

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 December	YEAR 2014
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 January 23, 2015	

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.

December 2014 was a dry month across most of the Hydrologic Service Area (HSA). 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. This report, past E-5 reports, and monthly hydrology and climatology summaries can be found at <http://www.srh.noaa.gov/tsa/?n=hydro-monthly-summary>.

Monthly Summary

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 1a), rainfall totals for December 2014 ranged from 0.50" in Osage/Pawnee Counties to around 4" in Le Flore and Franklin Counties. The majority of the HSA received 1.5"-3" of rain this month. Most of the HSA received below normal rainfall this month (Fig. 1b), getting 25%-90% of the normal December rain. A few isolated locations in eastern OK and northwest AR did receive near to slightly above normal rainfall for the month.

Tulsa, OK (TSA): December, 2014 Monthly Observed Precipitation
 Valid at 1/1/2015 1200 UTC- Created 1/3/15 22:04 UTC

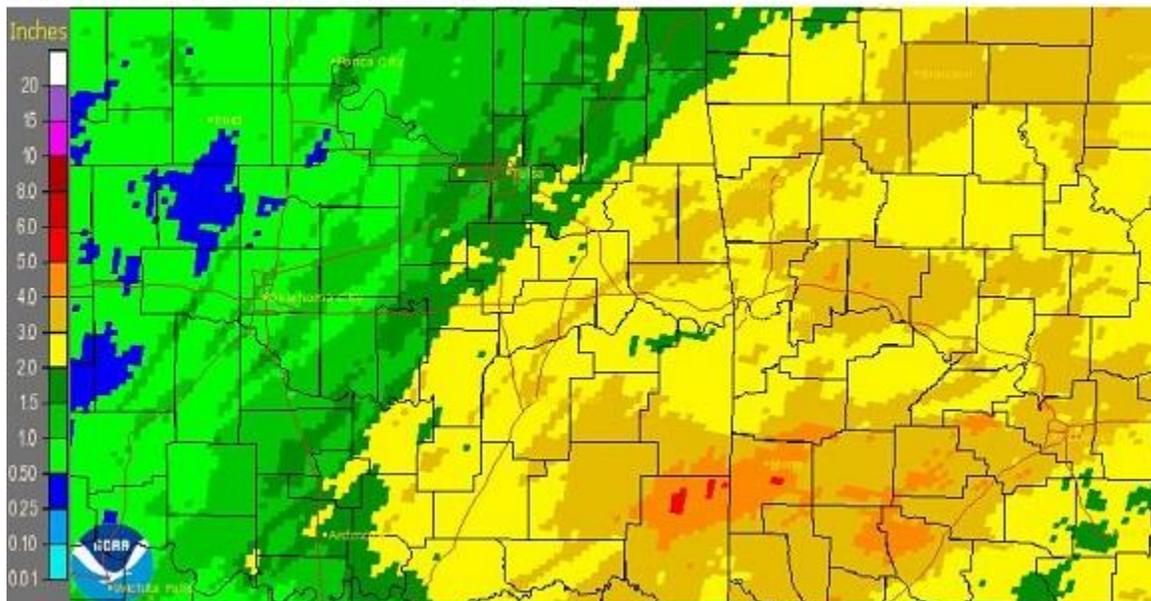


Fig. 1a. Estimated Observed Rainfall for December 2014

Tulsa, OK (TSA): December, 2014 Monthly Percent of Normal Precipitation
 Valid at 1/1/2015 1200 UTC- Created 1/3/15 22:05 UTC

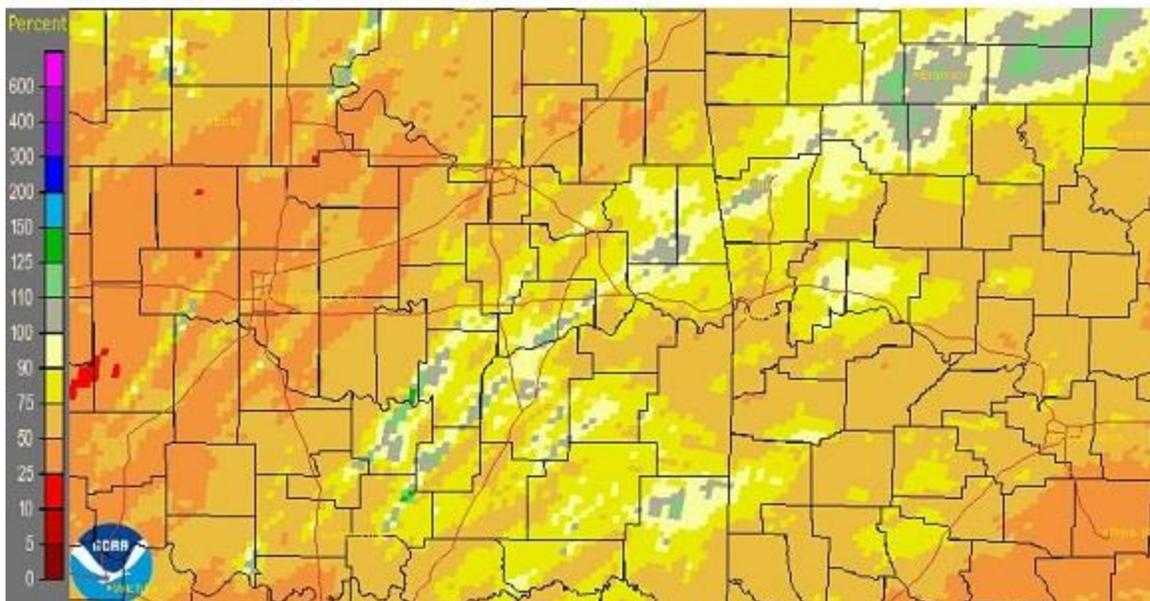


Fig. 1b. Estimated % of Normal Rainfall for December 2014

In Tulsa, OK, December 2014 ranked as the 32nd warmest December (42.5°F, tied 1956, 1954, 1948; since records began in 1905), the 47th wettest December (1.97"; since records began in 1888), and the 30th snowiest December (2.0", tied 1989, 1961; since records began in 1900). Fort Smith, AR had the 47th warmest December (43.5°F; since records began in 1882) and the 59th driest December (2.31"; since records began in 1882). There was a trace of snow at Fort Smith in December, which ties several years (since records began in 1883). Fayetteville, AR had the 18th warmest (40.5°F) and the 32nd driest (2.64") December since records began in 1949. There was a trace of snow at Fayetteville in December, which tied with several years (since records began in 1949).

