

Gulmarg end of season report

The 2009-2010 winter in Gulmarg could be described as tragic or triumphant. Luck plays its part in this business of avalanche forecasting both in our predictions and in the final outcome. For our part at Gulmarg snow safety, I am happy to present a reflection of the past three months in which both triumph and luck were in adequate proportion.

Gulmarg snow safety evolved this season. Over the past three winters, our two member company has focused on the development and implementation of a snow safety plan in addition to assessment and training of ski patrolling skills of the Kashmiri ski patrol team. Satisfied with the performance of general patrolling skills, our focus in training proceeded to basic snow science and instability assessment. The efforts put into this training and the progress made by the patrollers themselves needs to be matched by their government employers through the formality of establishing appropriate job designations. After more than 3 years, many capable ski patrollers still hold job designations of *golf walla*, an embarrassment to the formidable skill sets they have worked hard to obtain. Our company remains responsible for organizing and executing active avalanche control measures (explosives) in this politically sensitive region along with final snow stability decisions within the ski area boundary.

Apart from the official duties to the state department of tourism we continue to provide an avalanche advisory service, issuing daily bulletins covering the Pir Pinjal range surrounding Gulmarg. We see this service as obligatory, demanded in part by the position of the gondola, which offloads guests to 300 degrees of backcountry access and by the destructive capabilities of the terrain surrounding Gulmarg; as proven by the stunning death toll sustained by Indian military this winter from a single avalanche incident. This season, the advisory format was updated with new signs at the gondola and via website (www.gulmargsnowsafety.com). The website includes additional resources such as an avalanche incident database to help backcountry users avoid repeating other's mistakes. Our thanks go to those who have volunteered details of their incidents. These details are used anonymously for the benefit of other backcountry users. The Tuesday evening avalanche awareness talk continues to bring large numbers of international guests. The program and power point presentation were revised for this winter, remaining brief while attempting to present information of interest to the newcomer and routine visitor. In an effort to establish a more comprehensive avalanche center in Gulmarg, the snow safety program will advertise accredited avalanche courses via the website for next season. Courses will be offered conditional to sufficient enrollment with a deadline of Fall 2010. Courses will run during the first half of the season when the snowpack is most interesting.

Statistics

Winter operations of gondola phase 2:

Season	2007/2008	2008/2009	2009/2010
Opening day	Jan 13	Dec 15	Dec 15
Closing day	March 15	March 15	March 15
Days phase 2 open	43	65	68
Total Closed	20	24	21
Days Closed Wind	7	4	8
Days Closed Gondola Mechanical	1	2	0
Days Closed Military Explosives delayed or denied	3	4	1
Days Closed Storming Conditions	9	16	12

Clarification of Statistics and Planned Improvements to Infrastructure

Guests can decide if Gulmarg ski area represents a poorly planned venture or the ideal adventure but to do this they must be made aware of the situation at Gulmarg. In doing so, they become informed and thus can prepare for their visit and make appropriate decisions while at Gulmarg. Before I can extol the virtues of Gulmarg, I am directed by a sense of responsibility to first elaborate on potentially disparate features involving risk.

Gulmarg has a short winter season. A top priority of the snow safety program has been increasing efficiency of phase two through maximizing access to skiers and snowboarders while maintaining safety. Successful negotiations established an explosives avalanche control plan in 2008 and has accounted for the largest increase in efficiency. Closures due to wind are expected to continue with little solution. It is interesting to note that the threshold wind speed for safe operating given by the Cable Car Corporation is 10 meters/second (22 mile/hr; 36 km/hr). Closures due to wind directly affects access for avalanche control work. To complicate matters further, explosives are ordered from the military, with advanced notice favorably affecting availability. This system requires accurate forecasting of post storm winds to prevent redundant, unnecessary or cancelled explosive orders. Two solutions are being pursued to address this matter.

A commercial explosives permit is being sought through the Indian government. This would allow access to materials for predawn explosives assembly and avalanche control work prior to operating hours and would relieve the Indian military of the role of explosives provider.

