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|---|---|---|
| **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 **August** YEAR **2014** |
| TO: Hydrometeorological Information Center, W/OH2<br>NOAA / National Weather Service<br>1325 East West Highway, Room 7230<br>Silver Spring, MD 20910-3283 | | SIGNATURE **Steven F. Piltz**<br>(Meteorologist-in-Charge)<br>DATE **September 4, 2014** |

*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.**

June and July 2014 were cool and wet, but the end of August 2014 brought summer back to the region. For the month as a whole, temperatures were near normal. Rainfall, however, was lacking, with below average rainfall across the majority of eastern OK and northwest AR. 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.

## Monthly Summary

Using the radar-derived estimated observed precipitation from the RFCs (Fig. 1a), rainfall totals for August 2014 ranged from around 0.10" in Okfuskee County to around 5" in Franklin County. The majority of the HSA received 0.5"-3" of rain this month. With the exception of a few isolated locations, all of eastern OK and northwest AR received only 25%-75% of the normal August rainfall during August 2014 (Fig. 1b). Large portions of Creek, Okfuskee, Okmulgee, McIntosh, Pittsburg, and Choctaw Counties received less than 25% of the normal August rainfall, with some locations receiving less than 5%.

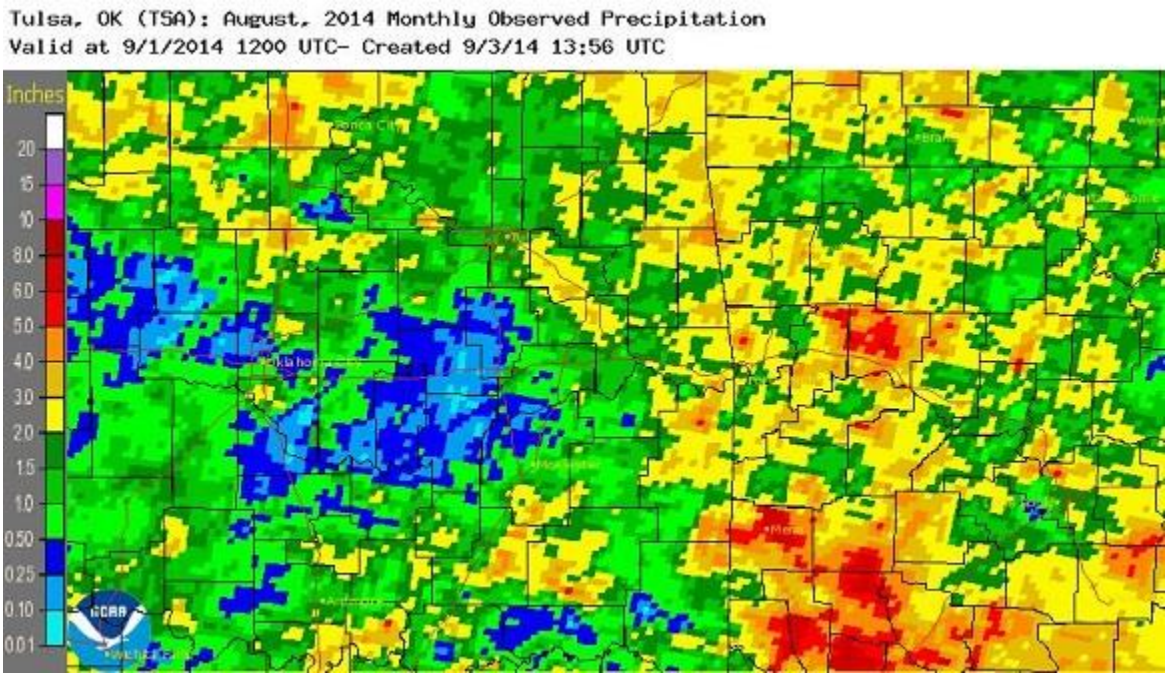


Fig. 1a. Estimated Observed Rainfall for August 2014

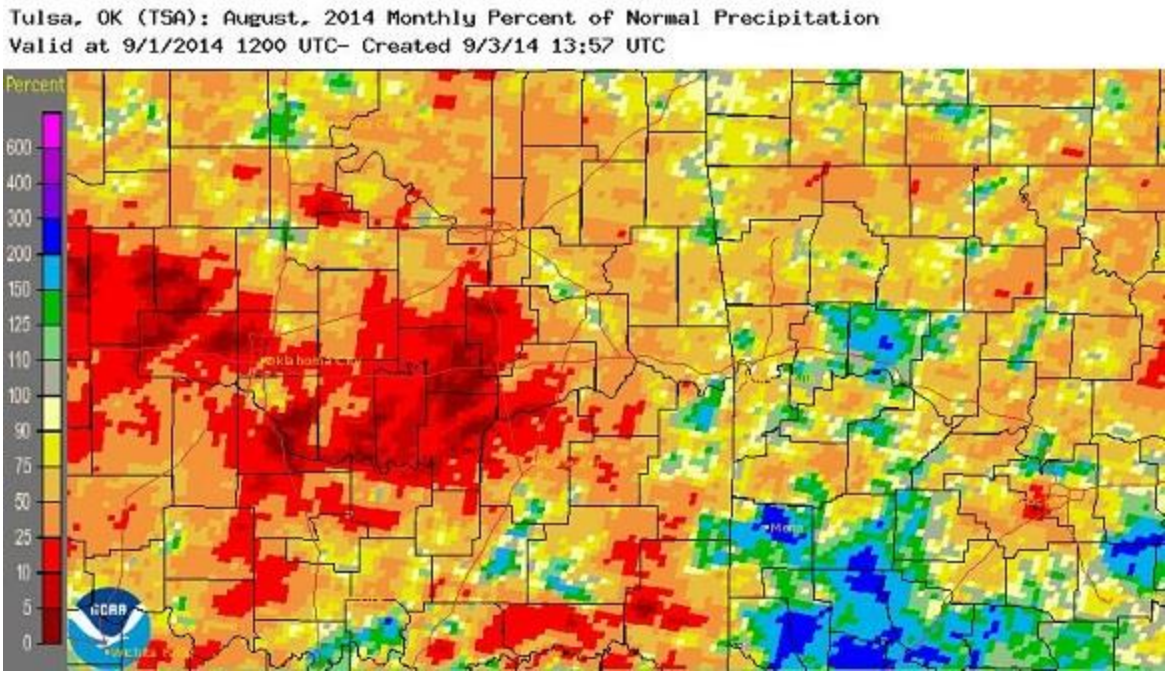


Fig. 1b. Estimated % of Normal Rainfall for August 2014

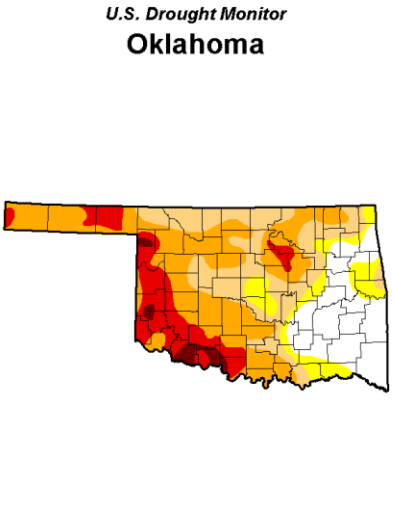
In Tulsa, OK, August 2014 ranked as the 47th warmest August (82.8°F, tied 1926; since records began in 1905) and the 22nd driest August (0.98"; since records began in 1888). Fort Smith, AR was the 61st warmest August (81.7°F; since records began in 1882) and the 36th driest August (1.58"; since records began in 1882). Fayetteville, AR was the 31st coldest (76.8°F; tied 1975) and the 19th driest (2.08") August since records began in 1949. McAlester, OK only measured 0.36" of rain this month, tying 2006 as the 5th driest August since records began in 1953. 5 of the top 10 driest Augusts in McAlester have occurred from 2000-2014.

