

The Challenges for Scottish Avalanche forecasters observing a Maritime Snowpack

Mark Diggins
SportsScotland Avalanche Information Service

ABSTRACT: Avalanche Forecasting in the Highlands of Scotland presents many challenges for the SportsScotland Avalanche Information Service forecast team, the maritime climate and latitude of the operational areas ensure that the weather patterns are complex and often severe, the snowpack is varied and the stability changes rapid. Additionally, the user groups commonly carry out their mountain activities in poor weather conditions, a factor influencing the SAIS operational methods. In this paper we will describe the geography, landscape and reason for the location of the five SAIS observation areas and present an impression of the working conditions and method in an environment and weather system that can produce winds of 176mph (283kph) and frequently 40-70mph (65-120kph) and consider the characteristics of the Scottish snowpack. We will present the avalanche occurrences observed in the 5 areas for the winter 08/09 relating the findings to weather conditions at the time and the stated avalanche hazard, establishing that the avalanche occurrences occurred predominantly during the snow storm-cycles.

Unlike in Alpine countries the mountain user groups who carry out walking and climbing excursions in the Scottish Highlands are mainly on foot, with very small numbers on ski. Their general behaviour and objectives are influenced by the scarcity of good climbing and stable weather conditions. Therefore it is common practice to carry out activities in poor weather and during considerable hazard conditions. In this regard we will look at data from the winter of 08/09 to identify if indeed, avalanche incidents involving people, occurred during periods of considerable hazard and poor weather.

KEYWORDS: Scotland, Forecasting, Challenges.

1 INTRODUCTION

The SAIS operation covers a total area of approximately 3,500 sq kilometers (1300 sq miles), which is approximately 30% of the Mountain area in Scotland.

This total area is subdivided into 5 areas which comprise traditionally the most popularly visited mountain locations in the Highlands of Scotland. The five area locations are managed by a co-ordinator with a team of ten, five chief observers and five area observers. Daily avalanche reports are provided for each area from early December until early April the following year. The SAIS service is government funded and receives £120,000 per year.

The avalanche reports are published on a website and the reports are accessed by up to 320,000 people during the 4 months of operation.

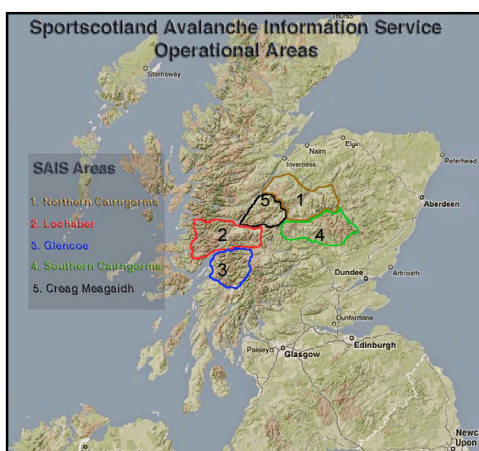


Figure 1

2 AVALANCHE REPORT AREAS

The five areas comprise;

1. Northern Cairngorms which contains the second highest mountain in Britain, Beinn Macduibh 1309 m which is accessed by the crossing the arctic terrain of the 1000m Cairngorm plateau, also, the Northern Corries are three cirques of cliffs which are accessible to many climbers and groups.

2. Lochaber, which contains the highest British mountain, Ben Nevis 1344m with its worldwide reputation for high quality winter mixed and ice climbs, and the cliffs of Aonach Mor which provide accessible winter climbing.

3. Glencoe with its iconic mountain Buachaille Etive Mhor and impressive but complex ridges and corries all accessible

4. The South Cairngorms are less accessible but with the famous winter climbing in Lochnagar and the High Arctic plateau of Ben Avon it receives many visitors.

5. Creag Meagaidh is a famous winter climbing area with good access and fine walks on to summit areas but big cliffs and an area of significant avalanche danger.

3 WEATHER CONSIDERATIONS

The highlands of Scotland are influenced mainly by North Atlantic weather systems and are categorised by fast changing weather patterns, rapidly changing temperatures, strong winds and heavy precipitation. For the winter 08/09 period the wind speed was 20 mph and above for 89% of the days.

