

Storm Data and Unusual Weather Phenomena - February 2013

Location	Date/Time	Deaths & Injuries	Property & Crop Dmg	Event Type and Details
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OKLAHOMA, Panhandle

(OK-Z001) CIMARRON, (OK-Z002) TEXAS, (OK-Z003) BEAVER

02/01/13 00:00 CST	0	Drought
02/28/13 23:59 CST	50M	

The late February blizzard brought some much needed relief for Beaver County, but the remainder of the Oklahoma Panhandle saw drought conditions worsen. Exceptional (D4) drought affects all of Cimarron and Texas County. Beaver County improved from exceptional (D4) drought to extreme (D3) drought.

The late February blizzard produced 1 to 15 inches of snow across the Oklahoma Panhandle which equaled the majority of the precipitation for the month. Guymon recorded 1.25 inches of precipitation (0.78 inches above normal) for the month. Overall this month ranked as the 39th coldest and 10th wettest February on record for the Oklahoma Panhandle.

Limited dormant fuels remain in prime condition for the spread of fires across the Panhandle. However, the beneficial moisture provided by the blizzard caused the Keetch-Byram Drought Index for the Oklahoma Panhandle to improve to the 400 to 600 range.

The increased moisture during the month helped the growth of dryland winter wheat and native grazing fields. Irrigated fields showed average growth with minor supplemental watering. The Palmer Drought Severity Index showed significant improvement to near normal rating for the Oklahoma Panhandle. Water watches remain in effect for several public water systems through February while voluntary to mandatory water restrictions have been enacted.

Economic losses due to the drought through February were estimated near \$10 million (D3)/\$20 million (D4) a county, and were predominately the result for poor growth of winter wheat, heavy supplemental watering, and supplemental feed for cattle in pastures and rangeland.

(OK-Z002) TEXAS

02/09/13 18:15 CST	0	High Wind (MAX 52 kt)
02/09/13 18:17 CST	0	

A vigorous lee side low pressure system developed across southeastern Colorado and northeastern New Mexico during the afternoon on February 9th. This created a strong surface pressure gradient across the western Oklahoma Panhandle. Sustained winds of 25 to 30 mph with gusts up to 50 mph were common across the Panhandle. However, strong mid layer winds of 60 to 70 mph mixed to the surface to produce a 60 mph gusts at the Oklahoma mesonet site 2 miles east of the city of Goodwell (Texas County). The surface low moved off the southern Rockies and into southwestern Kansas, and a surface cold front swept across the Oklahoma Panhandle. The stabilization of the near surface atmosphere provided by the cooler post-frontal airmass, and a weakening of the surface pressure gradient brought an end to high wind conditions by 7 PM CST.

(OK-Z001) CIMARRON, (OK-Z002) TEXAS, (OK-Z003) BEAVER

02/12/13 00:23 CST	0	Winter Weather
02/12/13 15:00 CST	0	

During the late night hours of the 11th and early morning hours of the 12th, an upper level trough of low pressure moved out of southern New Mexico and into west central Texas. This placed the Oklahoma Panhandle on the left front quadrant of 120 to 140 mph jet streak and within the warm sector of an 850mb closed low. This closed low brought moisture from the Gulf of Mexico over the cold surface airmass. This moisture coupled with the lift from the jet streak to initiate snow showers over eastern New Mexico just prior to midnight on February 12th. These showers expanded eastward quickly to enter the Oklahoma Panhandle around 12:30 AM CST. By 2:30 AM CST, snow showers had produced 1 inch of snow in Beaver (Beaver County) as reported by local Emergency Management. Bands of enhanced snow showers developed as the upper level trough of low pressure took on a more negatively tilted orientation by 6 AM CST. These enhanced bands quickly produced multiple inches of snow across the Panhandle, and made driving hazardous due to near zero visibilities. No injuries were reported, but multiple single vehicle accidents were reported across the area. By noon, the upper level trough was over the eastern Oklahoma Panhandle causing snow to end across the far west. The remaining snow showers across the Panhandle ended by 3 PM CST as the 850mb closed low moved over east Texas, removing the necessary moisture to support snow. Storm total amounts of 1 to 5 inches were reported across the Oklahoma Panhandle.

The following is a list of the highest snowfall totals per county: 5 inches in Slapout (Beaver County); 1 inch in Kenton (Cimarron County); and 5 inches Goodwell (Texas County).

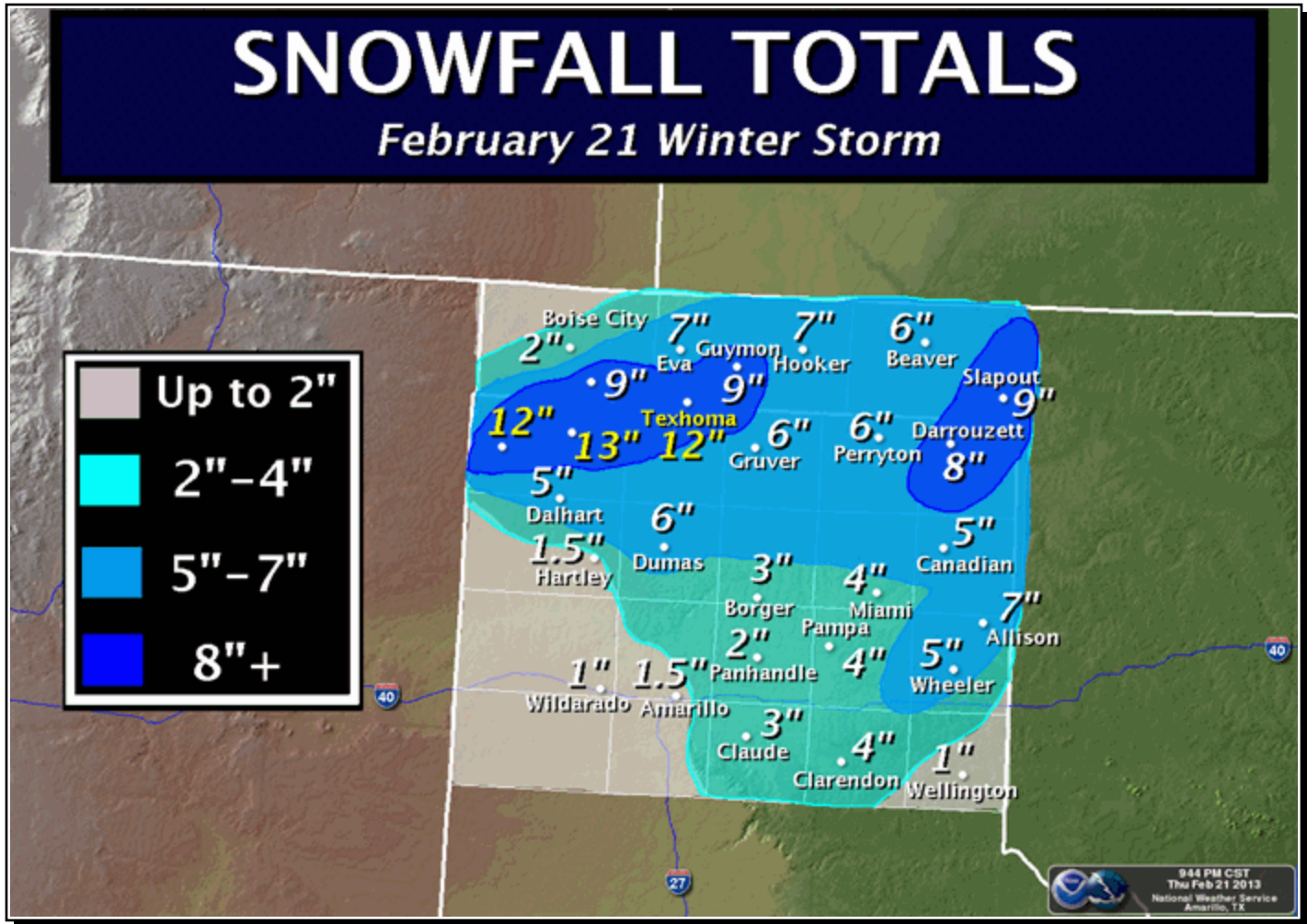
(OK-Z001) CIMARRON, (OK-Z002) TEXAS, (OK-Z003) BEAVER

