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 **September** YEAR **2013**
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 **October 3, 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.

Overall, September was warm and dry across eastern OK and northwest AR. No river flooding occurred this month. Normal rainfall for September ranges from 4.2 inches in Okmulgee County to 5.4 inches in Delaware County. In the Ozark region of northwest Arkansas, rainfall averages 4.5 inches for the month.

Monthly Summary

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 1a), rainfall totals for September 2013 ranged from around 0.75" in east central OK and west central AR to around 8" in Osage Co. (northeast OK). A large portion of the HSA received 2"-4". Portions of Osage Co. were near to 200% of normal this month, with the majority of the region receiving only 25% to 75% of the normal September rainfall this month (Fig. 1b). Portions of Pittsburg, Haskell, northern Le Flore, Sequoyah, and Crawford Counties only had between 10% and 25% of the normal rainfall this month.

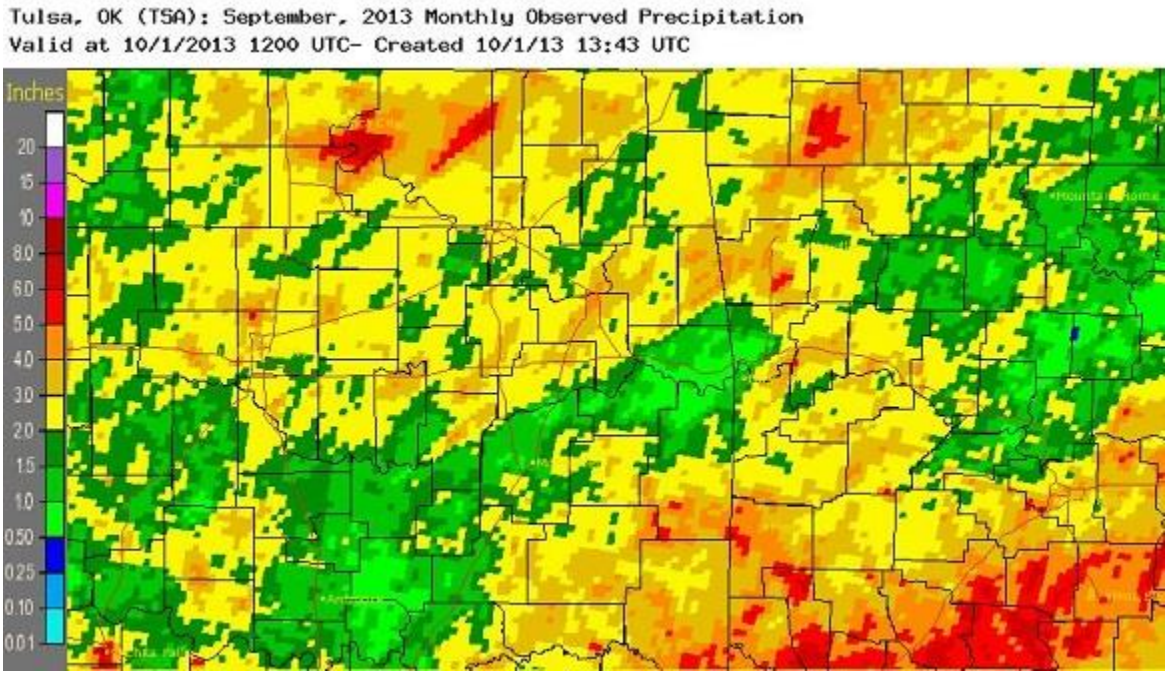

