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 **January** YEAR **2011**
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 **February 9, 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.

Precipitation was once again meager across eastern OK and northwest AR during January 2011. Normal precipitation for January ranges from 1.2 inches in Pawnee County to 2.2 inches in Haskell County. In the Ozark region of northwest Arkansas, precipitation averages 2.2 inches for the month.

Monthly Summary

Using the radar-derived estimated observed precipitation from the RFCs (Figs. 1a.), rainfall totals for January 2011 ranged from around 0.5" to 1.5" eastern OK and northwest AR. Most of the region received below normal rainfall this month (Fig. 1b), with locations along the I-44 corridor receiving near normal rainfall for the month. Portions of southeast OK and northwest AR only received 10% to 25% of the monthly normal precipitation.

In Tulsa, OK, January 2011 ranked as the 24th coldest January (34.1°F; since records began in 1905), was the 23rd driest January (0.57"; since records began in 1888), and was the 39th snowiest January (3.6"; since records began in 1900). Fort Smith, AR was the 42nd coldest January (37.6°F) and was the 10th driest January (0.51") since records began in 1883, and was the 36th snowiest January (2.8") since records began in 1884.

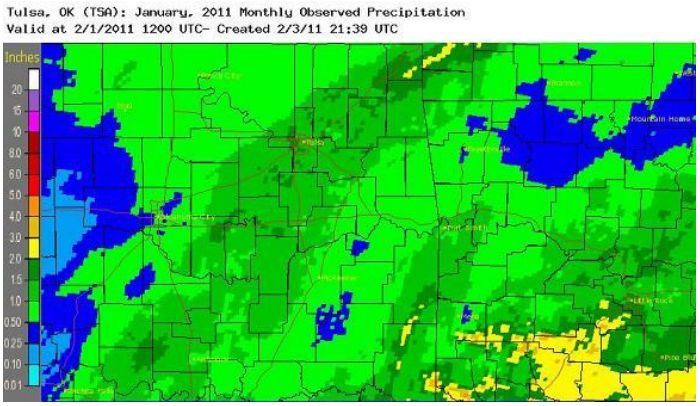
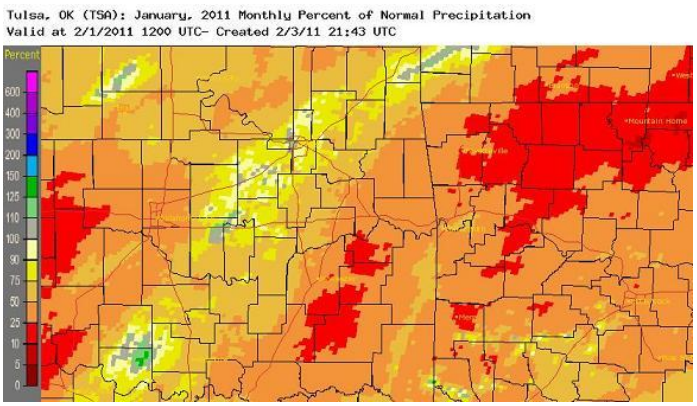


Fig. 1a. Estimated Observed Rainfall for January 2011



1b. Estimated % of Normal Rainfall for January 2011

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

Hugo, OK (meso)	0.89	Fanshawe, OK (coop)	0.70	Cloudy, OK (meso)	0.63
Antlers, OK (meso)	0.61	Riverside Jenks Arpt, OK (ASOS)	0.58	Miami, OK (coop)	0.57
Tulsa, OK (ASOS)	0.57	Cookson, OK (meso)	0.56	Tahlequah, OK (meso)	0.52

According to the U.S. Drought Monitor (USDM) from February 1, 2011, severe drought conditions (D2) were affecting southern Choctaw County. Abnormally dry (D0) and moderate drought (D1) conditions were affecting the remainder of eastern OK and northwest AR (see Figs. 2 & 3). This expansion of drought conditions was

due to the below normal precipitation received again this January, which has exacerbated both the long- and short-term rainfall deficits.