02/20/13 19:00 CST	0	Winter Storm
02/21/13 14:00 CST	0	

Storm Data and Unusual Weather Phenomena - February 2013

Location	Date/Time	Deaths & Injuries	Property & Crop Dmg	Event Type and Details
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A potent upper level low moved across southern New Mexico during the evening hours of February 20th. This system would go on to produce several inches of snow with a maximum of 12 inches in Texas County after making a transition from rain and sleet to all snow. As the upper level low moved into southeastern New Mexico it transitioned from a neutral tilt to a slightly negative tilt. This reorientation provided additional lift across the southwestern and eastern Oklahoma Panhandle which in turn helped intensify snowfall rates. It was in this area where the two highest snow depths occurred, 9 to 12 inch swath across southern Cimarron County and southwestern Texas County, and an 8 to 9 inch swath across southeastern Beaver County. By the early afternoon the upper level low had progressed over central Kansas, removing forcing across the Panhandle and bringing an end to precipitation. The following is a listing of the highest storm total snowfall for each county: 12.0 inches in Texhoma (Texas County); 9.0 inches nine miles southeast of Boise City (Cimarron County); 9.0 inches in Slapout (Beaver County).



Map showing the highest snow amounts across the Texas and Oklahoma Panhandle made by the National Weather Service Office in Amarillo.

(OK-Z002) TEXAS, (OK-Z003) BEAVER

02/24/13 21:00 CST	1.34M	Blizzard
02/25/13 17:00 CST	0	

Between the evening hours of February 24 and the afternoon hours of February 25th, widespread snowfall totals of 1 to 15 inches of snow were reported across the Oklahoma Panhandle. This snowfall crippled the Panhandle in ways not seen since the 1957 and 1934 blizzards.

The 6 PM CST upper air analysis on February 24th revealed a closed mid-level low pressure system diving south-southeastward from the Four Corners Region. This positioning put the Oklahoma Panhandle under the front right quadrant of a 90 mph to 120 mph upper level jet streak, and caused a transition of a surface stationary front draped across the Southern Texas Panhandle into a cold front. The large scale forcing provided by the aforementioned factors coupled with low level moisture advection to initiate snow showers over eastern New Mexico. These snow showers quickly expanded into the western Oklahoma Panhandles. The surface cold front surged southward in advance of the snow showers, which ensured any precipitation reaching the ground would be in a frozen state. A few embedded

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lightning strikes were evident as snow showers taped into very steep mid-level temperature lapse rates and weak elevated instability while moving further into the Panhandle. Snowfall rates of 1 inch to 2 inches per hour were observed, but higher snow fall rates of 2 inches to 3 inches per hour were possible given the weakly convective nature of some of the storms.

By midnight of the 25th, the mid-level closed low had progressed into southeastern New Mexico. This placed the Panhandles squarely in the "comma head" of the system. As a result, bands of heavy snow developed from Hereford, Texas (Deaf Smith County) to Slapout, Oklahoma (Beaver County). Weak instability continued to produce isolated lightning strikes within these snow bands. Sustained surface winds across the Panhandle had built into the 30 to 40 mph range in response to the strong post-frontal surface pressure gradient and occasional 55 to 65 mph winds gusts were reported within the heavier snow bands. These blizzard conditions caused visibilities to drop as low as 50 feet, and produced multiple inches of snow over several hours.

By 6 AM CST, the mid-level closed low was positioned near Sweetwater, Texas, and heavy bands of snow were still evident on radar along a Hereford, TX (Deaf Smith County) to Slapout, Oklahoma (Beaver County) line. Snow amount reports averaged between 4 to 10 inches along and to either side this line with Beaver (Beaver County) measuring eight inches. Blizzard conditions continued throughout the morning hours.

By 12 PM CST, the mid-level closed low had progressed into north central Texas allowing a clearing line to approach the New Mexico/Oklahoma state line. This further east position of the low also had a diminishing effect on the heaviest snow bands as the upper level forcing had lessen. Snowfall rates dropped to below 1 inch per hour, and the surface pressure gradient was slowly weakening to allow slower sustained surface winds. However, near zero visibilities were still reported in locations where snow had ended due to blowing snow. The clearing line was positioned from Amarillo, Texas (Randall and Potter County) to Guymon, Oklahoma (Texas County) by 3 PM CST, and distinct snow bands were no longer evident on radar. Surface winds had also dropped below 35 mph sustained to bring an end to blizzard conditions across the Panhandles. Snow showers continued to diminish before coming to an end just before 10 PM CST.

The following is a listing of the highest snow amounts per county: 15.0 inches in Slapout (Beaver County); 5 inches in Guymon (Texas County); and trace of snow in Boise City (Cimarron County).