Fig. 1a. Estimated Observed Rainfall for September 2013

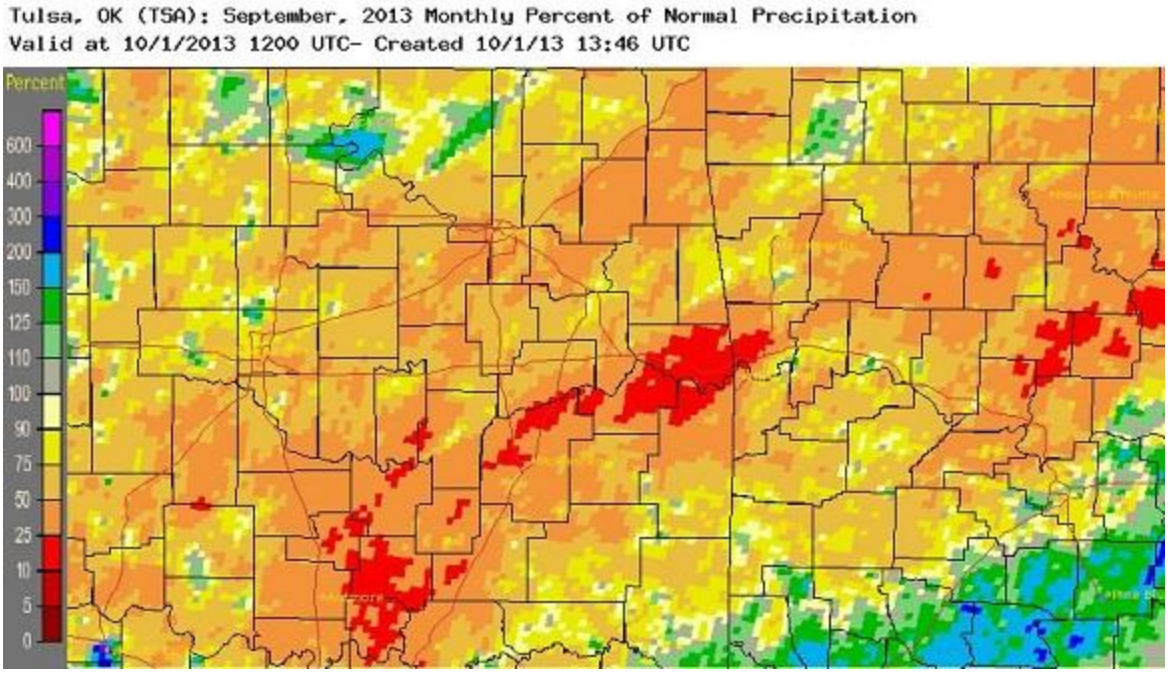

Fig. 1b. Estimated % of Normal Rainfall for September 2013

In Tulsa, OK, September 2013 ranked as the 21st warmest September (76.4°F; since records began in 1905) and the 47th driest September (2.50"; since records began in 1888). Fort Smith, AR was the 13th warmest September (78.7°F; since records began in 1882) and the 30th driest September (1.50"; since records began in 1882). Fayetteville, AR was the 14th warmest (71.5°F) and the 26th driest (3.66") September since records began in 1949.

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

Burbank, OK (meso)	6.52	Wynona, OK (meso)	5.73	Bartlesville, OK (ASOS)	5.21
Bartlesville, OK (coop)	5.19	Westville, OK (meso)	4.09	Cloudy, OK (meso)	4.08
Vinita, OK (meso)	4.02	Antlers, OK (meso)	3.87	Ozark, AR (coop)	3.87

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

Sallisaw, OK (meso)	1.11	McAlester, OK (ASOS)	1.22	McAlester, OK (meso)	1.25
Fort Smith, AR (ASOS)	1.50	Stigler, OK (meso)	1.50	Okemah, OK (meso)	1.55
Natural Dam, AR (coop)	1.58	Wister, OK (meso)	1.76	Miami, OK (meso)	1.88

