

<b>NWS FORM E-5</b> (11-88) (PRES. by NWS Instruction 10-924)	<b>U.S. DEPARTMENT OF COMMERCE</b> NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION NATIONAL WEATHER SERVICE	HYDROLOGIC SERVICE AREA (HSA) <b>Tulsa, Oklahoma (TSA)</b>
		REPORT FOR: MONTH                      YEAR <b>August</b> <b>2009</b>
<b>MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS</b>		SIGNATURE <b>Steven F. Piltz</b> (Meteorologist-in-Charge)
TO: Hydrometeorological Information Center, W/OH2 NOAA / National Weather Service 1325 East West Highway, Room 7230 Silver Spring, MD 20910-3283		DATE <b>September 1, 2009</b>

*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)*

August 2009 was near normal across eastern OK and northwest AR, with one river forecast point exceeding minor flood stage. August is climatologically the second driest non-winter month for the Tulsa HSA. Normal rainfall for August ranges from 2.6 inches in McIntosh County to 3.8 inches in Ottawa County. In the Ozark region of northwest Arkansas, rainfall averages 3.7 inches for the month.

**Summary of Rain Events**

**August 1-9:**

August began with an early morning mesoscale convective system (MCS) affecting the eastern and southern portions of the HSA. While most of the affected area received less than one quarter inch of rainfall, Choctaw and southern Pushmataha Counties received the highest totals of 0.50 to 2 inches of rain. On August 3, a dying MCS brought very light rain to southern Pittsburg, Pushmataha, and southern Le Flore Counties. The leftover MCV sparked isolated thunderstorms with locally heavy rain during the early afternoon in Fort Smith and its vicinity. On August 5, afternoon thunderstorms developed along several boundaries that were located across the HSA. Training storms lead to flash flooding across northwest Arkansas, while severe storms produced large hail and damaging winds. Rainfall totals were generally around a half inch or less south of Hwy 412, with localized areas receiving 1.5 to 2.5 inches.

**August 10-19:**

Several rounds of precipitation affected the HSA on August 10. During the day, thunderstorms developed along multiple boundaries across northeast OK and northwest AR, and eventually developed into a severe MCS. During the overnight hours, a second MCS dropped south through the region, bringing additional copious rainfall. Widespread 0.5 to 1 inch of rain was estimated across the HSA from these storms, with a large portion of east central OK receiving around 2 inches (see Fig. 1). The highest totals of near 5 inches occurred across eastern Okmulgee and western Muskogee Counties.

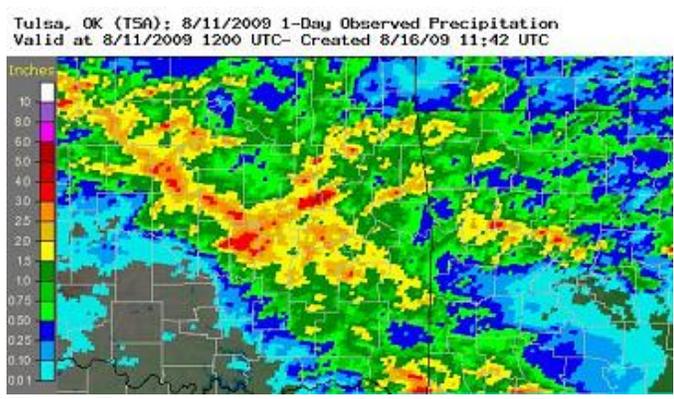


Fig. 1. Estimated 24-hr rainfall ending at 7am Aug. 11, 2009

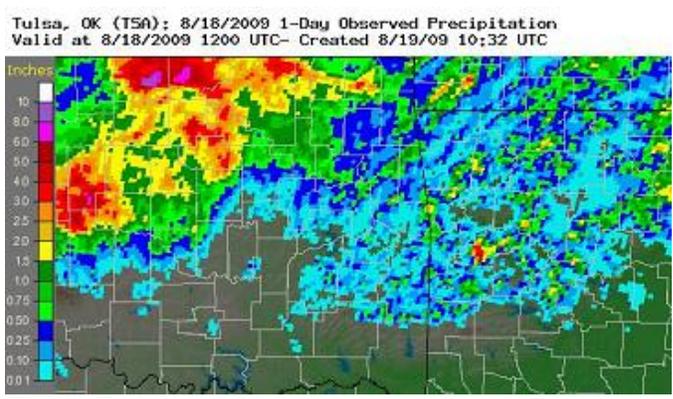


Fig. 2. Estimated 24-hr rainfall ending at 7am Aug. 18, 2009

Another MCS affected southeast OK on the 11<sup>th</sup>; however, rainfall amounts were much lighter with this complex. The highest precipitation was across southern Pushmataha and eastern Choctaw Counties, where 0.5 to around 1.5 inches fell. Light rainfall, generally around one tenth of an inch or less, occurred along and northwest of I-44 on the 15<sup>th</sup>.