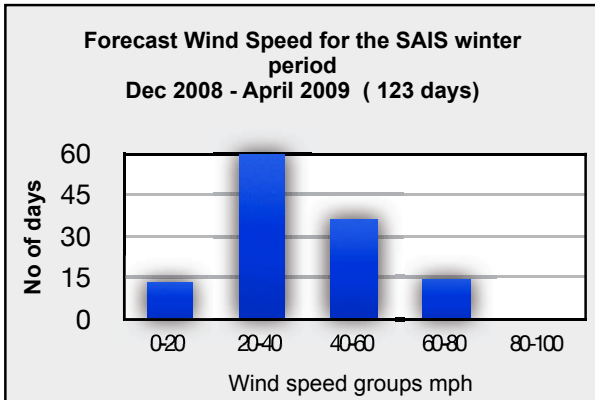


Figure 2

The temperatures fluctuate over short time periods and from area to area. Figures 3 and 4 show daily temperature and snow values over a thirty day period from the 30th January to 2nd February 2009. It can be seen that, although the areas are close to one another geographically, values differ markedly between the operational areas

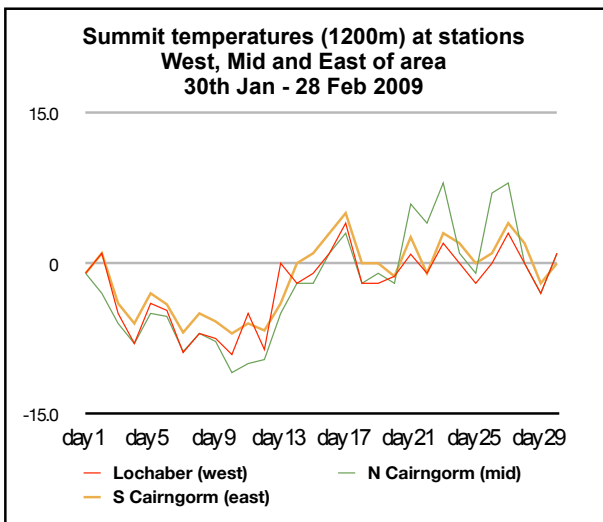


Figure 3

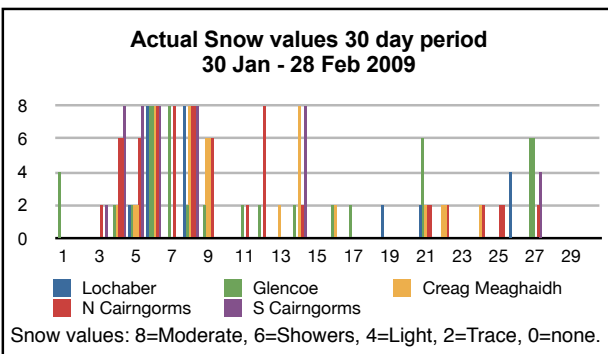


Figure 4

4. HAZARD EVALUATION FIELD METHODS

Historically, prior to the formation of the Scottish Avalanche Information service in 1988 research was undertaken in determining if snowpack information could be sufficiently gathered from automatic stations. It was identified at the time that reliable avalanche forecasting could only be done effectively by experienced forecasters in the field, as a fixed station may not always be located in a reliable study plot and would therefore require a flexible approach to study sites. The continuing strong temperature and precipitation variations as identified in figures 3 and 4 continue to reinforce this principal.

Avalanche hazard evaluation currently is carried out by field observers identifying snow distribution changes on a daily basis and travelling by foot or on ski to a location that represents the highest hazard and completing a snow profile and tests. The information determined from the snow profile area will generally contribute 15% of the information required in determining the avalanche hazard for that day. The greater proportion of the information is gathered from observations and mobile field tests whilst travelling on a range of aspects and altitudes.

5. USER GROUPS

The majority of winter mountain activity is undertaken on foot, hill walking, mountaineering and ice and mixed climbing being the main pursuits, during favourable conditions ski touring is also carried out.

It is always difficult to determine exactly the numbers of mountain users throughout the Scottish highlands but two areas can provide an indication of usage due to confined access to The North face of Ben Nevis, Aonach Mor and Corrie an t Sneachda in the North Cairngorms. Numbers have been determined by headcounts, beam counters and pressure counters on paths, and telepherique access.

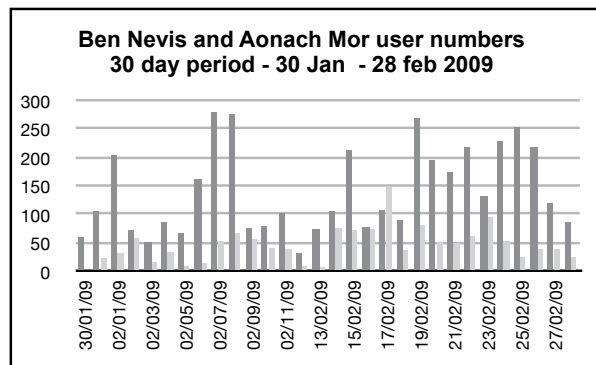


Figure 5

The total number for the period in figure 5 are 4198 for Ben Nevis and 1370 for Aonach Mor.

During the same period in the Coire an t Sneachda in the Northern Cairngorms, on three sample days, head counts were made by the Cairngorm Ranger service for a half hour midday period.

