AVALANCHE news

canadianavalancheassociation
Volume 67 Winter 2003

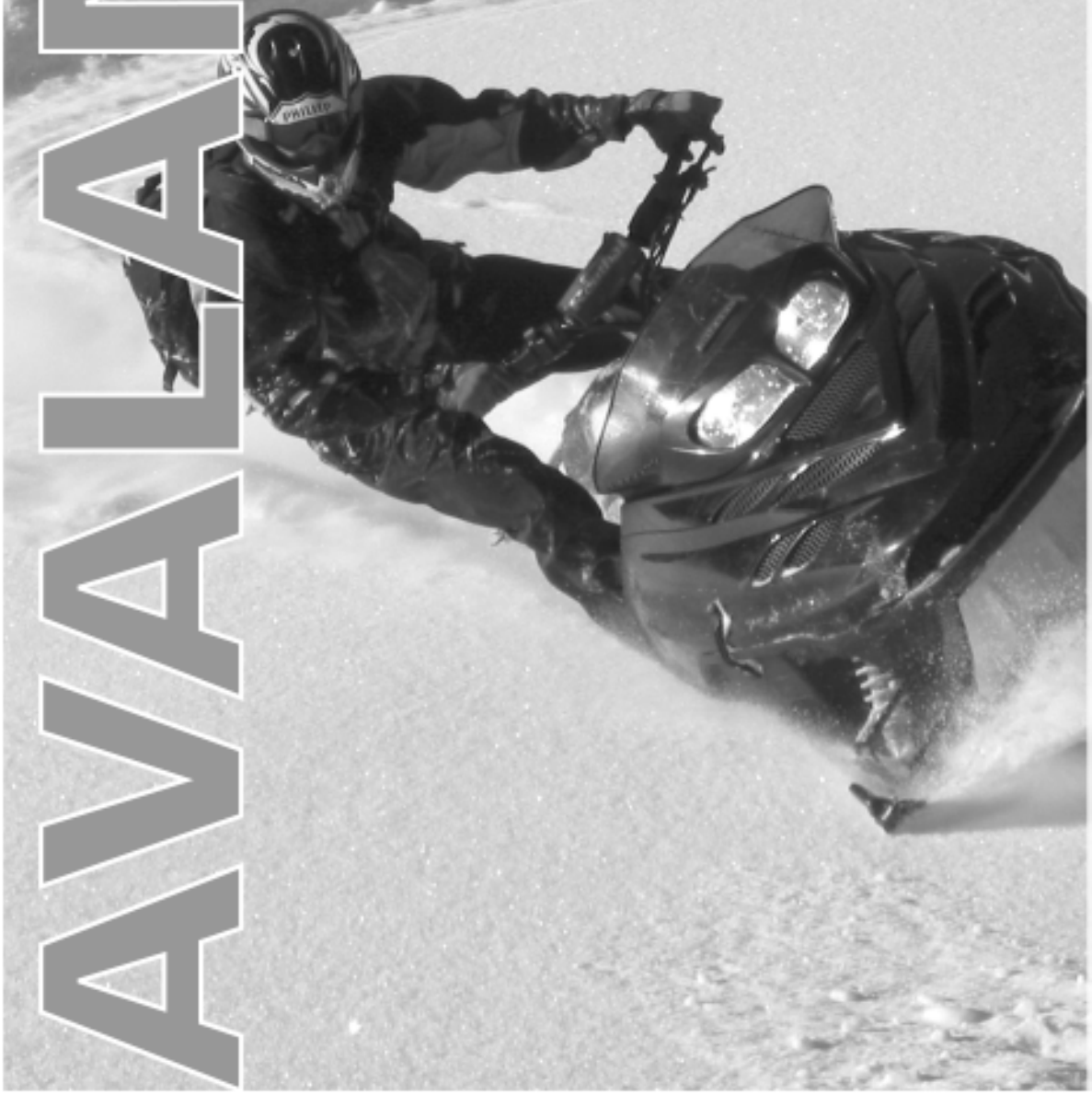

Photo by: Tony Parisi

inside

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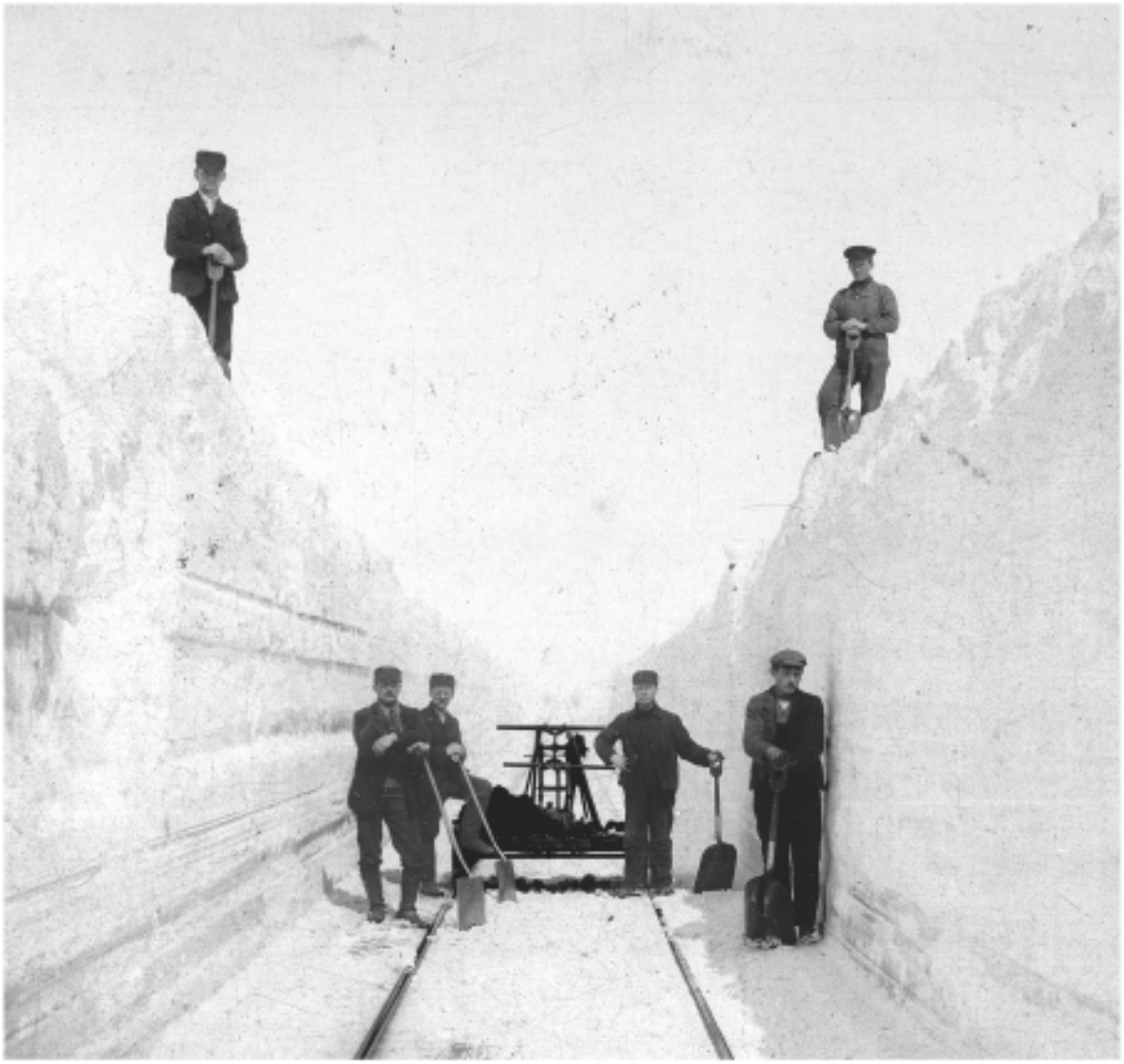

Photo: Canadian Pacific Railway Archives

Making tracks in the backcountry since 1884.

Since coming to Western Canada over 100 years ago, Canadian Pacific Railway has been a pioneer of backcountry exploration and safety. By finding the first route through Rogers Pass and opening the West. By building Mount Macdonald Tunnel, the longest railway tunnel in the western hemisphere, to avoid the avalanches and dangers of the Pass. By hiring Swiss guides to help ensure tourists stayed safe while mountaineering and exploring the backcountry. That tradition continues today through CPR's partnership with the Canadian Avalanche Association to make the backcountry a safer place for people to work and play.

To find out how you can support the Canadian Avalanche Association, please call **1-250-837-2435.**

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CANADIAN PACIFIC RAILWAY
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Avalanche News

Winter 2003 ❄ Volume 67

Avalanche News is the official publication of the Canadian Avalanche Association, a national non-profit society based in Revelstoke, BC. The goal of Avalanche News is to keep readers current on the issues and happenings affecting avalanche safety in Canada. It is published quarterly.

Avalanche News always welcomes your: opinions, teaching tips, photos, research papers, survival stories, new product announcements, product reviews, book reviews, historical tales, event listings, job openings, humourous anecdotes and really, *anything* interesting about avalanches or those people involved with them. Help us share what you've got. Please send submissions to:

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Editor & Advertising Todd Beernink
Graphics Guru Brent Strand

Content Deadlines:
Material is due on the 1st of February, May, August, and November for our spring, summer, fall and winter editions respectively.

Note: Digital contributions work best for us. For details, contact Brent Strand at canav@avalanche.ca.

canadianavalancheassociation

Editor's View

This past fall the CAA was busier than any group I've ever worked with. A huge commitment from a solid group of staff and supporters has resulted in a lot of good news to report in this edition of *Avalanche News*.