A few thunderstorms developed late on the 16<sup>th</sup> along a cold front that was located northwest of the HSA. These storms moved into northeast OK, affecting locations northwest of I-44. While overall the precipitation with this activity was light, there was locally heavy rain – estimated around 3 inches – near the Pawnee/Osage County line. Rain, heavy at times, continued to affect areas northwest of I-44 on the 17<sup>th</sup> ahead of the front, which remained stalled just to the northwest of the HSA. An MCS moved through the region during the early morning hours of the 18<sup>th</sup>, dumping additional heavy rainfall over eastern Kay, Osage, Pawnee, and Washington Counties in northeast OK (see Fig. 2). Estimated 24-hour rainfall totals ranged from around 0.75 to 2.5 inches northwest of I-44, with lesser amounts across all but southeast OK. On the 18<sup>th</sup>, several dying thunderstorm complexes made a run at the HSA. These storms yielded around one inch or less across the far western portions of Osage, Pawnee, and Creek Counties, with much lighter amounts elsewhere across the western half of the HSA. The series of MCS activity continued early on the 19<sup>th</sup>, as a decaying system affected areas north of I-40. Convection redeveloped along an outflow boundary during the early afternoon, affecting east central OK and west central AR. Rainfall totals of 0.25 to 1.5 inches were widespread along and north of I-40. Higher amounts to over 2 inches affected Osage, Wagoner, Cherokee, and Sequoyah Counties. The highest rainfall totals of over 3 inches occurred across the far northeast corner of Oklahoma. This heavy rain extended northward into far southeast Kansas, with rainfall estimates of 6 to 8 inches in Cherokee Co, KS. All of this rain led to significant rises along the Spring River near Quapaw, which remained 1.5 feet below flood stage, and the Neosho River near Commerce, where the river rose to within a few inches of the moderate flood stage of 18 feet (see the E3 report for more detail).

#### August 20-31:

A cold front moved through the HSA on August 20, with widespread showers and thunderstorms developing ahead of the front. Heavy rain fell over east central OK and west central AR, just south of I-40, with rainfall estimates of 2.5 to over 4 inches (see Fig. 3). Elsewhere, rainfall totals were generally less than 1 inch.

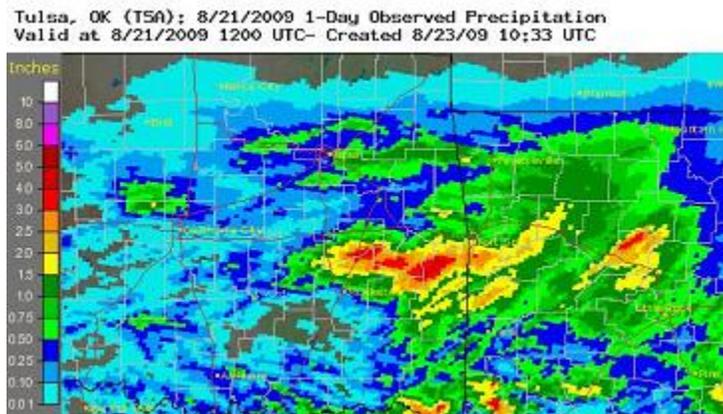


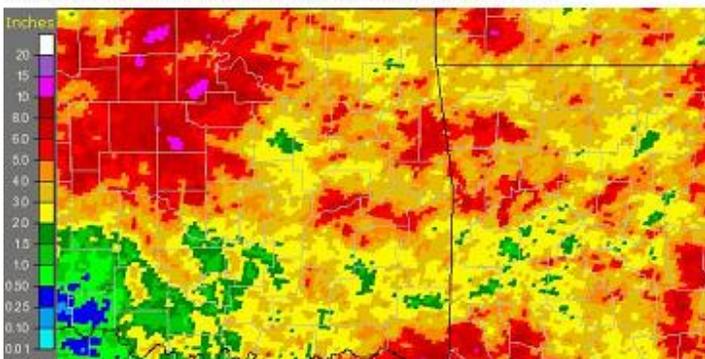
Fig. 3. Estimated 24-hr rainfall ending at 7am Aug. 21, 2009

The majority of the shower and thunderstorm activity on the 26<sup>th</sup> remained west of the HSA, though some rain did make it into eastern Kay, western Osage, and western Pawnee Counties. Rainfall totals in these areas were around one inch or less. On the 27<sup>th</sup>, scattered showers and thunderstorms developed along and ahead of a cold front, which moved southeast through the region. The majority of the rain fell between I-40 and I-44, where the heaviest rain of 1.5 to around 3 inches fell. Most locations, however, received less than one quarter of an inch.