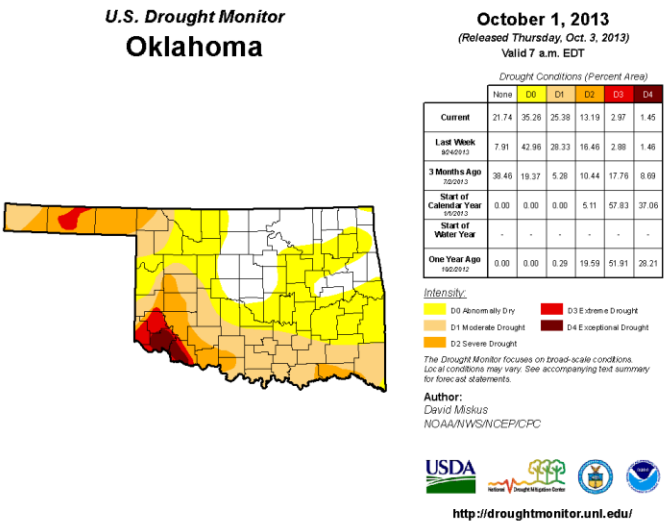

Fig. 2. Drought Monitor for Oklahoma

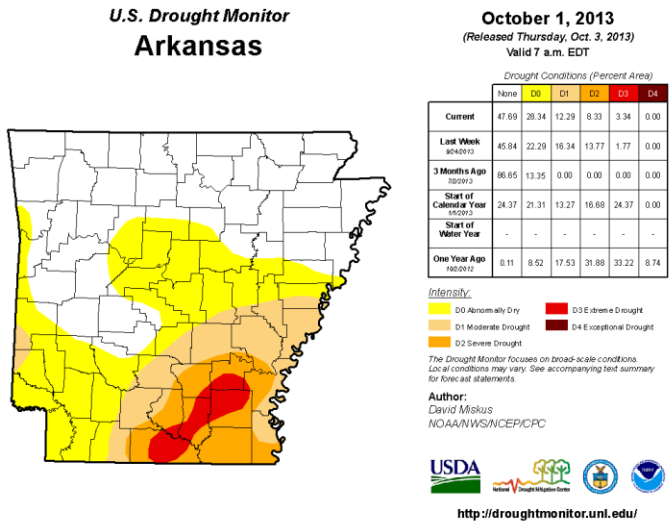

Fig. 3. Drought Monitor for Arkansas

According to the U.S. Drought Monitor (USDM) from October 1, 2013 (Figs 2, 3), Severe (D2) drought affected Choctaw County in southeast OK. Moderate (D1) Drought extended into Pushmataha County in southeast

OK. Portions Delaware, Mayes, Rogers, southern Craig, Tulsa, Wagoner, eastern Pawnee, Creek, Okmulgee, Okfuskee, McIntosh, southern Muskogee, Sequoyah, Haskell, Le Flore, Latimer, Pittsburg, and northern Pushmataha Counties in eastern OK and far western Crawford and far western Sebastian Counties in west central AR were classified as Abnormally Dry (D0), but not experiencing drought conditions.

Most of the major reservoirs in the HSA were operating within ±1% of the top of their conservation pools, though Hudson Lake remained within its flood control pool at 103%. A few lakes were below normal: Skiatook Lake 79%, Beaver Lake 94%, Sardis Lake 94%, Heyburn Lake 94%, and Wister Lake 95%.

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

Rank since 1921	Last 30 Days (Sep 1 – Sep 30)	Last 60 Days (Aug 2 – Sep 30)	Last 90 Days (Jul 3 – Sep 30)	Last 120 Days (Jun 3 – Sep 30)	Last 180 Days (Apr 4 – Sep 30)	Year-to-Date 2013 (Jan 1 – Sep 30)	Water Year 2013 (Oct 1, 2012 – Sep 30, 2013)
Northeast OK	36th driest	45th driest	25th wettest	42nd wettest	30th wettest	24th wettest	42nd wettest
East Central OK	28th driest	35th driest	43rd wettest	33rd driest	39th wettest	25th wettest	39th driest
Southeast OK	37th driest	21st driest	44th wettest	35th driest	45th wettest	39th wettest	26th driest
Statewide	30th driest	41st driest	22nd wettest	35th wettest	41st wettest	29th wettest	36th driest

2013 Water Year Summary (October 1, 2012-September 30, 2013)

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 4a), rainfall totals for Water Year 2013 ranged from 25" to 60". This equates to 110%-125% of normal for portions of Osage, Nowata, Ottawa, and Benton Counties, while the remainder of the HSA was 50% to 90% of normal (Fig. 4b). Only small areas were near normal (90%-110% of the water year normal).