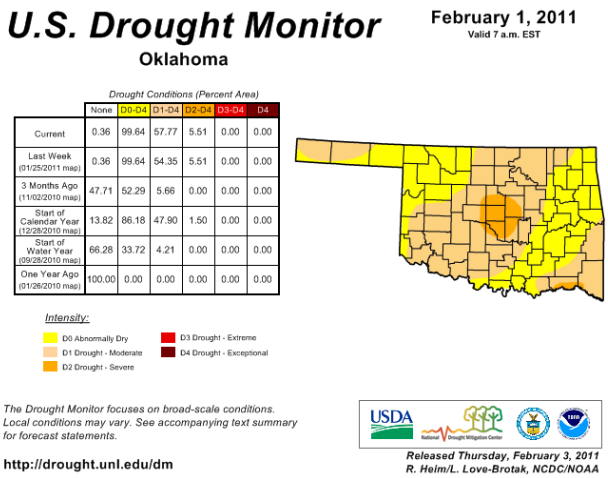


Fig. 2. Drought Monitor for Oklahoma

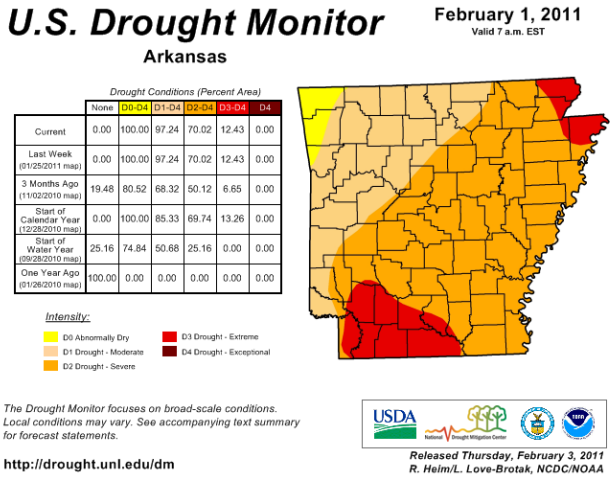


Fig. 3. Drought Monitor for Arkansas

Most of the major reservoirs in the Tulsa HSA were reporting below 90% of their normal conservation pools as of February 4, 2011, though a few reported pools that were 90% - 100% full, and Lake Hudson was actually reporting 3% and Kaw Lake was 1% of flood control storage. Conservation pool deficits: Eufaula Lake 70%, Keystone Lake 70%, Tenkiller Lake 71%, Beaver Lake 71%, Heyburn Lake 81%, Hugo Lake 82%, Copan Lake 84%, Birch Lake 84%, Skiatook Lake 84%, Hulah Lake 84%, and Ft. Gibson Lake 86%.

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

Rank since 1921 ("Last XX days" ending January 31, 2011)	January 2011	Winter to Date (Dec 1, 2010 – Jan 31, 2011)	Last 90 Days (Nov 3, 2010 – Jan 31, 2011)	Water Year (Oct 1, 2010 – Jan 31, 2011)	Cool Growing Season (Sep 1, 2010 – Jan 31, 2011)	Last 180 Days (Aug 5, 2010 – Jan 31, 2011)
Northeast OK	**8th driest**	**1st driest**	**11th driest**	**7th driest**	**18th driest**	**18th driest**
East Central OK	**7th driest**	**5th driest**	**5th driest**	**6th driest**	32nd driest	22nd driest
Southeast OK	**6th driest**	**14th driest**	**10th driest**	**8th driest**	**8th driest**	**5th driest**
Statewide	**6th driest**	**2nd driest**	**10th driest**	**10th driest**	**17th driest**	**17th driest**

Outlooks

The Climate Prediction Center (CPC) outlook for February 2011 (issued January 31, 2011) indicates a slightly enhanced chance for above average temperatures across eastern OK and northwest AR. This outlook as indicates a slightly enhanced chance for above median precipitation across western AR, with equal chances for above, near, and below median precipitation across eastern OK. For the 3-month period Feb-Mar-Apr 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 January 20, 2010). The enhanced chance for above average temperatures for the 1- and 3-month outlooks is consistent with La Niña impacts across the southern Plains.