The biggest change over the past few months has undoubtedly been the news of assured government funding from the province of BC for public avalanche safety programs. This news is outlined in the first few pages of this edition, along with a background of the Public Avalanche Bulletin (PAB), an update from our new forecasters on how this public program will change, and a letter of support for a national avalanche centre from the **Canada West Ski Areas Association** (page 11, 18 and 15 respectively).

While changes to public programs attracted the most media attention, many changes have been made to our private industry programs too. For example, the avalanche-training program for the snowmobile industry was completely overhauled in October by a group of 16 snowmobile community stakeholders from around Western Canada. The first run of the revamped weeklong, industry-specific course took place in late November. Feedback from students was very positive. See page 53 for the full story from **Ian Tomm** and **Pat Whiteway**.

For those ski RAC instructors thinking of tapping into the growing number of avy-aware snowmobilers, do yourself a favour and first read **Doug Chabot**'s no-nonsense article on the Zen of sled-ucation. It's full of tips like "…to think like a snowmobiler we have to be a snowmobiler …the goal is to not be seen as a bunch of goobers getting stuck at every turn… we've taken the last few years to become proficient riders." Where was this article when I taught my first few groups? It wasn't until I taught with **Lori Zacaruk** that I figured it out. She must have sensed my lack of sledibility, because she sent me a totally comprehensive introduction to the world of sledding. Check it out on page 49.

This edition also contains a few research papers that are sure to be of immediate use to those who are out there gauging snow stability. One paper is on shear quality by **Karl Birkeland** (page 30); the other is on fracture propagation and resistance in weak layers by **Bruce Jamieson** (page 36). Dig in.

Another interesting read is the **CAA's Oral History Project**, written about Canada's avalanche pioneers. This edition includes the first of a four-part series of the project and features a biographical summary of the legends themselves. In the next four issues we will explore the role of industry-related accidents, the growth of recreation, the evolution of public safety practices, and the evolution of avalanche control and forecasting.

This is the fourth edition of the *Avalanche News* that I've edited during the last year and I'd like to thank all those who have contributed material and made my job so rewarding, especially Bruce Jamieson who has submitted a research paper for each of these issues.

Winter's here – enjoy it!

Todd Beernink

Todd Beernink
Editor

Seasons greetings!

FROM BILL MARK, CAA PRESIDENT

First of all I would like to thank the Board members and all the committee members for your volunteer time and effort over the summer and fall. Your Board and the committees have once again been working behind the scenes on a number of projects.

At the Board level, we recently had a face-to-face meeting in Canmore in early November. We had the opportunity to receive some sponsored Board training to improve our effectiveness as directors. The most important point that this course reiterated for me was that the Board sets the strategic direction for our association.

You have elected the Board to "take hold of the tiller" for the CAA by setting priorities and creating policies that give direction to the various CAA committees. The Board also provides direction for the Executive Director (Clair Israelson) to lead the staff in the day-to-day operations of the Association. This is how we will achieve the mission and vision outlined below. These vision and mission statements, which were reviewed last April and ratified by the membership at the AGM, continue to be our primary reference to help guide our association forward. As we grow in size, these policies make our operations more consistent.

In keeping with this vision, I have written an article about a current issue later in this edition of Avalanche News (pages 20-21), which explains the fundamentals of the current InfoEx product and discusses other options in keeping with the CAA vision statement.

I am pleased to announce that the BC government has, for the first time, made a three-year financial commitment of $125,000 to public avalanche safety. BC also released the report on "the review of public avalanche services in BC". In that report a model was suggested that a "national avalanche center" be developed using a partnership of government & private funding and operated by the CAA. The report suggested that private donors and sponsors fund $125,000, that the Provinces of BC and Alberta cooperate to fund a combined $250,000, and that the federal government match that fundraising of $250,000. As yet we have had no formal commitment from Alberta or the Federal government. There have also been some informal discussions with Quebec.

On behalf of the CAA Board of Directors I would like to wish everyone a happy and safe winter.

Regards,

Bill Mark
President
Canadian Avalanche Association

The Canadian Avalanche Association Mission Statement:
The CAA is dedicated to bringing the avalanche community together to develop knowledge and understanding of avalanches, facilitate communication, promote professionalism, and provide quality avalanche education.

Vision Statement:
The CAA is Canada's national organization promoting avalanche safety.

The CAA is a non-profit society that will:

1. Promote professionalism in Canadian avalanche safety programs.
2. Enhance and promote public avalanche safety programs through partnerships within the private and public sectors.
3. Facilitate information and technology transfer.
4. Develop, maintain and deliver avalanche education programs.
5. Promote avalanche research and development.
6. Ensure value of membership and encourage participation.

Executive Director's Report

BY CLAIR ISRAELSON

The past three months have been a period of intense activity for the CAA. The usual fall workload of registering students for CAA Training Schools courses, catching up on our memberships' requests that accumulate over the summer months, and getting ready for the CAA's winter operating season was very capably handled by your Centre staff. In this report I'll touch on a few of the more significant developments of the past three months.

Clair Israelson and Mayor Mark McKee cut the ribbon at the grand opening of the CAA's new location.

New Home for the CAA

In the middle of October there was a major disruption as we moved from the leased office space we had previously occupied into the CAA's newly purchased home at 110 MacKenzie St. Fronting onto Grizzly Plaza, the new location and larger work space is perfect for the CAA. The best part of the situation is that starting next year, CAA overhead costs will be reduced because the CAA will no longer be paying rent for office space. Early last spring a thorough business analysis of office purchase vs. continuing to lease space was done for us by our accounting firm, BDO Dunwoody. Their analysis concluded that purchase of the 110 MacKenzie St. property would save the Association money in both short and longer terms, and send a strong signal to industry and governments that the CAA is committed to serving the future needs of the avalanche safety industry and the Canadian public.

Meanwhile visitors and CAA members mingle about inside.

Quebec Avalanche Safety Programs Developments

In early October I had the privilege of spending a week in Quebec, working with the avalanche community that has been formed during the Quebec Collaborative Avalanche Project (QCAP). I was extremely impressed with what has been accomplished, and the expertise and cooperation that is developing within Quebec. In particular I wish to acknowledge the efforts of QCAP project managers Marc Deschênes and Susan Hairsine, Dominic Boucher and Stéphane Gagnon of the Haute Gaspésie Avalanche Centre (CAHG), and Captain René Marchand of the Sûreté du Québec. Good people from strong organizations are forging relationships that will continue into the future, and serve as the foundation for ongoing avalanche safety initiatives in that region of Canada.

I learned a lot during my time in Quebec. Avalanche terrain in the Haute Gaspé is bigger, steeper and much more dangerous than I had imagined. Governments have invested over $62 million to make the Gaspé the "mountain centre for eastern North America." Winter tourism is growing rapidly, and avalanches pose a very real threat to winter tourists in the area. The need for high quality avalanche safety programs in Quebec is real.

There was much discussion of the value of a Quebec representative on the CAA's Board of Directors, the possibility of a standing "Quebec Committee" to provide perspective and input into decisions, and how a National Avalanche Centre might have an English speaking office in the west, and a French speaking office in Quebec. In a meeting with Nancy Charest, National Assembly member for the riding of Matane, I heard strong support for improving avalanche information and technology transfer between western Canada and Quebec, and a desire to see avalanche safety programs developed to support Quebec's growing winter tourism industry. It is likely that changes to the CAA's constitution will be required before all of these goals can be realized, and that those changes may not all be completed before this spring's AGM. However I believe that everyone recognizes the benefits of closer working relationships between the avalanche safety communities in western Canada and Quebec, and that all stakeholders are committed to achieving that goal. It will take hard work and perseverance, and perhaps a little time, but we will succeed. It's the right thing.

BC Public Avalanche Safety Programs Review

On October 20th the long awaited Public Avalanche Safety Program Review was released by BC Solicitor General Rich Coleman. The report recommends establishment of a National Avalanche Centre "to resolve common issues and coordinate the efforts of the public and private agencies involved in public avalanche safety programs." Minister Coleman pledged $125,000 annually for the next three years for public avalanche safety initiatives in partnership with the CAA. Details of this decision are described elsewhere in this edition of Avalanche News.

The avalanche tragedies of last winter generated three major reviews that together help us to appreciate the challenges faced by the Canadian avalanche community. Parks Canada, the Strathcona Tweedsmuir School and the BC provincial review all carry some strong common themes.

- The popularity of winter backcountry recreation will continue to grow. To reduce the avalanche accident rate, we must become better at understanding, communicating and managing the risks of winter backcountry recreation. Natural and social sciences research will be required to get it right.
- Canada's public avalanche safety programs need improvement. Government agencies, private industry, outdoors clubs and organizations like the CAA need to work together to develop and deliver cost effective avalanche safety programs. No one can afford to go it alone.
- Society expects a higher standard of protection than we have been delivering in the past, especially from persons and organizations with responsibility for the safety of others. The bar has gone up.

Throughout the coming months the CAA will be engaging Canadian avalanche industry organizations, the Meteorological Service of Canada, Parks Canada, the National Search and Rescue Secretariat, provincial governments in BC, Alberta and Quebec and stakeholder organizations such as the Alpine Club of Canada, the Outdoor Recreation Council of BC, the Canadian Council of Snowmobile Organizations and others, to explore options for a National Avalanche Centre. In keeping with the direction set by our Board of Directors, the CAA will offer to serve as a table for stakeholders to gather around to address their common issues. If the stakeholders wish the CAA to operate a National Avalanche Centre to deliver public avalanche safety programs for Canada, we will do everything we can to be of service. The next several years promise to be busy and challenging times.