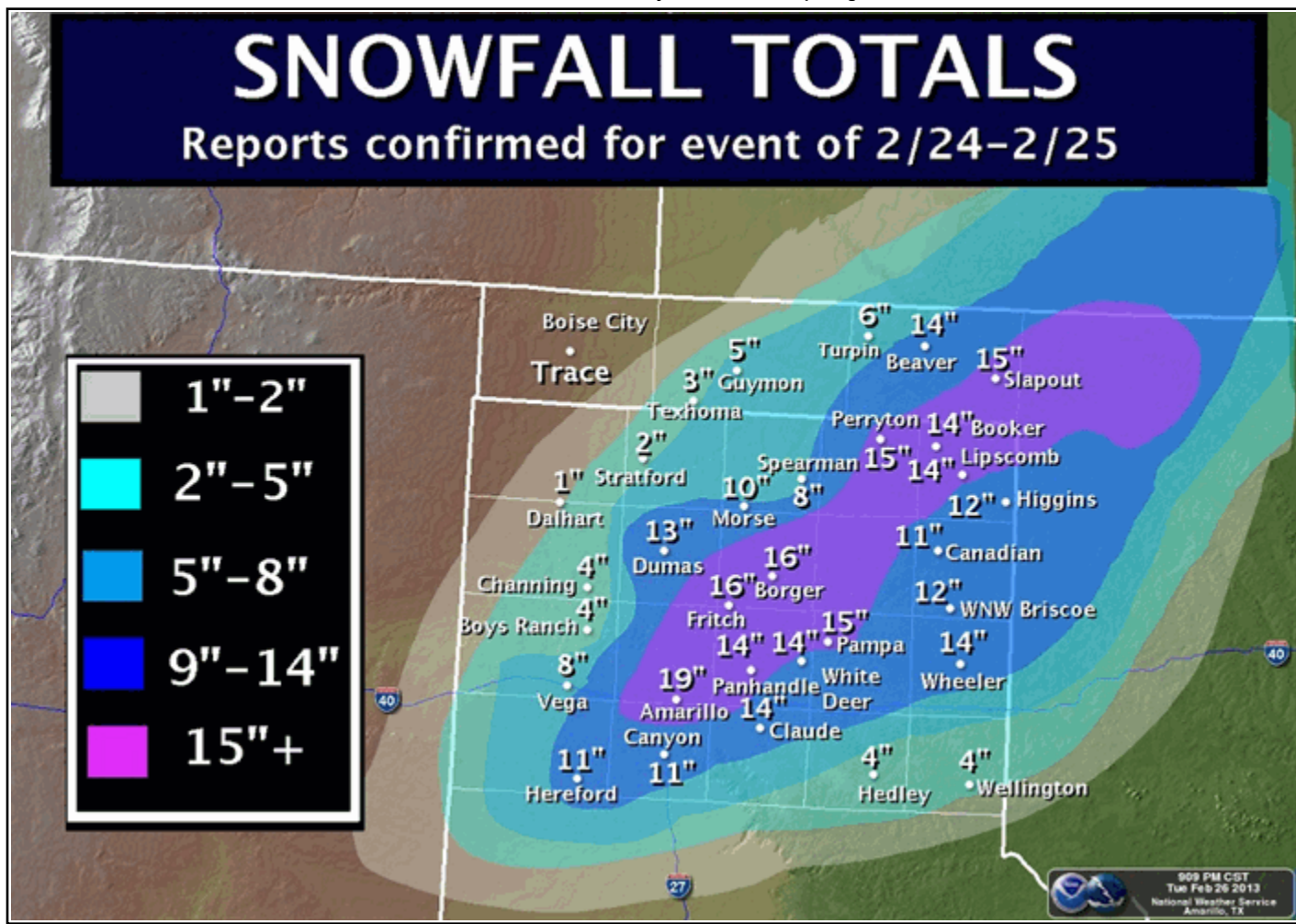
While the total economic losses due to the blizzard remains largely undocumented, the blizzard cost cattle farmers across the Texas and Oklahoma Panhandle \$10.24 million in cattle losses. The 5 to 15 inch swath of snow across the central and eastern Oklahoma Panhandle paralyzed traffic, and the Oklahoma Department of Transportation (OKDOT) to close all roads and highways across the region. Numerous motorists became stranded during and after the blizzard.

The blizzard forced businesses to shut down, caused temporary power outages, and limited the supply of goods by paralyzing delivery methods. Toot-n-Totum closed 52 of their 62 locations across the panhandles, which was the first time in 62 years of operations that so many locations were closed. The remaining 10 locations were reported to have been visited by 11,000 customers with lines of 40 to 50 people deep according to security camera estimates.

Economic losses per county estimated from known cattle losses, estimated department of transportation costs, and estimated vehicle repairs.

Storm Data and Unusual Weather Phenomena - February 2013

Location Date/Time Deaths & Property & Event Type and Details
 Injuries Crop Dmg



Snow total map created by the National Weather Service Office in Amarillo, Texas.

(OK-Z001) CIMARRON

02/24/13 21:00 CST	0	Winter Weather
02/25/13 22:00 CST	0	

Between the evening hours of February 24 and the afternoon hours of February 25th, widespread snowfall totals of 1 to 15 inches of snow were reported across the Oklahoma Panhandle. This snowfall crippled the Panhandle in ways not seen since the 1957 and 1934 blizzards. However the positioning of the mid-level closed low pressure system kept the majority of Cimarron County on the dry side of the system. Only the extreme southeastern corner of the county received up to 1 inch of snow.