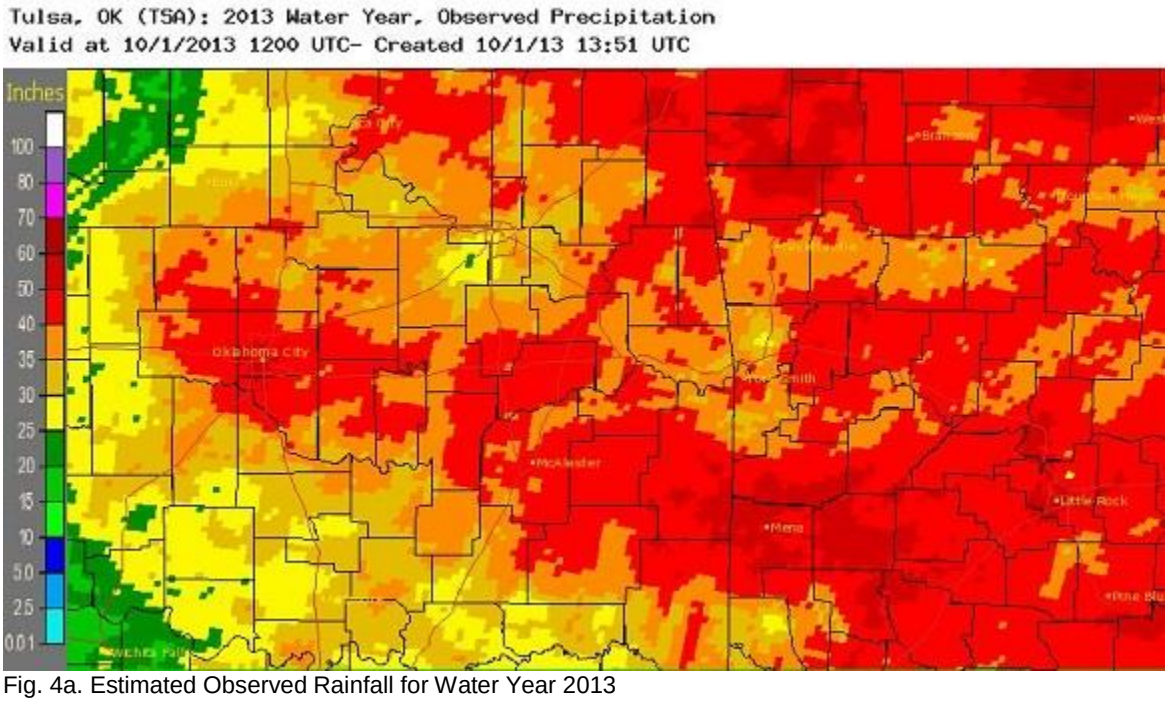

Fig. 4a. Estimated Observed Rainfall for Water Year 2013

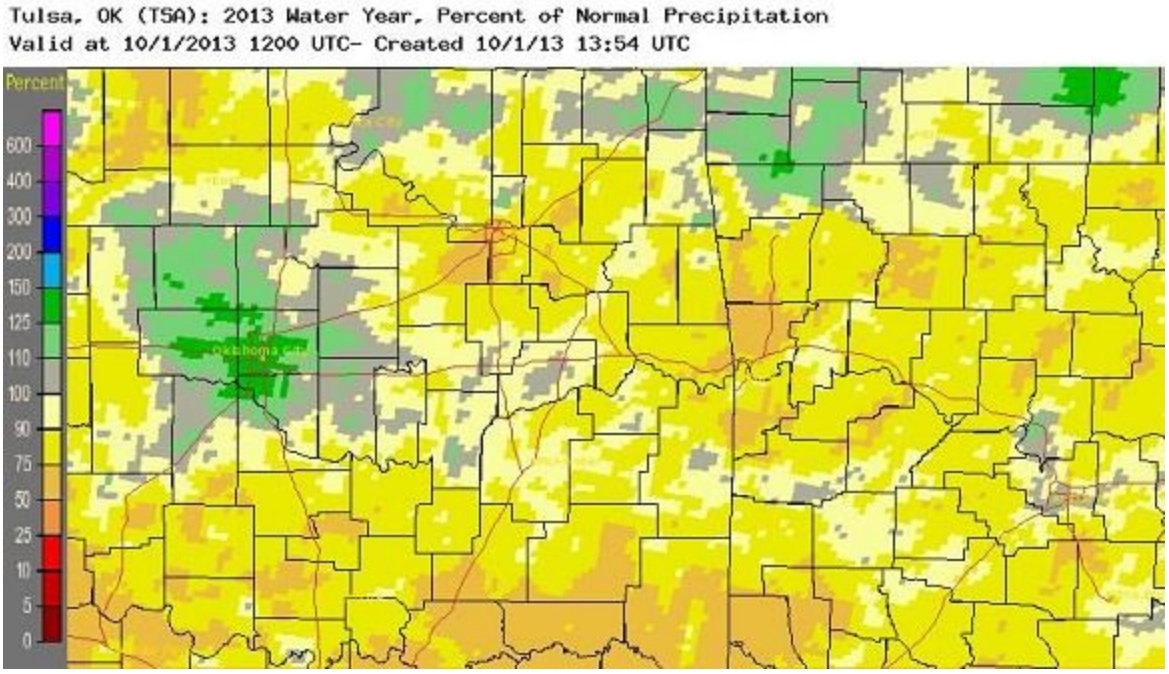

Fig. 4b. Estimated % of Normal Rainfall for Water Year 2013

In Tulsa, OK, Water Year 2012-13 ranked as the 17th driest Water Year (30.59") since records began in Water Year 1893-94. 2012-13 in Fort Smith, AR was the 62nd wettest Water Year (42.06") since records began in Water Year 1882-83. 2012-13 in Fayetteville, AR was the 21st driest Water Year (41.51") since records began in Water Year 1949-50.

Some of the larger precipitation reports (in inches) for Water Year 2013 included (Mesonet/CoCoRaHS not included):

St Paul, AR (coop)	54.07	Fanshawe, OK (coop)	49.57	Ozark, AR (coop)	49.16
Winslow 7NE, AR (coop)	48.99	Gravette, AR (coop)	48.88	NW AR Reg. Airport (ASOS)	47.86
Hindsville 10NNE, AR (coop)	47.38	Miami, OK (coop)	47.37	Bengal, OK (coop)	47.27

Outlooks

The Climate Prediction Center (CPC) outlook for October 2013 (issued September 30, 2013) indicates a slightly enhanced chance for above normal temperatures and an equal chances for above, near, and below median precipitation across all of northeast OK and northwest AR. This outlook is based primarily on dynamical computer models.

For the 3-month period Oct-Nov-Dec 2013, CPC is forecasting an equal chance for above, near, and below normal temperatures and rainfall across all of eastern OK and northwest AR (outlook issued September 19, 2013). According to CPC, ENSO neutral conditions remained through September. ENSO neutral conditions are expected to continue into Winter 2013-14. Therefore, this outlook is primarily based on dynamical computer model output, though also includes some input from recent trends, statistical forecast tools, and long-term trends.

Summary of Precipitation Events

September 1-15

A few light showers drifted out of MO into far northeast OK and northwest AR during the morning of the 1st. Additional widely scattered showers and thunderstorms developed during the afternoon across southeast OK and northwest/west central AR, south of a boundary. Most of this activity produced around 0.50" or less of rain, with a few spots of 1"-2".

Isolated showers and thunderstorms formed over the favored higher terrain areas of southeast OK and northwest AR on the afternoon of the 11th, and lasted into the late evening hours. Most areas affected by

these showers and thunderstorms received less than 0.50", though a few locations received 0.50" to 1.5" of rain.

