

# WINTER STORM

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## Hazard Description

A severe winter storm event is identified as a storm with snow, ice, or freezing rain—all of



which can cause significant problems for area residents. Winter storms are associated with freezing or frozen precipitation such as freezing rain, sleet, snow and the combined effects of winter precipitation and strong winds. Wind chill is a function of temperature and wind. Low wind chill is a product of high winds and freezing temperatures. January is the month when snow, sleet or freezing rain is most likely to be observed; yet, winter weather conditions can occur at any time during the winter and early spring months.

## Location

Winter storms vary in location, intensity and duration but are considered rare occurrences in CVCOG communities. It is assumed that all of the jurisdictions are uniformly exposed to winter storm events; therefore, all areas of the counties are equally exposed.

## Extent

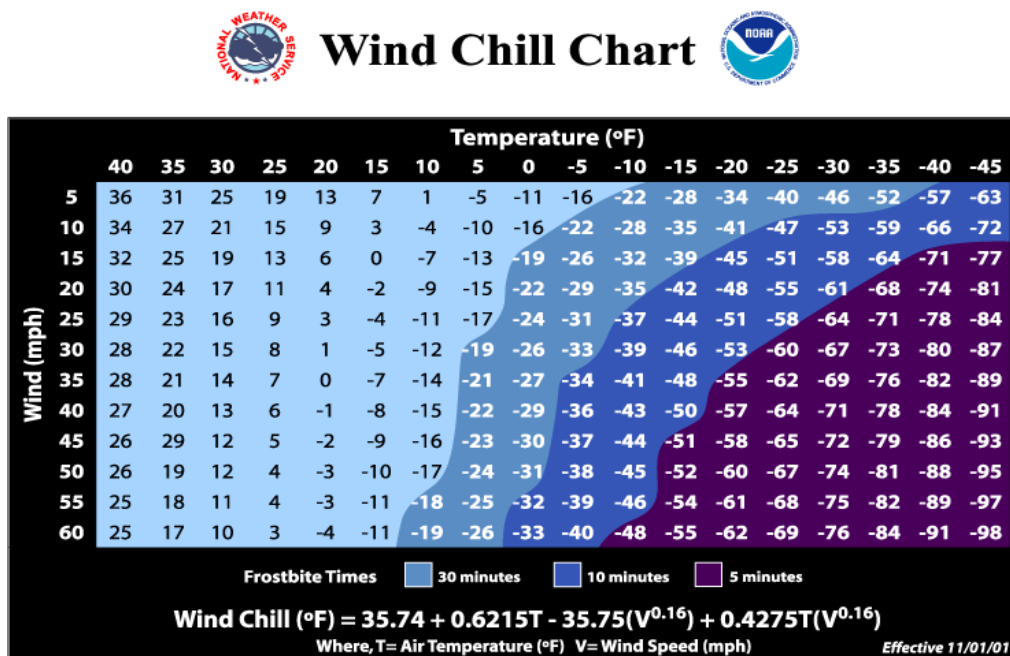
Table 11-1 below displays the magnitude of severe winter storms. The wind-chill factor is further described in Figure 11-1. This is an index developed by the National Weather Service, although the chart is not applicable when temperatures are over 50° or winds are calm.

**Table 11-1. Extent Scale - Winter Weather Alerts**

<b>WINTER WEATHER ADVISORY</b>	This alert may be issued for a variety of severe conditions. Weather advisories may be announced for snow, blowing or drifting snow, freezing drizzle, freezing rain, or a combination of weather events.
<b>WINTER STORM WATCH</b>	Severe winter weather conditions may affect your area (freezing rain, sleet or heavy snow may occur separately or in combination).
<b>WINTER STORM WARNING</b>	Severe winter weather conditions are imminent.
<b>FREEZING RAIN OR FREEZING DRIZZLE</b>	Rain or drizzle is likely to freeze upon impact, resulting in a coating of ice glaze on roads and all other exposed objects.
<b>SLEET</b>	Small particles of ice usually mixed with rain. If enough sleet accumulates on the ground, it makes travel hazardous.
<b>BLIZZARD WARNING</b>	Sustained wind speeds of at least 35 mph are accompanied by considerable falling or blowing snow. This alert is the most perilous winter storm with visibility dangerously restricted.
<b>FROST/FREEZE WARNING</b>	Below freezing temperatures are expected and may cause significant damage to plants, crops and fruit trees.
<b>WIND CHILL</b>	A strong wind combined with a temperature slightly below freezing can have the same chilling effect as a temperature nearly 50 degrees lower in a calm atmosphere. The combined cooling power of the wind and temperature on exposed flesh is called the wind-chill factor.

