

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 YEAR
		July	2009
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	
		August 5, 2009	

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 No flood stages were reached in this HSA during the month above.

Significant rainfalls occurred across much of the HSA during July 2009; however, none of these rainfall events were significant enough to cause river flooding. July is climatologically one of the drier months of the year across the Tulsa HSA. Normal rainfall for the month of July ranges from 2.6 inches in McIntosh County to 3.4 inches in Ottawa County. The Ozark region of northwest Arkansas averages 3.1 inches for the month.

Summary of Rain Events

July 1 - 9

At the beginning of the month, a northwest flow pattern began to setup over the area. This allowed for several mesoscale convective systems (MCS) to come across the area. Most of these MCSs were dissipating as they entered the Hydrologic Service Area (HSA), but brought some rain to portions of northeast Oklahoma and northwest Arkansas.

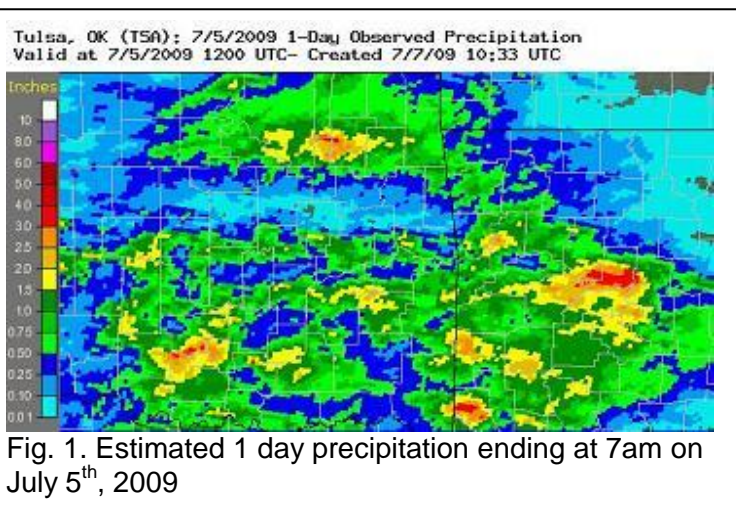


Fig. 1. Estimated 1 day precipitation ending at 7am on July 5th, 2009

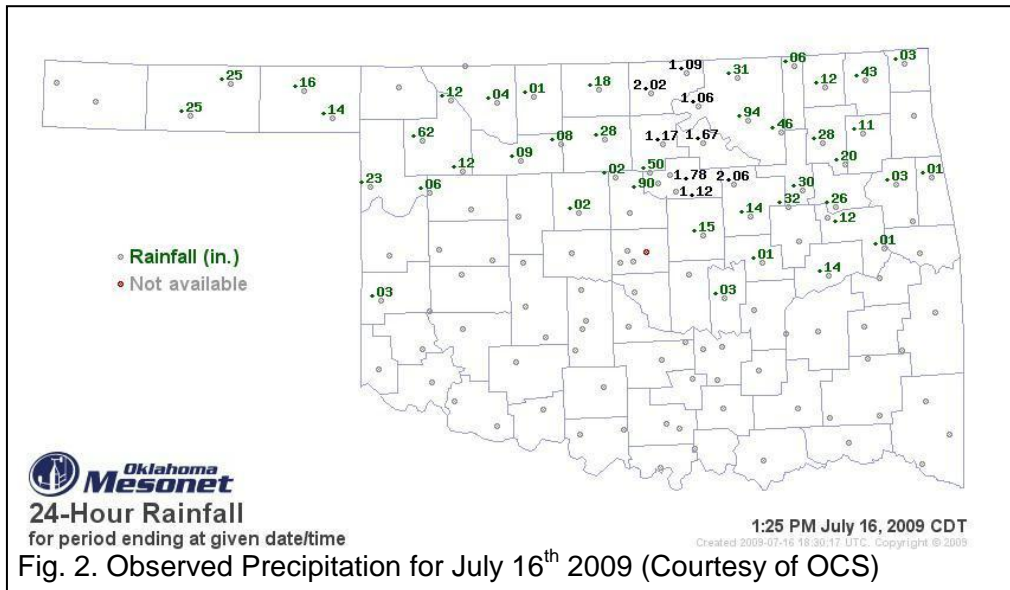
On July 4th, a morning MCS tracked across the northern part of the state. That evening, additional rainfall was recorded from storms that fired along a cold front. Due to dry conditions during the latter part of June, most of this rainfall was absorbed by the ground and little of it became run off. Many areas saw rainfall amounts of at least a tenth to three quarters of an inch over a period of two days. At Pryor, Oklahoma, 2.72 inches of rain was measured. Radar estimates indicated that some areas may have even received as much as 3 inches of rainfall in northern Tulsa County (see Fig. 1).