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

| | | | | | |
|---|---|---|---|---|---|
| Natural Dam, AR (coop) | 5.03 | Porter, OK (meso) | 4.10 | St. Paul, AR (coop) | 3.14 |
| Winslow 7NE, AR (coop) | 3.12 | Ozark, AR (coop) | 3.09 | Pawnee, OK (coop) | 2.97 |
| Muskogee, OK (ASOS) | 2.97 | Fanshawe, OK (coop) | 2.94 | Sallisaw, OK (meso) | 2.81 |

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

| | | | | | |
|---|---|---|---|---|---|
| Okemah, OK (meso) | 0.10 | Hugo, OK (meso) | 0.26 | McAlester, OK (ASOS) | 0.36 |
| Eufaula, OK (meso) | 0.37 | Okmulgee, OK (meso) | 0.44 | Bristow, OK (meso) | 0.69 |
| Wilburton, OK (meso) | 0.70 | Berryville 5NW, AR (coop) | 0.73 | Foraker, OK & Tulsa, OK (meso) | 0.77 |



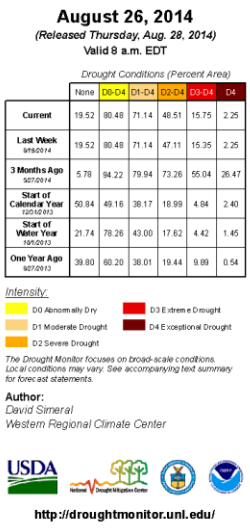
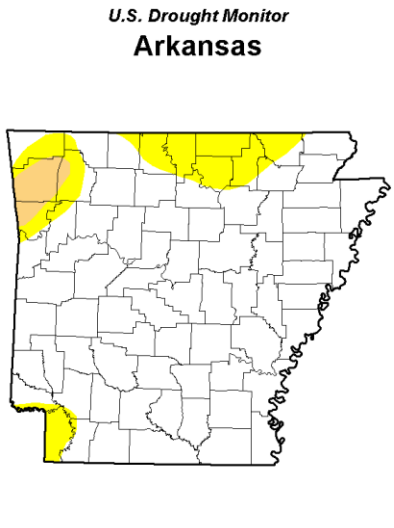




Fig. 2. Drought Monitor for Oklahoma



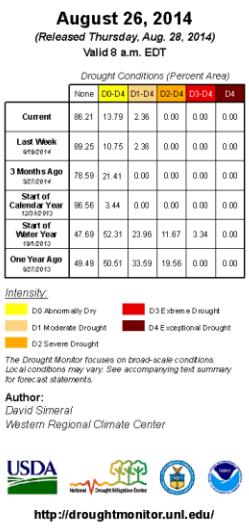




Fig. 3. Drought Monitor for Arkansas

According to the U.S. Drought Monitor (USDM) from August 26, 2014 (Figs 2, 3), Extreme Drought (D3)

conditions remained across southern Pawnee and northwestern Creek Counties in northeast OK. Severe Drought (D2) conditions were occurring across Osage, Pawnee, Creek, northern Washington, Nowata, and western Craig Counties in eastern OK. Moderate Drought (D1) conditions were present across western Ottawa, Craig, northern Rogers, Tulsa, Okfuskee, northwestern Okmulgee, far northern Mayes, southeastern Adair, and northeastern Sequoyah Counties in eastern OK, and Crawford, far western Madison, and Washington Counties in northwest AR. Abnormally Dry (D0), but not experiencing drought, conditions were occurring across portions of Ottawa, Mayes, Rogers, Tulsa, Okmulgee, Okfuskee, Cherokee, Adair, Sequoyah, and Choctaw Counties in eastern OK. In northwest AR, D0 conditions were affecting Benton, far western Carroll, Crawford, Madison, and far northwestern Franklin Counties.

According to the USACE, most of the major reservoirs in the HSA were operating within ±3% of the top of their conservation pools as of 9/02/2014. Several lakes remained below normal: Skiatook Lake 61%, Beaver Lake 82%, Keystone Lake 86%, Tenkiller Lake 90%, and Eufaula Lake 95%. One lake had levels within its flood control pool: Hudson Lake 105%.