The BC government financial support has produced immediate, significant improvements to public avalanche safety. For the first time in history a highly skilled avalanche forecaster will be at work in the CAA's Revelstoke offices each day throughout the winter season. Avalanche bulletins will be issued three times a week for at least five of BC's most popular mountain recreation areas. Behind the scenes, this team of forecasters will be working with other partners, building the tools to deliver improved public avalanche safety programs. You will see the results of their work in the coming months and years.

Before I leave this subject, I wish to celebrate the companies, clubs and individuals who have, for many years, provided the money that allowed the CAA to produce the Public Avalanche Bulletins and other public avalanche safety programs. You lead the way, demonstrating that our mountain community really is neighbors helping neighbors. In the future your contributions will still be essential; the Option 2 model for the proposed National Avalanche Centre is based on the principle that the mountain community brings the first $125,000 annually to the table, and the provincial and federal governments together contribute $500,000 annually. Donation of one private sector dollar could leverage four public sector dollars. This would certainly be an improvement over the previous situation where the CAA's public avalanche services were entirely dependent on private sector support.

To all of the good folks who provided financial and sweat equity support to the CAA in past years, I offer our most sincere and heart felt "Thank You!" Your generosity, commitment and determination has helped prevent avalanche accidents, and saved lives. I look forward to continuing our work together as we move into this new era of improved public sector support for avalanche safety in Canada.

This Winter Season

This is the time of year that we love. Winter has arrived, the snowpack is shaping up to be one of the best in a many years, and co-workers are returning from all corners of the globe to engage in another season of work in avalanche safety operations. We feel privileged to be able to be part of such an exciting and challenging industry, and to work with such wonderful people. As we go into this season, let's pause to reflect on colleagues who have perished in the mountains, and commit to being the best that we can be, through every day of our winter season. Wouldn't it be great if next spring we could celebrate a season where no avalanche workers were killed or injured on the job? I believe it's possible. Let's do it.

canadianavalancheassociation
Box 2759, Revelstoke, BC V0E 2S0 ❄ ph: (250) 837-2435 / fax: (250) 837-4624 ❄ email: canav@avalanche.ca / www.avalanche.ca

November 10, 2003

Hon. Rich Coleman, MLA
Fort Langley - Aldergrove
Room 236
Parliament Buildings
Victoria, BC
V8V 1X4

Re: **Public Avalanche Safety Program Review**

Dear Mr Coleman:

Your release of the Public Avalanche Safety Program Review, and commitment of $125,000 annually for the next three years for public avalanche safety programs delivered in partnership with the Canadian Avalanche Association (CAA), is a great step forward for BC.

The CAA recognizes the difficult choices your government faces regarding investment of public funds. Now we need to work together with all stakeholders to get it right. The CAA will be engaging your officials from the Provincial Emergency Program, outdoors clubs and other groups to ensure all new public avalanche safety initiatives are designed to meet their needs. Each year we will provide you with a public accounting, demonstrating that all funds were used wisely against program priorities developed in consultation with stakeholders.

I believe your leadership will result in the establishment of a National Avalanche Centre that will coordinate resources and avalanche accident prevention programs across Canada, save lives, and restore western Canada's reputation as the world's preferred destination for winter mountain tourism. On behalf of the hundreds of thousands of BC residents and visitors that will benefit from this partnership between the Government of BC and the CAA, I offer a heartfelt "Thank you" for your contributions to this success.

Sincerely,

Clair Israelson
Executive Director
Canadian Avalanche Association

Cc: Hon. Gordon Campbell, Premier

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November 10, 2003

Ms. Wendy McMahon, MLA
Columbia River – Revelstoke
C/O Revelstoke Constituency Office
Box 2849
Revelstoke, BC
V0A 1K0

Re: **Education Key to Reducing Avalanche Risk**

Dear Wendy:

I was pleased to learn that you were recognized at the press conference when BC Public Safety and Solicitor General Rich Coleman released the Public Avalanche Safety Program Review, and committed $125,000 annually for the next three years for public avalanche safety programs delivered in partnership with the Canadian Avalanche Association (CAA).

The CAA recognizes the difficult choices your government faces regarding investment of public funds. Now, we need to work together with all stakeholders to get it right. The CAA will be engaging officials from the Provincial Emergency Program, and outdoors clubs and other groups to ensure all new public avalanche safety initiatives are prioritized and meet their needs. Each year we will provide you with a public accounting, demonstrating that all funds have been used wisely against program priorities established by these stakeholders

Since your election in 2001 you have worked on behalf of your constituents and active outdoors people across British Columbia, to promote support for avalanche safety programs that will save lives, and restore BC's reputation as a safe destination for winter mountain tourism. On behalf of the hundreds of thousands of BC residents and visitors that will benefit from this partnership between the Government of BC and the CAA, I offer a heartfelt "Thank You" for your contributions to this success.

Sincerely,

Clair Israelson
Executive Director
Canadian Avalanche Association

Presenting Partner of Columbia Brewery Avalanche Awareness Days

CAA Welcomes BC Provincial Participation in National Avalanche Centre

By BILL MARK and CLAIR ISRAELSON - October 20, 2003

Today [October 20, 2003], BC Solicitor General and Public Safety Minister Rich Coleman released the ***Public Avalanche Safety Review*** and committed $125,000 annually for the next three years to support public avalanche awareness and education for British Columbia. The report calls for the Canadian Avalanche Association (CAA) to operate a national avalanche centre that would coordinate and deliver public avalanche awareness and education across Canada. A federal-provincial-private sector partnership would provide core services funding for the national centre.

"The CAA looks forward to partnering with the Provincial Emergency Program to raise awareness of avalanche risk in British Columbia, and save lives," says CAA President Bill Mark. "Today's announcement is a landmark. For the first time, the BC government has recognized the significant role they play in delivering avalanche awareness programs for the public."

"Until now, the CAA has had to rely on private sector sponsors and donations to pay for these public safety programs. The BC contribution matches the amount pledged this year by our private sector sponsors and the public, and will bring some financial security to enhance these programs."

"The BC report's recommendation for a National Avalanche Centre to deliver public safety programs across Canada is excellent," Mr. Mark continued. "With the release of this report, we now encourage the federal government, and provincial governments in Alberta and Quebec to follow BC's lead. We believe it is essential for those governments to partner with the private, not-for-profit and volunteer sectors to deliver improved public avalanche protection across Canada."

ATTENTION RAC INSTRUCTORS

YOUR STUDENTS ARE APPLYING FOR CAATS COURSES

One of the prerequisites for the CAA Training School's Snowmobile or Ski Operations Level 1 course is participation on a RAC course. Applicants must submit a photocopy of their RAC certificate, or proof of attendance on a RAC course, as part of their application package. Talking to our students it has become clear to us that many RAC students don't get anything from their RAC provider as proof of attendance on courses.

Standardized RAC certificates are available through the CAA for current RAC providers free of charge. Contact Audrey at audrey@avalanche.ca for more information.

For those that do issue certificates could you please let your participants know that they will require it if they intend to go on to the Level 1 Ski Operations program.

Thanks very much,

Ian Tomm
Schools Coordinator

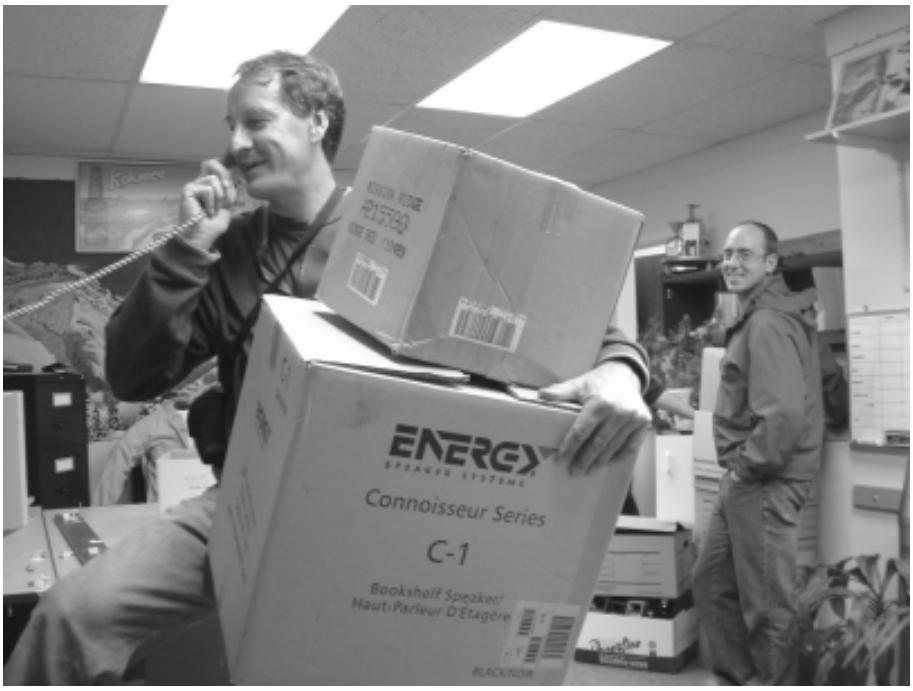
canadianavalancheassociation

CAA moves into its own office "home"

During the last two weeks of October, just as it was starting to get busy at the CAA, we moved from the cramped, six-room, rented office space on Revelstoke's First Ave. to our own new-to-us office building on the main street of town. For more than a week, those staff who were not hauling boxes were limited to one phone line. It was next to impossible to send or receive emails, but the short-term pain was well worth the long-term gain.

