



Some of the larger precipitation reports (in inches) for February 2011 included:

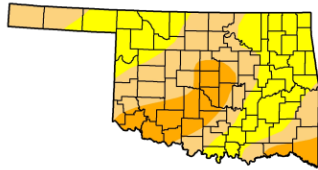
Berryville, AR 5NW (coop)	3.86	Fayetteville, AR (ASOS)	3.70	Oilton, OK (meso)	3.53
Mountainburg, AR 2NE (coop)	3.41	Westville, OK (meso)	3.30	Skiatook, OK (meso)	3.27
Ralston, OK (coop)	3.24	Fort Smith, AR (ASOS)	3.18	Cookson, OK (meso)	3.17

According to the [U.S. Drought Monitor](#) (USDM) from March 1, 2011, severe (D2) drought conditions were affecting most of Choctaw County in southeast OK. Abnormally dry (D0) and moderate drought (D1) conditions were affecting all of the remainder of eastern OK and northwest AR (see Figs. 2 & 3). Despite the significant winter weather storms this month, drought conditions did not improve due to the low snow to liquid equivalent ratios.

### U.S. Drought Monitor Oklahoma

March 1, 2011  
Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D1	D1-D2	D2-D3	D3-D4	D4
Current	0.02	99.98	58.68	18.16	0.00	0.00
Last Week (02/22/2011 map)	0.02	99.98	63.04	18.15	0.00	0.00
3 Months Ago (11/30/2010 map)	48.34	53.66	3.13	0.00	0.00	0.00
Start of Calendar Year (12/28/2010 map)	13.82	86.18	47.90	1.50	0.00	0.00
Start of Water Year (09/29/2010 map)	66.28	33.72	4.21	0.00	0.00	0.00
One Year Ago (02/23/2010 map)	100.00	0.00	0.00	0.00	0.00	0.00



**Intensity:**  
■ D0 Abnormally Dry    ■ D3 Drought - Extreme  
■ D1 Drought - Moderate    ■ D4 Drought - Exceptional  
■ D2 Drought - Severe

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



Released Thursday, March 3, 2011  
L. Edwards, Western Regional Climate Center

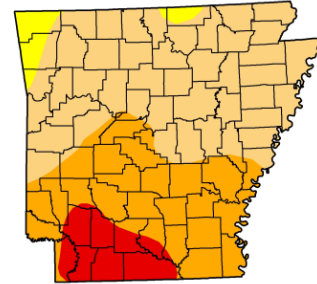
<http://drought.unl.edu/dm>

Fig. 2. Drought Monitor for Oklahoma

### U.S. Drought Monitor Arkansas

March 1, 2011  
Valid 7 a.m. EST

	Drought Conditions (Percent Area)					
	None	D0-D1	D1-D2	D2-D3	D3-D4	D4
Current	0.00	100.00	96.47	41.53	9.41	0.00
Last Week (02/22/2011 map)	0.00	100.00	97.24	56.17	9.41	0.00
3 Months Ago (11/30/2010 map)	17.42	82.58	67.68	45.48	4.07	0.00
Start of Calendar Year (12/28/2010 map)	0.00	100.00	85.33	69.74	13.26	0.00
Start of Water Year (09/29/2010 map)	25.16	74.84	50.68	25.16	0.00	0.00
One Year Ago (02/23/2010 map)	100.00	0.00	0.00	0.00	0.00	0.00



**Intensity:**  
■ D0 Abnormally Dry    ■ D3 Drought - Extreme  
■ D1 Drought - Moderate    ■ D4 Drought - Exceptional  
■ D2 Drought - Severe

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



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<http://drought.unl.edu/dm>

Fig. 3. Drought Monitor for Arkansas

Several of the major reservoirs in the Tulsa HSA were reporting below 95% of their normal conservation pools as of March 1, 2011, though most pools have increased since the end of January. All of the reservoirs in the Grand/Neosho River Basin reported full conservation pools. A few reported pools were reporting within 5% of their flood control storage, with Pensacola Lake utilizing 20% of its flood control storage. Conservation pool deficits: Eufaula Lake 74%, Beaver Lake 75%, Tenkiller Lake 79%, Skiatook Lake 85%, Birch Lake 90%, Keystone Lake 92%, and Sardis Lake 93%.

