

Evolving Public Uses and the General Avalanche Forecast

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ABSTRACT: Improvements in equipment and easy access from ski resorts and mountain highways are changing backcountry travel habits. Extreme terrain that was historically only accessed by experienced alpinists during stable conditions is now frequented by free riders on a routine basis. A growing number of the public's primary interest is skiing or riding steep couloirs, cliff areas and major avalanche paths. Less experienced members of this group are often resort based skiers who are in the early stages of developing avalanche hazard assessment skills. The Bridger-Teton National Forest Avalanche Center (BTAC) has issued daily general avalanche hazard advisories since the mid 1970's. Although these advisories include morning and afternoon avalanche hazard level ratings for specific elevations, they are general in nature. The information issued by the center is an essential resource for this important user group. As the avalanche hazard decreases forecasters are increasingly challenged to communicate to these users that although mostly stable conditions exists the "general avalanche hazard rating" should not be applied to extreme terrain where slope specific knowledge and expert avalanche hazard assessment skills are always required. To address this challenge the BTAC is partnering with a local company to produce a short film that addresses this important topic. This film will be linked to the center's website and shown at avalanche awareness presentations.

KEYWORDS: Avalanche hazard forecast, extreme terrain, avalanche awareness

1.0 INTRODUCTION

The mountainous areas of Western Wyoming are steep and receive large amounts of snow. In the Teton Range over 10 meters of snow falls annually at an elevation of 3,000 meters.

The low humidity and cold air temperatures associated with the inter-mountain climate foster the development and preservation of weak faceted layers and dry powder snow.

These terrain and snow conditions are very popular with winter recreationists. Access to dangerous avalanche is readily available. Backcountry users who leave resort boundaries and trailheads on mountain passes can be in dangerous avalanche terrain in less than five minutes at some access points and in less than an hour in most locations.

During the past 10 years, equipment improvements have greatly facilitated access to less skilled skiers and riders. At the same time Jackson Hole has become increasingly popular with vacationers and seasonal resort workers as a place where people can easily access steep slopes in deep powder conditions.

Some user's primary interest is focused on high marking cirque headwalls, skiing or riding in steep couloirs and cliff areas and ascending, traversing and descending major avalanche paths.

The Bridger-Teton National Forest Avalanche Center has issued daily avalanche hazard bulletins since the 1970's. The bulletins and other products issued by the center are quite popular and include numerous hazard assessment resources with a wide spectrum of sophistication.

Some viewers primarily check the center's website to see how much new snow has fallen, determine how cold it will be, find out if there will be any more new snow and view the general avalanche hazard rating.

Statements from users who may be in the early stages of developing avalanche skills have led to the conclusion that some users may not be aware of some of the basic limitations of a general avalanche forecast. Some of these users appear to be inexperienced with respect to the interpretation of the avalanche hazard rating scheme and may make slope specific go/no decisions in extreme terrain based on a "Low" general avalanche hazard rating.

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To address this concern the center decided to create a short film for the purposes of communicating basic information regarding the limitations and interpretation of the general avalanche. This short film will be linked to the center's website and shown during avalanche education presentations.

2.0 AVALANCHE HAZARD FORECAST LIMITATIONS

The topics of discussion are:

- Forecast area elevation limit
- Un-forecast weather events
- Spatial variability within a forecast area
- Extreme terrain and behavior
- Danger scale interpretation

2.1 Forecast area elevation limit

In Western Wyoming the daily avalanche hazard forecasts do not include terrain above an elevation of 3,200 meters. This limitation is due to:

- All of the data derived from remote automated weather stations originates from an elevation of 3,300 meters or less
- Avalanche specialist spend very little time above an elevation of 3,200
- Field observations from elevations above 3,200 meters rarely occur during the winter
- The terrain above 3,200 meters is largely the realm of the mountaineer

The highest peaks of the Teton Range rise to an elevation of 4,200 meters. The terrain above 3,200 meters that retains snow is extremely steep and primarily comprised of snow filled couloirs and hanging snowfields.

This limitation is especially relevant during the late spring when extreme skiers venture into the very steep terrain that comprises the highest peaks in the Teton Range.

2.2 Un-forecast weather events

The general avalanche forecasts are based on the assumption that the weather forecast provided is accurate. If the actual weather deviates from the forecasted weather then the actual avalanche hazard may deviate from the forecasted general avalanche hazard.