Storm Data and Unusual Weather Phenomena - February 2013

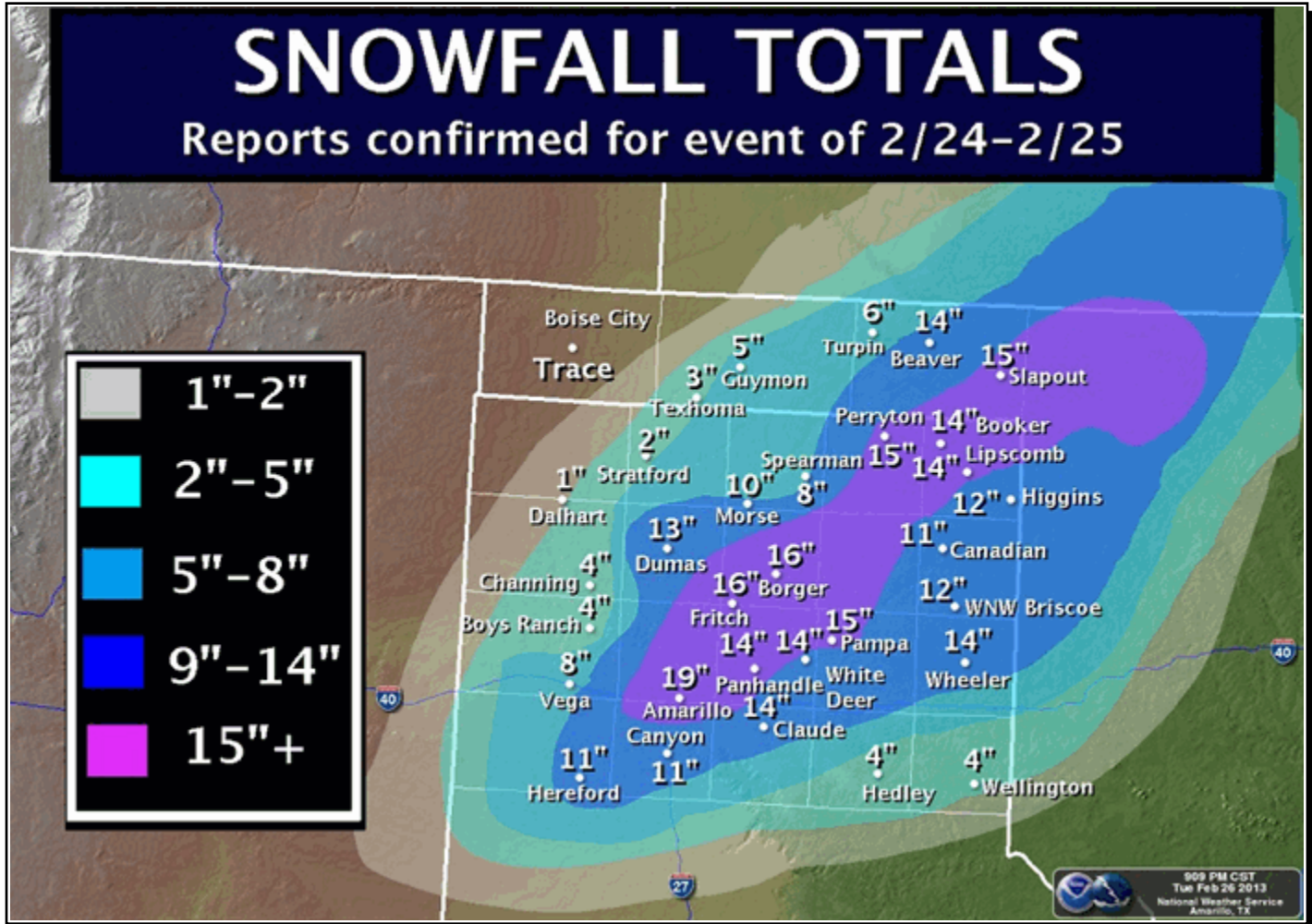
Location

Date/Time

Deaths &
Injuries

Property &
Crop Dmg

Event Type and Details



Storm total snow amounts map for the Texas and Oklahoma Panhandle due to the February 24th and 25th created by the National Weather Service Office in Amarillo, Texas.

TEXAS, North Panhandle

(TX-Z001) DALLAM, (TX-Z002) SHERMAN, (TX-Z003) HANSFORD, (TX-Z004) OCHILTREE, (TX-Z005) LIPSCOMB, (TX-Z006) HARTLEY, (TX-Z007) MOORE, (TX-Z008) HUTCHINSON, (TX-Z009) ROBERTS, (TX-Z010) HEMPHILL, (TX-Z011) OLDHAM, (TX-Z012) POTTER, (TX-Z013) CARSON, (TX-Z016) DEAF SMITH, (TX-Z017) RANDALL, (TX-Z018) ARMSTRONG	02/01/13 00:00 CST	0	Drought
	02/28/13 23:59 CST	0.13B	

February brought both sporadic and widespread winter precipitation to the Texas Panhandle, which led to a one drought category improvement for most of the region. Exceptional (D4) drought affects Dallam County. Extreme (D3) drought affects most of the northern Texas Panhandle. Severe (D2) drought affects the southwestern Texas Panhandle while the southeastern corner has dropped below the severe drought rating.

The late February blizzard produced the majority of the total precipitation for the month. Amarillo recorded 2.53 inches of precipitation for February (1.97 inches above normal), Dalhart recorded 0.63 inches (0.23 inches above normal), and Borger recorded 2.24 inches of precipitation (1.62 inches above normal). Overall this month ranked as the 48th coldest and 8th wettest February on record for the Texas High Plains region.

Limited dormant fuels remain in prime condition for the spread of fires across the Panhandle despite the recent precipitation. However, the Keetch-Byram Drought Index showed continued improvement for the Texas Panhandle. Only Dallam and Hartley Counties remaining within the 600 to 800 range while the majority of the area stayed within the 400 to 600 range. The 200 to 400 range now encompasses the entirety of the southeastern corner of the Texas Panhandle. Countywide burn bans remain in effect for all of the Texas Panhandle except for Hansford, Sherman, Hutchinson, Oldham, Casron, Gray, Wheller, and Deaf Smith Counties.

Storm Data and Unusual Weather Phenomena - February 2013

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The increased moisture during the month helped the growth of dryland winter wheat and native grazing fields. Irrigated fields showed average growth with minor supplemental watering. Rangeland and pastures across the Texas Panhandle have remained in poor to very poor condition. However cattle have been able to graze on the winter wheat crops that have greened from the recent precipitation as observed by the Texas Crop and Weather Report. The Palmer Drought Severity Index showed marginal improvement to Moderate Drought for the Texas High Plains.

Reservoirs and stream flows across the Panhandles have remained at below normal levels with only a minor rise due to the recent precipitation. The reservoirs of Palo Duro and Greenbelt Lake are both below 13 percent capacity with Lake Meredith below 1 percent capacity. Water watches for several public water systems persisted through February while voluntary to mandatory mild water restrictions have been enacted.

Economic losses due to the drought through February were estimated near \$5 million (D2)/\$10 million (D3)/\$20 million (D4) a county, and were predominately the result for poor growth of winter wheat, heavy supplemental watering, and supplemental feed for cattle in pastures and rangeland.