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

Rank since 1921 ("Last XX days" ending February 28, 2011)	Last 30 Days (Jan 30 – Feb 28, 2011)	Water Year (Oct 1, 2010 – Feb 28, 2011)	Winter (Dec 1, 2010 – Feb 28, 2011)	Cool Growing Season (Sep 1, 2010 – Feb 28, 2011)	Last 365 Days (Mar 1, 2010 – Feb 28, 2011)	Year 2011
Northeast OK	20 <sup>th</sup> wettest	11 <sup>th</sup> driest	11 <sup>th</sup> driest	22 <sup>nd</sup> driest	31 <sup>st</sup> driest	28 <sup>th</sup> driest
East Central OK	38 <sup>th</sup> wettest	9 <sup>th</sup> driest	11 <sup>th</sup> driest	31 <sup>st</sup> driest	21 <sup>st</sup> driest	23 <sup>rd</sup> driest
Southeast OK	30 <sup>th</sup> driest	6 <sup>th</sup> driest	10 <sup>th</sup> driest	7 <sup>th</sup> driest	4 <sup>th</sup> driest	9 <sup>th</sup> driest
Statewide	30 <sup>th</sup> driest	10 <sup>th</sup> driest	6 <sup>th</sup> driest	17 <sup>th</sup> driest	18 <sup>th</sup> driest	17 <sup>th</sup> driest

### Outlooks

The [Climate Prediction Center](#) (CPC) outlook for March 2011 (issued February 28, 2011) indicates an enhanced chance for above average temperatures. This outlook also indicates a slightly enhanced chance for below median precipitation approximately southwest of a Tulsa to Fort Smith line, with an equal chance for above, near, and below median precipitation elsewhere. Computer models indicate that moderate La Niña conditions are expected to continue through March. For the 3-month period Mar-Apr-May 2011, CPC is forecasting an enhanced chance for above average temperatures and equal chances for above, near, and below median precipitation across eastern OK and northwest AR (outlook issued February 17, 2011). The

enhanced chance for above average temperatures for the 1- and 3-month outlooks are consistent with La Niña impacts across the southern Plains.

According to CPC, moderate La Niña conditions were observed at the end of February. While negative sea surface temperature anomalies have begun to weaken in parts of the Pacific Ocean, current computer models indicate that La Niña conditions can still be expected to continue through the remainder of spring 2011. However, La Niña or ENSO-neutral conditions are equally likely during May-June 2011. A La Niña Advisory continues, meaning La Niña conditions have been observed and are expected to continue.

## **Summary of February Precipitation Events**

### **February 1 - 15:**

#### **January 31-February 1 Blizzard and Major Winter Storm**

A significant winter storm affected eastern OK and northwest AR January 31 – February 1, 2011. The combination of a deepening upper-level storm system moving across OK and AR, and cold arctic air spilling south into the area, resulted in a major winter storm across all of eastern OK and northwest AR on the night of January 31 and through February 1, 2011. Surface low pressure intensified as it moved from Texas northeast into eastern AR by the afternoon of Feb. 1. This resulted in strong northerly winds across eastern OK and northwest AR, with blizzard to near blizzard conditions at times.

Precipitation moved into eastern OK around 9 pm Jan. 31. The initial precipitation was mostly freezing rain or sleet, but as the cold air continued to spill south, a quick changeover to snow occurred across much of northeast OK. The snow continued, heavy at times, into the afternoon of Feb. 1 before tapering off. A few thunderstorms also accompanied the sleet and snow during the night of Jan. 31. Total snowfall amounts of 10"-15" were common across northeast OK, with isolated heavier amounts near the I-44 corridor. Tulsa officially recorded 14.0" of snow with this storm, breaking the record for the heaviest snowfall from a single storm (see table below for additional records broken). Figures 4 and 5 show snow/sleet and ice accumulation estimates and Figure 6 shows the extent of the snow field after the storm.