Our new 12-room office building looks like it was custom designed for the CAA. There's space for the Schools program to have a small assembly line for CAATS manuals, a large room for our new three-person forecasting team, and even a meeting room that doesn't have to double as Clair's office.

The move to the new building, purchased by the CAA from the City of Revelstoke last spring, was recommended by the CAA's accounting firm, BDO Dunwoody, as a way to reduce annual overhead and allow us to better serve the needs of the Canadian avalanche safety community. As the building inspector said, "This is one of the best built buildings in downtown Revelstoke and it's in great shape. I'd buy it!" We're proud of the new place and our plans for the future, so stop by and check it out next time you're in town.



Energy to spare: Phil Hein lent a hand (or four) during the move.

Out with old (300 West 1st Street)…
Ian Tomm, Ryan Gill and April White on the move.


…and in with the new (110 Mackenzie Ave.)
Here, Revelstoke's Mayor Mark McKee cuts the ribbon at the official grand opening, November 14, 2003

From left to right:Clair Israelson, Executive Director of the CAA; Ken Little, Manager of Environment Canada's Mountain Weather Centre; Betty Sloan, Manager, Finance and Administration, Mount Revelstoke and Glacier National Park; Evan Manners, CAA Operations Manager; Staff Sergeant Randy Brown, RCMP Revelstoke.

MP Jim Abbot (Kootenay Columbia) and fellow MP and Transport Critic James Moore stopped by the new offices in November to learn more about the CAA from our Operations Manager Evan Manners. They also discussed efforts to get Transport Canada to ease off on regulations that limit accessibility to the Avalanche Airbag System (ABS).

CORRECTIONS

From the last edition of *Avalanche News*:

- The date of the CAF Fundraiser Dinner in Calgary with Hans Gmoser and Justin Trudeau has been changed from January 9th to February 19th, 2004. Details on page 26
- There are statistical typos on page 34 and 35 of Vol. 66, the "Analysis of Avalanche Safety Equipment". The p-values should be $p < 0.001$, not ">". Since a lower p value indicates greater significance, $p>0.001$ means little. Note that $p<0.001$ is correct on page 36.

October 17, 2003

CANADA WEST SKI AREAS ASSOCIATION

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VERNON, BC
V1T 8T3

Telephone: 250-542-9020
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Web: www.cwsaa.org

Hon Guy Boutilier
Minister Municipal Affairs
227 Legislature Building
10800 97th Avenue
Edmonton, AB
V5K 2B6

Dear Minister:
BC Avalanche Review

I feel sure that you are aware of the critical importance of providing the highest possible standard of public safety and education for those who travel and carry out recreational activities in the backcountry.

In the winter of 2003, 29 people died in avalanches in Canada. Of these, 14 were Albertans, including the student group from Strathcona Tweedsmuir school. The economic impact on winter tourism was also profound, with a sharp drop in bookings for backcountry lodges and tour operators, given the poor mountain safety image resulting from these accidents.

More deaths result from snow avalanches each year in Canada than from any other natural hazard. Since 1991, 179 people have died in snow avalanches in Canada.

A National Avalanche Centre would provide avalanche warnings and education to the public. At present we have a part-time bulletin and the only warning system that I am aware of in the world that is not funded entirely or mostly by government. These avalanche bulletins are provided through government support in most alpine countries and in all of those with substantial winter tourism.

Last year's tragedies have caught the eye of many people, including the federal and provincial governments and our goal is that they will join our existing group of corporate and individual supporters to establish a sustainable National Avalanche Centre. BC has verbally committed to funding support to the tune of $125,000 (Hon Rich Coleman, Solicitor General) and a formal announcement of this support is imminent. BC has approached Alberta to match the BC funding via your office, which we trust you will support. The final goal is to obtain matching funding from the federal government for $250,000, the provincial total.

The timing right now is critical to get the maximum support for this vital endeavour prior to the onset of winter. At the operations end, the Avalanche Centre has had to take the risk, assuming this will go through, and hire staff/make preparations as the season starts after Nov. 1.

I wish to stress the following:

- Canada needs a National Avalanche Centre to provide public avalanche warnings, and to support our winter tourism industry.
- This National Avalanche Centre should be structured as a public / private partnership, delivered by a non-profit with avalanche safety expertise - the Canadian Avalanche Association. Public sector support should be provincial (BC and AB) and federal.
- While the majority of avalanche incidents are in BC and Alberta, avalanche safety is a national issue. A National Avalanche Centre needs to be able to address avalanche safety for all Canadian constituencies.

This is a great opportunity to show cooperation between Alberta and BC, the federal government and the private sector on a very positive benefit to the public. I request that you give this critically important project your fullest support in achieving the financial assistance that will give the best possible service to the public using the backcountry in the West.

Yours sincerely

(J. Spencer)

JIMMIE SPENCER
President & CEO

Copy: CWSAA Board of Directors
Task Force
CAA
Chris Stethaem

Parks Recommendations for Custodial Groups traveling in the Backcountry

Office of the Executive Director
Mountain Parks
P.O. Box 900
Banff, Alberta
T1L 1K2
Tel: (403) 762-1560
Fax: (403) 762-1555

November 17, 2003

Re: Winter backcountry travel in National Parks - Recommendations for custodial groups

To Whom It May Concern,

This letter is in regard to Parks Canada's policy on licensing and leadership requirements for custodial groups traveling in the backcountry in Banff, Glacier, Jasper, Kootenay, Mount Revelstoke, Waterton Lakes and Yoho national parks (Mountain National Parks). As a result of last winter's tragic avalanche accidents, Parks Canada has reviewed its avalanche safety program. Our goal is to maximize public safety, while maintaining Mountain National Parks backcountry access for youth groups.

Businesses (defined as "for profit, gain, fundraising or commercial promotion") that operate guided winter backcountry activities within the Mountain National Parks are required to possess a business license. Conditions of this license require these businesses to engage the services of a mountain or ski guide certified by the Association of Canadian Mountain Guides (ACMG) or International Federation of Mountain Guide Associations (IFMGA).

At this time, Parks Canada does not require licensing of groups that do not meet the definition of a business. As in the past, these groups will continue to be primarily responsible for their own safety. There is a strong moral duty placed upon the leadership of these groups to ensure their skills are appropriate for the activity.

This is particularly important with respect to the management of custodial groups. Custodial groups are defined as those with a strong "duty of care" owing to adult leadership of groups comprised of minors (ie: school groups, scouts, etc).

As an interim measure, Parks Canada is making the following recommendation to these groups:

If your trip plan includes travel through any terrain exposed to avalanche hazard, you are STRONGLY recommended to seek the leadership of a licensed, certified mountain or ski guide.

For information on hiring a mountain or ski guide, please refer to the Association of Canadian Mountain Guides at **www.acmgguides.com**.

Please ensure this information is distributed to the appropriate contacts within your organization. Parks Canada recognizes the value of outdoor education and experiences within the Mountain National Parks. We hope this letter offers a clear perspective on what is appropriate leadership in backcountry areas.

Announcing the New *Backcountry Lodges of BC Association*

BY MARGIE JAMIESON, BLBC Executive Director

November 18, 2003

What is the BLBC?
The Backcountry Lodges of BC Association (BLBC) is an organization of commercial backcountry lodge operators who run a wide variety of year-round, non-mechanized operations (helicopters, snow cats or snow machines may be used to access these lodges but operations are un-mechanized from the point of the lodge). This organization is meant to be a pro-active voice in our industry. We had consensus at our first meeting in Penticton on May 7th, 2003 that we needed a strong organization of lodge operators.

For many years there had been a hand-full of operators who are mostly all friends with a pretty good idea of each other's operations. Things have certainly changed in the 27 years that I have been operating Ptarmigan Tours in the Southern Purcell Range. From being able to seat everyone in a booth at McDonalds (Al Schaffer's favourite), we now fill a conference room.

Our History
About 15 years ago we did have an organization of commercial lodge operators, when the entire industry was in its infancy. In those days, we did not have the advantage of e-mail communications – yes, we did pre-date some major technologies – and because we were all small owner/operators, time was the major factor that led to the organization's demise.

We now have 26 operators in the province of BC and gross revenue for all operators reaches into the millions of dollars. It has become increasingly urgent for us, as professionals, to become organized under one umbrella. The coroners report for the Durrand Glacier accident hinted that a lodge operator's organization would be recommended, so we decided to be pro-active in organizing our association. I am sure that Government will welcome with open arms a unified body instead of dealing with all the appendages.

Our Executive
President & Executive Director: Margie Jamieson (Ptarmigan Tours)
Vice-President: Brad Harrison (Golden Alpine Holidays)
Secretary/Treasurer: Trevor Holsworth (Ymir Yurts)
BLBC Liaison: Christoph Dietzfelbinger (Bernie Hut)
Director at Large: Russell Hulbert (Ice Creek Lodge)

Purpose & Goals
The purpose of the association is to unify, represent and support the backcountry lodge operators of BC. Our goals are:

- To advocate for our industry in negotiations with government and other user groups
- To promote environmental stewardship in operations
- To facilitate communications within the industry
- To formulate standards of operation

For more information, contact
Margie Jamieson - Executive Director
BLBC
Box 7
Ta Ta Creek, BC V0B 2H0
250-422-3270
ptarmigan@cyberlink.bc.ca

Background on the CAA's Public Avalanche Bulletin Program

By CAA STAFF - October 20, 2003

The Public Avalanche Bulletin (PAB) is the most frequently requested service of the non-profit Canadian Avalanche Association (CAA). The PAB is a free service available via the Internet, fax or phone. Similar to weather forecasts, bulletins provide an analysis and forecast of weather, snow and avalanche conditions for popular mountain recreation areas in western Canada. The CAA plans to publish the first bulletin this year by mid-November and can be accessed from **www.avalanche.ca**.