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

| Rank since 1921 | Last 30 Days (Aug 2 – Aug 31 | Summer 2014 (Jun 1 – Aug 31) | Last 120 Days (May 4 – Aug 31) | Warm Growing Season (Mar 1 – Aug 31) | Year-to-Date (Jan 1 – Aug 31) | Water Year-to-Date (Oct 1 – Aug 31) | Last 365 Days (Sep 1, 2013 – Aug 31, 2014) |
|---|---|---|---|---|---|---|---|
| Northeast OK | 23rd driest | 43rd wettest | 42nd driest | 21st driest | **12th driest** | **13th driest** | **10th driest** |
| East Central OK | **14th driest** | 44th wettest | 44th driest | 31st driest | **14th driest** | 21st driest | **14th driest** |
| Southeast OK | **9th driest** | 26th wettest | 22nd wettest | 40th wettest | 31st driest | 40th driest | 36th driest |
| Statewide | **10th driest** | 27th wettest | 37th wettest | 29th driest | **14th driest** | 18th driest | 16th driest |

## Summer (June-July-August)

In Tulsa, OK, Summer 2014 ranked as the 32nd coldest Summer (79.8°F, tied 1975; since records began in 1905) and the 60th driest Summer (10.07"; since records began in 1888). Only 7 days reached 100°F or more this summer in Tulsa. Fort Smith, AR was the 46th coldest Summer (79.8°F, tied 1983; since records began in 1882) and the 58th driest Summer (8.71"; since records began in 1882). There were no days this summer that reached 100°F or more in Fort Smith. The last time this happened was in 2004. Fayetteville, AR was the 8th coldest (74.3°F) and the 17th driest (8.61", tied 1988) Summer since records began in 1949. There were no days this summer that reached 100°F or more in Fayetteville.

Some of the larger precipitation reports (in inches) for Summer 2014 included *(mesonet data not included)*:

| | | | | | |
|---|---|---|---|---|---|
| Natural Dam, AR (coop) | 14.04 | McAlester, OK (ASOS) | 14.03 | St. Paul, AR (coop) | 13.90 |
| Kingston 2S, AR (coop) | 13.81 | Fanshawe, OK (coop) | 13.56 | Claremore 2ENE, OK (coop) | 13.25 |
| Ralston, OK (coop) | 13.08 | Bartlesville, OK (ASOS) | 12.94 | Spavinaw, OK (coop) | 12.94 |

## Outlooks

The Climate Prediction Center (CPC) outlook for September 2014 (issued August 31, 2014) indicates equal chances for above, near, and below normal temperatures and precipitation across all of eastern OK and northwest AR. This outlook is based on short-range forecasts of expected weather conditions, with weak climate signals indicating that the likelihoods of monthly mean temperatures and monthly accumulated precipitation are similar to climatological probabilities.

For the 3-month period September-October-November 2014, CPC is forecasting a slightly enhanced chance for below normal temperatures across Osage, Pawnee, and eastern Kay Counties, with equal chances for above, near, and below normal temperatures elsewhere across eastern OK and northwest AR. CPC is also

forecasting an enhanced chance for above median rainfall for all of eastern OK and northwest AR (outlook issued August 21, 2014). According to CPC, current atmospheric and oceanic observations suggest a transition from ENSO neutral to El Niño conditions is underway. El Niño is still favored to be in place by early fall. Most forecasts indicate El Niño will peak at weak or moderate strength in late autumn into early winter. Therefore, this outlook is based on both statistical and dynamical forecast tools and considering El Niño conditions.

## Summary of Precipitation Events

### August 1-15

Showers and thunderstorms moved southeast out of KS and across eastern OK and northwest AR shortly after midnight on the 7th and continuing through the morning hours. These storms weakened as they moved into southeast OK. Most of the HSA received 0.20" to 0.75" of rain from this complex of storms, with several locations across northeast OK and far northwest AR getting 1"-2.25" of rain (Figs. 4, 5).

A series of upper-level waves brought periods of showers and thunderstorms to the area on the 8th – 11th. A weakening mesoscale convective system (MCS) moved into northeast OK on the morning of the 8th, but dissipated quickly. A few isolated areas received 0.50"-1" of rain, with most of the affected area getting around 0.25" or less (Fig. 6). Additional widely scattered thunderstorms developed during the afternoon across northwest AR and along Oklahoma's eastern border, bringing 0.25" to around 2" of rain to the affected locations. The highest total of 2"-3" occurred across far northeast Franklin County. Another extensive area of showers and thunderstorms moved across the region during the morning and afternoon hours of the 9th. Scattered showers with isolated thunderstorms then continued across southeast OK during the evening along a weak surface boundary. Most of eastern OK and northwest AR received light rain, though isolated locations had 0.50" to around 2.5" of rain. Storms fired up during the morning of the 10th along an outflow boundary left over from a dissipating MCS across north central OK and southern KS. The storms moved rather quickly, bringing around 0.50" or less of rain to primarily east central OK and west central AR. A final round of convection developed along the nearly stationary weak frontal boundary across southeast OK, mainly south of a McAlester to Poteau line, early on the 11th. This activity brought 0.25" – 1" of rain, with isolated 1.5"-3" in western Pushmataha County. The front finally pushed south as a cold front, bringing an end to the daily rain.