Some of the larger precipitation reports (in inches) for December 2014 included:

Ozark, AR (coop)	3.67	Cookson, OK (meso)	3.59	Winslow 7NE, AR (coop)	3.45
Cloudy, OK (meso)	3.37	Hindsville 10NNE, AR (coop)	3.34	Wilburton, OK (meso)	3.23
Antlers, OK (coop)	3.21	Eufaula, OK (meso)	3.21	Talihina, OK (meso)	3.20

Some of the lowest precipitation reports (in inches) for December 2014 included:

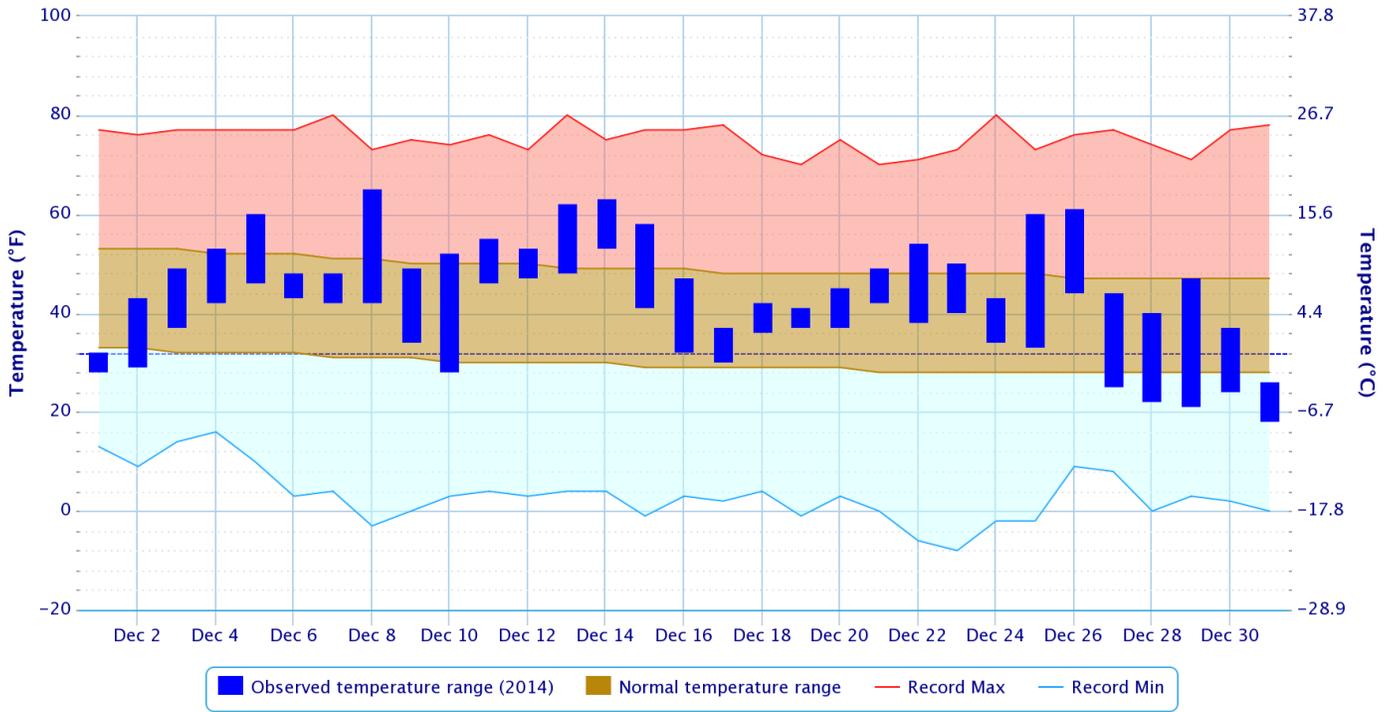
Ralston, OK (coop)	0.81	Burbank, OK (meso)	0.85	Pawnee, OK (coop)	0.93
Pawnee, OK (meso)	1.12	Oilton, OK (meso)	1.22	Wynona, OK (meso)	1.23
Bartlesville, OK (ASOS)	1.25	Foraker, OK (meso)	1.33	Nowata, OK (meso)	1.34

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

Rank since 1921	December 1 – 30, 2014	Cool Growing Season (Sep 1 – Dec 30)	Water Year-to-Date (Oct 1 – Dec 30)	Last 60 Days (Nov 1 – Dec 30)	Last 180 Days (Jul 4 – Dec 30)	Year-to-Date (Jan 1 – Dec 30)
Northeast OK	43 rd driest	38 th wettest	31 st wettest	36 th driest	38 th wettest	18 th driest
East Central OK	34 th wettest	41 st wettest	34 th wettest	42 nd wettest	43 rd wettest	27 th driest
Southeast OK	46 th driest	44 th wettest	37 th driest	24 th driest	40 th wettest	33 rd driest
Statewide	44 th driest	39 th driest	44 th wettest	45 th driest	45 th driest	18 th driest

Daily Temperature Data – Tulsa Area, OK (ThreadEx)

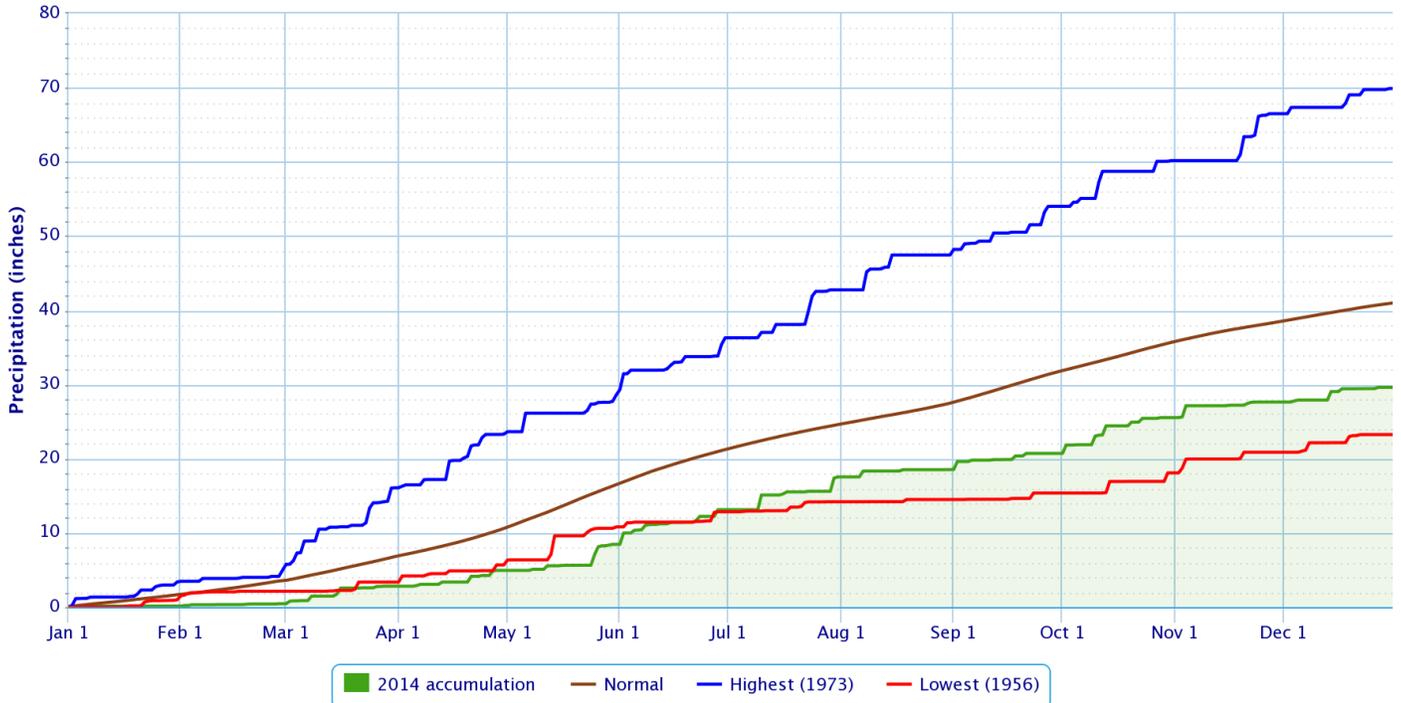
Period of Record – 1905-01-06 to 2015-01-05. Normals period: 1981-2010. Click and drag to zoom chart.