Across the rest of eastern OK and northwest AR, freezing rain and sleet persisted for a longer period of time, leading to greater accumulations of ice and sleet. Ice accumulations were generally less than a 0.25", with sleet accumulations of an inch or two in some places. The freezing rain and sleet did eventually change to snow, with snow accumulations ranging from 1"-5" across much of southeast OK and northwest AR. Isolated heavier snow amounts did occur in the northwest corner of AR, where the precipitation was quicker to change over to snow. Liquid equivalent totals from this storm ranged from around 0.25" to 1.25", with isolated areas of 1.5" to 2.25". Well below normal temperatures affected the region in the wake of this system on the 3<sup>rd</sup>, with lows falling to well below 0°F and wind chill values below -20°F across northeast OK and northwest AR (see Figs. 8, 9). For additional information about this event, see: [http://www.srh.noaa.gov/tsa/?n=weather\\_event\\_2011feb1](http://www.srh.noaa.gov/tsa/?n=weather_event_2011feb1)

#### **New Records set at Tulsa, OK due to this storm:**

<b><u>New Records set at Tulsa, OK due to this storm:</u></b>			Previous Record:
<b>February 1, 2011</b>	<b>13.2"</b>	<b>Record Calendar Day Snowfall for Any Day Record Snowfall for February 1 Record Snowfall for the Entire Month of February</b>	12.1" March 8, 1994 5.0" February 1, 1996 10.5" February 2003
<b>Jan. 31 - Feb. 1, 2011</b>	<b>14.0"</b>	<b>Record Event Snowfall Record 24-hour Snowfall</b>	12.9" March 8-9, 1994 12.9" March 8-9, 1994
<b>February 2, 2011</b>	<b>14.0"</b>	<b>Record Maximum Snowfall Depth</b>	11.0" January 7-8, 1988