According to CPC, borderline strong La Niña conditions were observed at the end of January. 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 Precipitation Events

January 1 - 15:

The first precipitation of the year was snow as two storm systems affected eastern OK and northwest AR. As the first system moved into the area, precipitation spread north out of TX and affected primarily southeast OK and west central AR on January 9th. This system brought widespread 1" to 3" of snow, including 1" of snow measured officially in Fort Smith, AR (see Fig. 4, 5). The highest amount of near 5" was estimated near Sobol in Pushmataha County, and 4" of snow was reported near Ft. Towson, 2SE Hugo, and 5NW Wister. A trace to light dusting of snow occurred elsewhere across eastern OK and northwest AR. Liquid equivalent amounts were generally 0.10" to 0.25" south of I-40, with only a trace to a few hundredths of an inch elsewhere.

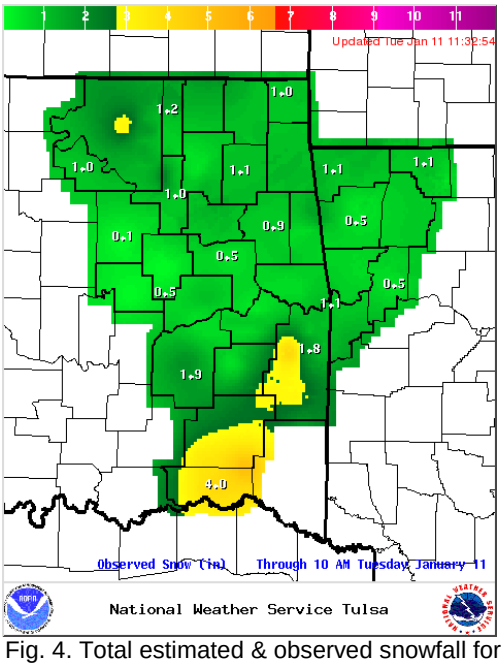


Fig. 4. Total estimated & observed snowfall for January 9-10, 2011.

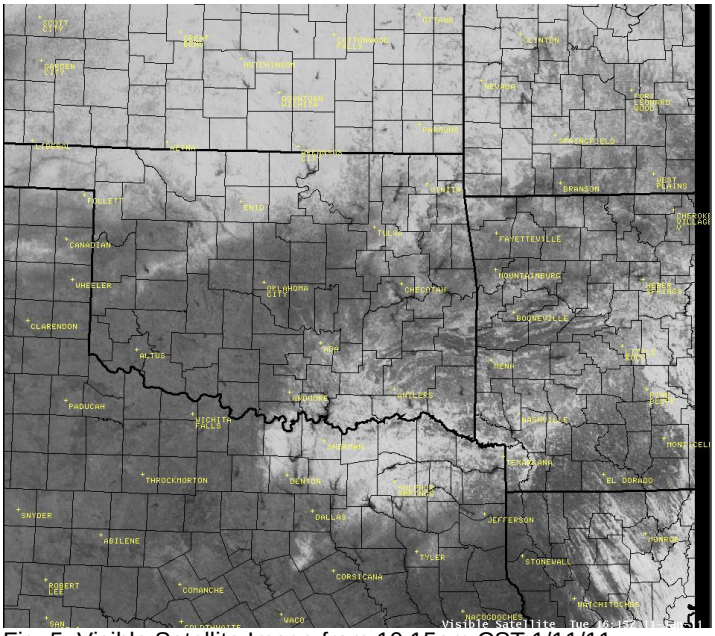


Fig. 5. Visible Satellite Image from 10:15am CST 1/11/11. White areas are snow cover.