Powered by ACIS

Accumulated Precipitation – Tulsa Area, OK (ThreadEx)

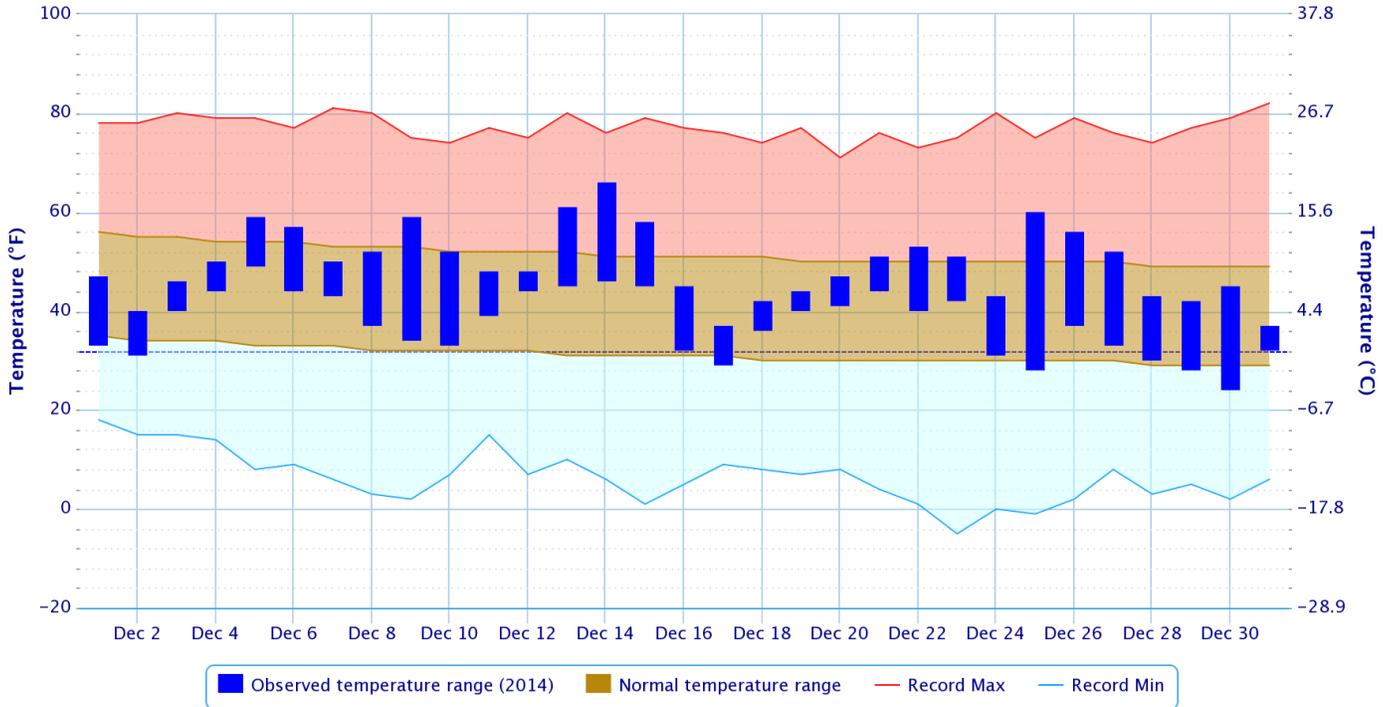
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

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

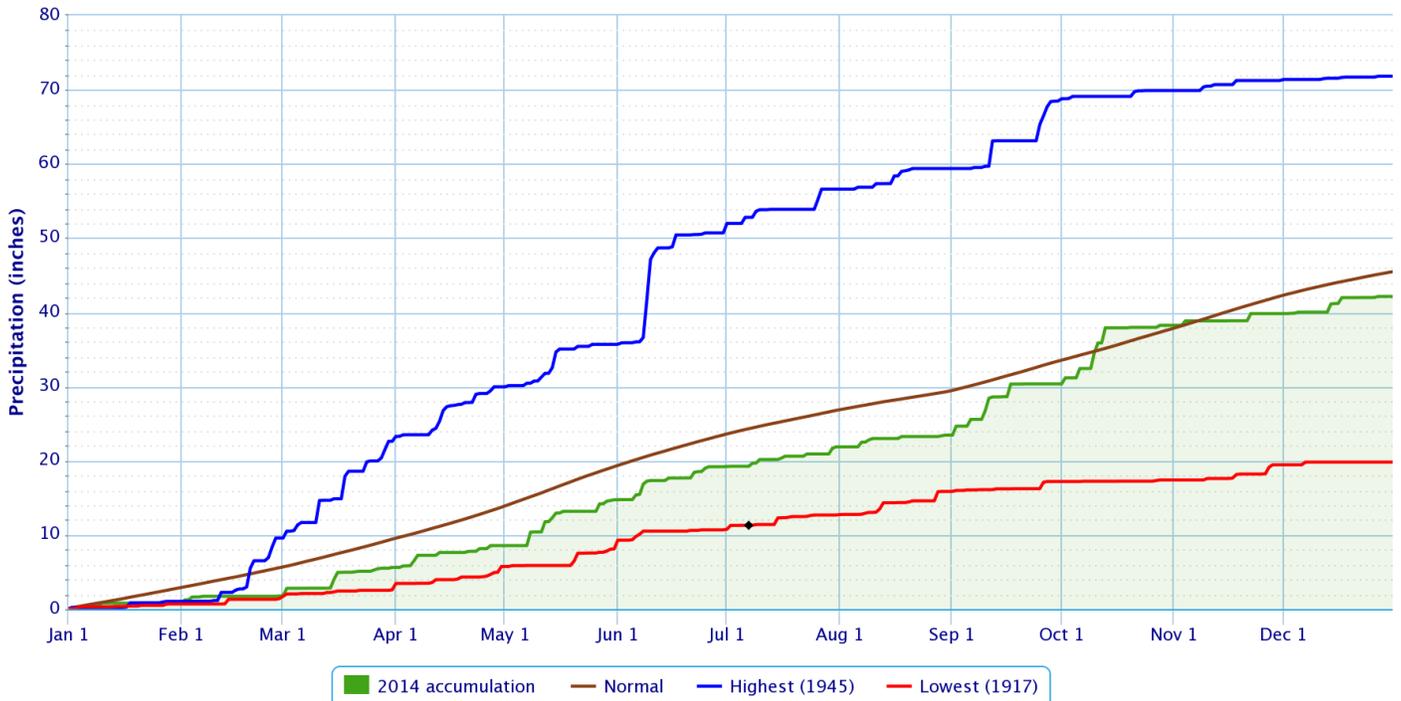
Period of Record – 1882-06-01 to 2015-01-05. Normals period: 1981-2010. Click and drag to zoom chart.