(TX-Z001) DALLAM, (TX-Z006) HARTLEY, (TX-Z011) OLDHAM, (TX-Z016) DEAF SMITH

02/09/13 14:04 CST	0	High Wind (MAX 55 kt)
02/09/13 18:00 CST	0	

A vigorous lee side low pressure system developed across southeastern Colorado and northeastern New Mexico during the afternoon on February 9th. This created a strong surface pressure gradient across the western Texas Panhandle. Sustained winds of 25 to 30 mph with gusts up to 50 mph were common across the Panhandle. However, strong mid layer winds of 60 to 70 mph mixed to the surface to produce 58 to 63 mph wind gusts at Dalhart (Hartley and Dallam County) Bootleg (Deaf Smith County), and Slapout (Deaf Smith County). Also sustained winds of 42 to 44 mph were reported at Dalhart (Dallam and Hartley County), Bootleg (Deaf Smith County), and Adrian (Oldham County) between 3 PM and 6 PM CST. The surface low moved off the southern Rockies and into southwestern Kansas, and a surface cold front swept across the Texas Panhandles. The stabilization of the near surface atmosphere provided by the cooler post-frontal airmass, and a weakening of the surface pressure gradient brought an end to high wind conditions for the Texas Panhandle by 7 PM CST.

The following is a list of the highest wind gusts across the Texas Panhandle: West Texas Mesonet site 11 miles west-northwest of Bootleg (Deaf Smith County) 60 mph, West Texas Mesonet site at Slapout (Deaf Smith County) 63 mph, NWS ASOS at Dalhart (Dallam and Hartley County) 58 mph.

DONLEY COUNTY --- 2.7 WSW CLARENDON [34.92, -100.95], 2.5 NE CLARENDON [34.95, -100.87]

02/09/13 19:47 CST	0	Hail (1.00 in)
02/09/13 19:49 CST	0	Source: Public

One inch hail was reported in the city of Clarendon (Donley County) by members of the public.

DONLEY COUNTY --- 1.9 S LELIA LAKE [34.87, -100.78], 3.0 NNE HEDLEY [34.91, -100.65]

02/09/13 20:00 CST	0	Hail (1.75 in)
02/09/13 20:02 CST	0	Source: Storm Chaser

Storm chasers 2 miles southeast of Lelia Lake (Donley County) reported golf ball size hail.

DONLEY COUNTY --- 2.0 NNW GILES [34.84, -100.55], 7.5 SSW HEDLEY [34.77, -100.72]

02/09/13 20:00 CST	0	Hail (1.25 in)
02/09/13 20:02 CST	0	Source: Storm Chaser

Storm chasers 5 miles southeast of the city of Hedley (Donley County) reported half dollar size hail.

COLLINGSWORTH COUNTY --- 6.2 NW QUAIL [34.93, -100.54], 6.2 NNE QUAIL [34.97, -100.43]

02/09/13 20:44 CST	0	Hail (1.00 in)
02/09/13 20:46 CST	0	Source: Storm Chaser

Storm chasers 6 miles west-northwest of Quail (Collingsworth County) reported quarter size hail.

A vigorous upper level low pressure system moved across the Southern Plains during the evening hours of February 9th. At the surface a warm front surged northward into the southern Texas Panhandle as a cold front advanced eastward from eastern New Mexico. The lift provided by the upper level low and surface boundaries overcame convective inhibition at the surface over the southeastern Texas Panhandle. Thunderstorms quickly strengthened in an area of mid-level lapse rates of 8 degrees C/km and effective Bulk Shear of 60 kt. Storms in this area of enhanced instability produced hail up to the size of golf balls over Donley and Collingsworth Counties. As the cold front moved closer to the Texas state line with Oklahoma, it occluded with the warm front, and any

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preexisting storms began to weaken before dissipating over western Oklahoma.

(TX-Z001) DALLAM, (TX-Z002) SHERMAN, (TX-Z003) HANSFORD, (TX-Z005) LIPSCOMB, (TX-Z008) HUTCHINSON, (TX-Z009) ROBERTS, (TX-Z010) HEMPHILL, (TX-Z012) POTTER, (TX-Z013) CARSON, (TX-Z014) GRAY, (TX-Z017) RANDALL, (TX-Z018) ARMSTRONG, (TX-Z019) DONLEY, (TX-Z020) COLLINGSWORTH

02/12/13 00:23 CST	0	Winter Storm
02/12/13 15:00 CST	0	

During the late night hours of the 11th and early morning hours of the 12th, an upper level trough of low pressure moved out of southern New Mexico and into west central Texas. This placed the Texas Panhandle on the left front quadrant of 120 to 140 mph jet streak and within the warm sector of an 850mb closed low. This closed low brought moisture from the Gulf of Mexico over the cold surface airmass. This moisture coupled with the lift from the jet streak to initiate snow showers over eastern New Mexico just prior to midnight on February 12th. These showers expanded eastward quickly to enter the Texas Panhandle around 12:30 AM CST. Snow showers quickly produced 1 inch of snow in Dalhart (Dallam and Hartley County), and local law enforcement reported periods of near zero visibilities. Bands of enhanced snow showers developed as the upper level trough of low pressure took on a more negatively tilted orientation by 6 AM CST. These enhanced bands quickly produced multiple inches of snow across the Panhandle, and made driving hazardous due to near zero visibilities. No injuries were reported, but multiple single vehicle accidents were reported across the area. By noon, the upper level trough was over the eastern Texas Panhandle causing snow to end across the far northwest. The remaining snow showers across the Panhandles ended by 3 PM CST as the 850mb closed low moved over east Texas, removing the necessary moisture to support snow. Storm total amounts of 4 to 9 inches were reported across the Texas Panhandle. COOP and CoCoRAHS observers at Dalhart (Dallam County), Borger (Hutchinson County), Amarillo (Potter County), and Boys Ranch (Oldham County) provided liquid equivalent values to show snow to liquid ratios ranged between 10 to 1 and 16 to 1. Also the 4.7 inches of snow at Amarillo broke the old record daily maximum snowfall of 2.4 for February 12th set in 2004.

The following is a list of the highest snowfall totals per county: 8.0 inches in Claude (Armstrong County); 8 inches in Skellytown (Carson County); 6 inches in Wellington (Collingsworth County); 8 inches in Dalhart (Dallam County); 3 inches in Hereford (Deaf Smith County); 9 inches in Clarendon (Donley County); 9 inches in Pampa (Gray County); 6.0 inches in Spearman (Hansford County); 7.0 inches in Dalhart (Hartley County); 6.0 inches in Canadian (Hemphill County); 7.0 inches in Fritch (Hutchinson County); 6.0 inches in Darrouzett (Lipscomb County); 5.5 inches in Dumas (Moore County); 5.0 inches in Perryton (Ochiltree County); 4.0 inches in Vega (Oldham County); 6.5 inches in Amarillo (Potter County); 7.0 inches in Palo Duro Canyon (Randall County); 7.0 inches in Stratford (Sherman County); 4.0 inches in Wheeler (Wheeler County); and 6.0 inches in Miami (Roberts County).