Wind chill temperature is a measure of how cold the wind makes real air temperature feel to the human body, similar to the heat index for extreme heat (Figure 12-1). Since wind can dramatically accelerate heat loss from the body, a blustery 30°F day would feel just as cold as a calm day with 0°F temperatures. The CVCOG Region has been subject to winter storm watches, warnings, freezing rain, sleet, snow and wind chill.

Figure 11-1. Wind Chill Chart



The Concho Valley Region is part of the Panhandle Plains in Texas for the northern half of the region and the Hill Country for the southern counties. As a whole this region experiences similar winter events. Winter nights for the area commonly see temperatures fall below the freezing mark, or 32 °F. From the past occurrence data, all counties have experienced ice storms, heavy snow, winter storms and winter weather. The average number of cold days are similar for each county. Therefore the intensity of a winter storm event to be mitigated for the area is an ice storm and heavy snow.

## Historical Occurrences

Table 11-2 shows historical occurrences for the area since 1950, as well as the type of event provided by the National Climatic Data Center (NCDC). Although there have been relatively few storms, it is likely that a high number of occurrences have gone unreported. Additionally, historical winter storm information, as provided by the NCDC, shows winter storm activity across a multi-county forecast area for each event. In some instances within the study area, a single record could consist of up to 27 counties including some or all of the ones participating in this risk assessment. Therefore, an appropriate percentage of the total property and crop damage reported for the entire forecast area has been allocated to each participating county impacted by each event.

**Table 11-2. Historical Winter Storm Events by Jurisdiction, 1950-2010)**

COUNTY	NUMBER OF REPORTED EVENTS	TYPES OF EVENTS
Coke	13	Ice Storm, Heavy Snow, Winter weather/mix, and Winter Storm
Concho	9	Ice Storm, Heavy Snow, Winter weather/mix, and Winter Storm
Crockett	15	Ice, Ice Storm, Heavy Snow, and Winter Storm
Irion	10	Ice Storm, Heavy Snow, Winter weather/mix, and Winter Storm
Kimble	12	Ice Storm, Heavy Snow, and Winter Storm
McCulloch	10	Ice Storm, Heavy Snow, Winter weather, and Winter Storm
Menard	13	Ice Storm, Heavy Snow, Winter weather, and Winter Storm
Reagan	8	Ice Storm, Heavy Snow, Winter weather, and Winter Storm
Schleicher	13	Ice, Ice Storm, Heavy Snow, Winter Storm, and Winter weather
Sterling	12	Ice Storm, Heavy Snow, Winter weather/mix, and Winter Storm
Sutton	14	Ice Storm, Heavy Snow, and Winter Storm
Tom Green	10	Ice Storm, Heavy Snow, Winter weather/mix, and Winter Storm
<b>TOTAL</b>	<b>139</b>	

### Significant Past Events

#### 24 November 1996

This event affected eight of the twelve counties in the planning area. A vigorous upper level storm system interacted with a cold Canadian air mass to produce snow, sleet, and freezing rain on the Nov 24. Total sleet and snowfall amounts were generally between two and six

inches over the Concho Valley, northern Edwards Plateau, and northwest Hill Country. The highest amounts were generally in the northwest Hill Country, where eight inches of snow fell at Junction. Icy roads proved hazardous to drivers and numerous accidents occurred throughout the area. There were a few fatalities and several injuries. The cold moisture damaged the unharvested cotton in Tom Green County.