> *"The value of this data from private industry has been calculated to exceed $2 million annually". Evan Manners*

The CAA's public avalanche bulletin program started 12 years ago, when the public began phoning the CAA's newly opened office in Revelstoke, to inquire about avalanche conditions in the backcountry. "The general public found out that the CAA was coordinating a daily information exchange service for the various avalanche safety operations in western Canada," says CAA Operations Manager Evans Manners. "The CAA knows about avalanche conditions in Western Canada; please share that information with us so we can make safer decisions," they asked. From this modest beginning, the demand for service has grown dramatically. Last year there were almost 800,000 requests for avalanche bulletins distributed by the CAA.

Today, data supplied by a network of more than 70 professional avalanche operations across western Canada, and special weather forecasts produced by Environment Canada serve as the basis for the CAA's public avalanche bulletins. "The value of this data from private industry has been calculated to exceed $2 million annually. Private sponsors, clubs and individuals paid for the analysis, compilation and distribution of the CAA avalanche bulletins. Now with the latest BC government commitment, we have a viable partnership to start meeting the rapidly growing demands for public awareness and education of avalanches," Manners concluded.

The CAA would like to acknowledge the support of many groups and organizations for their generous financial and technical support for public avalanche safety programs in the past, and we look forward to their continuing support. Major sponsors of the CAA's public avalanche safety programs include: Mountain Equipment Co-op (MEC), Columbia Brewery, Canadian Avalanche Foundation, Janod/Vertec Contractors and Canadian Pacific Railway.

A sponsor of the CAA's public services since 1991, MEC has been a strong advocate of backcountry avalanche safety. Company CEO Peter Robinson said, "The near record numbers of avalanche fatalities last winter underscores the need for increased support for avalanche awareness and safety programs in BC and other mountainous regions of Canada. MEC extends its thanks to the Government of British Columbia for supporting the promotion of avalanche awareness and safety."

The Columbia Brewery, presenting partner of the Columbia Brewery Avalanche Awareness Days events, also praised the province's decision to join private supporters of the CAA. "We are very pleased to welcome the Government of British Columbia as a partner in promoting public avalanche awareness and responsible backcountry adventures," said Neil Sweeney, Director of Public Affairs for the brewery.

Update on the Public Avalanche Bulletin Forecasting Program

The forecasting centre is now up and running at the Canadian Avalanche Centre in Revelstoke. The first public avalanche bulletin was produced on November 18th, 2003 and they will continue throughout the season until the end of April. There are some changes that have already been implemented since last year, and more to come for this season and in the long-term plan.

Some of the changes have already begun. For the first time, the CAC has hired a team of avalanche forecasters to work from the office in Revelstoke to produce public avalanche bulletins. There will be a forecaster in the CAC every day until the end of this season. The public bulletins will be produced with the same frequency as previous years to start with – Monday, Wednesday and Friday. However, this year we will have a forecaster here seven days per week so we can produce special bulletins to respond to changing conditions. The BC Provincial Emergency Program (PEP) is providing support to the program for producing extraordinary bulletins this season.

Changes to the Public Avalanche Bulletin program are made possible due in large part to the government of BC's recent announcement to partner with our community to provide public avalanche warning services. Also, the Meteorological Service of Canada has agreed to work more closely with us to provide improved weather products. Examples of improvements already implemented include consultation with meteorologists for forecasts, and expanded regional coverage for the mountain weather forecast. We are pleased to welcome and thank these important partners, and look forward to working with them to improve public avalanche services.

The forecast regions for this year remain unchanged for the short-term: South Coast, North Columbia, South Columbia, Kootenay-Boundary and southern Rockies. However, there is increasing demand for public bulletins in northern BC, and the CAC is looking into ways to address this need. We will be consulting with northern users and contributors to the InfoEx to determine the feasibility of a northern program, and ways we can improve services.

We have started the process of consulting with our partners, stakeholders and user groups in order to create a long-term vision, prioritize our goals and ultimately build our service to cover more regions with greater frequency. This will be a work in progress, and we hope to implement changes throughout the season.

We encourage both the public and CAA members to contact us throughout the winter to voice your feedback and ideas concerning the bulletin, to tell us about your experiences in the mountains, and to report any encounters you may have with avalanches. You can reach us by email at **forecaster@avalanche.ca** or by phone at 250-837-2435.

Have a safe and rewarding winter!

Alan Jones
John Kelly
Ilya Storm

Canadian Avalanche Centre,
Public Avalanche Forecasting Team

The Public Avalanche Forecasting Team at work in the new Forecasting Centre of the CAA. Above left: Alan and JK show how satellite imagery is projected onto the big screen and used for forecasting. Above right: A cameraman from CHBC in Kelowna films Ilya and the meteorological models. Below: Ilya looks at live satellite feeds while JK and Alan check out the precipitation maps for BC.

InfoEx Background Principles and Options for the Transfer of Avalanche Information

BY BILL MARK, CAA President

The CAA's strategic vision commits this association *"to promote professionalism in Canadian avalanche safety programs,"* and to *"facilitate information and technology transfer."*

Recently there have been concerns expressed that the CAA has been unwilling to modify the principles of InfoEx to accommodate the needs of smaller, less well-established members of the commercial avalanche community. This discussion was triggered by a recent BC Coroner's Service recommendation which stated "*It is recommended that all commercial operations where client safety could be affected by avalanches be required to participate in the InfoEx program."*

To keep this discussion moving forward, I'd like to review the principles of the InfoEx program, and explore options for developing other industry services that are in keeping with the CAA's vision statement.

InfoEx was developed in 1991 after a BC Coroner's report recommended that operators in avalanche terrain (the "avalanche industry") should share avalanche information within their professional community, so that one operator would not be blind sided by conditions that had been previously recognized by adjacent (sometimes competing) operators. After much discussion the InfoEx cooperative was formed based on the following operating principles:

1. Each "operational decision node" should hold a subscription. For example, BC Ministry of Transportation, Canadian Mountain Holidays, etc. purchase subscriptions for each of their individual operations (decision nodes) in Western Canada.

2. There must be a CAA Professional Member at each decision node. This ensures quality of the data exchanged and code of ethics compliance regarding professional confidentiality described in point 4 below.

3. Subscribers are expected to input data on a regular basis, not just receive information. This ensures the regular contributions necessary for success of this cooperative service.

4. Confidentiality. Subscribers provide full disclosure of events occurring within their operating areas on the condition that these data will not be forwarded to non-subscribers or circulated outside of the avalanche safety team. Subscribers have concerns about liability or public relations issues that could result from untrained readers drawing inappropriate conclusions from the highly technical, coded InfoEx reports.

5. Non-profit subscription rates. Subscription rates need to cover the CAA's costs of providing the services requested by the subscribers. At present an InfoEx subscription is $850 (with taxes $973.25) for the six-month winter season (1991 pre-tax price $900). Monthly subscriptions are also available.

In 1991 the InfoEx cooperative decided that the CAA should serve as its service provider. This was because the CAA is commercially neutral and technically capable of providing confidential overnight compilation and turn around of InfoEx reports. In its position as InfoEx service provider, it would be inappropriate for the CAA to unilaterally invoke changes or exemptions to the Infoex principles that subscribers have set. If any group of avalanche professionals would like to propose changes to the InfoEx principles, the appropriate process would be for that group to develop a proposal, and offer that proposal for consideration and a vote by InfoEx subscribers at the next CAA annual general meeting.

At present, the CAA's avalanche information services are either the subscriber driven InfoEx (principles outlined above) or the public avalanche bulletins, which are designed for amateur recreationists and paid for by sponsorships, donations and BC provincial government funding. The "Informal-Ex," a bulletin board/email service coordinated by the Association of Canadian Mountain Guides (ACMG) posts guides' backcountry observations and other information, is an example of another decision support product that has evolved to serve that community.

Given the broad range of "commercial operations where client safety could be affected by avalanches" in Western Canada, it is being suggested that InfoEx may not be a perfect fit for everyone. In keeping with the CAA's strategic vision to *promote professionalism in Canadian avalanche safety programs* and to *facilitate information and technology transfer*, the CAA welcomes your suggestions for new ways to serve the smaller and less developed sectors of our commercial avalanche community. I

encourage snowmobile tour operators, the ACMG, individual guides, the recently formed Backcountry Lodges of BC (BLBC) and other independent operators to get together. I suggest that you assess your operational and communications capacities, and your standards for avalanche risk management. During this process it may be prudent to solicit input from land management, insurance and legal advisors. If this assessment exercise were to generate a new, more appropriate model for timely exchange of avalanche safety information within the "small operator" sector of the avalanche community, the CAA would gladly work with that group to implement a system that works for you.

As a non-profit organization with constant financial pressures, the CAA cannot facilitate a new service free of charge; however, we are very aware of the necessity to keep overhead costs as low as possible for you and the association.

If the CAA can assist any sector of the Canadian avalanche community by providing decision support services that will help you to better manage avalanche risks, we will be pleased to assist. That's what the CAA is all about.