(TX-Z004) OCHILTREE, (TX-Z007) MOORE, (TX-Z011) OLDHAM, (TX-Z015) WHEELER, (TX-Z016) DEAF SMITH

02/12/13 00:23 CST	0	Winter Weather
02/12/13 15:00 CST	0	

A potent upper level low moved across southern New Mexico during the evening hours of February 20th. This system would go on to produce several inches of snow with a maximum of 12 inches in Texas County after making a transition from rain and sleet to all snow. As the upper level low moved into southeastern New Mexico it transitioned from a neutral tilt to a slightly negative tilt. This reorientation provided additional lift across the southwestern and eastern Oklahoma Panhandle which in turn helped intensify snowfall rates. It was in this area where the two highest snow depths occurred, 9 to 12 inch swath across southern Cimarron County and southwestern Texas County, and an 8 to 9 inch swath across southeastern Beaver County. By the early afternoon the upper level low had progressed over central Kansas, removing forcing across the Panhandle and bringing an end to precipitation. The following is a listing of the highest storm total snowfall for each county: 12.0 inches in Texhoma (Texas County); 9.0 inches nine miles southeast of Boise City (Cimarron County); 9.0 inches in Slapout (Beaver County).

(TX-Z001) DALLAM, (TX-Z002) SHERMAN, (TX-Z003) HANSFORD, (TX-Z004) OCHILTREE, (TX-Z005) LIPSCOMB, (TX-Z007) MOORE, (TX-Z015) WHEELER

02/20/13 19:00 CST	0	Winter Storm
02/21/13 14:00 CST	0	

A potent upper level low moved across southern New Mexico during the evening hours of February 20th. This system would go on to produce several inches of snow with a maximum of 13 inches produced in Hartley County after making a transition from rain and sleet to all snow. As the upper level low moved into southeastern New Mexico it transitioned from a neutral tilt to a slightly negative tilt. This reorientation provided additional lift across the northern Texas Panhandle which in turn helped intensify snowfall rates. It was in this area where the two highest snow depths occurred, 9 to 13 inch swath across Dallam and Sherman Counties and an 8 to 9 inch swath over Lipscomb County. While the additional lift provided by this reorientation was lesser across the southern Texas Panhandle, it allowed the storms to tap into marginal elevated instability to produce a lesser swath of higher snowfall totals across the southeastern Texas Panhandle. Also the marginal instability led to isolated reports of thundersnow in Clarendon (Donley County). By the early afternoon the upper level low had progressed over central Kansas, removing forcing across the Panhandle and bringing an end to precipitation.

The following is a listing of the highest storm total snowfall for each county: 3.0 inches in Claude (Armstrong County); 1.5 inches in Panhandle (Carson County); 1.0 inch in Wellington (Collingsworth County); 13.0 inches eighteen miles southeast of Felt and fifteen miles

Storm Data and Unusual Weather Phenomena - February 2013

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north east of Ware (Both Dallam County); 4.1 inches in Clarendon (Donley County); 4.0 inches in Pampa (Gray County); 6.0 inches in Gruver (Hansford County); 3.5 inches in Dalhart (Hartley County); 4.0 inches in Canadian (Hemphill County); 3.0 inches in Fritch (Hutchinson County); 8.0 inches in Darrouzett (Lipscomb County); 6.0 inches nine miles northeast of Dumas (Moore County); 8.0 inches in Perryton (Ochiltree County); 1.5 inches seven miles east-northeast Amarillo (Potter County); 1.0 inch six miles southwest Amarillo (Randall County); 4.0 inches Miami (Roberts County); 6.0 inches in Stratford (Sherman County); and 7.0 inches in Allison (Wheeler County).				



Picture of the snow eighteen miles southeast of Felt (Dallam County) courtesy of Ron and Kay Howell.

(TX-Z006) HARTLEY, (TX-Z008) HUTCHINSON, (TX-Z009) ROBERTS, (TX-Z010) HEMPHILL, (TX-Z012) POTTER, (TX-Z013) CARSON, (TX-Z014) GRAY, (TX-Z017) RANDALL, (TX-Z018) ARMSTRONG, (TX-Z019) DONLEY, (TX-Z020) COLLINGSWORTH

02/20/13 19:00 CST	0	Winter Weather
02/21/13 14:00 CST	0	

A potent upper level low moved across southern New Mexico during the evening hours of February 20th. This system would go on to produce several inches of snow with a maximum of 13 inches produced in Hartley County after making a transition from rain and sleet to all snow. As the upper level low moved into southeastern New Mexico it transitioned from a neutral tilt to a slightly negative tilt. This reorientation provided additional lift across the northern Texas Panhandle which in turn helped intensify snowfall rates. It was in this area where the two highest snow depths occurred, 9 to 13 inch swath across Dallam and Sherman Counties and an 8 to 9 inch swath over Lipscomb County. While the additional lift provided by this reorientation was lesser across the southern Texas Panhandle, it allowed the storms to tap into marginal elevated instability to produce a lesser swath of higher snowfall totals across the southeastern Texas Panhandle. Also the marginal instability led to isolated reports of thundersnow in Clarendon (Donley County). By the early afternoon the upper level low had progressed over central Kansas, removing forcing across the Panhandle and bringing an end to precipitation.

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Location	Date/Time	Deaths & Injuries	Property & Crop Dmg	Event Type and Details
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The following is a listing of the highest storm total snowfall for each county: 3.0 inches in Claude (Armstrong County); 1.5 inches in Panhandle (Carson County); 1.0 inch in Wellington (Collingsworth County); 13.0 inches eighteen miles southeast of Felt and fifteen miles north east of Ware (Both Dallam County); 4.1 inches in Clarendon (Donley County); 4.0 inches in Pampa (Gray County); 6.0 inches in Gruver (Hansford County); 3.5 inches in Dalhart (Hartley County); 4.0 inches in Canadian (Hemphill County); 3.0 inches in Fritch (Hutchinson County); 8.0 inches in Darrrouzett (Lipscomb County); 6.0 inches nine miles northeast of Dumas (Moore County); 8.0 inches in Perryton (Ochiltree County); 1.5 inches seven miles east-northeast Amarillo (Potter County); 1.0 inch six miles southwest Amarillo (Randall County); 4.0 inches Miami (Roberts County); 6.0 inches in Stratford (Sherman County); and 7.0 inches in Allison (Wheeler County).