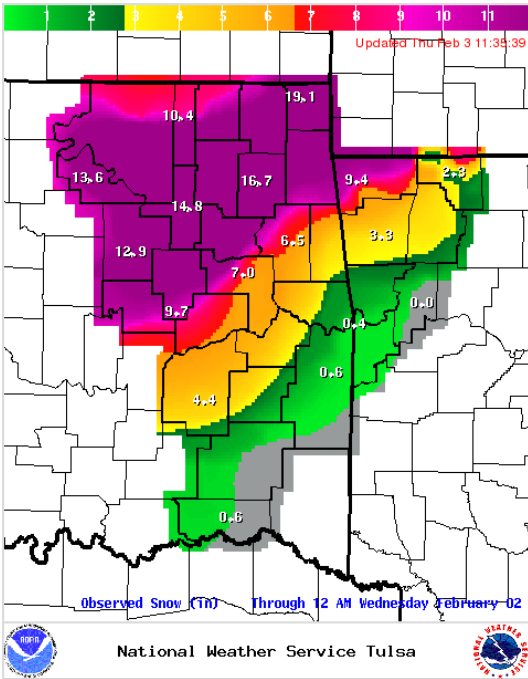


Fig. 4. Estimated sleet/snow totals Jan. 31-Feb. 1, 2011

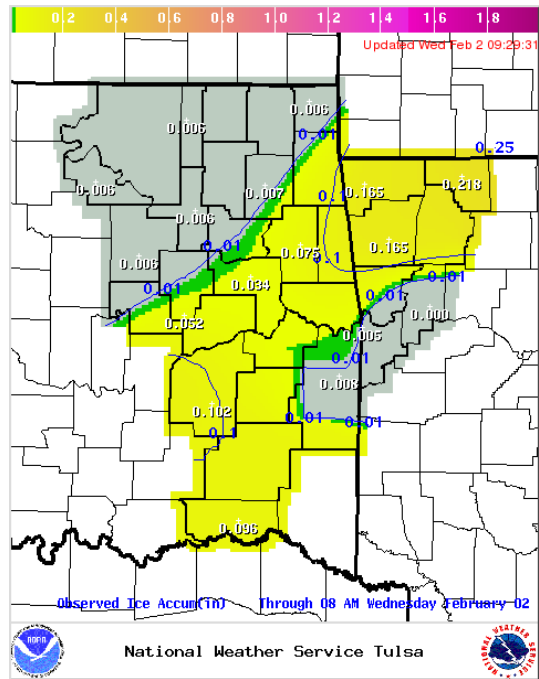


Fig. 5. Estimated ice totals Jan. 31-Feb. 1, 2011

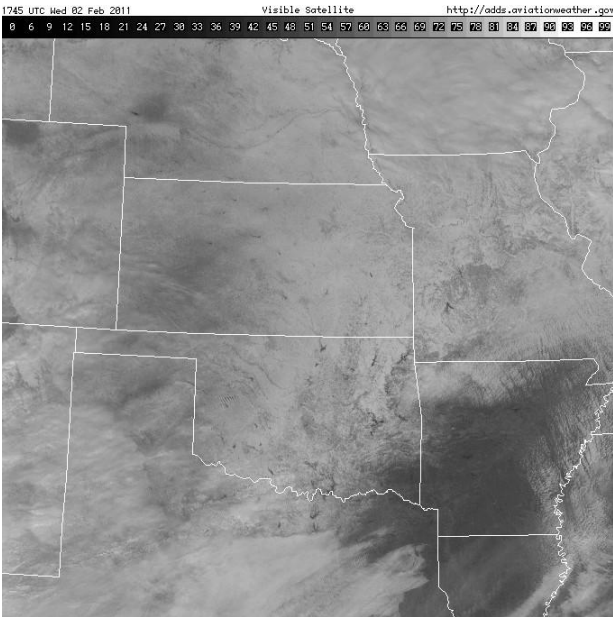


Fig. 6. Visible satellite imagery at 11:45am 2/02/2011.  
White areas in eastern OK and northwest AR area snow.

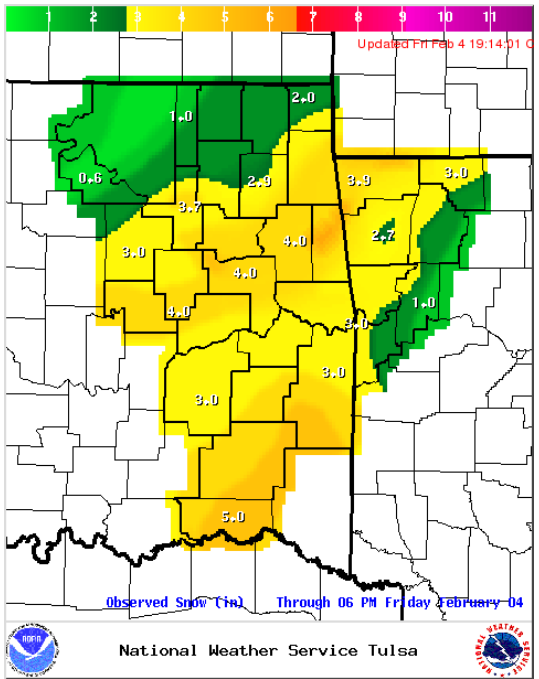
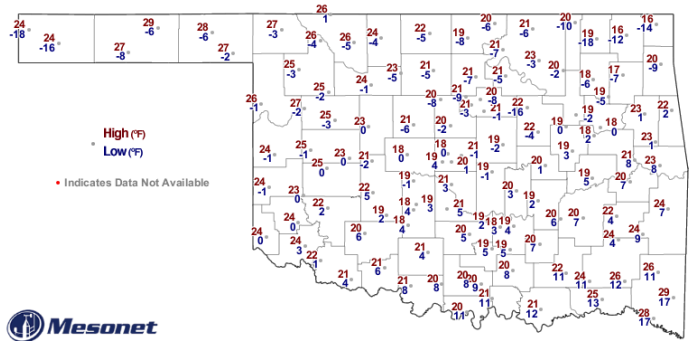