Bill Mark
President
Canadian Avalanche Association

ATTENTION INDUSTRY EMPLOYERS

Increasingly the CAA is being approached by government departments and partnering organizations soliciting input or perspective on future policy direction, initiatives, and issues affecting the avalanche community in Canada. To ensure that we can inform you of these issues that affect your operations and solicit your feedback prior to responding to these inquiries, the CAA is creating a database of organizations and government agencies that contribute to avalanche protection in Canada.

We are compiling an industry employer contact list so that the CAA can improve our communications with you and your industry. We know who many of you are, but there are other industry partners out there who we may not be not aware of at this time.

If you employ avalanche workers in any capacity we would like to hear from you… today. Please contact the CAA and ask that your organization be put on our INDUSTRY CONTACT LIST. We assure you that this list will not be distributed to any third parties.

- Forestry
- Mining
- Rail
- Film
- Highways
- Ski Hills
- National Parks / Provincial Parks
- Snowmobile Organizations
- Ski Touring Operations

Please contact Ryan Gill, CAA Data & Computer Systems Technician, at: ryan@avalanche.ca, by phone at 250.837.2435, or by fax at 250.837.4624 with the following information:

Organization name	Phone number
Industry sector (see list above)	Mailing address
Contact person's name, position/title	Email address

We thank you for your cooperation

canadianavalancheassociation

Editor's note: *The following is a continuation of the draft minutes of the CAA's AGM 2003, started in the last edition of the Avalanche News. Minutes of have been omitted for those speakers who recently published articles on their presentation in the Avalanche News. This includes: Cam Campbell, Alec van Herwijnen, Steve Blake, Ian Tomm, Evan Manners, Stephane Gagnon and André Martin. These minutes are still in their draft form since some speakers have not yet reviewed the draft. If you would like a copy of the minutes in its entirety, please contact Susan Hairsine at mtnmgmt@monarch.net.*

Continuation of CAA Draft Minutes of Technical Presentations at the Annual General Meeting ~ May 8, 2003

BY SUSAN HAIRSINE

Simon Walker ~ Chair

University of Calgary Avalanche Research Overview ~ Bruce Jamieson:

Bruce provided an overview of the avalanche research program at the University of Calgary. It was an excellent winter for snowpack data and the research teams spent more than 300 days performing fieldwork at Rogers Pass, Blue River and Kicking Horse Mountain Resort. They have a strong team of graduate students and Swiss collaboration.

Highlights include:

- Five presentations at ISSW – October 2002 and presentations at May 2003 AGM
- Practical contributions to knowledge on formation and stabilization of facets and crusts, spatial variability of stability within starting zones, and stabilization of buried surface hoar layers
- Transfer of knowledge and snow skills through 11 previous staff now guiding or working with avalanche programs
- Some research results incorporated into the CAATS Level 2 course
- Profiles on the web; stability tables on InfoEx
- Six research papers published plus two accepted for publication since May 2002
- 75 papers of which 32 can be downloaded and are listed on the project's web site: http:// www.eng.ucalgary.ca/Civil/Avalanche/papers.htm.

Research technicians for 2002/03 included Jill Hughes, Paul Langevin, Ryan Gallagher and graduate students were Antonia Zeidler, Alex van Herwijnen and Cam Campbell.
Bruce thanked the many sponsors of this research program.

Snowpack Stability Indices for Forecasting ~ Antonia Zeidler:

Antonia discussed the nearest neighbour model, part of a three-year project in conjunction with Bruce Jamieson. She discussed how stability indices of buried persistent weak snowpack layers correlate with skier triggered avalanche activity.

Antonia discussed challenges and how she carries out the data with extrapolations between days with snowpack observations. She explained daily skier instability index as a response variable and the values applied in her research. Antonia reviewed the predictor variables including temperature, wind, new snow, height of snow, etc., and showed graphs that ranked these properties in the forecasting models. She explained the study plot and datasets in Blue River and showed how the nearest neighbour model looks, and what the data can be linked to the model. Antonia explained the data she received running the model, and other ways to verify the model.

Future work will include storm snow instabilities, times without significant weak layers, more than one weak layer present in snowpack, rutschblock and compression tests, and visualization. She concluded by thanking her project field staff and sponsors.

Faceting Above Wet Layers and Crusts ~ Bruce Jamieson:

Bruce will be presenting this talk in Davos later this year. He explained some methods used in the Rogers Pass cold lab and showed examples of how they make the snow and rain used in the layers. The researchers have control over thickness of wet layer and dry snow over wet layer. Bruce showed a graph showing temperature gradients over time. A theoretical model developed in conjunction with the Swiss Institute was shown.
Freezing time is roughly proportional to the thickness of the wet layer times the thickness of the dry layer. A stronger temperature gradient will cause it to freeze faster.

Bruce showed some results he had graphed using a Swiss snowpack model and best simulation. Faceting was observed at the base of the upper dry snow layer within five hours and before the wet layer froze in four of seven experiments. He had good documentation that there is two phases to the faceting.

Bruce reviewed the data from the Swiss snowpack simulation model. There are two ways to estimate the temperature gradient in the crust and layers above, and this is verified in the cold lab.

Bruce showed a slide where the theory could be applied in field conditions with dry and wet snow. A thicker wet layer will increase the freezing time and will show you more faceting. Bruce discussed different perspectives for applications such as site selection for profiles, stability tests for bomb placements, and travel routes, etc. He added that people still need to dig holes in the snow to get more detailed information.

He summarized his talk by stating that there are different types of near crust faceting, dry over wet snow favors brief but fast faceting, and faceting can continue after the wet layer freezes. A snowpack model can simulate freezing time and grain type.

His next research work will include:
- Cold lab shear strength over time in dry over wet layer/crusts, and faceting under crust and within limitations
- Field faceting in dry over wet layers, and shear strength over time in dry over wet layer/crusts

Bruce thanked all his supporters and sponsors.

Afternoon Session ~ John Kelly Chair:

Education Planning Committee Findings ~ Janice Johnson:

Janice gave a summary of the final report from the Education Planning Committee. The committee had been asked by the Board of Directors to do a strategic plan for the education programs of the CAA for the Board's consideration.

Public consultations included the forum at ISSW and online surveys in January 2003. These focused on various groups (employers, CAATS instructors, students, members, etc). Jan reviewed the categories of data and reviewed the findings.

The most significant trends for avalanche education and training included an increased use of the backcountry and a growing demand for professional credentials. Jan reviewed survey questions and discussed a number of responses.

She discussed the graphs showing survey results pertaining to adequacy of current programs. The apprenticeship program survey was discussed and Jan explained the qualifiers to the respondents' answers.

There are two types of recommendations: options for student learning programs, and options for accreditation and relationship for CAATS. Options for an accreditation process were discussed including incorporating on line learning in a relationship with a partner involved in this realm (i.e. Justice Institute).

The BOD identified three priorities to move forward on:
1) Build upon and improve existing programs
2) Explore formal apprenticeship option
3) Investigate relationship with the Justice Institute focusing on on-line learning

Next steps will include finalizing specific recommendations for improvements to individual courses and to services for specific groups. The results will be presented on the web site with the report available on members' site. There will be a summary on public part of the web page as well. This phase of the Education Planning Committee work is completed and the committee has been disbanded.

Objectives for next year include:
- Develop a complete plan for building on and improving CAA education programs for the next 12-36 months
- Investigate relationship with the Justice Institute and plan a pilot project
- Explore the apprenticeship option
- Report to BOD

Jan thanked Laura Adams, Bruce Jamieson, John Hetherington, Steve Parsons, Garry Walton and Robin Siggers for all their work on this initiative.

Explosives Industry Update ~ Everett Clausson:

Everett thanked the group for the invitation to the meeting, on behalf of CIL Orion and the explosives industry and introduced other company representatives in attendance.

He discussed what they see in the upcoming months in their industry. He reviewed milldet performance in the avalanche market, where out of 12000 units there was only one classified failure, and one rouge failure. Everett added that he has seen no other bona fide failures, and the U.S. Military had used 80,000 without a failure.

Next year they hope to incorporate the Recco chip and are also hoping that boosters will utilize Enviroprime, which has a biodegradable capability.

CIL Orion has entered into an agreement with Dopplemeyer Austria to work on an avalanche guard system. Everett said he thinks it demonstrates excellent engineering and CIL would like to get into this area. They will have explosives plants in North America that can supply the booster and he is excited about the prospects.

Explosives delivery freight regulations are getting more stringent. He recommended that the group look at their needs, and forecast properly. Everett believes that in the future only licensed trucks and drivers will be able to accommodate the delivery of explosives, and this would help explosive buyers minimize their freight costs.

Meteorological Service of Canada ~ Ken Little:

Ken discussed the partnership in snow avalanche prediction and hazard awareness. Pacific and Yukon regional office provides forecasts for aviation weather and Interior and Yukon public forecasts. They have 35 people working in their Kelowna office. The Mountain Weather Centre office opened in 1998 and it continues to evolve. It now serves as a storm prediction centre and issues storm warnings for BC and Yukon. Their primary focus will be a national and regional outreach including education, awareness, preparedness, product evaluation and development, and support to private sectors.

He reviewed current activities that included the daily 5 a.m. weather bulletin to CAC InfoEx and welcomed comments on this product. The national radar network expansion and high-resolution meteorological models were also discussed. This radar network has validated model results and he was very impressed with the station added at Silver Star Mountain. Ken showed maps detailing the radar network locations that can verify their forecasts.

Ken discussed other research initiatives that include avalanche meteorology community of practice (shared meteorological snow avalanche data networks), collaborative product distribution, and collaborative educational and outreach initiatives. Timing is dependent on funding.

