

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)
		REPORT FOR: MONTH YEAR December 2010
MONTHLY REPORT OF RIVER AND FLOOD CONDITIONS		SIGNATURE Steven F. Piltz (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 January 3, 2011

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.

December 2010 was yet another month with below normal rainfall across much of eastern OK and northwest AR. Most of the precipitation that did fall this month occurred within the last 10 days of the year. Normal precipitation for December ranges from 1.5 inches in Pawnee County to 3.2 inches in Haskell County. Normal precipitation for the Ozark region of northwest Arkansas averages 3.2 inches for the month.

Monthly Summary

Using the radar-derived estimated observed precipitation from the RFCs (Figs. 1a. and 1c.), rainfall totals for December 2010 ranged from 0.25” to near 1.0” across locations northwest of an Okemah to Tahlequah to Bentonville line, with the remainder of the area receiving around 1” to around 3”. A few locations in southeast OK even saw 4” to 5” of much needed rain this month. All but far southeast OK received below normal rainfall this month (Fig. 1b). Most of the HSA recorded less than 50% of the normal December rainfall, with many locations only receiving 5% to 25% of the monthly normal. The rainfall at the end of the month kept portions of southeast OK near normal up to 200% of the normal December rainfall.

In Tulsa, OK, December 2010 ranked as the 34th coldest December (38.7°F, tied with 2005; since records began in 1905) and was the 20th driest December (0.55”, tied with 1976; since records began in 1888). Only a trace of snow was recorded in Tulsa this month. Fort Smith, AR was the 55th coldest December (41.2°F, tied with 1969) and was the 51st driest December (2.14”) since records began in 1882, and no snow was recorded this month. Both Tulsa and Fort Smith did not receive any measurable rainfall until Christmas Eve, and then rain was only measured on 3 days this month in Tulsa and 5 days in Fort Smith. Over half of the monthly total rainfall at Fort Smith occurred on December 29th, when 1.33” was measured.

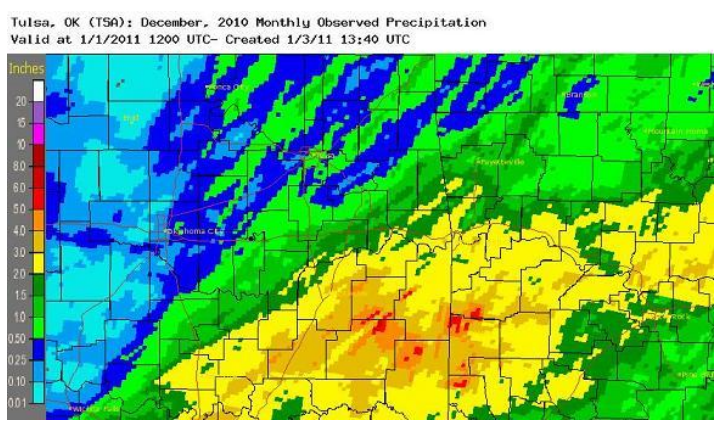
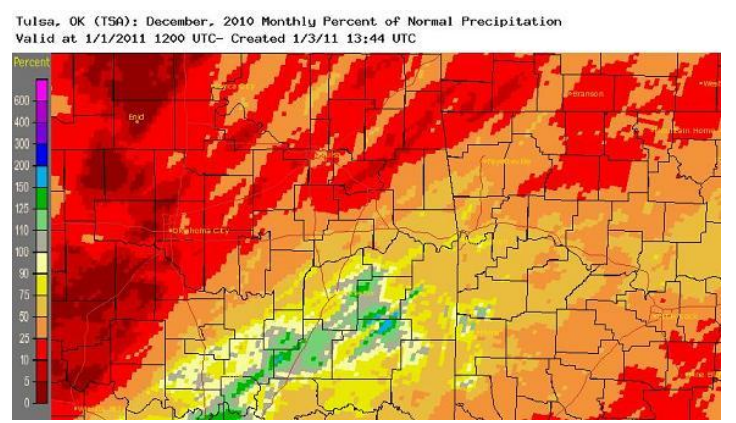


Fig. 1a. Estimated Observed Rainfall for December 2010



1b. Estimated % of Normal Rainfall for December 2010

Some of the larger precipitation reports (in inches) for December 2010 included:

Tuskahoma, OK (coop)	3.91	Clayton, OK (meso)	3.47	Antlers, OK (coop)	3.44
Cloudy, OK (meso)	3.23	Talihina, OK (meso)	3.17	Antlers, OK (meso)	3.06
Hugo, OK (meso)	3.03	Fanshawe, OK (coop)	2.97	Wister, OK (meso)	2.63

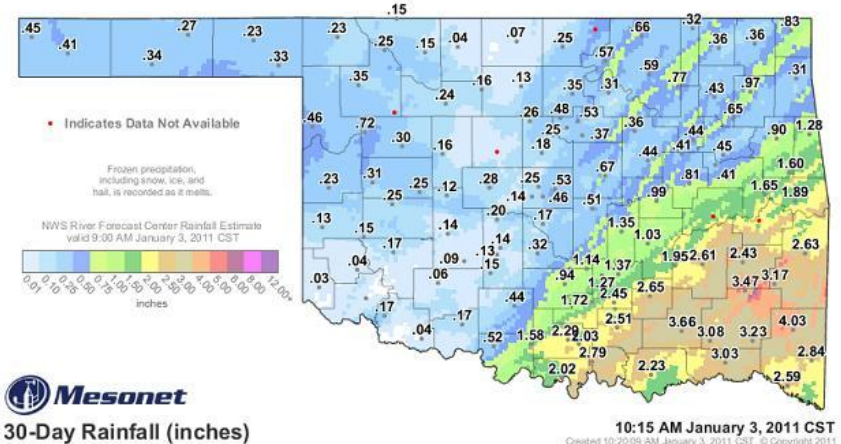


Fig. 1c. 30-Day rainfall totals from the Oklahoma Mesonet with RFC rainfall estimate overlay image.

According to the [U.S. Drought Monitor](#) (USDM) from December 28, 2010, abnormally dry (D0) and moderate drought (D1) conditions were affecting all of eastern OK and northwest AR (see Figs. 2 & 3). This expansion of drought conditions was due to the below normal precipitation received this December, which has exacerbated both the long- and short-term rainfall deficits and led to lower lake levels across the area.

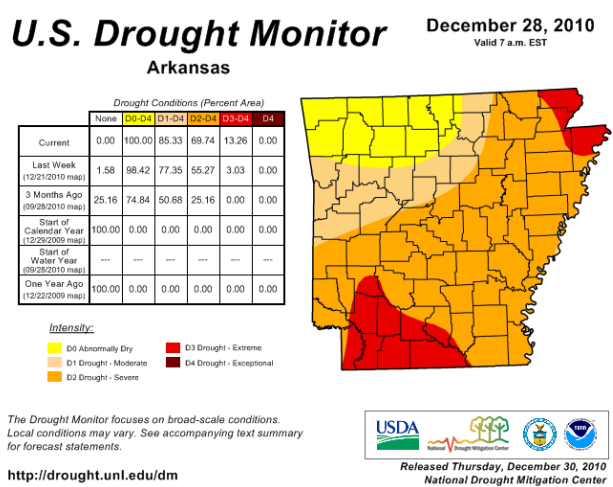
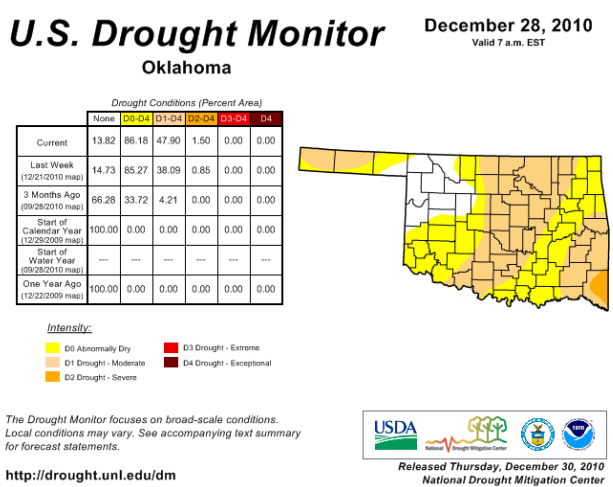


Fig. 2. Drought Monitor for Oklahoma

Fig. 3. Drought Monitor for Arkansas

Most of the major reservoirs in the Tulsa HSA were reporting below 90% of their normal conservation pools as of January 3, 2011, though a few reported pools that were 90% - 100% full and Lake Hudson was actually reporting 1% of flood control storage. Conservation pool deficits: Hugo Lake 63%, Heyburn Lake 76%, Eufaula Lake 79%, Tenkiller Lake 82%, Keystone Lake 83%, Copan Lake 85%, Birch Lake 85%, Skiatook Lake 86%, and Hulah Lake 87%.