On July 8th, scattered shower activity developed during the morning hours and continued on through the afternoon. Most of this precipitation formed from storms that started due to isentropic lifting. By mid afternoon on the 8th, a line of showers moved across the area, and some areas saw as much as an inch of rain during the event. Several of these showers trained across the same area, attributing to the high rainfall amounts. Late on July 8th, storms developed over Kansas and moved southeast into the HSA during the early morning hours of the 9th, bringing rain to most of the area. These storms eventually developed into a squall line that dissipated later on that morning. Most of the HSA saw a trace of rainfall. In Osage County near Burbank, rainfall amounts totaled to 1.55 inches of rain. Some of this heavier rain made it into parts of western Tulsa and northern Creek Counties.

July 10 - 19

Over the course of the week from July 10th through the 19th, showers and thunderstorms repeatedly developed during the overnight hours in Kansas and moved into southwestern Missouri during the early morning hours. These bands of precipitation clipped northeastern Ottawa County with rain. During the latter part of this time

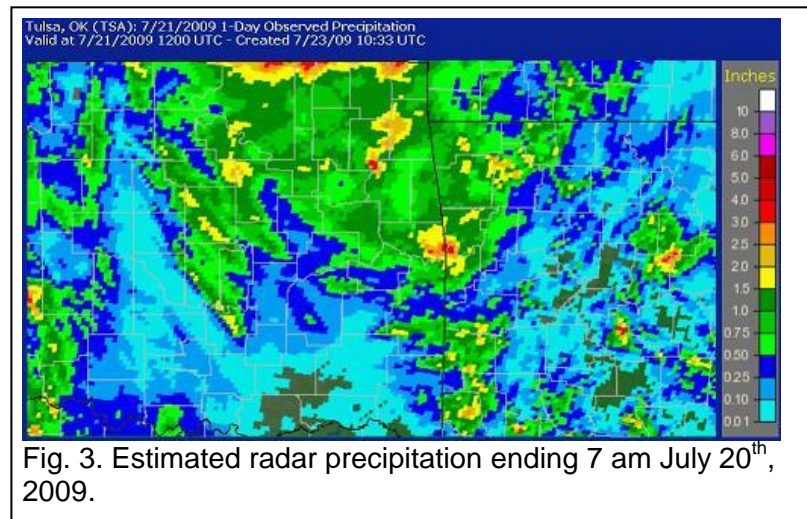
frame, many areas in northeast Oklahoma began to see rainfall amounts of over an inch of rain in a given day. In the instances where frontal waves were passing through, isolated severe thunderstorms would also occur, dropping heavy rainfall amounts. On July 13th, isolated showers and severe thunderstorms developed over Le Flore County and dropped as much as 2 inches of rain. Earlier in the day, showers affected northwest Arkansas, bringing an inch and a half of rain over the area. On July 15th, pop-up showers and thunderstorms developed across portions of northwest Arkansas in Washington and Madison Counties and dropped as much as an inch of rainfall. Later that evening, slow moving storms affected western Osage and Pawnee Counties and dropped as much as 2 inches of rainfall (see Fig. 2).