A second, strong, upper-level wave then moved across the Southern Plains on the 10th. Light to moderate snow fell across northeast OK during the morning hours, with renewed development in the afternoon across northeast and east central OK, as well as northwest AR. Snowfall totals from this second system were generally around 1" or less, with Tulsa officially measuring 0.8" (see Figs. 4, 5). The highest snowfall report was 3" from 2S Pawhuska in Osage County. Liquid equivalent values from this secondary wave of snowfall were 0.1" to 0.25" across the counties bordering Kansas, with less than 0.1" elsewhere. An arctic airmass moved into the region on the heels of this system, bringing below freezing temperatures to most of the HSA for several days. Most locations recorded 90-120 consecutive hours of below freezing temperatures. Northerly winds also yielded wind chill values several degrees below zero across a large portion of northeast OK and northwest AR (see Figs. 6-7). The mesonet station in Foraker reported a wind chill of -10°F on the morning of the 1/11/11 and -14°F on the morning of the 1/12/11. Also interestingly, on January 11th, snow was on the ground in 49 states, with only Florida without snow.

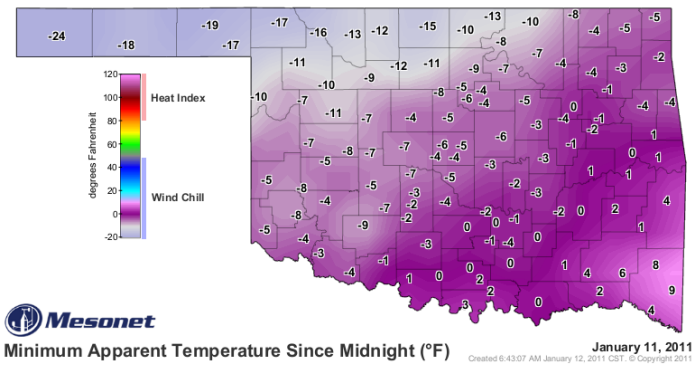


Fig. 6. Minimum Wind Chill 1/11/11. Courtesy OCS.

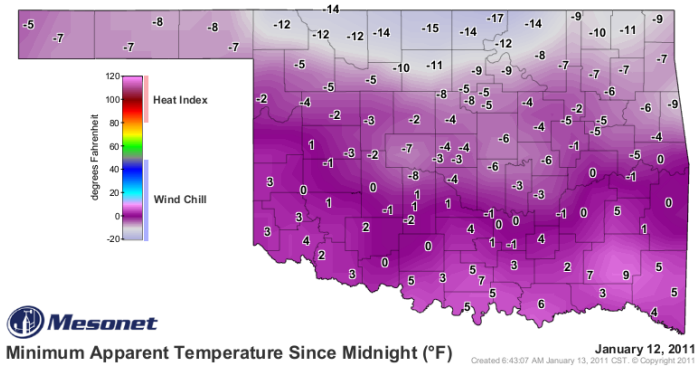


Fig. 7. Minimum Wind Chill 1/12/11. Courtesy OCS.

January 16 - 31:

A shallow cold front became hung up in the higher terrain of far southeast OK on the 16th, allowing for a few hundredths to around one tenth of an inch of rainfall across Choctaw County. As another cold front and upper-level wave approached the area on the 17th, light rain developed across northeast and east central OK, as well as northwest AR. Most locations only received a few hundredths of an inch of rainfall, with isolated areas of around one tenth of an inch.

A storm system brought a mix of wintery precipitation to the area beginning on the evening of the 19th and continuing into the early afternoon of the 20th. The precipitation started off as a mix of freezing rain/drizzle and sleet near a Bristow to Tulsa to Jay line, leading to a light glaze on elevated surfaces. As colder air progressed to the southeast and wet-bulb effects occurred, the precipitation quickly changed over to snow. This same process continued as the area of precipitation expanded and moved southeast across eastern OK and northwest AR. Once the atmosphere was cold enough, periods of moderate snow occurred across northeast OK and northwest AR. 1"-3" of snow was common along and north of Bristow, OK to Fort Smith, AR line, with several locations reporting snowfall totals of 4". Isolated snowfall amounts of 5"-6" were also reported across this area (see Fig. 8). Further south, snowfall totals were generally only a few tenths. Bands of heavier precipitation can be seen on the KINX radar estimated liquid precipitation storm total in Fig. 9. Liquid equivalent totals were estimated to be generally less than 0.25" across most of the region, though higher amounts up to 0.5" occurred in areas with higher snowfall totals or longer periods of liquid rainfall.