(TX-Z011) OLDHAM, (TX-Z012) POTTER, (TX-Z016) DEAF SMITH, (TX-Z017) RANDALL, (TX-Z018) ARMSTRONG

02/21/13 18:42 CST	0	Dense Fog
02/21/13 20:00 CST	0	

Abundant low level moisture from snow showers earlier in the day allowed dense fog to form across the southern Texas Panhandle. Even as surface winds gusted into the 30 mph range, surface visibilities dropped to a quarter mile or less for a couple hours at Amarillo (Potter and Randall County), Herford (Deaf Smith County), Vega (Oldham County), and Claude (Armstrong County). While no vehicle accidents were reported, traffic flow on roads and highways were reduced greatly.

(TX-Z001) DALLAM

02/22/13 18:30 CST	0	Winter Weather
02/23/13 01:30 CST	0	

An upper level trough of low pressure over southern Colorado and northern New Mexico moved eastward across the northern Texas Panhandle during the evening hours of the 22nd to cause light snow showers across Dallam County. Snow began falling across Dallam County around 6:30 PM CST and continued until 1:30 AM CST as snow showers moved outside of the county. The combination of freezing surface temperatures, lift provided by the upper level trough, and moisture advection overrunning the cold surface airmass proved sufficient to produce 3 inches of snow in the city of Texline (Dallam County). Trained storm spotters in Texline reported highways in and out of town became snow covered and icy however, no vehicle accidents were reported in relation to icy roadways. Snow showers diminished in intensity and areal coverage as they moved out of Dallam County.

(TX-Z001) DALLAM, (TX-Z002) SHERMAN, (TX-Z003) HANSFORD, (TX-Z004) OCHILTREE, (TX-Z005) LIPSCOMB, (TX-Z006) HARTLEY, (TX-Z007) MOORE, (TX-Z008) HUTCHINSON, (TX-Z009) ROBERTS, (TX-Z010) HEMPHILL, (TX-Z011) OLDHAM, (TX-Z012) POTTER, (TX-Z013) CARSON, (TX-Z014) GRAY, (TX-Z015) WHEELER, (TX-Z016) DEAF SMITH, (TX-Z017) RANDALL, (TX-Z018) ARMSTRONG, (TX-Z019) DONLEY, (TX-Z020) COLLINGSWORTH

02/24/13 19:00 CST	13.28M	Blizzard
02/25/13 17:00 CST	0	

Between the evening hours of February 24 and the afternoon hours of February 25th, widespread snowfall totals of 5 to 13 inches with a maximum of 19 inches of snow were reported across the Texas and Oklahoma Panhandle. This snowfall crippled the Panhandles in ways not seen since the 1957 and 1934 blizzards. In Amarillo (Potter and Randall County), this blizzard was the third largest snowfall event on record, the second largest snowfall for a calendar day on record, the largest snowfall for a single day on record, and the 17 inch snow depth from 6 AM CST Tuesday, February 26th set the highest all-time snow depth at Amarillo on record.

The 6 PM CST upper air analysis on February 24th revealed a closed mid-level low pressure system diving south-southeastward from the Four Corners Region. This positioning put the Texas and Oklahoma Panhandle under the front right quadrant of a 90 mph to 120 mph upper level jet streak, and caused a transition of a surface stationary front draped across the Southern Texas Panhandle into a cold front. The large scale forcing provided by the aforementioned factors coupled with low level moisture advection to initiate snow showers over eastern New Mexico. These snow showers quickly expanded into the northwestern Texas and Oklahoma Panhandles. The surface cold front surged southward in advance of the snow showers, which ensured any precipitation reaching the ground would be in a frozen state. A few embedded lightning strikes were evident as snow showers tapered into very steep mid-level temperature lapse rates and weak elevated instability while moving further into the Panhandles. Snowfall rates of 1 inch to 2 inches per hour were observed, but higher snow fall rates of 2 inches to 3 inches per hour were possible given the weakly convective nature of some of the storms. By 7 PM CST, these possible higher snowfall rates were validated when a storm chaser in Hutchinson County reported 2 inches of snow had accumulated within 45 minutes.

By midnight of the 25th, the mid-level closed low had progressed into southeastern New Mexico. This placed the Panhandles squarely in the "comma head" of the system. As a result, bands of heavy snow developed from Hereford, Texas (Deaf Smith County) to Slapout, Oklahoma (Beaver County). Weak instability continued to produce isolated lightning strikes within these snow bands. Sustained surface winds across the Panhandles had built into the 30 to 40 mph range in response to the strong post-frontal surface pressure gradient and occasional 55 to 65 mph winds gusts were reported within the heavier snow bands. These blizzard conditions caused visibilities to drop as low as 50 feet, and produced multiple inches of snow over several hours.

By 6 AM CST, the mid-level closed low was positioned near Sweetwater, Texas, and heavy bands of snow were still evident on radar along a Hereford, TX (Deaf Smith County) to Slapout, Oklahoma (Beaver County) line. Snow amount reports averaged between 4 to 10 inches along and to either side this line with the National Weather Service in Amarillo measuring eleven inches. Blizzard conditions

Storm Data and Unusual Weather Phenomena - February 2013

Location	Date/Time	Deaths & Injuries	Property & Crop Dmg	Event Type and Details
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continued throughout the morning hours, and two hurricane force wind gusts were measured at the National Weather Service Office in Amarillo and at the Pantex plant just prior to noon. The gust at the National Weather Service office in Amarillo measured 75 mph, and the gust from the Pantex plant was measured at 77 mph.

By 12 PM CST, the mid-level closed low had progressed into north central Texas allowing a clearing line to the New Mexico/Texas state line. This further east position of the low also had a diminishing effect on the heaviest snow bands as the upper level forcing had lessened. Snowfall rates dropped to below 1 inch per hour, and the surface pressure gradient was slowly weakening to allow a slow lowering of sustained surface winds. However, near zero visibilities were still reported in locations where snow had ended due to blowing snow. The clearing line was positioned from Amarillo, Texas (Randall and Potter County) to Guymon, Oklahoma (Texas County) by 3 PM CST, and distinct snow bands were no longer evident on radar. Surface winds had also dropped below 35 mph sustained to bring an end to blizzard conditions across the Panhandles. Snow showers continued to diminish before coming to an end just before 10 PM CST.

The following is a listing of the highest snow amounts per county: 19.0 inches in Amarillo (Potter County); 1.0 inch in Dalhart (Dallam County); 8.0 inches in Vega (Oldham County); 12.0 inches in Dumas (Moore County); 10.0 inches in Morse (Hansford County); 2.0 inches in Stratford (Sherman County); 11.3 inches in Canyon (Randall County); 11.0 inches in Hereford (Deaf Smith County); 15.0 inches Perryton (Ochiltree County); 16.0 inches in Pampa (Gray County); 17.0 inches in Sanford (Hutchinson County); 14.0 inches in Wheeler (Wheeler County); 4.0 inches in Hedley (Donley County); 4.0 inches in Samnorwood (Collingsworth County); 12.0 inches in Briscoe (Hemphill County); 14.0 inches in Panhandle (Carson County); 14.0 inches in Lipscomb (Lipscomb County); 14.0 inches in Claude (Armstrong County); 14.0 inches in Miami (Roberts County); and 4 inches in Channing (Hartley County).