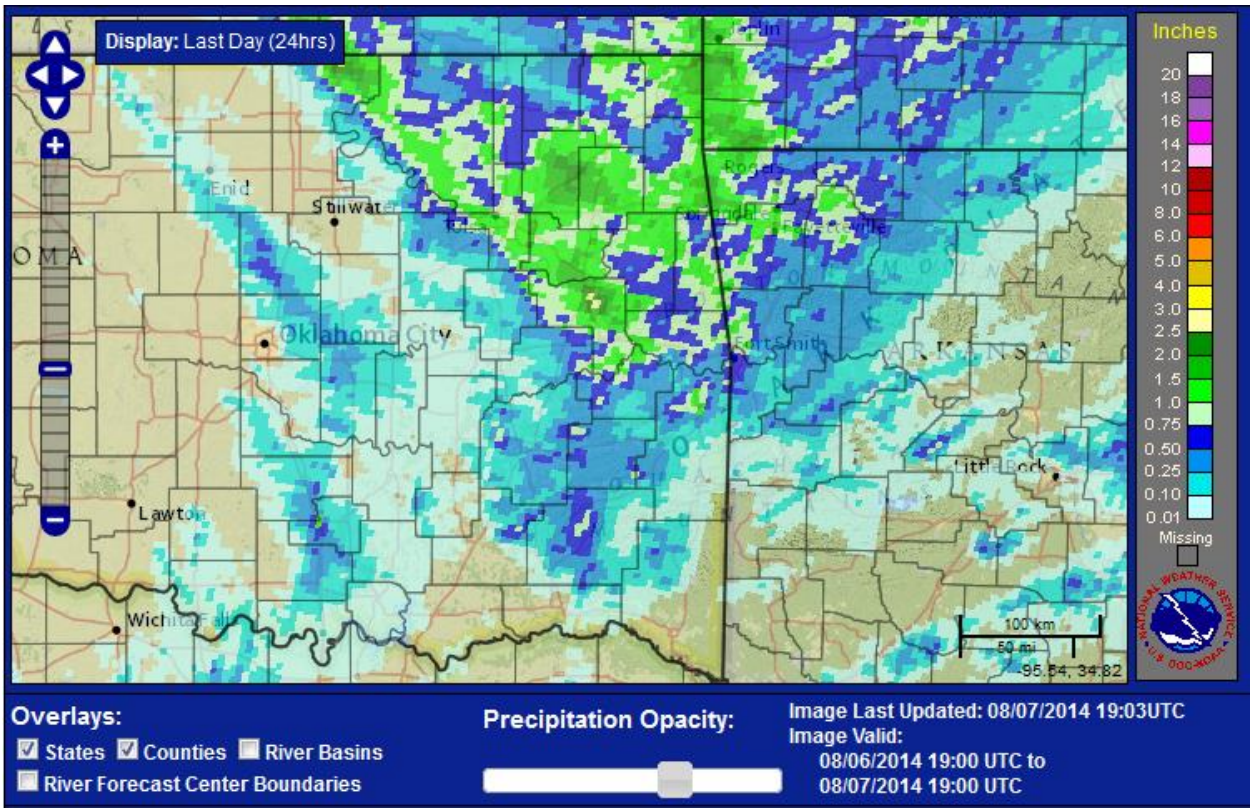


Fig. 4. 24-hr estimated observed rainfall ending at 2pm CDT 8/07/2014.