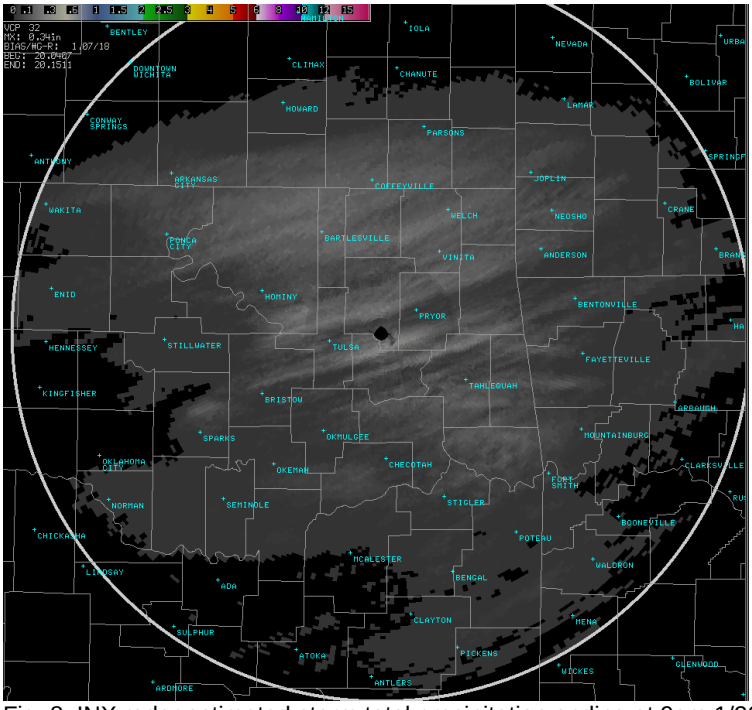


Fig. 8. INX radar estimated storm total precipitation ending at 9am 1/20/11. Can see where bands of rain, freezing rain, sleet, and snow affected northeast OK.

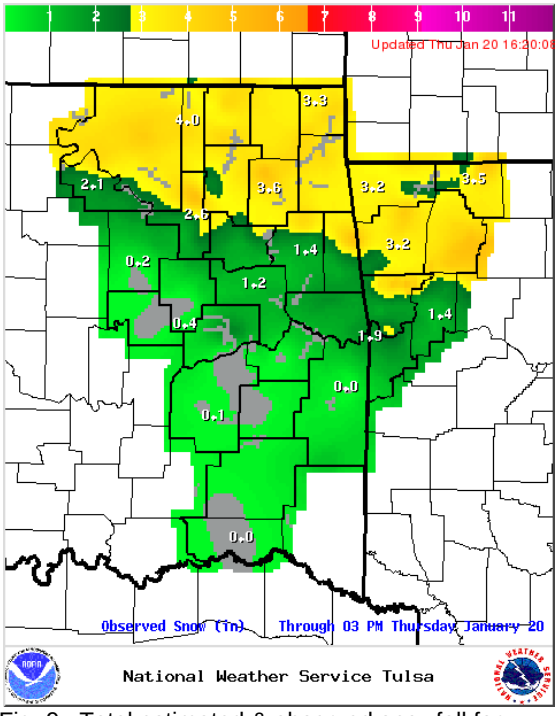


Fig. 9. Total estimated & observed snowfall for January 19-20, 2011

Patches of light rain developed across southeast OK and west central AR during the afternoon of the 23rd as a cold front moved through the region. While most of the affected areas received only a few hundredths of an inch of rain, isolated locations had upwards of around one quarter of an inch.

Significantly warmer temperatures occurred on the 28th – 29th across the area, with many locations recording high temperatures in the upper 60s to mid 70s. On the 29th, a record high of 76°F tied in Tulsa (tied with 1947), a record high of 74°F tied in McAlester (tied with 2002), and a record high of 74°F was set in Fayetteville (previous record was 73°F 2002). Only a few days later, record lows and record snowfall was being set.