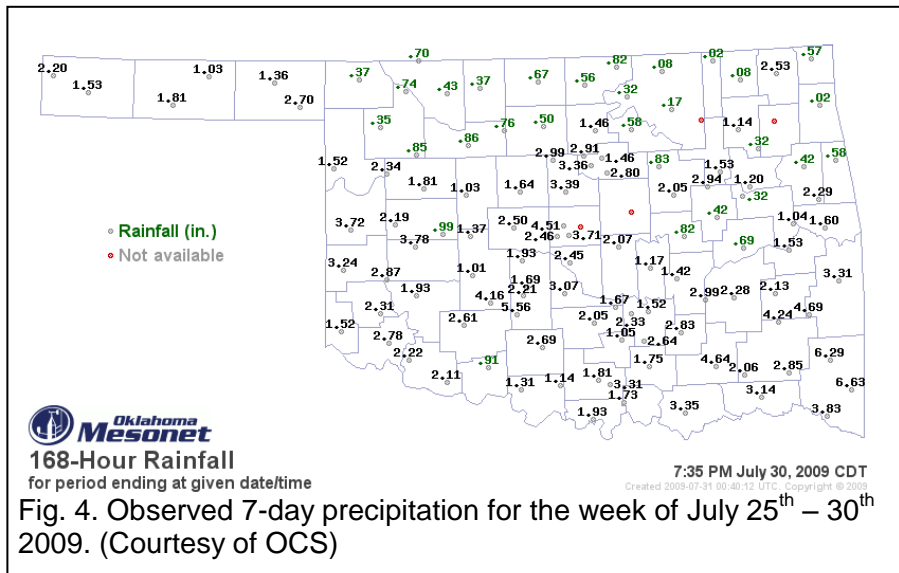
On the morning of the 17th, a complex of storms fired south of Interstate 40, dropping half an inch of rain across most of southeastern Oklahoma.

July 20 - 31

During the late afternoon and into early evening hours of July 20th, supercell storms developed across southern Kansas. Several of these storms deviated from the average storm motion and slowed down, dropping large amounts of rain across southern Kansas and northeastern Oklahoma. Radar estimates indicated as much as 5 inches of rain fell in places from these storms. These storms initially began to bow out and eventually congealed into a MCS, which dropped widespread rain amounts of one half to one inch across most of northeastern Oklahoma. Due to the heavy rains to the north in Kansas, the Neosho River near Commerce came within a few inches of flood stage. Significant amounts of rain also fell in and around Fort Smith, Arkansas. This rainfall led to a new 24-hour rainfall record of 2.57 inches at Fort Smith. This beat the previous record amount of 2.18 inches of rainfall set in 1950 (see Fig. 3).



On July 25th through the 26th, isolated showers and thunderstorms developed over southeastern Oklahoma, dropping rainfall amounts of close to an inch in locations primarily south of Interstate 40. The following day, another frontal boundary passed through the area and dropped steady amounts of rain for most of the day. Again, over an inch of rain fell in many places south of Interstate 40 in southeastern Oklahoma. From July 27th through the 31st, northwest flow across the area continued to bring several fronts and significant rains to much of the HSA. Southeastern Oklahoma particularly saw a lot of additional rainfall, with several places recording as much as 4.24 inches of rainfall over the course of the week. However, some places in northeastern Oklahoma only saw a few hundredths (see Fig. 4).



Monthly Summary

Using the radar-derived estimated precipitation from the RFCs (Fig. 5a.), a rainfall minimum can be seen in the Tulsa HSA, with monthly totals from 1 to 2 inches in the area from eastern Wagner County to Cherokee County. Elsewhere, widespread 6 to 10 inches of rain were estimated across southeast Oklahoma into Pawnee and northern Creek Counties, with some localized areas receiving over 8 inches. Locations generally between Interstate 44 and 40 in northeast Oklahoma and northwest Arkansas received between 50% and 100% of normal precipitation for the month. The remainder of the HAS received 110% to around 200% of the normal July rainfall (fig. 5b.).