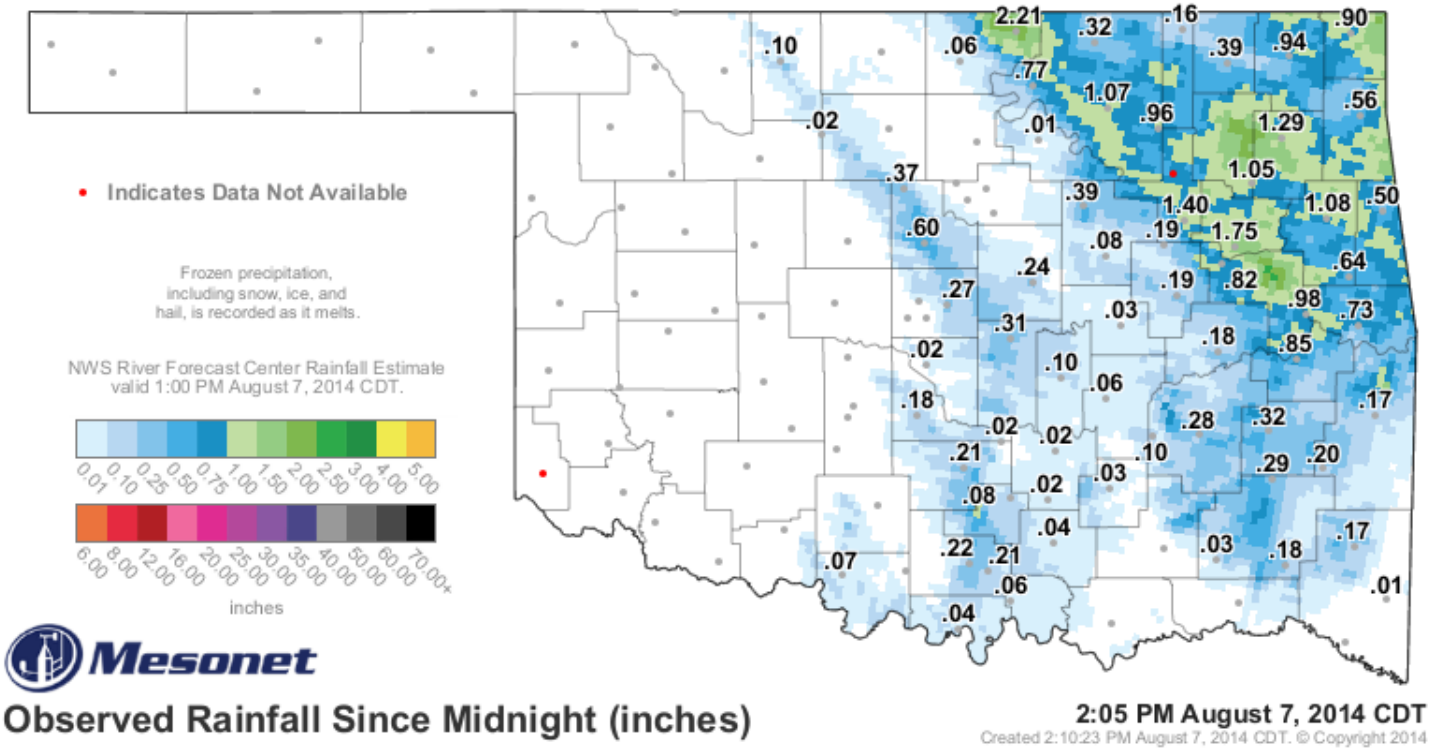



Fig. 5. 2-day estimated observed rainfall (image) and OK Mesonet measurements ending at 2:05pm CDT 8/07/2014.