A significant winter storm began to affect eastern OK and northwest AR on the last day of the month. The combination of a deepening upper-level storm system moving across Oklahoma and Arkansas, and cold arctic

air spilling south into the area, resulted in a major winter storm across all of eastern Oklahoma and northwest Arkansas on the night of January 31 and through February 1, 2011. Surface low pressure intensified as it moved from Texas northeast into eastern Arkansas by the afternoon of Feb. 1. This resulted in strong northerly winds across eastern Oklahoma and northwest Arkansas, with blizzard to near blizzard conditions at times. Precipitation moved into eastern Oklahoma 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 Oklahoma. 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 inches were common across northeast Oklahoma, with isolated heavier amounts near the Interstate 44 corridor. Tulsa officially recorded 14.0 inches of snow with this storm, breaking the record for the heaviest snowfall from a single storm. Figures 10 and 11 show snow/sleet and ice accumulation estimates.

Across the rest of eastern Oklahoma and northwest Arkansas, 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 quarter inch, 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 to 5 inches across much of southeast Oklahoma and northwest Arkansas. Isolated heavier snow amounts did occur in the northwest corner of Arkansas, 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”.

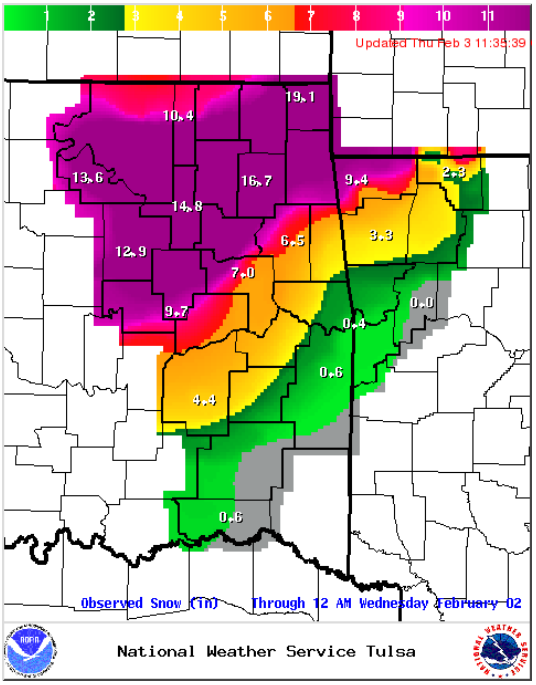


Fig. 10. Estimated sleet/snow totals Jan. 31-Feb. 1, 2011

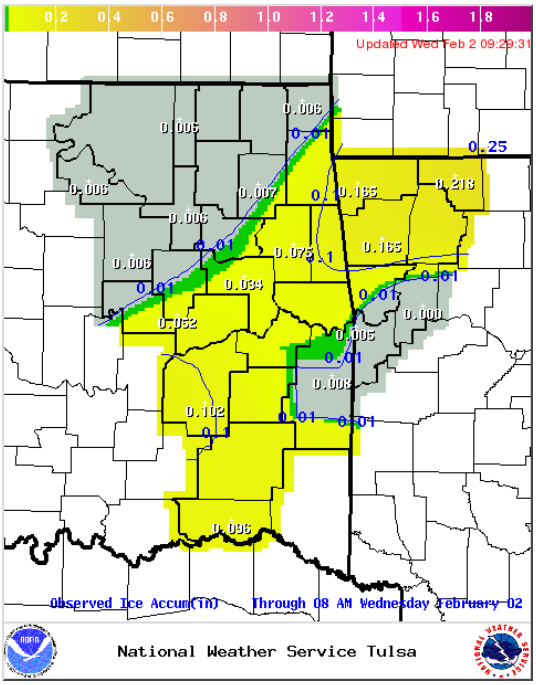


Fig. 11. Estimated ice totals Jan. 31-Feb. 1, 2011

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)
1 Drought Information Statements (DGT)