Figure 1. The general avalanche hazard rating issued by the Bridger-Teton National Forest Avalanche Center is not applicable to the highest elevations of the Teton Range due to lack of data and the extreme nature of the snow covered terrain at this altitude.

Large areas of the Rocky Mountains are uninhabited and provide no observations or data to weather forecasters at the National Weather Service. Un-forecasted changes in the weather can occur rapidly and are not uncommon.

Changes that can rapidly affect the stability of the snowpack include but are not limited:

- Sustained (several hours) intense new snow accumulation
- Strong wind events that drift snow onto leeward slopes and along corniced ridges
- Unexpected sunshine
- Rapid warming
- Rain on snow events

It is important for backcountry users to:

- Know the weather forecast

- Recognize unexpected deviations
- Understand the ramifications of unexpected weather changes on the stability of the snowpack
- Make appropriate decisions according to these changes

2.3 Spatial variability within a forecast area

The general avalanche hazard rating is provided for large areas with a huge amount of spatial variability. Large variations in the stability of the snowpack can exist in very small distances.

The potential for significant spatial variability on the same slope, at the same elevation, on the same aspect, in the same drainage and across forecast regions must be anticipated, recognized and addressed.

It must be understood that areas with one or even two danger levels above or below the forecasted avalanche danger rating for that forecast area can exist. For this reason every backcountry user must continually assess the hazard on the slopes where they are recreating. This principle is fundamental to safe travel in avalanche terrain.

2.4 Extreme terrain and Behavior

Although backcountry users have always ventured into extreme terrain, the demographics and habits of those involved seem to be evolving, and the numbers of those who seek out this terrain seem to be on the increase.

Some users on high power motorized snowmachines routinely enjoy the experience of high marking steep slopes in deep powder conditions. Some backcountry skiers and snowboarders routinely enjoy the thrills of steep terrain in deep powder snow and cliff jumping is popular among some.



Figure 2. Photograph of a large deep slab avalanche triggered by a high marking snowmachine.

The general avalanche danger rating issued by avalanche forecast centers applies to a wide variety of terrain in a particular forecast region that in some areas is elevation and/or aspect specific.

This general avalanche hazard rating has limitations in extreme terrain where slope-specific knowledge and expert avalanche hazard assessment skills are always required.

This discussion topic is especially relevant during periods of low hazard when users are jumping cliffs and groups of snowmobilers are high marking in steep avalanche prone bowls.



Figure 3 Photograph of extreme terrain easily accessed from the ski area boundary in the Southern Teton Range.

There are many days when a mostly stable snowpack exists and the potential for anything other than a small avalanche in extreme terrain is quite remote. Some users do not understand that a low avalanche hazard rating does not mean there is no hazard.

There is a strong consensus among forecasters that it is not appropriate to wait until every slope on every aspect is completely stable to decrease the hazard to low. However, at times it is a challenge to make this point apparent to the public and some forecasters are hesitate to make this important determination.

In North America low hazard is defined as:

Probability

Natural avalanches very unlikely.
Human triggered avalanches unlikely.

Distribution

Generally stable snow. Isolated areas of instability.

Travel

Travel is generally safe. Normal caution is advised.

Decisions in the backcountry should be based on field observations, knowledge and experience, not on the general avalanche danger rating.

In Europe low hazard is defined as:

Snowpack stability

The snowpack is generally well bonded and stable.

Avalanche triggering probability

Triggering is generally possible only with high additional loads on few locations in steep extreme terrain. Only natural sluffs and small avalanches are possible.

Examples of high additional loads are groups of skiers without spacing, snowmobiles/groomers, and avalanche blasting.

From the authors perspective the European Danger Scale provides a better definition with respect to this issue than the North American Danger Scale.

2.5 Danger scale interpretation

The avalanche danger scale is based on the probability for avalanches to be human triggered or release naturally, the extent of the terrain where avalanches are possible and avalanche size.

It is important to know that small avalanches can occur and kill people during periods of low hazard.

Terrain evaluation skills are essential. No matter what the avalanche danger rating is, there are always some avalanche-safe areas in the mountains, and almost always some areas that remain dangerous.

3.0 CONCLUSIONS

The general avalanche hazard rating for a particular region on any given day is a starting point that should be consulted as backcountry users begin to plan their activities.

In order to effectively mitigate avalanche hazard, backcountry users must be aware of the limitations of a general avalanche hazard rating. Continuous assessment of the avalanche hazard on a slope specific level is essential for safe travel in avalanche terrain.