The second solution determines not only efficiency but also safety and therefore receives higher priority. It involves collecting automated weather data for avalanche forecasting. Currently both the snow safety program and the avalanche advisory rely on weather data manually collected at an elevation 1000 meters below both the avalanche start zones and

the top station of the gondola. Meanwhile, two automated weather stations are gathering data at perhaps 5-second intervals over 24 hours every day at ideal locations at the top and base of phase 2 of the gondola (on the ski resort property) for the Snow and Avalanche Study Establishment (SASE) of the Indian military. Abiding by guidelines set by the Indian Department of Defense, SASE has refused to share data being gathered by these two automated weather stations (AWS). Having no other choice, we have developed a plan with the Indian Department of Meteorology to build two additional (and likely identical) AWS towers to duplicate this essential weather data for ski area snow safety and for avalanche forecasting of the backcountry terrain. Without a change in the policy of the Indian Department of Defense, these additional sites are scheduled for construction in the summer of 2011.

Backcountry Accidents and Planned Improvements to Infrastructure

The vast backcountry accessible from the Gulmarg gondola presents guests with the ability to range great distances from the ski area boundary. Guests of Gulmarg are made very clear that their responsibilities upon leaving the ski area boundary include affecting their own rescue whether it is due to injury or an avalanche. Limited ski patrol staff and equipment along with the need to give priority to rescue services within the ski area boundary are the primary factors in this mandate. If approved, rescue assistance is often delayed and may be inadequate by western standards. Therefore guests are also made aware that their exposure to risk while in the backcountry should be proportionate to the outcome of sustaining an injury in a remote area. I expand on the following details to clarify the consequences of becoming injured in the Gulmarg backcountry and suggest improvements to infrastructure.

The potential inadequacy of a backcountry rescue at Gulmarg is due to poor communication resources, the lack of swift or modern evacuation resources and the absence of an inter-agency rescue plan. The agency in this case is the High Altitude Warfare School (HAWS). This agency and its staff are endemic in the Gulmarg village during winter. They possess the manpower and training adequate for extensive and remote searches and are called upon in such cases. Unfortunately, offers to HAWS by the snow safety department to cooperate in producing an interagency rescue plan have gone unanswered. As the need for organized search-and-rescue operations increases, prior planning will improve consistency, efficiency, and the safety of rescuers. In each scenario this would improve the outcome of an injured person.

To meet standards of rescue enjoyed in the West, communication and evacuation resources also need to be addressed. No standard of communication exists within the public sector at Gulmarg ski area. Cell phones and UHF radios all have limited coverage. Of greater concern is the variable reliability of the UHF radios used by the ski patrol to communicate within the ski area boundary. The system lacks signal repeaters, which results in numerous “dead spots” where no radio signal is possible. Many more locations inside the ski area boundary have poor signal strength making communication unclear resulting in misunderstandings during critical situations. Instead of simply installing solar supported repeaters for the current UHF system, a better solution might be to convert to VHF radio sets and install repeaters to support signal strength where needed. The benefit

of this approach includes broadening the scope of communication to privately owned VHF radios carried by many guests, guides and perhaps HAWS members. Guests of Gulmarg would have a better opportunity to contact ski patrol dispatch directly in the event of an emergency. Ski patrol dispatch could also contact HAWS directly prior to, and during a major incident.

Rescue resources refer to the means of affecting a rescue. For the injured party it addresses the question, “who is going to come help me and how are they going to get me from this place to hospital?” The most important resource absent at Gulmarg, which many first-time visitors are surprised to learn, is rescue by helicopter. Regardless of the nature of the injury or where in proximity to the Gulmarg gondola the accident occurs, a helicopter has never been available in the rescue plan at Gulmarg ski area. Furthermore, upon arriving back to Gulmarg village, an injured patient must travel by vehicle for at least one hour before arriving at a hospital equipped for treating severe trauma or medical injuries. No plans have been announced officially to introduce helicopter rescue services to Gulmarg.