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

Rank since 1921 ("Last XX days" ending December 31, 2010)	December 2010	Water Year (Oct 1, 2010 – Dec 31, 2010)	Cool Growing Season (Sep 1, 2010 – Dec 31, 2010)	Last 60 Days (Nov 2 – Dec 31)	Last 180 Days (Jul 5, 2010 – Dec 31, 2010)	Year 2010
Northeast OK	8 th driest	15 th driest	23 rd driest	23 rd driest	34 th driest	37 th driest
East Central OK	25 th driest	13 th driest	44 th driest	19 th driest	30 th driest	26 th driest
Southeast OK	39 th driest	16 th driest	19 th driest	26 th driest	14 th driest	10 th driest

Annual Summary

Using the radar-derived estimated observed precipitation from the RFCs, most of the HSA received between 30" and 40" of rain this year (see Fig. 4a.). This corresponds to near to below normal precipitation (50% to 110% of the normal annual rainfall) for most of the region for the year 2010 (see Fig. 4b.). While the end of 2010 was dry with no snow accumulations (and under the influence of a moderate to strong La Niña), the beginning of 2010 brought cold temperatures and heavy snowfall events to the region (under the influence of a strong El Niño).

In Tulsa, OK, 2010 ranked as the 33rd warmest year (61.3°F, tied with 1986, 1982, 1928, 1927; since records began in 1905), was the 44th driest year (34.47"; since records began in 1888), and was the 18th snowiest year (15.4", tied with 1989; since records began in 1900). Fort Smith, AR was the 17th warmest year (62.9°F), the 38th driest year (35.27"), and the 10th snowiest year (15.5") since records began in 1883.

Tulsa, OK (TSA): Full Year 2010 Observed Precipitation
Valid at 1/1/2011 1200 UTC- Created 1/3/11 13:46 UTC

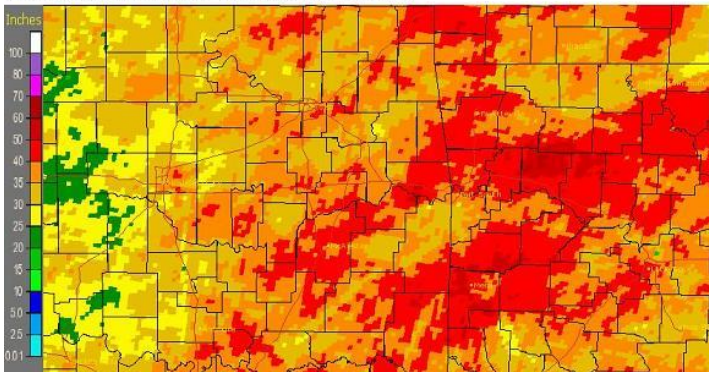


Fig. 4a. Estimated Observed Rainfall for 2010

Tulsa, OK (TSA): Full Year 2010 Percent of Normal Precipitation
Valid at 1/1/2011 1200 UTC- Created 1/3/11 13:50 UTC

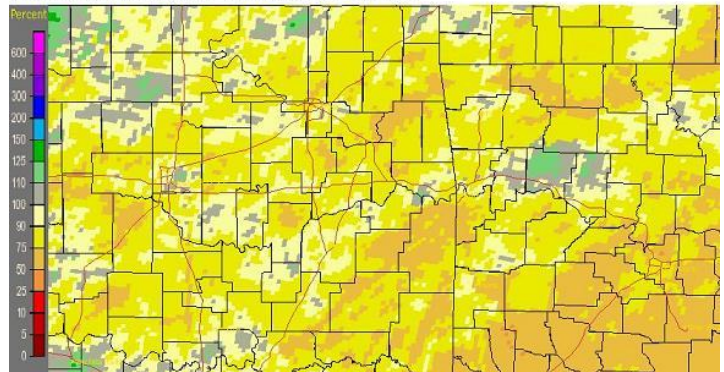


Fig. 4b. Estimated % of Normal Rainfall for 2010

Some of the larger precipitation reports (in inches) for 2010 included:

Mountainburg, AR 2NE (coop)	50.77	Sallisaw, OK (meso)	50.09	St. Paul, AR (coop)	49.56
Ozark, AR (coop)	48.50	Miami, OK (meso)	48.26	Natural Dam, AR (coop)	44.76
Spavinaw, OK (coop)	43.93	Cookson, OK (meso)	42.74	Oktaha, OK 2NE (coop)	42.41

Outlooks

The [Climate Prediction Center](#) (CPC) outlook for January 2011 (issued December 31, 2010) indicates an equal chance for above, near, and below average temperatures as well as an equal chance for above, near, and below median precipitation. Short-term computer models continue to indicate that an enhanced chance for cooler than normal temperatures due to a negative phase of the Arctic Oscillation and North Atlantic Oscillation will offset the enhanced chance for warmer than normal temperatures due to La Niña effects. Therefore, the January outlook indicates equal chances for temperature across the region. For the 3-month period Jan-Feb-Mar 2011, CPC is forecasting an enhanced chance for above average temperatures. CPC is also forecasting a slightly enhanced chance for above median precipitation across northwest AR, with equal chances for above, near, and below median precipitation across eastern OK (outlook issued December 16, 2010). The enhanced chance for above average temperatures for the 3-month winter outlook is consistent with La Niña impacts across the southern Plains.

According to CPC, borderline strong La Niña conditions were observed at the end of December. Current computer models indicate that La Niña conditions can still be expected to continue through the remainder of winter 2010-11 and into spring 2011. A La Niña Advisory continues, meaning La Niña conditions have been observed and are expected to continue.

Summary of December Rain Events

December 1 - 31:

A compact, fast-moving upper low brought the first precipitation of the month to the area during the evening and overnight hours of December 7. A dry airmass in place, however, led to a lot of virga. Only around one tenth to a few hundredths of an inch of rain was measured across southeast OK along and south of a line from Okmulgee to Wister. The evaporating precipitation caused air temperatures to cool below freezing, and the higher terrain areas of Le Flore County saw some light snow during the late night hours. A weak upper-level wave traversed the Southern Plains on the 17th, bringing around 0.10" of light rain to areas south of I-40.

A stronger upper-level low moved from the Four Corners area southeast across southern OK. This system brought some much needed rain to the region beginning on the evening of the 23rd and continuing on the 24th. All of the HSA received some precipitation, with most of the area receiving 0.50" or less. However, much needed heavier rainfall of 0.50" to 1.50" occurred across far southeast OK, generally south of a McAlester to Wister line. As colder air filtered in behind this system, a few flurries were observed across portions of northeast OK and northwest AR on Christmas Day.

As a weak upper-level wave moved into the region, showers and isolated thunderstorms developed across portions of eastern OK and western AR, generally south of I-44, during the overnight hours of the 28th and continuing through the afternoon of the 29th. The highest rainfall totals of 1.5" to around 2.5" occurred across southeast and east central OK, with most locations south of a Henryetta, OK to Winslow, AR receiving at least 1" of rain (see Fig. 5).

The final precipitation event of the year began during the late evening hours of the 30th and continued through the first half of New Year's Eve. Very warm and moist conditions were in place ahead of an eastward progressing cold front, allowing thunderstorms to develop across eastern OK and western AR. Some of these thunderstorms became severe, and unfortunately, an EF3 tornado killed 3 people in Cincinnati, AR and led to numerous injuries along its path (see http://www.srh.noaa.gov/tsa/?n=weather_event_30dec2010 for details). The rain came to an end as the cold front swept through the area New Year's Eve, bringing much colder temperatures to ring in the New Year. All of the HSA received rain from this event, with most locations getting between a few hundredths to near half an inch of rain. Locations affected by thunderstorm activity saw upwards of 1.5" of rain (see Figs. 6 and 7).