#### Monthly Summary

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 4a.), most of the HSA received between 2 and 5 inches of rain during August 2009. The highest totals of 5 to 10 inches occurred across Pawnee and Osage Counties, with some areas of 5 to 8 inches in east central OK and west central AR. Overall, much of the region received between 50% and 150% of the normal August rainfall (Fig. 4b.), with the locations that had the highest rainfall totals receiving 150% to near 300% of normal August rain.

Tulsa, OK (TSA): August, 2009 Monthly Observed Precipitation  
Valid at 9/1/2009 1200 UTC- Created 9/1/09 14:45 UTC



Tulsa, OK (TSA): August, 2009 Monthly Percent of Normal Precipitation  
Valid at 9/1/2009 1200 UTC- Created 9/1/09 14:50 UTC

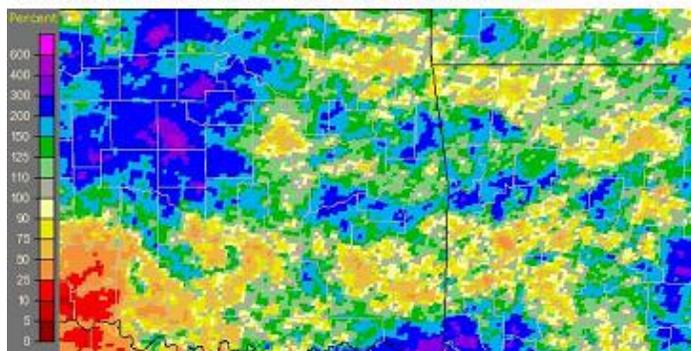


Fig. 4a. Estimated Observed Precipitation for Aug. 2009 4b. Estimated Percent of Normal Precipitation for Aug. 2009

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

Cookson, OK (meso)	7.37	Ozark, AR (coop)	6.42	Tahlequah, OK (meso)	6.38
Pawnee, OK (meso)	6.18	Fayetteville, AR (ASOS)	6.13	Wynona, OK (meso)	6.04
Natural Dam, AR (coop)	5.53	Burbank, OK (meso)	5.33	Mountainburg 2 NE (coop)	5.24

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

Rank since 1921	August	July & August	Summer (Jun-Aug)	Warm Growing Season (Mar. 1- Aug. 31, 2009)	Year-to-Date (Jan. 1 – Aug. 31)
Northeast OK	<b>17<sup>th</sup></b> wettest	<b>15<sup>th</sup></b> wettest	42 <sup>nd</sup> wettest	26 <sup>th</sup> wettest	32 <sup>nd</sup> wettest
East Central OK	22 <sup>nd</sup> wettest	27 <sup>th</sup> wettest	45 <sup>th</sup> wettest	41 <sup>st</sup> wettest	45 <sup>th</sup> wettest
Southeast OK	31 <sup>st</sup> wettest	<b>15<sup>th</sup></b> wettest	32 <sup>nd</sup> wettest	<b>10<sup>th</sup></b> wettest	22 <sup>nd</sup> wettest

According to the U.S. Drought Monitor (USDM) from August 25, 2009, drought conditions no longer existed across northeast OK and northwest AR. The major reservoirs in the Tulsa HSA reported levels within  $\pm 5\%$  of their conservation pools by August 31, 2009, with the exceptions of Hugo Lake (68% of conservation pool), Hudson Lake (7% of flood pool), and Fort Gibson Lake (10% of flood pool).

The Climate Prediction Center (CPC) outlook for September 2009 (issued August 31, 2009) indicates equal chances for above, near, and below normal temperature and precipitation. For the 3-month period Sep-Oct-Nov 2009, CPC is also forecasting equal chances for above, near, and below normal temperature and precipitation (outlook issued August 20, 2009). Sea-surface temperatures in the equatorial Pacific indicate that weak El Niño conditions currently exist. These conditions are expected to strengthen this fall and winter, with at least a moderate El Niño expected by most computer models by this coming winter. An El Niño Advisory remains in effect.

Written by:  
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Products issued:

- 3 River Flood Warnings
- 9 River Flood Statements
- 0 River Flood Advisories
- 0 River Flood Watches
- 0 River Statements
- 0 Hydrologic Outlooks
- 0 Drought Information Statements