### **24 February 2003 – McCulloch County**

An arctic cold front barreled through West Central Texas on the Feb. 23, dropping temperatures into the teens and 20s across all of the area. Strong overrunning began during the morning of the Feb. 24; producing thunderstorms that dropped large amounts of sleet and even hail to one half inch in diameter. The Big Country saw one to three inches of sleet during the afternoon and early evening of the 24<sup>th</sup>, with the activity slipping to the southeast into the Heartland during the evening of the 24<sup>th</sup>. One-half to one inch of sleet was reported across the Heartland. With temperatures remaining below freezing until the morning of the 26<sup>th</sup>, the accumulated ice remained on area roadways, with numerous accidents reported. There were also some minor injuries reported in the Abilene area, due to people slipping and falling down on the ice.

## **Probability of Future Events**

A total of 24 unique events have impacted the CVCOG Region from 1950 to 2010. Although the counties reported a total of 139 incidents over the 60-year period, indicating that storms can impact the 12-county planning region as frequently as two winter storm events per year. Hence it is likely that the region will experience a winter storm event; an event is probable within the region within the next three years.

## **Vulnerability and Impact**

All buildings and facilities are considered to be equally exposed and vulnerable to this hazard and could potentially be impacted because winter storm events are widespread within the planning area. Although a winter storm is a slow onset hazard with generally six to twelve hours of warning time, utility disruptions from winter storms can severely impact people and critical infrastructure. Ice and cold temperatures can lead to frozen water pipes and broken power lines due to a buildup of ice or downed trees, all of which can disrupt services. If the disruption continues it can lead to energy shortages and higher prices.

While all populations and infrastructure are uniformly exposed in the CVCOG Region, the elderly and those with weakened immune systems are at a greater risk to death from hypothermia in extreme events. Homes with a poor foundation may have cracks or water damage from broken pipes in extreme events and residences with insufficient insulation will see an increased cost for heating. Hospitals and emergency facilities without back-up or emergency generators will also be significantly impacted in a severe winter storm event. In

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addition fires during winter storms present a greater danger because water supplies may freeze and impede firefighting efforts.

Historical evidence shows that most of the area is susceptible to winter storm activity; however, past reported property damages indicate that, while winter events (typically consisting of snow and ice) do occur, their economic impacts are typically not severe across the entire study area.

Loss estimates consider an appropriate percentage of the total property and crop damage reported for the entire forecast area since damages are reported as a sum of all impacted counties' damages. Table 11-3 below summarizes the reported damages by county. Historic loss estimates (in 2009 dollars) total \$19.7 million over the 12 county region during the 60-year reporting period from the NCDC, providing a regional annual loss estimate of \$330,000.

**Table 11-3. Historic Damage Estimates by County**

COUNTY	NUMBER OF REPORTED EVENTS	REPORTED DAMAGES	ANNUALIZED LOSS (AL)
Coke	13	\$2,644,904	\$44,081.73
Concho	9	\$1,593,254	\$26,554.23
Crockett	15	\$1,575,575	\$26,259.58
Irion	10	\$1,382,757	\$23,045.95
Kimble	12	\$1,618,060	\$26,967.67
McCulloch	10	\$1,648,691	\$27,478.18
Menard	13	\$1,618,282	\$26,971.37
Reagan	8	\$1,378,728	\$22,978.80
Schleicher	13	\$1,599,724	\$26,662.07
Sterling	12	\$1,382,757	\$23,045.95
Sutton	14	\$1,672,868	\$27,881.13
Tom Green	10	\$1,594,393	\$26,573.22
<b>TOTALS FOR STUDY AREA</b>	<b>139</b>	<b>\$19,709,993</b>	<b>\$328,499.88</b>

The potential severity of impact for any one county in the planning area can be considered limited; critical facilities and services would not be expected to be shut down for more than 24 hours and less than 10 percent of property would be destroyed.