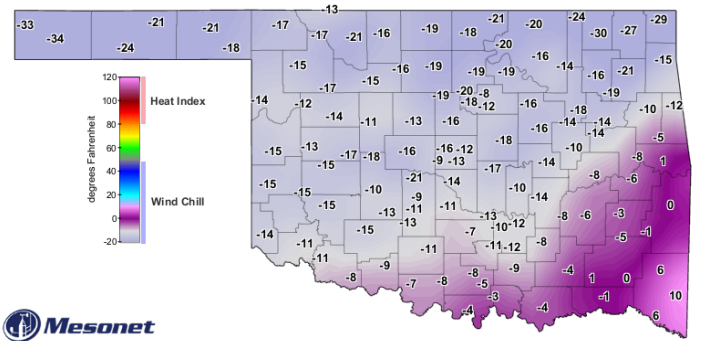
Fig. 7. Estimated sleet/snow totals Feb. 4, 2011

On the heels of the blizzard came another winter storm that brought snow to all of eastern OK and northwest AR February 4, when an upper-level low moved northeast out of TX into southeast OK and northern AR. Widespread snowfall totals of 3"-4" were reported across a large portion of eastern OK and northwest AR, with the highest totals of 5"-5.5" reported in Choctaw, Le Flore, Muskogee, Adair, and Benton Counties (see Fig. 7). Liquid water equivalent values from this event ranged from around 0.10" to near 0.50".

A quick moving upper-level trough moved east near the Red River on the 6<sup>th</sup>, bringing light rain to areas south of an Okemah, OK to Bentonville, AR line. There was some brief light freezing rain across southeast OK at the start of the event, with some light flurries across northwest AR at the end. Rainfall totals ranged from 0.10" to around 0.75", with the highest totals occurring from near McAlester, OK to Fort Smith, AR to Ozark, AR.



Max and Min Temperatures Since Midnight (°F) February 3, 2011  
Created 6:43:07 AM February 4, 2011 CST. © Copyright 2011  
 Fig. 8. Courtesy of the Oklahoma Climatological Survey



Minimum Apparent Temperature Since Midnight (°F) February 3, 2011  
Created 6:43:07 AM February 4, 2011 CST. © Copyright 2011  
 Fig. 9. Courtesy of the Oklahoma Climatological Survey

**February 8-9 Record Breaking Winter Storm**

An upper-level storm system moving across OK and AR, and cold arctic air spilling south into the area, resulted in another major winter storm across eastern OK and northwest AR during the night of February 8th and the morning of February 9th. While this storm system was not as strong as the one the week before, strong frontogenetic forcing led to a narrow band of intense snowfall that remained nearly stationary for several hours near a Ponca City to Chelsea to Fayetteville line. Snowfall amounts within this band ranged from 12"-18" in the western part of the band to 18"-25" in the eastern part of the band (see Figs. 10, 11, 12, 13). The NWS Cooperative Observer in Spavinaw, OK measured 27" of snowfall from this event. This snowfall total is now the new OK state record for greatest 24-hour snowfall, breaking the previous record of 26" set in Woodward, OK and Freedom, OK during the late-March 2009 blizzard.

Outside of the intense snow band, snow amounts from 4"-8" were widespread north of a McAlester to Poteau line, with 1"-4" to the south in far southeast OK. Some sleet also briefly fell as the precipitation began in far southeast OK. The snow was extremely dry with this event, allowing for record breaking snowfall totals. The snow to water ration was near 25:1 during this storm. Liquid equivalent totals from this storm were estimated from around 0.25" to 0.75", with upwards of 1.5" within the heavy snowband. Some blowing and drifting of snow also occurred, but winds were not as strong as they were with the system the previous week, and blizzard criteria were not met with this storm. For additional information about this event, see:

[http://www.srh.noaa.gov/tsa/?n=weather-event\\_2011feb9](http://www.srh.noaa.gov/tsa/?n=weather-event_2011feb9)