Powered by ACIS

Accumulated Precipitation – Fort Smith Area, AR (ThreadEx)

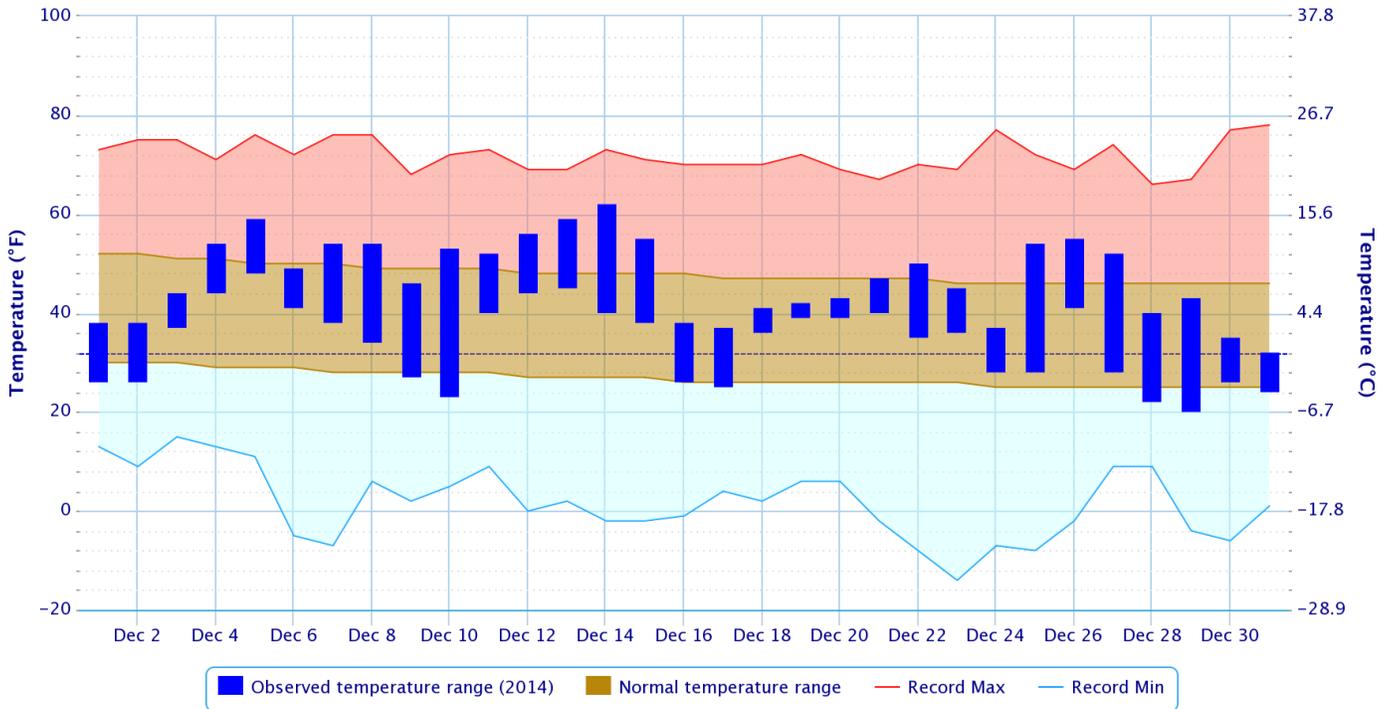
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Powered by ACIS

