
21.7
18.1
14.6
11.0
7.5
4.1
0.8
10pm Mon Apr 22
10pm Wed Apr 24
10pm Fri Apr 26
10pm Sun Apr 28
10pm Tue Apr 30
10pm Thu May 2
10pm Sat May 4
10pm Mon May 6
Site Time (CDT)
Graph Created (10:38PM May 2, 2024)
Observed
Forecast (issued 7:41PM May 2)
COMO2(plotting HGIRG) "Gage 0" Datum: 749.1'
Observations courtesy of US Geological Survey


NEOSHO RIVER NEAR COMMERCE
Universal Time (UTC)
17Z Apr 25
17Z Apr 27
17Z Apr 29
17Z May 1
17Z May 3
17Z May 5
17Z May 7
17Z May 9
Latest observed value: 5.5 ft at 11:30 AM CDT 5-May-2024. Flood Stage is 15 ft
Major: 24.0'
Moderate: 18.0'
Minor: 15.0'
Action: 14.0'
20.16 ft
6.5 ft
Stage (ft)
Flow (kcfs)
12pm Thu Apr 25
12pm Sat Apr 27
12pm Mon Apr 29
12pm Wed May 1
12pm Fri May 3
12pm Sun May 5
12pm Tue May 7
12pm Thu May 9
Site Time (CDT)
Graph Created (12:39PM May 5, 2024)
Observed
Forecast (issued 8:04AM May 5)
COMO2(plotting HGIRG) "Gage 0" Datum: 749.1'
Observations courtesy of US Geological Survey


POTEAU RIVER NEAR POTEAU
Universal Time (UTC)
3Z Apr 28
3Z Apr 29
3Z Apr 30
3Z May 1
3Z May 2
3Z May 3
3Z May 4
3Z May 5
3Z May 6
3Z May 7
3Z May 8
Latest observed value: 11.5 ft at 9:45 PM CDT 2-May-2024. Flood Stage is 24 ft
Moderate: 26.0'
Minor: 24.0'
22.65 ft
Stage (ft)
Flow (kcfs)
10pm Sat Apr 27
10pm Sun Apr 28
10pm Mon Apr 29
10pm Tue Apr 30
10pm Wed May 1
10pm Thu May 2
10pm Fri May 3
10pm Sat May 4
10pm Sun May 5
10pm Mon May 6
10pm Tue May 7
Site Time (CDT)
Graph Created (10:38PM May 2, 2024)
Observed
PTAO2(plotting HGIRG) "Gage 0" Datum: 409.4'


POTEAU RIVER NEAR PANAMA
Universal Time (UTC)
3Z Apr 23
3Z Apr 25
3Z Apr 27
3Z Apr 29
3Z May 1
3Z May 3
3Z May 5
3Z May 7
Latest observed value: 24.36 ft at 9:30 PM CDT 2-May-2024. Flood Stage is 29 ft
Minor: 29.0'
28.63 ft
25.3 ft
Stage (ft)
Flow (kcfs)
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
6
19.9
16.5
13.7
11.5
9.7
8.3
7.0
6.1
5.1
4.2
3.3
2.4
1.6
1.0
0.5
0.1
10pm Mon Apr 22
10pm Wed Apr 24
10pm Fri Apr 26
10pm Sun Apr 28
10pm Tue Apr 30
10pm Thu May 2
10pm Sat May 4
10pm Mon May 6
Site Time (CDT)
Graph Created (10:38PM May 2, 2024)
Observed
Forecast (issued 2:42PM May 2)
PANO2(plotting HGIRG) "Gage 0" Datum: 387.96'
Observations courtesy of US Geological Survey