Season Snowpack Review

Winter began early in Gulmarg, too early according to local farmers who struggled to shift livestock from snowstorm conditions which delivered over a meter of snow in early November. High pressure imbedded itself in the region inflicting colder than average temperatures for the next two months. By New Year’s Day, when a small storm brought light snowfall, the snowpack was rife with facets. Sunny days and very cold clear nights settled the November snowpack down to shallow uncohesive facets on solar aspects. North and Easterly aspects won more snow due in part to wind patterns typical of the polar and sub-tropical jet streams. But average snow depth was not sufficient to prevent depth hoar forming. Additional loads from winds produced hard layers that ultimately provided both bed surface and host to facet growth during the long period of high pressure. Widespread avalanche activity occurred during this period and the first reported avalanche incident of the season. Fortunately, the new year storm total proved insufficient weight to overload the depth hoar weak layer nor was it capable of producing large avalanches on it’s own as it’s weak interface with the previous snowpack persisted more than a week. Mid January brought moderate temperatures despite clear conditions. Too little, too late...

These warmer temperatures could not reverse the damage done over the previous two months. The last day of January marked the start of a Southwesterly storm pattern, which would continue through mid February. This storm would come in two waves. The first wave deposited a half-meter of snow followed by a short window of clear weather. Avalanche control work produced a massive avalanche cleaving an enormous fissure to the ground through the center of the ski area. This was a clear sign that the widespread depth hoar was reaching its breaking point and prompted special “instability warnings” issued on the web advisory and in the Tuesday night avalanche awareness talk. As the window of clear weather closed and forecasted storm totals suggested the second wave was approaching, a second special advisory was issued targeting the danger presented by climax avalanches triggered in the immense alpine terrain running “well below tree line”. Two days of continuous snowfall followed. On the morning of the third day, with over

one meter of additional storm snow in Gulmarg village, the intensity of the natural avalanche cycle was at its peak. Multiple avalanche paths were running beyond historical limits. In Drung valley, avalanche debris 2 meters in depth was present 10 kilometers from its originating start zone. On the same morning, multiple paths avalanched simultaneously above the Killanmarg plateau, a 700-meter long bench that often protects the tree line below from debris. Adjacent to this tree line, Indian HAWS (High Altitude Warfare School) members were conducting training. This avalanche cleared the Killanmarg plateau pouring through any opening in the forest. Beneath one opening a group of soldiers were detached for a tea break. One finger of the avalanche struck this group killing at least 17 men and injuring an additional 17 (see avalanche accident database for details). A safe response plan was established. A company of Gulmarg ski patrollers, equipment and personnel from the department of tourism were dispatched to assist in the rescue operation. Final storm totals from the two waves exceeded 210 cm. in the Gulmarg village. This enormous weight effectively scrubbed the depth hoar problem and established a new, deep snowpack, free of weak layers save the future new snow interface. With this in mind, three further storms followed shortly thereafter in the last week of February and early March. All of these storms arrived during the daytime or generally during a period of sustained warm temperatures sufficient to form a strong interface with the snowpack surface in each instance. Few natural avalanches were observed and active control measures inside the ski area produced small results. In March, a cold air mass established itself at the beginning of an extended period of high pressure. Temperatures gradually warmed despite continued clear conditions to finish the forecasting season on March 15th. As an ancillary warning, forecasted temperatures suggest a period of prolonged high temperatures in which any significant refreeze overnight may be absent up to an altitude of 4000 meters. This will occur during the week following the 15th of March. Residual persistent grains underlying the snowpack on Southerly aspects may pose a threat of producing potentially large wet avalanches.

Final Tribute

I would be remiss without thanking the many individuals who have donated their time, far from home, in the face of confounding circumstances, perhaps even risking their lives to progress the standards of safety at the Gulmarg ski area. Our success is built on their efforts. Thanks to the Pine Palace hotel, which provides the venue and projector for the avalanche awareness talk.

The snow safety program is devoted to promoting a community of informed riders at Gulmarg. We believe transparency of our organization is also important. This report is available to all interested parties. I welcome comments and observations.

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