

AVALANCHE RISK MANAGEMENT IN BACKCOUNTRY SKIING OPERATIONS

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ABSTRACT: Over the last 34 years Canada has had an average of 11 avalanche fatalities per year and during the past five years this average has increased to 16 fatalities per year. Today, avalanche accidents happen primarily to people during recreational pursuits, and about half of the victims over the last 20 years were backcountry skiers. Backcountry skiing operations in Canada are making a constant effort to improve their avalanche safety. This study is based on data from a large heli-skiing operator in Canada; Canadian Mountain Holidays (CMH).

The first objective of this study was risk analysis based on data from CMH's database, Snowbase. Skier triggered avalanches were analysed in terms of factors such as elevation level, aspect, stability rating and the time of the year. When looking at human triggered avalanches, it is not possible to analyse risk based on avalanche data alone; it is essential to have an idea about where and when people are skiing. Snowbase contains information about the usage of defined ski runs within the operation areas, and therefore it was possible to analyse the relative risk associated with the different factors. This study is the first one where such risk can be estimated, since the exposure of people is included, and this has important implications for the conclusions.

The study shows that the historical risk of accidentally triggering an avalanche greater than size 1 (according to the Canadian classification system) depends highly on the stability rating, with the highest risk under "poor" stability. The risk is greater in higher elevation levels than lower down, and it is lower during late season than earlier on. The risk does not depend as much on aspect as may be indicated from avalanche data alone, because the aspects with the highest number of avalanches were also the ones most frequently skied. Some analyses of combined factors were also performed, showing that these factors are not independent of each other.

The second objective of the study was to extract knowledge on avalanche risk management from professional mountain guides with a questionnaire and interviews, as well as observation and analysis of remarks in avalanche reports. The main focus was on terrain selection and group management, in terms of avalanche risk. The study indicates that when selecting terrain, guides first look at the overall shape and size of the terrain, but avalanche history of terrain and inclination are also important factors. Group management is an important component of avalanche risk management and experience is a significant factor in both terrain selection and group management.

Based on the findings of the study, the possibility of using rule based decision methods for professional mountain guides in Canada was evaluated. The result was that strictly rule based methods are not appropriate, because the guides are most likely able to make better decisions, and take more factors into account, based on experience. Also, the interrelation of the factors analysed here makes it difficult to create simple rules based on them. However, some structure is desirable for the decision making process, in order to minimize the risk of human error, and some structure already exists in backcountry skiing operations. The results of this study could be used as an advising tool for the decision making process of professional mountain guides.

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