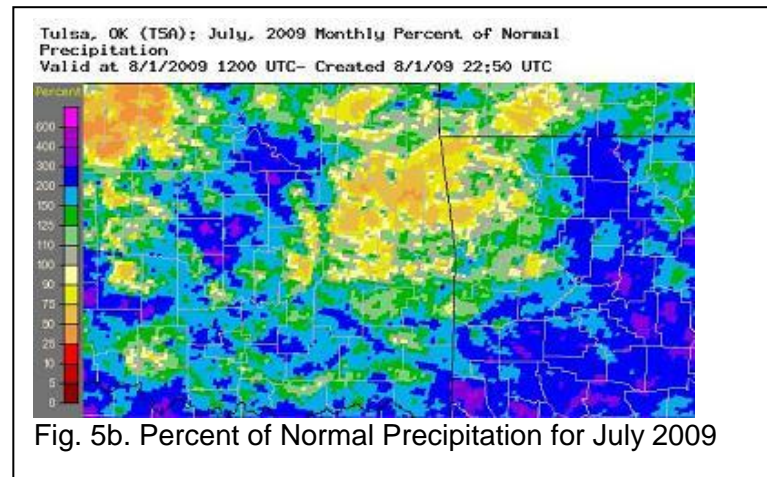
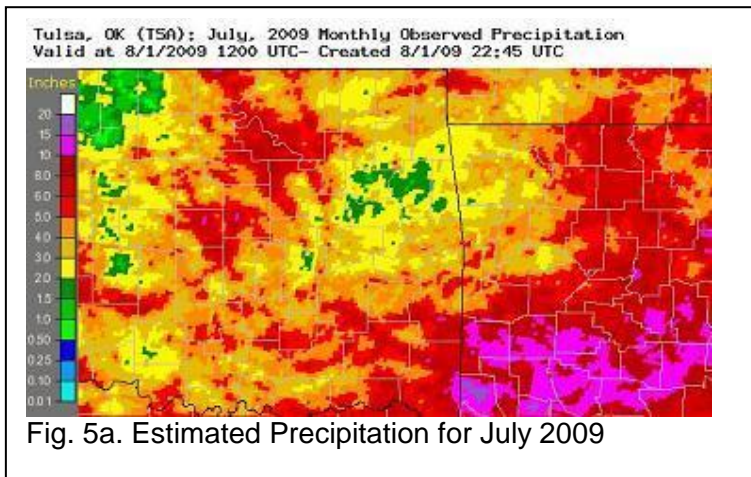


Fig. 5a. Estimated Precipitation for July 2009

Fig. 5b. Percent of Normal Precipitation for July 2009

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

Poteau, OK (coop)	7.17	Pawnee, OK (meso)	6.64	Clayton, OK (meso)	5.65
Oilton, OK (meso)	6.90	Hectorville, OK (meso)	6.11	Vinita, OK (meso)	5.54
Talihina, OK (meso)	6.89	Burbank, OK (meso)	5.67	Skiatook, OK (meso)	5.41

According to statistics from the Oklahoma Climatological Survey (OCS), northeast Oklahoma ranked as the 25th wettest for the July 3rd to August 1st time period since records began in 1921, receiving 145% of its normal rainfall. Southeast Oklahoma was the 12th wettest from July 3rd to August 1st, receiving 198% of its normal rainfall. East-central Oklahoma ranked as the 31st wettest July 3rd to August 1st time period, receiving 118% of its normal rainfall. Southeastern Oklahoma has seen a wet warm growing season, receiving 129% of its normal rainfall from March 1st to July 30th. This ranks as the 11th wettest on record for March - July.

According to the U.S. Drought Monitor (USDM) issued July 28th, abnormally dry to moderate drought conditions exist across portions of eastern Oklahoma and far northwest Arkansas from eastern Tulsa County to western Washington and Crawford Counties in northwest Arkansas.

The major reservoirs in the HSA were within 5% of the top of their conservation pools by August 4, 2009. The reservoirs utilizing the highest percentage of their flood control pools as of August 4 were Ft. Gibson Lake at 6% and Keystone Lake at 7%.

The Climate Prediction Center (CPC) outlook for August 2009 (issued July 31, 2009) indicates an equal chance of above, near, and below normal temperatures and precipitation across the HSA. For the 3-month period Aug-Sept-Oct 2009, CPC is also outlooking an equal chance for above, near, and below normal temperatures and precipitation (outlook issued July 16, 2009). Sea-surface temperatures in the equatorial Pacific indicate that El Niño conditions exist and these conditions are expected to strengthen through the remainder of the summer into early fall.

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Written for:
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Products issued:

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