# SEVERE WINTER STORM

## DESCRIPTION

A **severe winter storm** is defined as a prolonged event involving snow or ice. The characteristics of severe winter storms are determined by the amount and extent of snow or ice, air temperature, wind, and event duration (*National Weather Service*, 2009).

- **Heavy snow** is snowfall accumulating to four inches or more in depth in 12 hours or less, or snowfall accumulating to six inches or more in depth in 24 hours or less. A snow squall is an intense, but limited-duration period of moderate to heavy snowfall, also known as a snowstorm, accompanied by strong, gusty surface winds, and possibly lightning.
- **Blizzards** are characterized by low temperatures, wind gusts of 35 mph or more, and falling and/or blowing snow that reduces visibility to ¼-mile or less for three or more hours.
- **Sleet** is defined as pellets of ice composed of frozen or mostly frozen raindrops or refrozen partially melted snowflakes. These pellets of ice usually bounce after hitting the ground or other hard surfaces. Freezing rain is rain that falls as a liquid but freezes into glaze upon contact with the ground. Both types of precipitation, even in small accumulations, can cause significant hazards to a community.
- **Ice storms** are occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines, resulting in loss of power and communication. These accumulations of ice make walking and driving extremely dangerous.

## SEVERE WINTER WEATHER IN COLORADO

All areas of Colorado are vulnerable to the adverse impacts of Colorado's severe winter weather. Average snowfall is 72 inches or greater in the central (including the Front Range foothills) and western areas of the state (*Colorado Natural Hazards Mitigation Plan,* 2013, p. 3-120). While Colorado blizzards are less frequent and drop less snow in areas further east and north, they can still be devastating. As recently as 1997, several fatalities in northeastern Colorado were directly attributable to an October blizzard that caught many travelers unprepared. Heavy snows in the high mountains are common (p. 3-120).

## RELATED HAZARDS

Heavy snowstorms in the high mountains are common and can lead to avalanches. Each year several lives are lost due to avalanches. Avalanches pose a serious problem to residents, road maintenance crews, and backcountry travelers.

Colorado's spring flood potential results from melting snow pack at higher elevations. In a year of near-normal snow accumulation in the mountains and normal spring temperatures, river stages become high, but there is no general flooding. In years when snow cover is heavy, or when there is widespread lower elevation snow accumulation and a sudden warming in the spring, there may be higher than normal amounts of runoff that can lead to flooding.

## AVAILABLE DATA SOURCES

**Colorado Natural Hazards Mitigation Plan**

The *Colorado Natural Hazards Mitigation Plan* is the State's FEMA-approved plan that serves as a foundation for the State's program to reduce risks to people, property, and infrastructure from natural hazards. The Plan is administered and updated by the Colorado Division of Homeland Security and Emergency Management. dhsem.state.co.us/emergency-management/mitigation-recovery/mitigation/state-colorado-natural-hazards-mitigation-plan

**Colorado Climate Center**

The Colorado Climate Center is housed in the Department of Atmospheric Science at Colorado State University. It is a source of useful information on natural hazards in Colorado and provides an excellent resource to learn about climate in Colorado. ccc.atmos.colostate.edu

**National Centers for Environmental Information**

The National Centers for Environmental Information (NCEI) was formed in 2015 as a merger of NOAA's three existing National Data Centers. This site is a rich data source for climate and historical weather information and contains historical event data on a host of natural hazards. A particularly helpful NCEI tool is the Storm Events Database which contains archived records on the nature and impact of notable storm events including blizzards, extreme cold, ice storms, and other winter weather as documented by NOAA's National Weather Service. ncdc.noaa.gov/stormevents

**SHELDUS™**

Developed by the Hazards & Vulnerability and Research Institute at the University of South Carolina SHELDUS™ provides a county-level hazard loss data and map set for 18 different natural hazard events types, including severe winter storms, and has been used by some Colorado communities in completing the risk assessments for their local or regional hazard mitigation plans. hvri.geog.sc.edu/SHELDUS