Selkirk Geospatial Research Centre ~ Donna Delparte:

Donna introduced a new initiative at Selkirk College that she and Laura Adams are involved with. She gave an overview of this geospatial research centre and outlined the objectives and goals, their proposed avalanche research project, collaborations and partnerships.

The Selkirk Geospatial Research Centre (SGRC) is a multi-disciplinary research centre that will have applied research, education and application development opportunities.
They received grants from the Canada Foundation for Innovation ($543K) matched by the BC Knowledge Development Fund ($543K), the private sectors ($271K), start up operation of $164K totaling $1.5 million.

The SGRC was officially announced March 18th, 2003. They plan to carry out research in a variety of areas including forestry, recreational tourism, fish and wildlife, ecosystems, environment, oil and gas, hydro, land development and avalanche hazard mapping.

Donna discussed the types of training they will offer, application development and their hardware and software capacity. She also mentioned research collaboration and partnerships engaged in this initiative.

Laura and Donna are also proponents for a research proposal where they hope to develop a tool for backcountry users utilizing geospatial technology (mapping information in a useable format for public to use). Their aim is to provide an information rich map for backcountry users that would enhance public safety. They would develop a model to analyze complex risk variables, weather, and snowpack variables and apply them to terrain using GIS.

This would be a comprehensive, real time, decision-making tool for recreational backcountry travelers to reduce the number of avalanche accidents and fatalities in Canada.

The SGRC is looking to attract researchers, vendor and industry partnerships, academic partnerships, applied research, and students. They have established a web site and interested persons can contact Laura or Donna by email.

Canadian Avalanche Hazard Mapping Project Final Report ~ Chris Stethem:

The objectives of the project were to prepare guidelines for risk evaluation and mapping, information for land managers about avalanche hazards and mitigation, and training course for the delivery of guidelines and mapping. Two publications came from the project "Land Managers Guide to Snow Avalanche Hazard in Canada" and "Guidelines for Snow Avalanche Risk Determination and Mapping in Canada".

Chris discussed the risk-based guidelines including return period, probable consequences and probable exposure. The guidelines for land use in Canada includes work sites, transportation routes, energy communications, ski operations, forest harvest areas, occupied structures and multiple hazards. Chris showed a variety of charts for risk ratings and avalanche frequency and qualitative risk for avalanche size. He thanked the project team and supporters. Documents are available through the CAC, in English and French.

American Avalanche Association Report ~ Steve Conger:

Steve reported that the AAA is a healthy organization with 763 members of which 341 are professional members, including 29 new professionals this year. They had additional monetary support to avalanche review staff and worked on protection of intellectual property, fundraising and a membership drive.

A key initiative is the introduction of instructor certification, which is resumé- and experience- based. A fall seminar will be held in October 2003 with a focus on education techniques and weather forecasting.

The AAA web site was revised over the winter and the "Avalanche Review" has changed to four issues from six. There was very little media contact this winter (down 50% as most media was directed at Canada). SE Alaska members asked if they could join Infoex and the CAA has agreed to this.

ISSW 2004 will be held in Jackson Hole and in Telluride in 2006.

Research continued success with practitioner grant, a centre for snow and avalanche studies, and an Avalauncher round, where 200 rounds will be test fired to see how the new shape works.

A committee has been formed to study OGRS to determine how they can preserve the US data set with minor changes. They would like to work with the CAA technical committee and want to ensure that US ski patrollers and educators accept these new standards

Upcoming Events

February 19, 2004 (changed from January 9)

CAF Fundraising Dinner

The Canadian Avalanche Foundation is planning a dinner fundraiser in Calgary on Thursday, February 19th that will be hosted by Justin Trudeau and Chris Stethem. Guest speaker Hans Gmoser will share stories of his backcountry skiing experiences in the Canadian Rockies. To make for a less formal function, the CAF has changed the name of the annual function from "Black Tie Dinner", so you're welcome come in any business attire, black ties are optional.
Where: Safari Lodge at the Calgary Zoo
Time: Thursday, February 19, 2004. Cocktails at 6:00 pm, dinner at 7:30.
Tickets: $150. Receive a $75 charitable tax receipt. Tickets can be purchased through the CAF at (403) 678-2477 or *Email:* info@avalanchefoundation.ca.

April 12-16, 2004

Symposium of Snow and Avalanche in Warm Climatic Zones

The Snow and Avalanche Study Establishment (SASE), a research and development organization dedicated to controlling the avalanche problem in the Indian Himalaya, will host an international symposium on snow and avalanche in warm climactic zones. The focus will be on the mechanical and physical behavior of snow found in warm conditions, since little research has been done on snowpacks at temperatures above 10 degrees Celsius. The symposium organizers propose publishing the proceedings in the *Annals of Glaciology*.
Where: Manali, India
Info: Contact S.S. Sharma, SASE, RDC, Him Parisar, Sector 37A Chandigarh UT 160036, India; Tel: 0172 699804-06; fax: 0172 699802. *Email:* sase_afg@yahoo.com or root@sasehq.ernet.in.

Arpil 19-24, 2004

Western Snow Conference 2004: Snow, Friend or Foe?

The purpose of the Western Snow Conference is to provide a forum for individuals and organizations to share scientific, management, and socio-political information on snow and runoff from any viewpoint and to advance the Snow and Hydrologic Sciences. Organizers are now accepting papers for oral and poster presentations.
Where: Delta Hotel Vancouver Airport in Richmond, BC.
Info: www.westernsnowconference.org
Contact: Jon Lea, Program Chair; *Tel.*: (503) 414-3267; *Fax* (503) 414-3277; *E-mail*: jon.lea@or.usda.gov

May 3-7, 2004

CAA Annual General Meeting (AGM) & Spring Meetings

This annual *gathering of the clan* gets bigger and better each year. Meet people in your industry and find out what's new with the CAA, research, products and more.
Schedule: Monday – internal meetings (Board of Directors and Committees).
Tuesday – CAATS instructor meetings.
Wednesday – Public & Technical meetings (of most interest to public: new research, accident reviews, new products, and the pro program seminar).
Thursday – Public and Technical meetings in morning, AGM and elections of new board members in the afternoon .
Friday – full day Continuing Development Seminar, open to the public.
Where: Penticton, BC
Info: To be distributed in early spring. Contact Brent at (250) 837-2435, *Email:* canav@avalanche.ca for more details.

May 3-7, 2004

Avalanche Photography Contest

When: CAA AGM 2004
Where: Penticton, BC
Contact: Brent Strand; *E-mail:* canav@avalanche.ca
Info: Enter to win incredible prizes, not to mention the glory of having your photo published in the *Avalanche News* or on-line. There will be three categories: **CAA Members in the Field, Events & Occasions** and, of course, **Avalanches**! All images entered will be displayed at the next AGM. Stay tuned for more details.

Upcoming Events

July 5-8, 2004

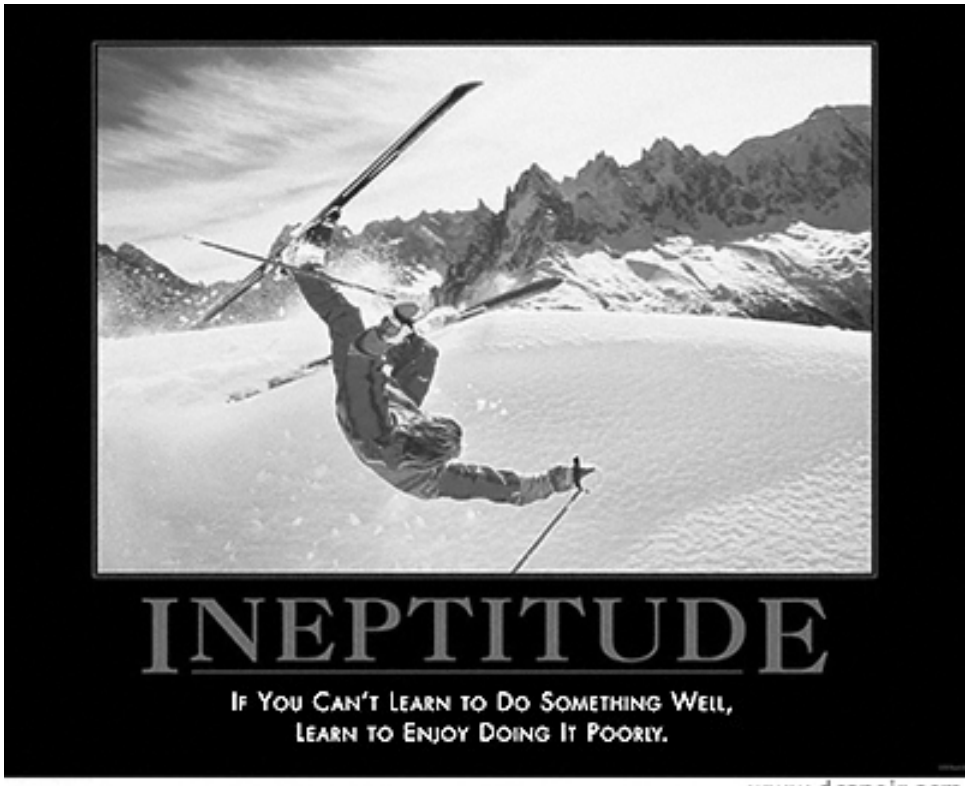
5th International Conference on Snow Engineering