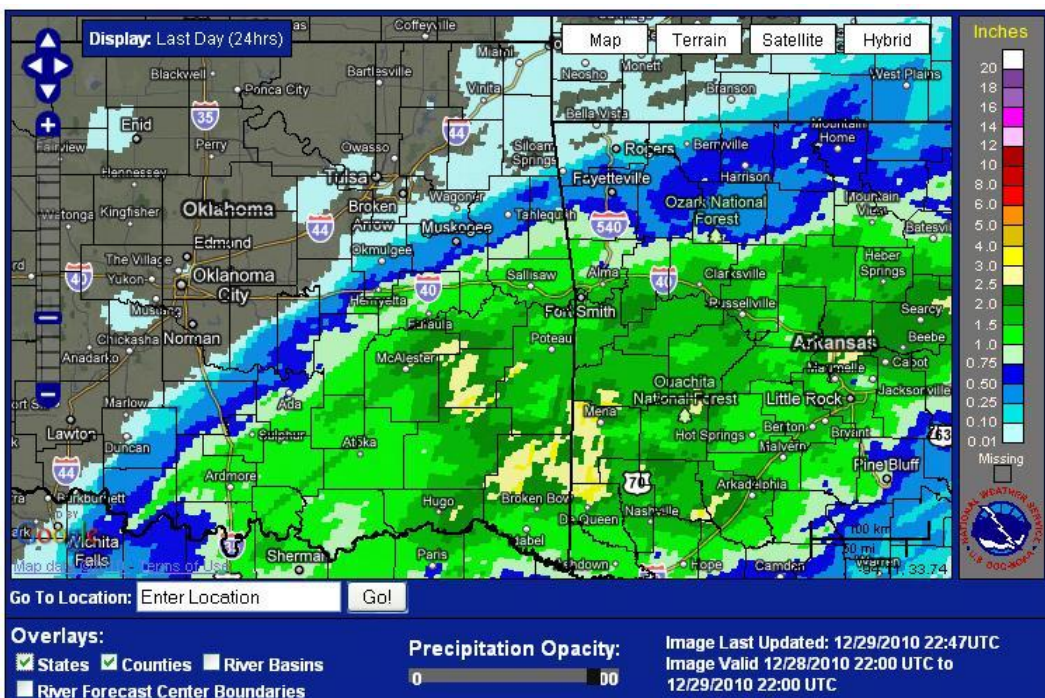


Fig. 5. 24-hour rainfall ending at 4pm CST 12/29/10

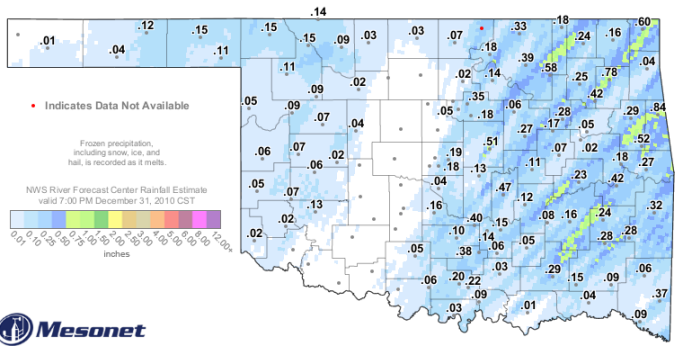


Fig. 6. 24-hour rainfall ending at 7:40pm CST 12/31/2010

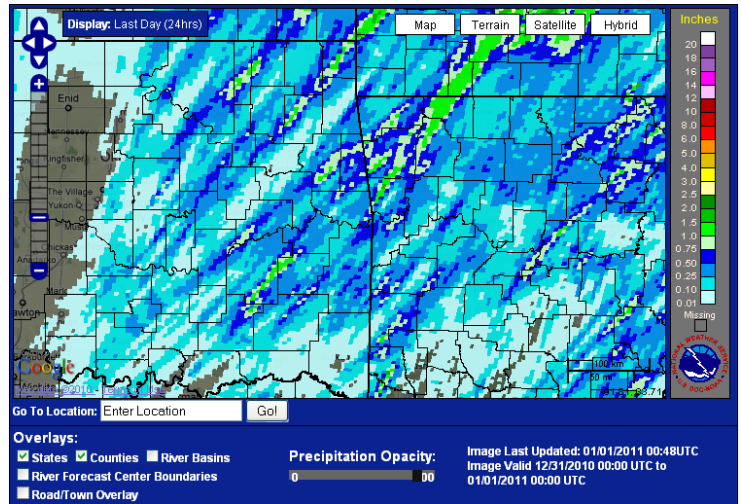


Fig. 7. 24-hour rainfall ending at 7:48pm CST 12/31/10

Written by:

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 Service Hydrologist
 WFO Tulsa

Products issued:

- 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)
- 0 Drought Information Statements (DGT)