Widely scattered showers and isolated thunderstorms developed near a cold front that stretched across northeast OK during the afternoon of the 12th, with additional scattered activity across southeast OK and northwest and west central AR near a pre-frontal trof. This activity ended soon after sunset and brought generally around 0.50" of rain or less to affected locations. However, a few spots received around 1" of rain.

September 16-30

Shortly after midnight on the 16th, showers and thunderstorms near a cold front moved into northeast OK, remaining primarily north of Hwy 412. This ended a 30-day streak of no rain at the Tulsa and Bartlesville observation sites. This activity waned during the day as the weak boundary moved south. However, light showers lingered over northeast OK through the afternoon. 1"-2" fell across northern Pawnee, Osage, Washington, northern Rogers, Nowata, and western Ottawa Counties, with far western Osage County receiving 3"-4" of rain. The Burbank mesonet site measured 3.51" from midnight to 3:35pm, though most of this fell within a few hours (see Fig. 5).

There was no real airmass change behind the cold front, so showers and thunderstorms moved out of central OK into northeast OK during the early morning hours of the 17th ahead of a short wave. Scattered showers and isolated thunderstorms continued through the morning hours across northeast OK, while later in the afternoon, scattered showers and thunderstorms developed over southeast OK and northwest AR. A cluster of storms affected primarily Okfuskee, Creek, and Okmulgee Counties during the evening. Overall rainfall totals were light, with most areas receiving around 0.10" or less of rain. A few isolated locations did receive around 0.75". The 2-day total resulted in 1"-2" of rain across northeast OK and along the AR/MO state line, with the western portions of Osage and Pawnee Counties getting 2.5" to around 5" of rain (see Fig. 6).

Scattered light rain showers moved across much of the HSA on the 18th; however, this activity only produced sprinkles to a few hundredths of an inch of rain.