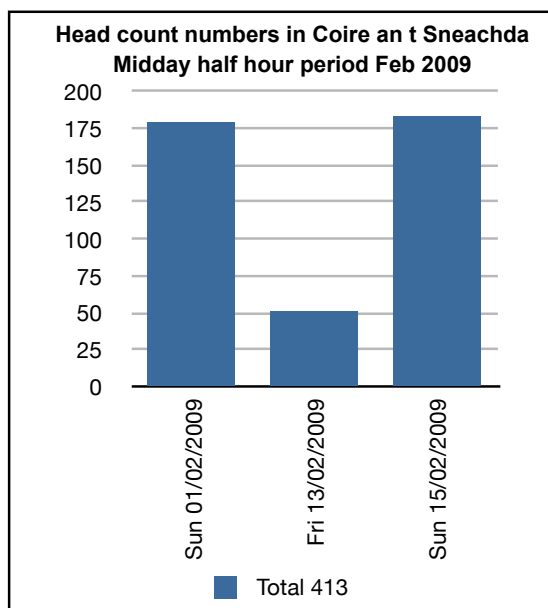


Figure 6

The user numbers show that the locations stated in figures 5 and 6 show a high user number, in particular at weekends.

6 AVALANCHE INCIDENTS FOR WINTER 2008-09

During the winter period 112 avalanche occurrences were observed or reported to the 5 avalanche observer areas, of these, 21 involved persons. Tragically 3 victims were buried and died when nine persons were avalanched in Glencoe on the 24th January 2009.

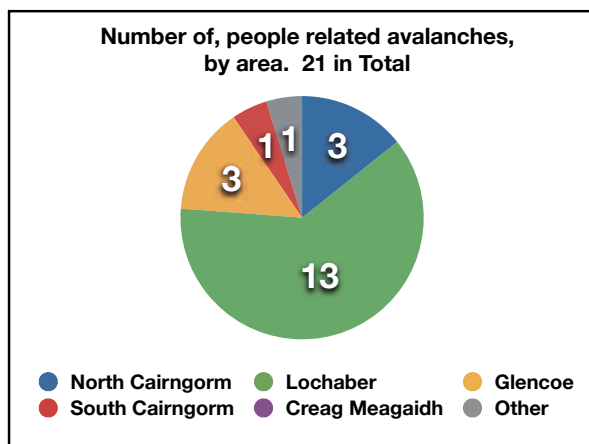


Figure 7

Relating the number of avalanche occurrences to weather conditions and hazard rating, on 20

days the hazard was either Considerable or High. Additionally the wind speed on, or up to 2 days prior to the avalanche occurrence was 20km/h or more. Indicating that windslab build up had taken place.

On 20 of the days the air temperature at 1000m was below freezing and only on one day was the

Avalanche Incidents - People related Winter 08/09

Date	Area	Av cat	Altitude	Wind sp <20kph	snowfall	1000m temps
3/1/09	NC	2	1020	1	1	-2
4/3/09	NC	3	1100	1	mod	-4
5/3/09	NC	3	1110	1	1	-5
14/1/09	LO	3	1150	1	0	+2
18/1/09	LO	4	1200	1	1	-5
18/1/09	LO	4	1110	1	1	-5
24/1/09	LO	4	1050	1	1	-4
4/2/09	LO	3	1090	1	1	-4
4/2/09	LO	3	1140	1	1	-4
1/3/09	LO	3	1190	1	1	-2
4/3/09	LO	4	1080	1	1	-5
4/3/09	LO	4	1000	1	1	-5
4/3/09	LO	4	1050	1	1	-5
6/3/09	LO	3	860	1	light	-2
6/3/09	LO	3	1030	1	light	-2
29/3/09	LO	3	1150	1	light	-5
21/1/09	GL	4	800	1	1	-5
24/1/09	GL	3	900	1	1	-2
7/2/09	GL	3	1000	1	1	-6
4/2/09	SC	4	890	1	1	-3
1/12/08	other	NA		1	0	0

Figure 8

temperature +2 degrees c. see figure 8.

7 CONCLUSION

It is evident from the data in figure 8 that 20 of the avalanche incidents occurred during days of significant hazard (Considerable and High). Referring to the people numbers for Ben Nevis some days indicated high user numbers, on the 18/01/09, a Sunday, for example, on a day when a High Avalanche hazard was forecast, 310 person were counted ascending to the North face.

Although the sample is too small to draw definite conclusions it does indicate that this is an area which requires more investigation.

8 REFERENCE

- Bullivant, N. Cairngorm Mountain Ranger Service - Northern Corries people survey 2008/9.
- Moss, G. SAIS Lochaber - Anoch Mor and Ben Nevis people surveys 2001 - 2009