Record cold temperatures also occurred on the morning of the 10th as an arctic high pressure system built into eastern OK and northwest AR in the wake of the winter storm. Bartlesville, OK set their all-time record low with a reading of -28°F, which also broke the previous state record of -27°F. Tulsa, OK had a daily record low of -12°F (tied as 5<sup>th</sup> all-time coldest temperature); Fayetteville, AR set a daily record with a low of -18°F; and McAlester, OK set a daily record low with a reading of -4°F. However, the coldest reading was -31°F recorded by the OK Mesonet site in Nowata at 7:40 am CST Feb. 10, 2011 (see Figs. 14, 15). This reading is now the new OK state record for coldest temperature, breaking the previous record of -27°F set in Vinita Feb. 13, 1905; Watts Jan. 18, 1930; and Guthrie Jan. 4, 1947.

**New State Records set due to this storm:**

- 2/8-9/2011 Spavinaw **27"** OK State Record 24-hour Snowfall
- 2/10/2011 Nowata **-31°F** OK State Record Minimum Temperature

Previous Record:

- 26" Woodward, Freedom March 28, 2009
- 27°F Vinita 2/13/1905, Watts 1/18/1930, Guthrie 1/4/1947

**New Tulsa Snowfall Records Set:**

- 5.7" of storm total snow February 8-9, 2011
- 26.1" of snow this cold season through Feb. 9, 2011  
 Ranks as the number 1 snowiest cold season on record as of 2/09/2011 (previous record 25.6" 1923-24)
- 26.1" of snow this year through Feb. 9, 2011  
 Ties as 2nd snowiest year on record as of 2/09/2011 (current record 29.6" 1958)
- 22.5" of snow this February through Feb. 9, 2011  
 Ranks as the number 1 snowiest February on record as of 2/09/2011 (previous record 10.5" 2003)  
 Ranks as the number 1 snowiest Month on record as of 2/09/2011 (previous record 19.7" March 1924)