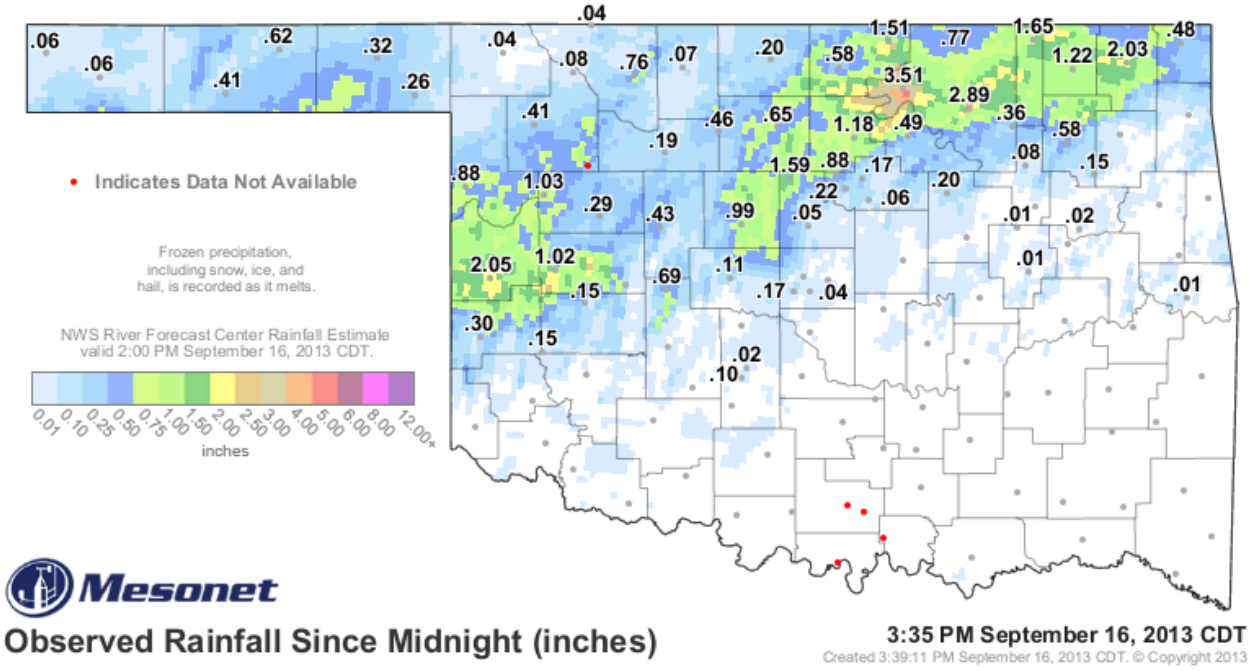

Fig. 5. Measured and radar estimated observed rainfall from midnight to 3:35pm 9/16/2013.

Fig. 6. RFC estimated observed 3-day rainfall ending at 9am 9/18/2013.

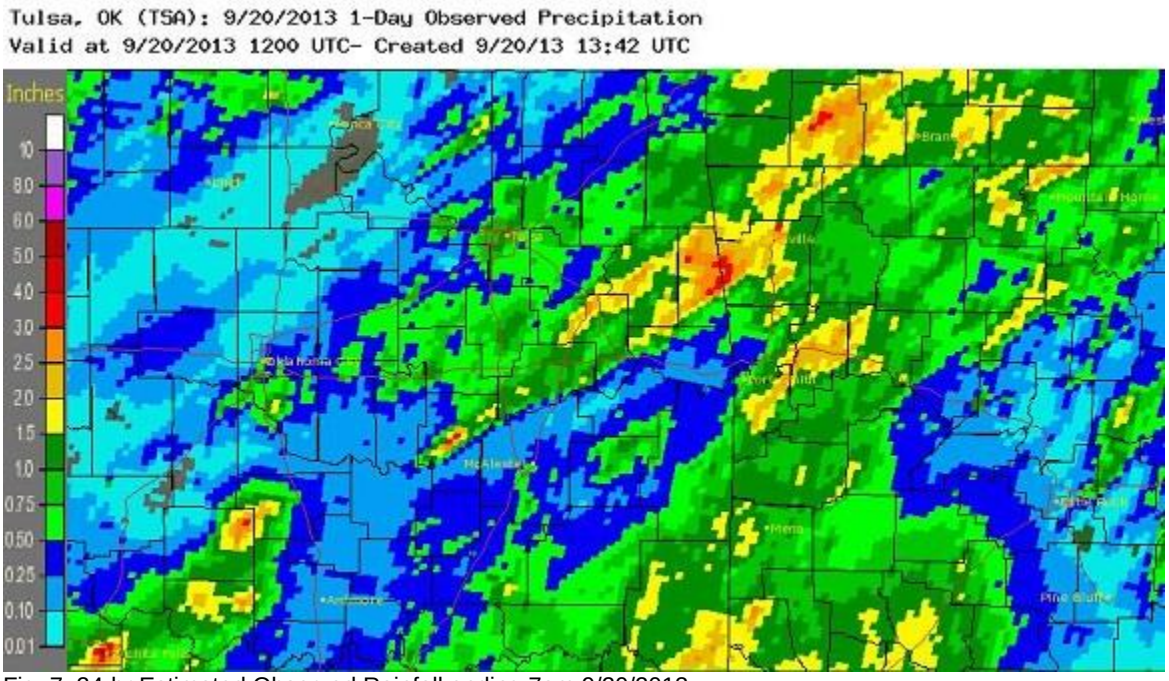

Fig. 7. 24-hr Estimated Observed Rainfall ending 7am 9/20/2013.

Showers and thunderstorms moved northeast across northeast OK and northwest AR during the morning and afternoon of the 19th, ahead of a cold front. Additional storms developed along the front and moved southeast into northeast OK later in the evening. Further south, warm air advection with a moist atmosphere led to widespread showers and thunderstorms across southeast and east central OK, as well as northwest AR. All of this activity brought 0.50" of rain or more to a large portion of the HSA, though a few locations missed out. The greatest rainfall occurred from Muskogee to Adair to Benton Counties, as well as Sebastian and Franklin Counties, where 1.5" to near 4" occurred (see Fig. 7). Light rain continued ahead of the front on the 20th, with rain ending from northwest to southeast through the day. This cold front also brought much cooler temperatures to the region and it finally felt like autumn – just in time for the autumnal equinox.