While the total economic losses due to the blizzard remains largely undocumented, the blizzard cleanup cost the Texas Department of Transportation (TXDOT) nearly \$1.6 million and cattle farmers \$10.24 million in cattle losses.

The 8 to 19 inch swath of snow across the majority of the Panhandles paralyzed traffic, and caused both TXDOT and the Oklahoma Department of Transportation (OKDOT) to close all roads and highways across the region. TXDOT crews began performing plowing operations during the onset of snow accumulation however; plowing operations had to be suspended due to several near misses, visibilities as low as 50 feet, and operator safety concerns. Plowing operations were not allowed to resume until the morning of the 25th as conditions improved. City Utilities and Parks Departments were re-tasked to assist road crews in plowing and TXDOT crews from as far away as El Paso and Dallas were deployed to assist.

Numerous motorists became stranded, 50 in Amarillo alone, during and after the blizzard across both the Texas and Oklahoma Panhandle. The National Guard deployed 53 troops and 37 vehicles to assist local law enforcement in search and rescue operations to locate stranded motorists along Interstate 40.

The blizzard forced businesses to shut down, caused temporary power outages, and limited the supply of goods by paralyzing delivery methods. Xcel Energy reported 4,400 customers across the Texas Panhandle lost power as a result the blizzard causing an issue at a substation on the northeast side of Amarillo (Potter County). Toot-n-Totum closed 52 of their 62 locations across the panhandles, which was the first time in 62 years of operations that so many locations were closed. The remaining 10 locations were reported to have been visited by 11,000 customers with lines of 40 to 50 people deep according to security camera estimates. All Pak-A-Sak locations in Amarillo were closed for the first time in their 35 years of operations. BNSF Railway notified customers to expect a 24 to 48 hour delay in the delivery of goods. The Rick Husband Amarillo International Airport was forced to shut down on the morning of the 25th, and was unable to reopen until the morning of the 26th. However, United Airlines and American Airlines did not schedule any departures until the 27th.

Economic impact of the blizzard estimated from known TXDOT costs, cattle losses, and estimated vehicle repairs and delayed services.

Storm Data and Unusual Weather Phenomena - February 2013

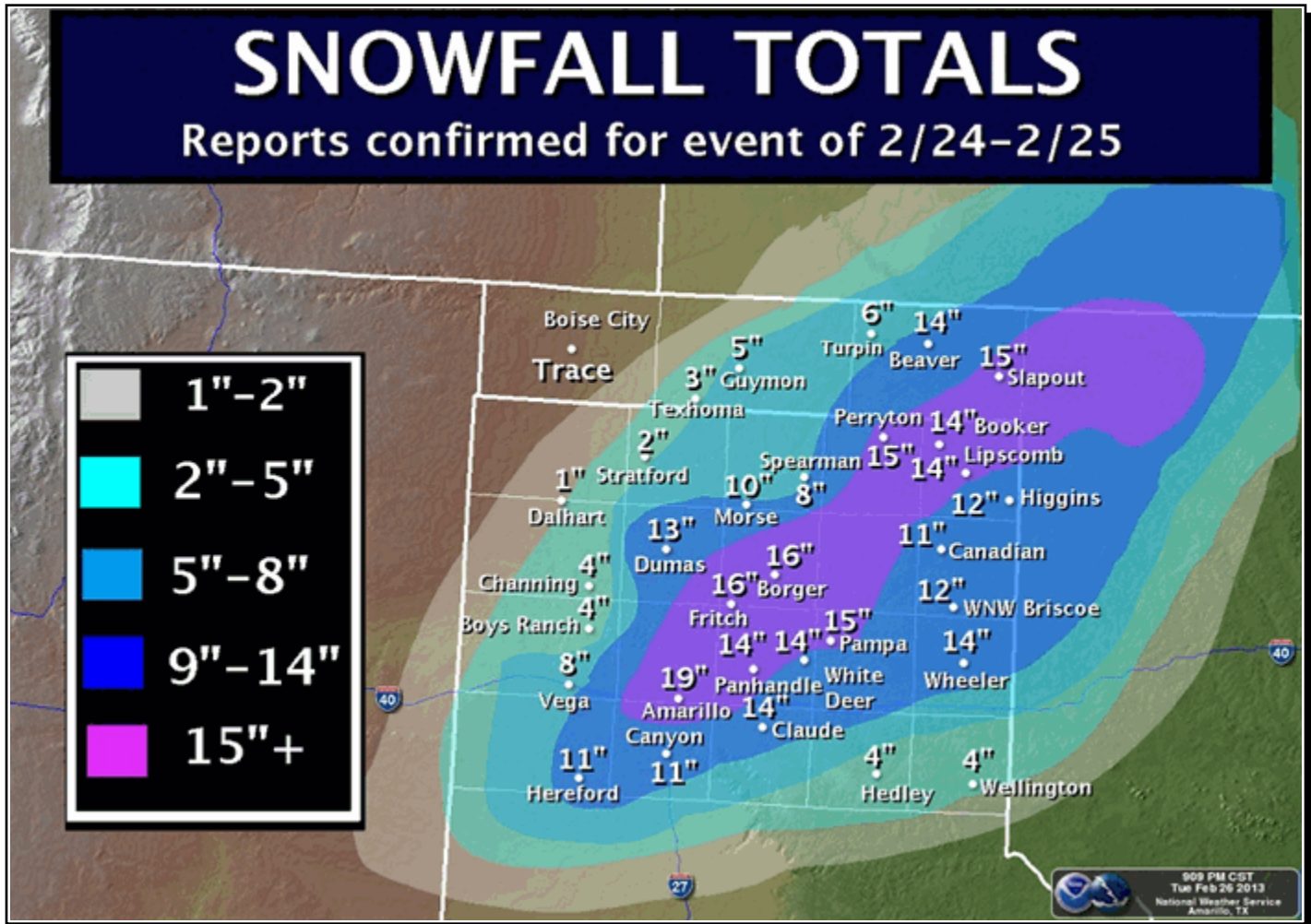
Location

Date/Time

Deaths &
Injuries

Property &
Crop Dmg

Event Type and Details



Snow total map from NWS Ama.