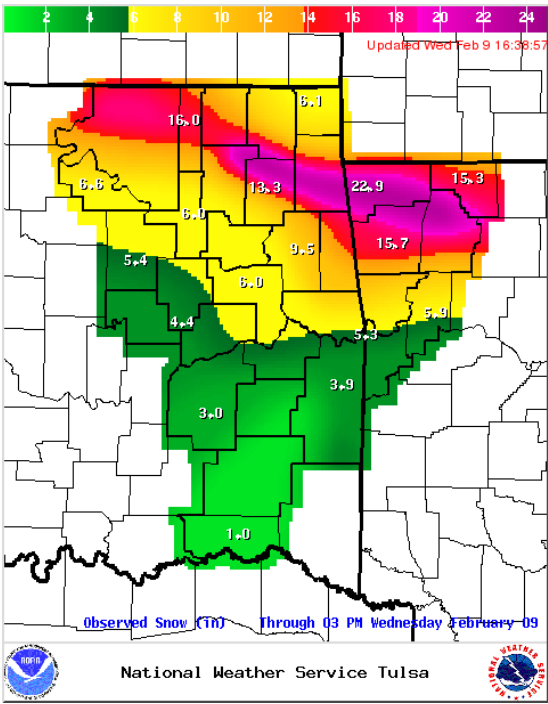


Fig. 10. Estimated sleet/snow totals Feb. 8-9, 2011

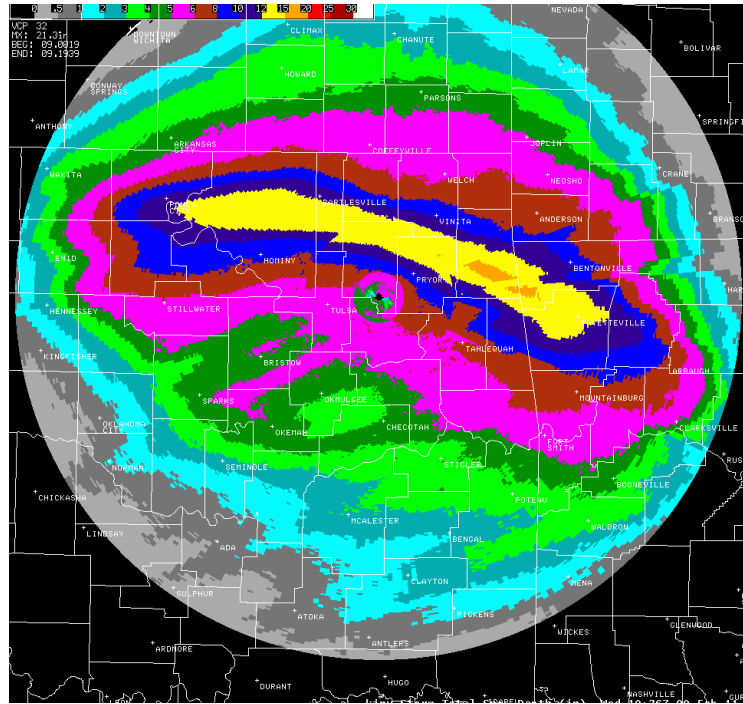


Fig. 11. INX Radar estimated storm total snow depth (in) ending 1:30pm 2/9/2011.



Fig. 12. Jay, OK Photo credit: Von Castor and Fox23 Tulsa



Fig. 13. Jay, OK Photo credit: Von Castor and Fox23 Tulsa

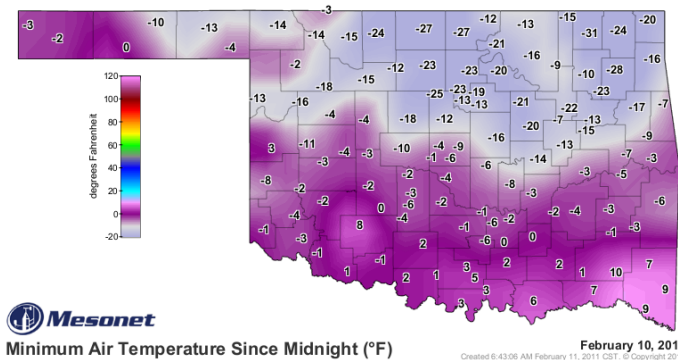


Fig. 14. Courtesy of the Oklahoma Climatological Survey

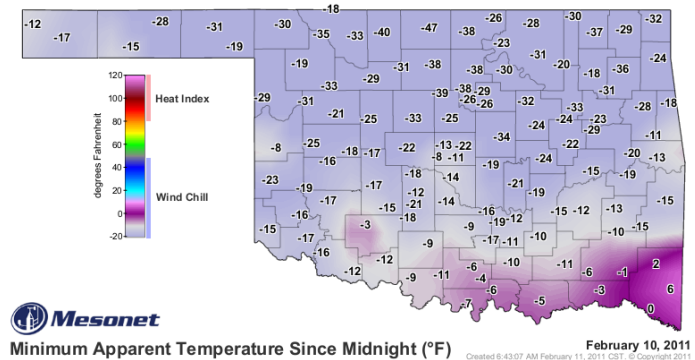


Fig. 15. Courtesy of the Oklahoma Climatological Survey

**February 16 - 28:**

On February 17<sup>th</sup>, record warm temperatures were observed and several wildfires broke out in the warm and windy conditions. Temperatures made a 90°F -110°F swing only one week at many locations after the record breaking cold temperatures and snowfall! The 7-day 110°F temperature change at the mesonet site in Nowata was the greatest such change within seven days in Oklahoma history. See Figures 14, 16.