24-hr Rainfall Totals >2.50" ending at 7am 9/20/2013:

Riverdale 4.2E, AR (CoCo)	3.84	Westville 3SSW, OK (CoCo)	3.37	Westville 0.2ENE, OK (CoCo)	3.05
Fayetteville, AR (coop)	3.00	Dutch Mills, AR (DCP)	2.76	Greenwood 1.9WNW, AR (CoCo)	2.74
Springdale 2.7SW, AR (CoCo)	2.68	Viney Grove 2.4NW, AR (CoCo)	2.66	Westville 5WNW, OK (meso)	2.64

The last rain of the water year occurred on the 28th as a cold front moved through the area. Widespread showers and isolated thunderstorms brought some much needed rain to the entire HSA. Most of the region received 0.50" to 1.50" of rain from this activity, with portions of eastern OK getting 2"-3" of rain (see Fig. 8).

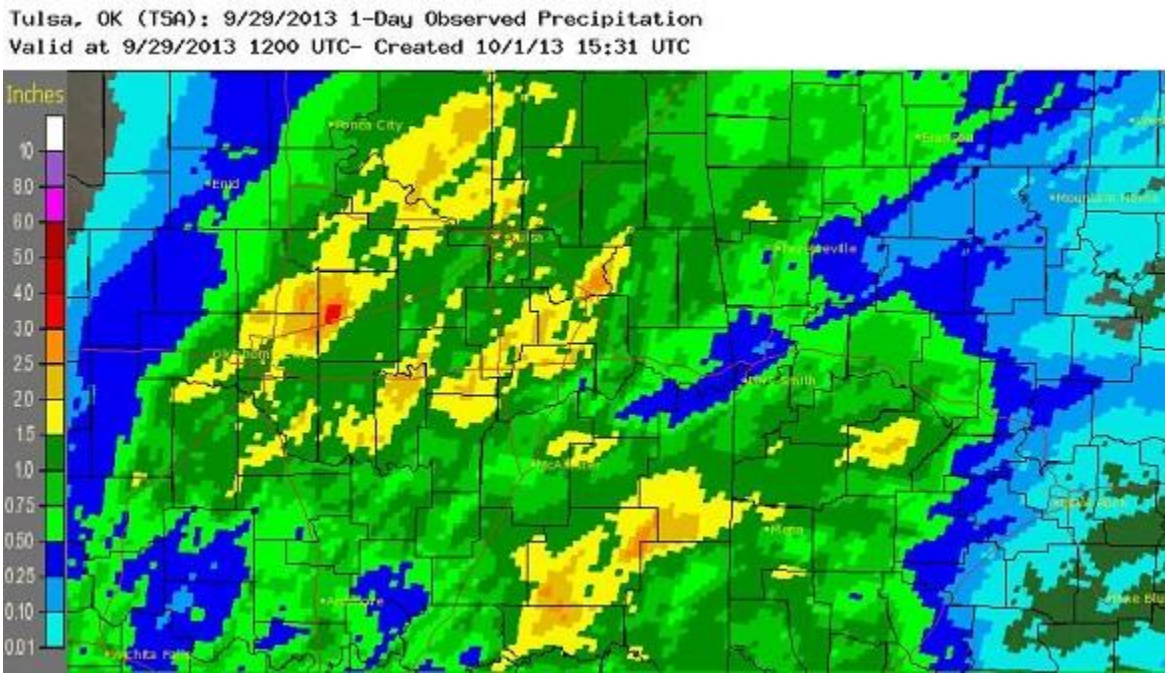

Fig. 8. 24-hr Estimated Observed Rainfall ending 7am 9/29/2013.

Written by:

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Service Hydrologist
WFO Tulsa

Products issued in September 2013:

*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)
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:

None