Daily Temperature Data – FAYETTEVILLE DRAKE FLD, AR

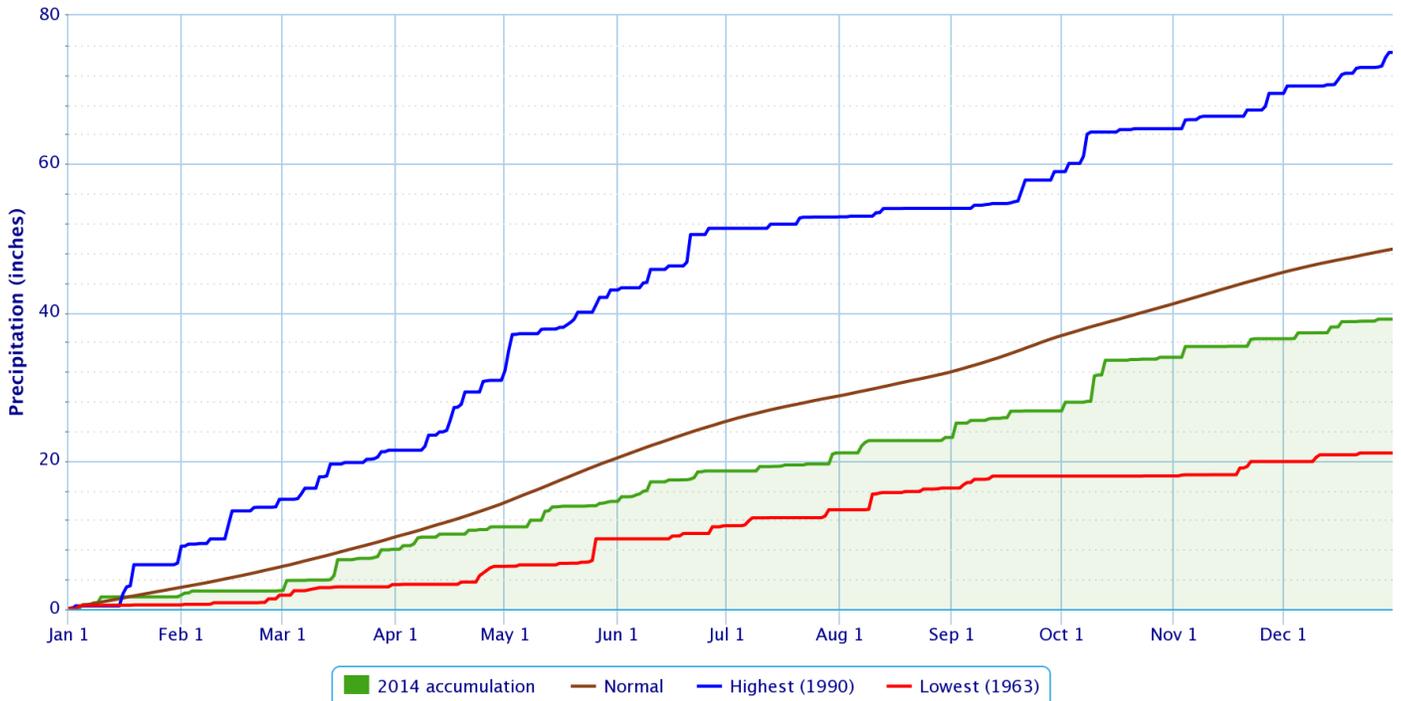
Period of Record – 1949-07-14 to 2015-01-05. Normals period: 1981-2010. Click and drag to zoom chart.



Powered by ACIS

Accumulated Precipitation – FAYETTEVILLE DRAKE FLD, AR

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



Powered by ACIS

According to the USACE, most of the major reservoirs in the HSA were operating within $\pm 3\%$ of the top of their conservation pools as of 1/05/2015. Skiatook Lake has slightly decreased in its conservation pool from 55% (697.68') at the end of November to 54% (697.28') at the end of December. This is the lowest the lake has been since it was filled in 1984. New low pool records will continue as the lake continues to fall. Several lakes were reporting below normal pool levels: Skiatook Lake 54%, Beaver Lake 80%, Keystone Lake 82%, Eufaula Lake 83%, and Birch Lake 91%. A few lakes were reported levels within the flood pool (in response to rainfall at the beginning of January 2015): Wister Lake 110%, Sardis Lake 106%, and Hudson Lake 104%.

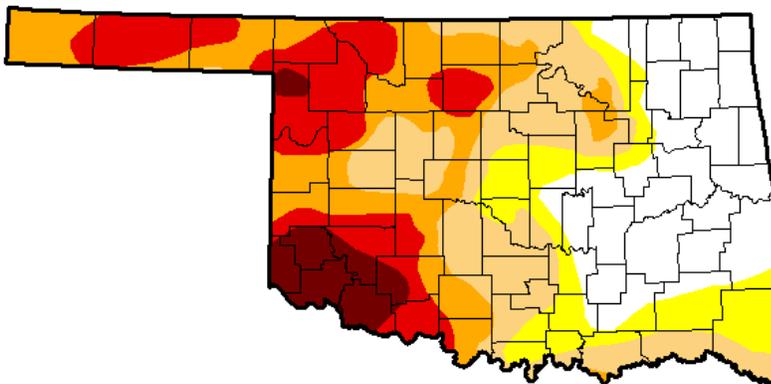
According to the [U.S. Drought Monitor](#) (USDM) from December 30, 2014 (Figs 2, 3), Severe Drought (D2) conditions were occurring across portions of southeastern Osage, eastern Pawnee, northern Creek, and far western Tulsa Counties in eastern OK. Moderate Drought (D1) conditions were present across portions of Osage, Pawnee, eastern Kay, western Tulsa, Creek, and Choctaw Counties in eastern OK. Abnormally Dry (D0), but not experiencing drought, conditions existed across areas of Osage, far southern Washington, Tulsa, far southern Creek, northern Okmulgee, far southern Le Flore, and Pushmataha Counties in eastern OK. Drought/abnormally dry conditions were not present in northwest AR.

U.S. Drought Monitor Oklahoma

December 30, 2014
(Released Wednesday, Dec. 31, 2014)
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	25.63	74.37	62.03	40.84	21.74	5.70
Last Week <i>12/23/2014</i>	25.63	74.37	62.03	40.84	21.67	5.71
3 Months Ago <i>9/30/2014</i>	8.55	91.45	73.31	58.13	20.92	4.64
Start of Calendar Year <i>12/1/2013</i>	50.84	49.16	38.17	18.99	4.84	2.40
Start of Water Year <i>9/30/2014</i>	8.55	91.45	73.31	58.13	20.92	4.64
One Year Ago <i>12/1/2013</i>	50.84	49.16	38.17	18.99	4.84	2.40



Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Brad Rippey
U.S. Department of Agriculture

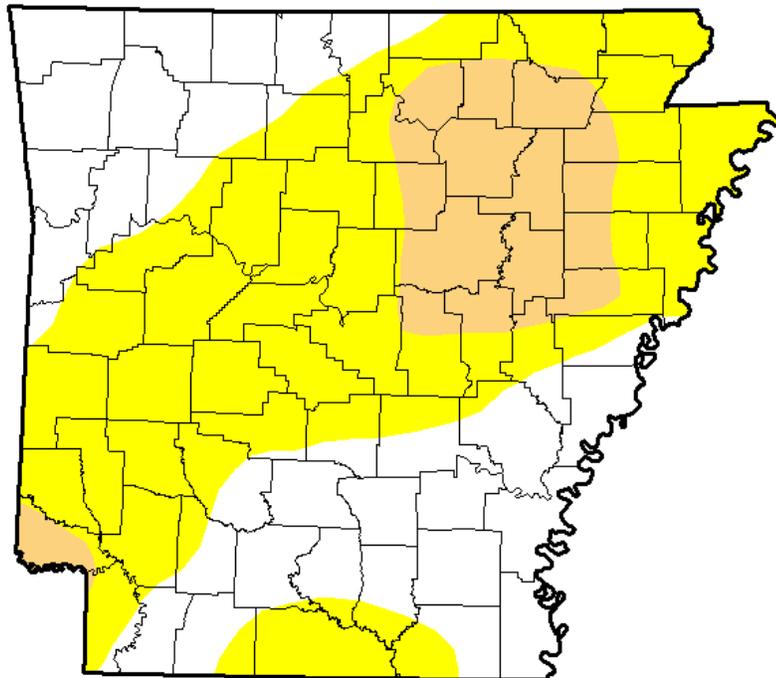


<http://droughtmonitor.unl.edu/>

Fig. 2. Drought Monitor for Oklahoma

U.S. Drought Monitor Arkansas

December 30, 2014
(Released Wednesday, Dec. 31, 2014)
Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	36.88	63.12	14.40	0.00	0.00	0.00
Last Week 12/23/2014	36.49	63.51	14.40	0.00	0.00	0.00
3 Months Ago 9/30/2014	54.54	45.46	9.13	0.00	0.00	0.00
Start of Calendar Year 12/31/2013	96.56	3.44	0.00	0.00	0.00	0.00
Start of Water Year 9/30/2014	54.54	45.46	9.13	0.00	0.00	0.00
One Year Ago 12/31/2013	96.56	3.44	0.00	0.00	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Brad Rippey
U.S. Department of Agriculture