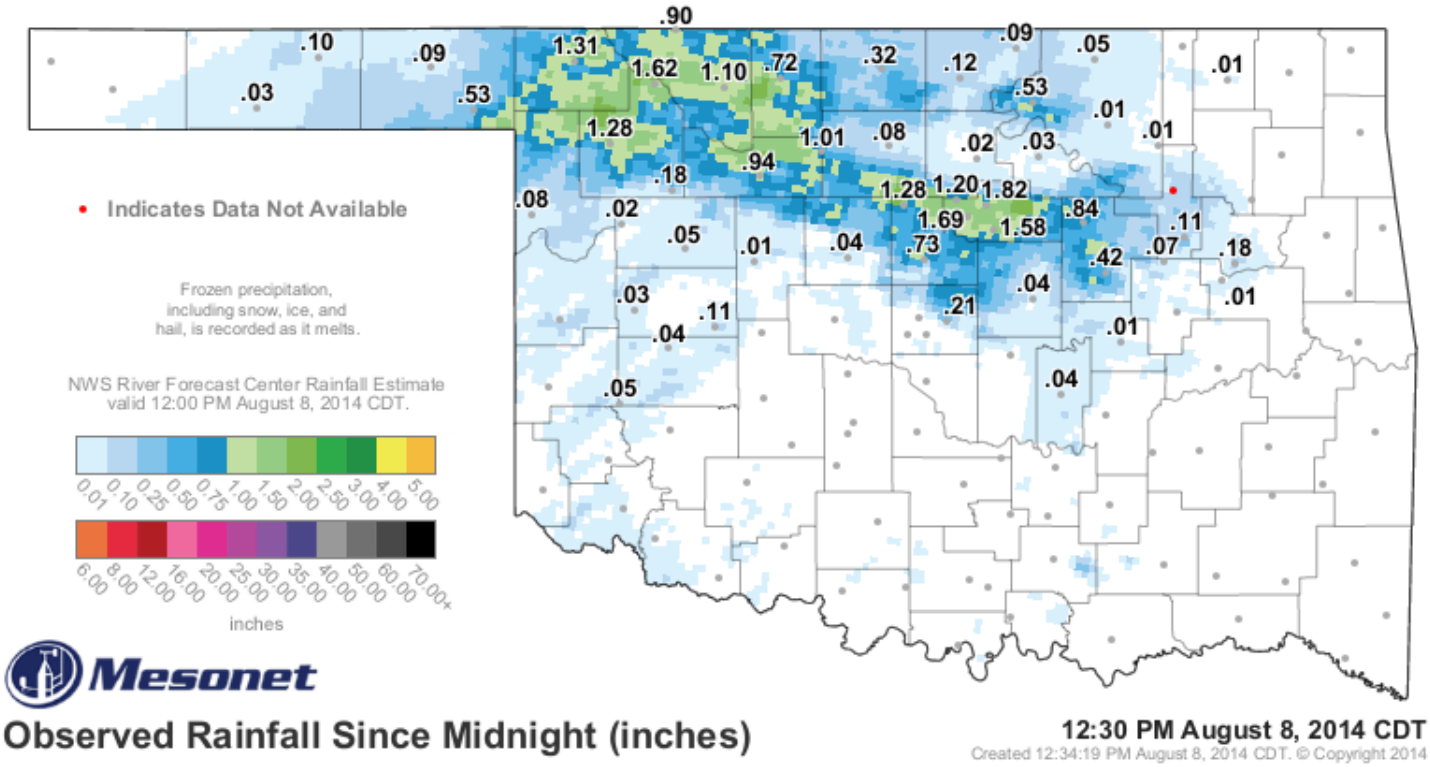



Fig. 6. 2-day estimated observed rainfall (image) and OK Mesonet measurements ending at 12:30pm CDT 8/08/2014.

**August 16-31**

A series of weak upper-level waves brought isolated to widely scattered showers and thunderstorms to the region on August 16-18. Most locations affected by this activity received less than 0.50" of rain, though a few spots did see 1"-3" of rain. High pressure then set up over the Southern Plains, bringing hot, humid, and rain-free conditions back to the HSA after a mostly cool and wet summer.

A slow moving upper-level system brought a return to slightly cooler temperatures and some rain on the 28th-30th. Showers and thunderstorms first moved into northeast OK during the late evening hours of the 28th and continued through the 29th across the remainder of the HSA. Most of the affected areas received around 0.50" or less of rain, though some isolated locations from central Le Flore, Sebastian, and Franklin Counties got 1"-2.5" of rainfall. Showers and isolated thunderstorms redeveloped during the early morning hours of the 30th and continued into the evening hours ahead of a mid-level shortwave. This activity brought an additional 0.10"-0.50", with isolated 1"-2", of rain.

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WFO Tulsa

**Products issued in August 2014:**

*MLBA4 and OZGA4 transferred to NWS Tulsa HSA February 5, 2014
*Mixed case River Flood products began July 31, 2013

1 Flash Flood Warnings (FFW)
1 Flash Flood Statements (FFS)
0 Flash/Areal Flood Watches (FFA) (0 Watch FFA CON/EXT/EXA/CAN)
8 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)
0 Drought Information Statements (DGT)

**Preliminary Hydrographs:**

None