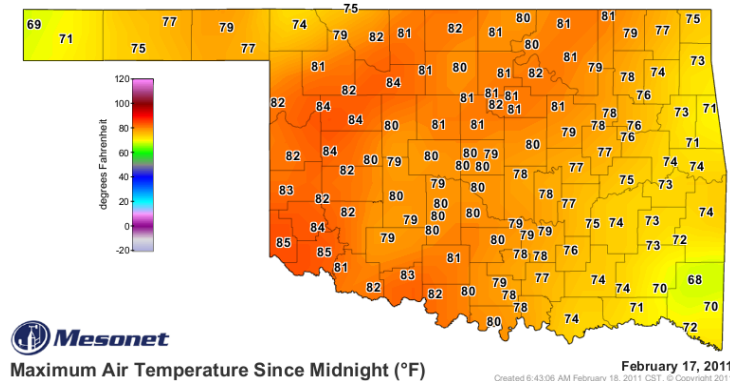


Fig. 16. Courtesy of the Oklahoma Climatological Survey

Tulsa, OK (TSA): 2/28/2011 1-Day Observed Precipitation  
Valid at 2/28/2011 1200 UTC - Created 2/28/11 15:42 UTC

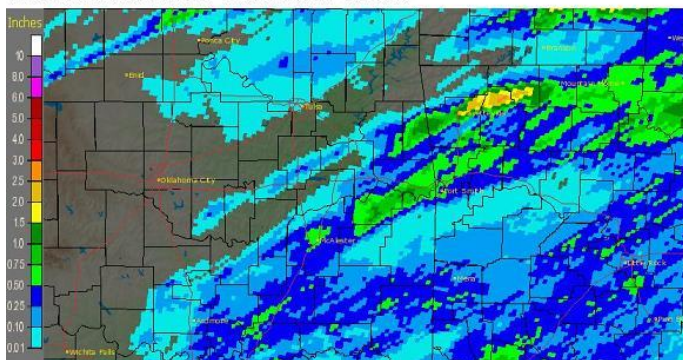


Fig. 17. Estimated 24-hr Observed Rainfall ending 6am 2/28/11.

A cold front moved through the region during the early morning through early afternoon hours of the 21<sup>st</sup>, bringing some widely scattered light showers and a few isolated thunderstorms. Rainfall amounts were only a few hundredths to around one tenth of an inch. A low-level jet and an increase in moisture resulted in widely scattered showers and thunderstorms during the evening and overnight hours of the 22<sup>nd</sup> – 23<sup>rd</sup>. Again, rainfall totals remained light, with a few hundredths to around one tenth of an inch.

A low pressure system affected the region on the 24<sup>th</sup>. A surface low moved across OK, with a warm front stretching across northeast OK into northwest AR. Showers and thunderstorms initially developed near and north of the warm front during the early morning hours. By mid-morning, the dry-line moved into east central and southeast OK. Widespread showers and thunderstorms developed within the warm sector. These storms continued to quickly move east into western AR by early afternoon before moving out of the area by mid evening. Some light wrap-around rain and drizzle affected northeast OK through the overnight hours. Rainfall totals from this system were 0.5" to 1" for much of eastern OK and northwest AR. However, portions of southeast OK received less than 0.5". The highest totals of 1" to localized 2.5" occurred northwest of I-44.

A more significant low pressure system brought severe weather to the region during the evening hours of the 27<sup>th</sup>. Thunderstorms initially developed along the warm front, affecting northeast OK near the OK/KS state line, and a brief tornado occurred near Grainola, OK (Osage County) as supercells moved from OK into KS. As a dry-line moved east, additional thunderstorms developed across southeast and east central OK. These storms eventually developed into a line as they moved northeast into northwest and west central AR during the late night hours. Some of these storms produced damaging winds and large hail, with reports of 70 mph wind gusts in Le Flore and Washington (AR) Counties. Showers and thunderstorms then developed along the Pacific front during the early morning hours, affecting northeast OK and northwest AR before the system exited the region at mid-morning of the 28<sup>th</sup>. A much needed 0.5" to 1.0" of rain occurred across much of the area southeast of an Okemah to Bentonville line. The highest totals of 1.5" to 2.5" occurred over northeast Washington, northern Madison, and southern Carroll Counties (see Fig. 17). Locations across northeast OK and northwest AR received a few hundredths to around one half inch of rainfall from this system.

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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)
- 2 Drought Information Statements (DGT)