<http://droughtmonitor.unl.edu/>

Fig. 3. Drought Monitor for Arkansas

Annual Summary

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 4a), rainfall totals for the Year 2014 ranged from around 25" in Pawnee County to around 50" in southeast OK and west central AR. The majority of the HSA received 30"-40" of rain this month. The entire HSA received below normal rainfall in 2014 (Fig. 4b), with most of the area receiving 50%-90% of the normal annual rain. Annual rainfall deficits for 2014 ranged from only a couple of inches to near 20" (Fig. 4c).

In Tulsa, OK, 2014 ranked as the 25th coldest Year (59.6°F, tied 1996, 1985, 1972, 1962, 1958; since records began in 1905), the 21st driest Year (29.60"; since records began in 1888), and the 47th snowiest Year (9.8"; since records began in 1900). Fort Smith, AR had the 37th coldest Year (60.7°F, tied 1981, 1967, 1951; since records began in 1883), the 59th wettest Year (42.14"; since records began in 1882), and the 53rd snowiest Year (5.7", tied 1994; since records began in 1884). Fayetteville, AR had the **Record coldest** (55.3°F; previous record 55.5°F in 1979, 1976), the 14th driest (39.08"), and the 22nd snowiest (10.9", tied 2003) Year since records began in 1950. Information about the record cold year in Fayetteville can be found at: http://www.srh.noaa.gov/tsa/?n=weather-event_2014fyvcoldestyear

Some of the larger precipitation reports (in inches) for 2014 included:

Clayton, OK (meso)	50.85	Wister, OK (meso)	48.74	St. Paul, AR (coop)	47.83
Talihina, OK (coop)	47.74	Winslow 7NE, AR (coop)	47.45	Mountainburg 2NE, AR (coop)	47.34
Natural Dam, AR (coop)	47.31	Fanshawe, AR (coop)	46.91	Porter, OK (meso)	45.27

Tulsa, OK (TSA): Full Year 2014 Departure from Normal Precipitation
Valid at 1/1/2015 1200 UTC- Created 1/14/15 4:50 UTC

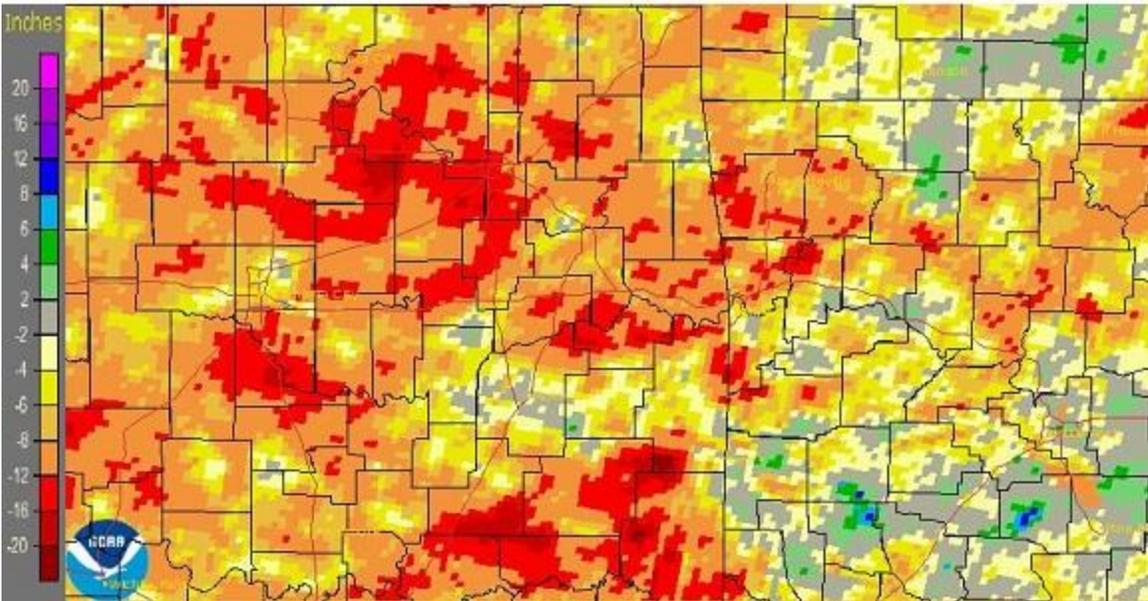


Fig. 4c. Estimated Departure from Normal Rainfall for 2014

Outlooks

The [Climate Prediction Center](#) (CPC) outlook for January 2015 (issued December 31, 2014) indicates a slightly enhanced chance for above median precipitation across eastern OK and west central AR, generally along and south of I-40. Elsewhere, there is an equal chance for above, near, and below median precipitation. This outlook also indicates an equal chance for above, near, and below normal temperatures across all of eastern OK and northwest AR. This outlook is based on short-range forecasts of expected weather conditions, primarily during the first part of the month, since there has been a lack of mid-latitude response to ENSO so far.

For the 3-month period January-February-March 2015, CPC is forecasting an enhanced chance for below normal temperatures across all of eastern OK and northwest AR. This outlook also indicates a slightly enhanced chance for above median rainfall across eastern OK, and equal chances for above, near, and below median precipitation across northwest AR (outlook issued December 18, 2014). According to CPC, current atmospheric observations continue to indicate ENSO neutral conditions; however, the oceanic observations are suggestive of El Niño conditions. Taken together, the observations indicate ENSO-neutral conditions remain. Forecast models still indicate the development of El Niño, but the continued weak atmospheric response this late in the season suggests that a weak El Niño event is most probable. CPC is forecasting a 60% chance for El Niño development and a 40% chance for a continuation of ENSO-neutral conditions through the winter. Therefore, this outlook is based on both statistical and dynamical forecast tools and considering weak El Niño conditions.