**U.S. Department of Labor, Occupational Safety and Health Administration**

One role of the Occupational Safety and Health Administration (OSHA) is to provide information to the public to protect them from various natural hazards, including winter weather. osha.gov/dts/weather/winter_weather/hazards_precautions.html

**High Plains Regional Climate Center**

The High Plains Regional Climate Center aims to increase the use and availability of climate data in the region that includes Colorado as well as Kansas, North Dakota, Nebraska, South Dakota, and Wyoming. The Center's website provides temperature and precipitation overviews that can be graphically depicted on a state-by-state basis by county boundaries. hprcc.unl.edu

**Rocky Mountain Insurance Information Association**

The Rocky Mountain Insurance Information Association (RMIIA) provides historical statewide data regarding damage resulting from natural hazards. The RMIIA website also contains recommendations for local planners to consider more specific ways to assess and reduce winter storm-related risks in

their community, such as burst pipes, ice dams, wind damage, leaky roofs, and building collapse caused by the weight of ice or snow. rmiia.org/catastrophes_and_statistics/Winter_Storms.asp

**National Weather Service**

The National Weather Service (NWS) is the official U.S. weather, marine, fire and aviation forecasts, warnings, meteorological, products, climate forecasts, and information about meteorology. NWS is a component of the National Oceanic and Atmospheric Administration (NOAA). NWS maintains a glossary of information on more than 2000 terms, phrases, and abbreviations used by the NWS and accepted as an excellent source of definitions of hazards (*National Weather Service,* 2009).

## ASSESSING THE RISK OF SEVERE WINTER STORM

Severe winter storms are a frequent occurrence and a source of major concern throughout Colorado. The combined perils of snow, ice, freezing temperatures, and high winds pose multiple risks, including threats to public safety and the potential to cause major property damage and disruption to commerce. For example, winter storm conditions can threaten transportation safety during the event and result in snow or ice accumulations that can collapse roofs or topple trees. Planners should also be mindful of the impacts that severe winter storms may have on vulnerable populations, especially the homeless or those living in households without heat. There is no simple or universal approach to assessing these risks; however, a variety of data sources and tools are available to assist in the process of understanding the likelihood and potential impact of future storm events on the community.

Similar to other hazards, the local or regional hazard mitigation plan should be among the first sources to look for data and/or information on severe winter storms. The risk assessments included within these plans should have information on historical events, as well as information on any particular risks or vulnerabilities the community faces. If the severe winter storm hazard is considered a real threat to the community, then potential risk reduction measures should also be included as part of the mitigation strategy or implementation section of the plan (e.g, strategies to deliver resources to vulnerable populations in a storm's aftermath or strengthening building codes to enable new construction to withstand severe winter storms). When seeking professional assistance and advice on severe winter storms, planners should also consider turning to meteorology experts from organizations such as the nearest local office of the National Weather Service or institution of higher education. Another valuable source of information is the Office of the State Climatologist at the Colorado Climate Center at Colorado State University (ccc.atmos.colostate.edu), which can provide additional weather and hazard risk-related data specific to each community.

## APPLICABLE PLANNING TOOLS AND STRATEGIES

The table below cites applicable planning tools and strategies that are profiled in this guide.

| APPLICABLE PLANNING TOOLS AND STRATEGIES – SEVERE WINTER STORM | |
|---|---|
| **Addressing Hazards in Plans and Policies** | • Comprehensive plan<br>• Climate plan<br>• Hazard mitigation plan<br>• Pre-disaster planning |
| **Strengthening Incentives** | *N/A* |
| **Protecting Sensitive Areas** | *N/A* |
| **Improving Site Development Standards** | *N/A* |
| **Improving Buildings and Infrastructure** | • Building code<br>• Critical infrastructure protection |
| **Enhancing Administration and Enforcement** | *N/A* |