Summary of Precipitation Events

December 1-15

Overrunning precipitation spread into eastern OK and northwest AR late on the 3rd north of a warm front that was located south of the Red River. The drizzle and light showers continued through the day on the 4th as a jet streak passed by. A second strong upper-level wave then moved into the region, bringing additional rainfall to much of eastern OK and northwest AR. Overall, the rainfall remained light with the secondary wave as well, with soggy and foggy conditions for much of the 5th. The rain ended from east to west as a cold front moved through. Rainfall totals from the 3rd-5th were mostly around 0.20" to around 0.50", though portions of east central OK, southeast OK, and northwest AR received 0.75" to around 1" of rain (Fig. 5).

Tulsa, OK (TSA): Current 7-Day Observed Precipitation
Valid at 12/8/2014 1200 UTC- Created 12/8/14 16:28 UTC

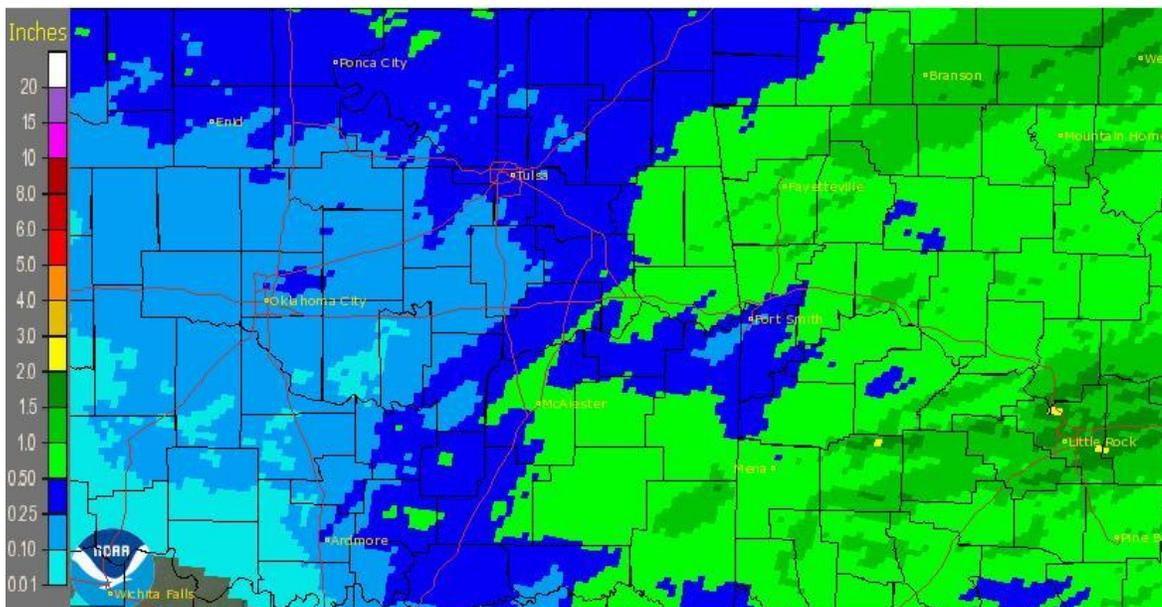


Fig. 5. 7-day Estimated Observed Rainfall ending at 7am CST 12/08/2014.

Tulsa, OK (TSA): 12/15/2014 1-Day Observed Precipitation
Valid at 12/15/2014 1200 UTC- Created 12/17/14 17:41 UTC

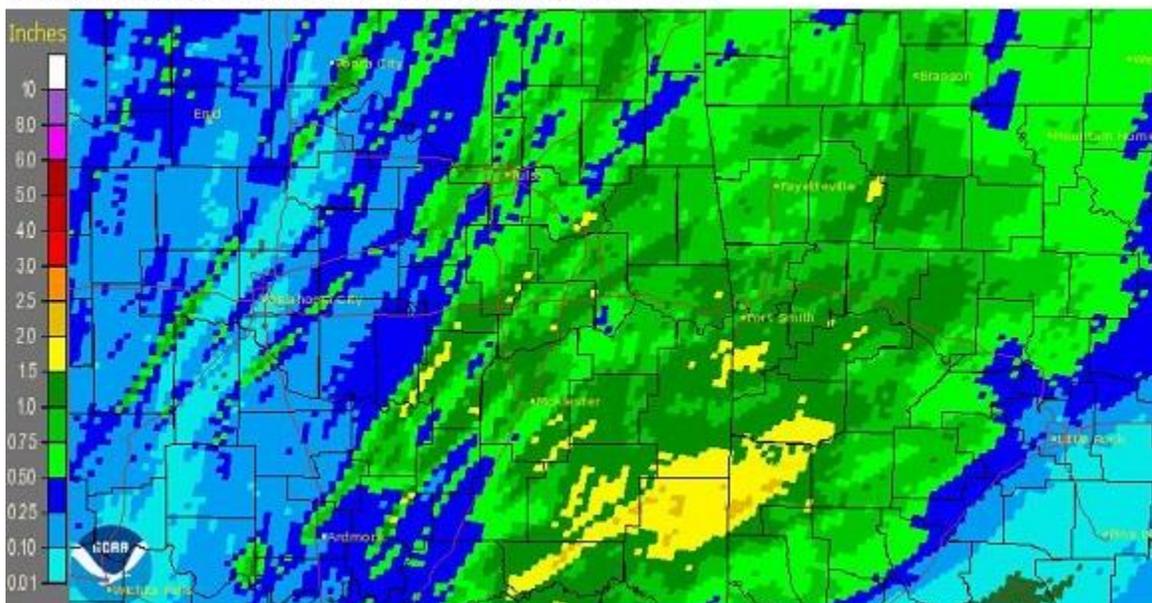


Fig. 6. 24-hour Estimated Observed Rainfall ending at 7am CST 12/15/2014.

Despite a blocking ridge over the central U.S., a few weak waves were able to generate some light precipitation. The first occurred during the early morning hours of the 11th, where a few hundredths to around a tenth of an inch of rain fell across northwest AR and a few locations in northeast OK near the AR state line. Isentropic lift generated shower activity again late on the 11th and into the morning of the 12th across southeast OK. Overall, rainfall was light, with totals of a few hundredths to around half an inch.

A band of convection moved across OK and into AR on the afternoon of the 14th as an upper-level trough moved into the region. A secondary line of thunderstorms developed near a dryline in central OK and then moved eastward across eastern OK and northwest AR on the 14th, bringing sporadic wind damage as it passed. Rainfall totals from both rounds of storms ranged from 0.10" to around 2", with the highest totals primarily occurring across southeast OK and west central AR (Fig. 6).

December 16-31

Cold rain, at times mixed with sleet, affected eastern OK and northwest AR on the 17th as an upper-level wave interacted with sub-tropical moisture over the region. A few isolated thunderstorms also affected portions of eastern OK. Rainfall totals ranged from around 0.10" to around 1", with the highest amounts occurring across east central OK and northwest AR (Fig. 7). There was no sleet accumulation.

Tulsa, OK (TSA): Current 1-Day Observed Precipitation
Valid at 12/18/2014 1200 UTC- Created 12/18/14 16:28 UTC

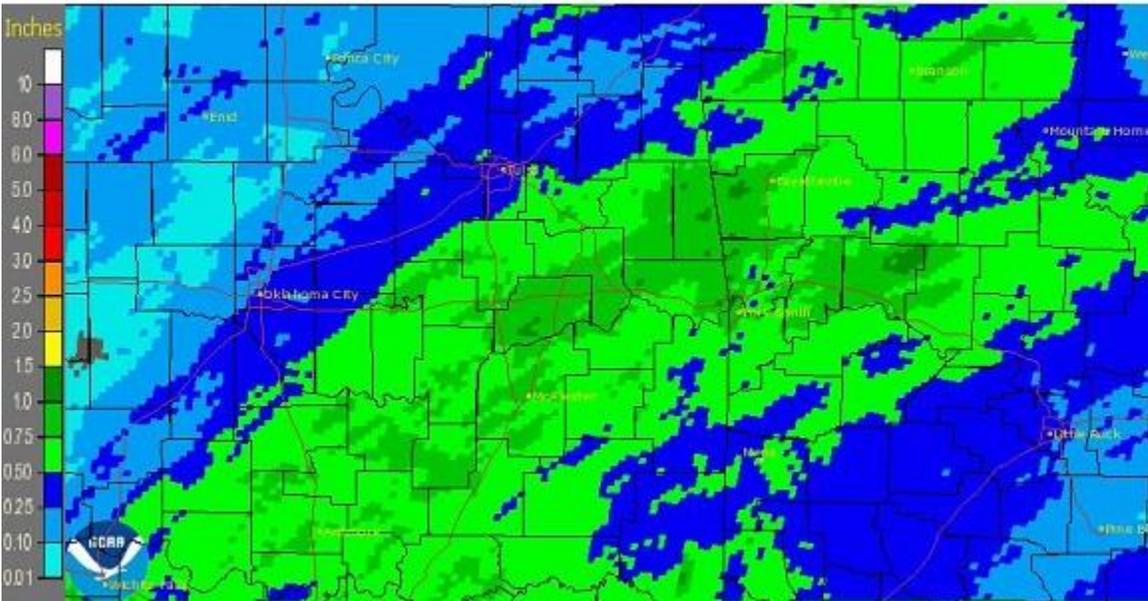
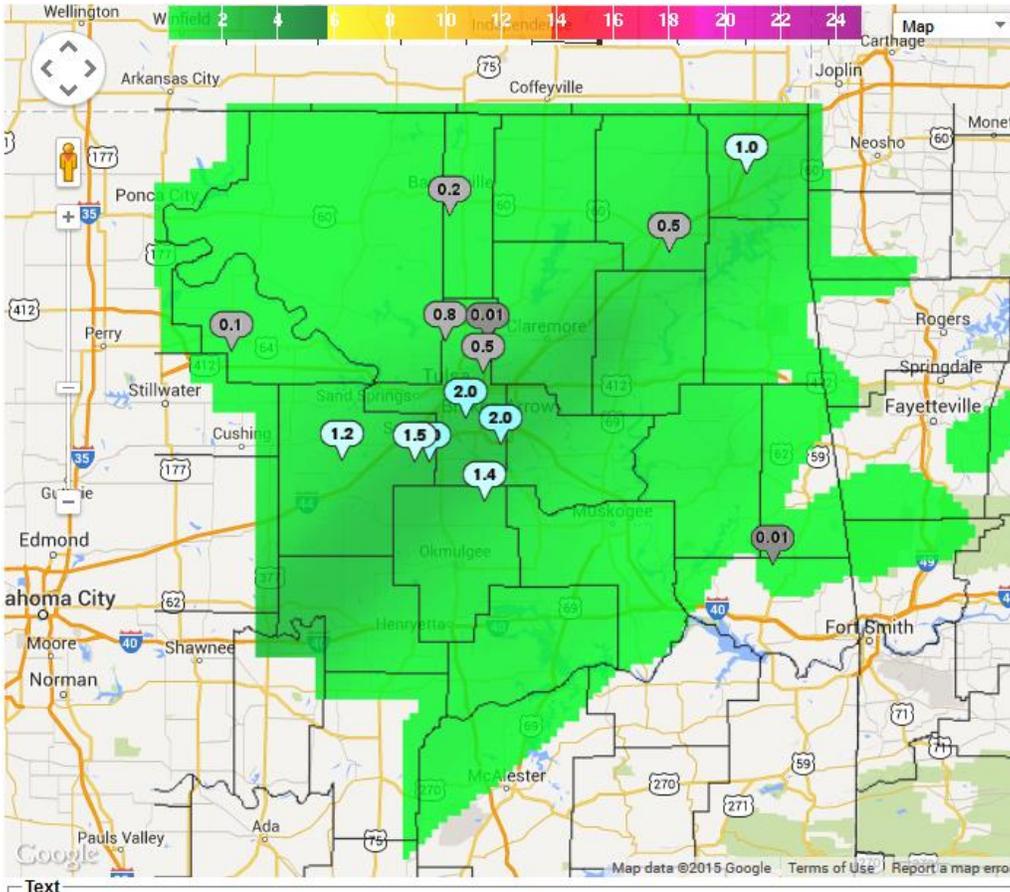


Fig. 7. 24-hour Estimated Observed Rainfall ending at 7am CST 12/18/2014.



Text
PRELIMINARY SNOW ACCUMULATION SUMMARY DEC 28 2014...
Fig. 8. Preliminary snow accumulation reports for 12/28/2014.

Light rain developed ahead of an approaching cold front on the afternoon of the 26th. The showers increased across eastern OK and northwest AR as the front moved south into the area during the evening and overnight hours. Light rain continued north of the front on the 27th, and as colder air filtered in behind the front, the rain changed to snow. The heaviest band set up just south of I-44, and locations near and just south of I-44 reported 0.5"-2" of snow (Fig. 8). Lesser amounts of snow and sleet were reported elsewhere across northeast OK and in a few spots in northwest AR. Most of the HSA received around one tenth to around half an inch of rain/snow water equivalent during this event.

Written by:

Nicole McGavock
Service Hydrologist
WFO Tulsa

Products issued in December 2014:

*MLBA4 and OZGA4 transferred to NWS Tulsa HSA February 5, 2014

*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/EXA/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