The Snow Engineering Conferences is an established forum for snow practitioners and researchers to present, discuss and exchange research results. Unlike other snow conferences, Snow Engineering is dedicated to the application of snow science to industrial and engineering applications. The sponsor of the conference is the Swiss Federal Institute for Snow and Avalanche Research SLF, Davos. For more information on the conference, visit www.snow2004.ch.
Where: Davos, Switzerland,
Contact: Snow Engineering Secretariat at *E-mail:* snow2004@slf.ch

September 19-24, 2004

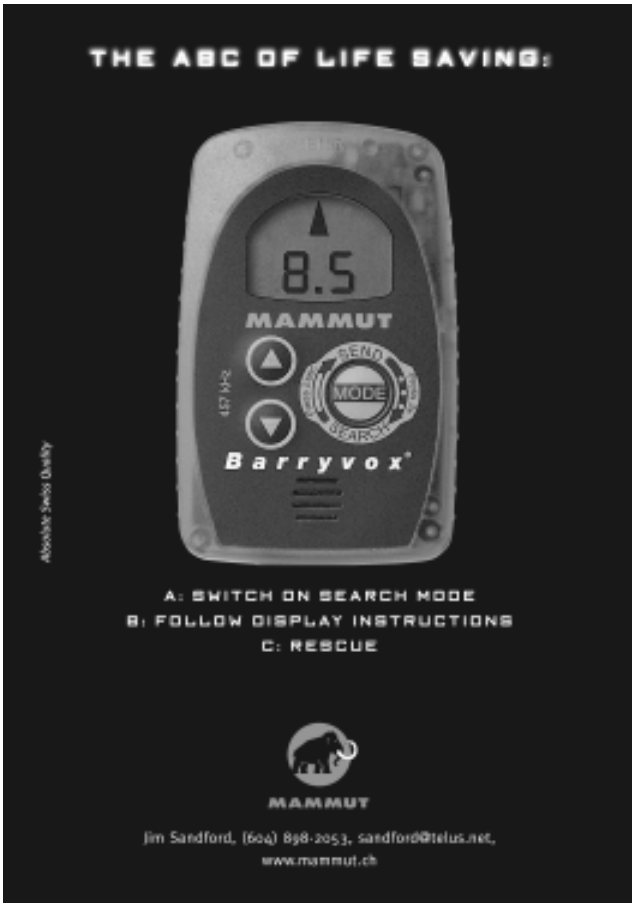
International Snow Science Workshop (ISSW) 2004

Snow scientists and avalanche practitioners from many nations will meet in Jackson Hole, Wyoming to present papers and exchange information at the International Snow Science Workshop 2004. ISSW 2004 will continue the theme of past workshops "A Merging of Theory and Practice." The American Avalanche Institute, Jackson Hole Mountain Resort, and United States Forest Service will be hosting this event.
Where: Teton Village, Wyoming
More info: www.issworkshop.org
Contact: American Avalanche Institute, PO Box 308, Wilson, WY 83014; *Tel.*: (307) 733-3315; *E-mail*: issw@aol.com



CAA's First Avalanche Blasting Training Course

The CAA's first Avalanche Blasting Training Course took place in Revelstoke this past November 1-2. Thirty people took part in the program, which was subsidized by CIL/Orion, and taught by Jerry Silva and Bruce Allen. The course teaches the fundamentals of explosives use, including regulations, transportation, storage, products and specific methods of delivery in the avalanche industry. The next course is running January 16-17, 2004 in Golden, BC and costs $60.00. For more information, contact schools@avalanche.ca.



Annual Meeting of the International Commission for Alpine Rescue

BY ALAN DENNIS

This year the International Commission for Alpine Rescue (ICAR) conference was held in Coylumbridge, Scotland, October 1 -5, 2003. The ICAR has four commissions: avalanche, flight rescue, medical and terrestrial rescue. Over the years the avalanche commission has contributed to significant developments in public safety and increasingly avalanche accident prevention. ICAR was instrumental in the standardizing of avalanche transceiver frequency and the introduction of the Five Step avalanche danger scale. There are 22 voting member countries, 17 of which were present.

Following the opening comments, there was a presentation put together by Tim Kovacs of the Mountain Rescue Association of the USA in memory of those rescuers from member countries who have died in the line of duty. With slides and music he had photographs of 80 people who have lost their lives, including four Canadians. Tim has offered to make the record as complete as possible for the period of ICAR's work so far. If you know anyone who lost his or her life in the line of rescue duty or training he can be contacted for further information at tkovacs@mindspring.com.

The avalanche commission had a short meeting to discuss future directions. In small groups a variety of suggestions came forward; for example further concentration on preventive strategies with avalanche forecast modeling programs, interactive web-based advisories and the 'wet grain/crust' identification dilemma. In January 2004 there will be a special meeting of the avalanche commission in Diavolezza (near St Moritz). This will be mainly to test equipment and review & develop practices in the field.

A motion from Manuel Genswein of the avalanche commission was put forward to the General Assembly. This recommended motion discourages the development of avalanche transceivers that add features not primary to the avalanche search role. Some additions include GPS with compass, inclinometer, medical sensors, sound (e.g., music) and other functions. The motion received very polarized debate that resulted in the vote being postponed to next year. This will give time to contact the manufacturers and discuss the issue with them.

The meetings of the terrestrial and avalanche commissions were combined for the next two days. There were numerous reports of avalanche accidents and other incidents that involved teams during rescues. Longer-term observers of the ICAR meetings were pleased to note that all countries were willing to discuss experiences learned through near misses, accidents, and in some cases fatalities during recovery operations. Directly related to this were two presentations (Dale Atkins and Dan Hourihan both from USA) describing the organization of rescues and common mistakes made in an organizational sense, including decisions made on the mountain. Bruno Jelk, ICAR board member suggested that ICAR should make a handbook describing recommendations for Incident Command System including lessons to be learned from common mistakes. It was generally agreed that this is a good idea.

Some new equipment described included:

- The GPS/GSM (cell phone). This handheld piece of equipment combines GPS and cell (mobile) phone capability. The caller can 'see' the location of the called phone. Limitations of the buried phone being searched for in an avalanche were described.
- An 'avalanche gate' giving access to off-piste areas for 'free riders' was described. A series of lights shows the posted level of hazard. The gate can be locked remotely during Category 4 & 5. It is possible to go around the gate if it is locked. The question of liability was raised if the gate is open and an avalanche accident happens.
- Techniques for teaching the use of avalanche transceivers were presented by Manuel Genswein.
- Probes & probing technique were reviewed.
- "Paramount" system: combines satellite, telecommunication and geo-information. Further information can be found at www.paramount-tours.com.

Mountain rescue groups reported on some unusual operations from urban situations (skyscrapers) and rural environment (sea stacks & crag bound sheep).

Due to the recent re-emergence of the "Considerable" debate in Canada some informal discussions indicated that the descriptor for Category 3 is not problematic in other 'English-as-a-first-language' countries. However in all cases we are reminded that writing the forecast for Category 3 is the most difficult. Vigilance in using language that is unequivocal, clear and concise for this Category is a constant challenge.

The final business for the avalanche commission at the General Assembly was the appointment of Hans Jurg Etter as new president of the Avalanche Commission. The President of ICAR closed the meeting, thanked everyone for attending and announced details about next year's meeting in Zakapone, Poland. The final gala dinner was a very well flavored Scottish affair!

Integrating Shear Quality into Stability Test Results

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(Author's note: This paper is mostly similar to the one in the Proceedings of the 2002 ISSW, but it includes some discussion of recent work on this topic that was published in the Fall 2003 Avalanche News).

Abstract: This study investigates whether collecting shear quality data in conjunction with stability test results improves snowpack evaluations. Over the past six seasons we have consistently evaluated shear quality when evaluating snowpack stability. Shear quality is subjectively evaluated on a 3-tiered scale from Q1 (clean, fast shears) to Q2 (average shears) to Q3 (irregular or dirty shears). Our method is a formalization of what ski patrollers and others have been doing in the U.S. and elsewhere for at least several decades. We used a dataset of nearly 700 individual stability tests (rutschblock, stuffblock and compression tests) collected by seven observers on slopes from Alaska to Chile. In addition to stability test results, observers noted whether slopes they felt were similar to their snowpit location had avalanches, or collapsing or cracking snowpacks, on that day. Results suggest that shear quality provides important stability information, especially when stability test results appear to indicate relatively stable conditions, but the shear quality is rated Q1. This might be because stability test results are often spatially variable, while our experience indicates that shear quality is more homogeneous. Given these results, we believe formally integrating some description of shear characteristics into stability assessments may be important for avalanche workers and backcountry enthusiasts.

1. Introduction

Avalanche workers and backcountry skiers use a variety of field stability tests to help assess avalanche danger. Most of the currently popular tests either quantitatively or qualitatively test the shear strength of the weak layer. Quantitative examples include the shear frame (Perla and Beck, 1983; Jamieson and Johnston, 2001) and the quantified loaded column test (Landry and others, 2001), while qualitative tests include the rutschblock (Föhn, 1987), compression (Jamieson and Johnston, 1997), and stuffblock (Birkeland and Johnson, 1999) tests. In addition to the actual test score, many avalanche workers informally evaluate the fracture character, fracture quality, and/or shear quality of the test. However, no consensus exists regarding the definitions or ratings of those attributes.

In a few cases, avalanche researchers and workers have begun to formally collect qualitative data on stability test fractures. In Canada, Jamieson (1995) and Jamieson and Johnston (2001) have observed twelve types of fracture surfaces in thousands of shear frame measurements. They found that only one type of fracture (when a divot greater than 10 mm existed under the rear compartment) exhibited significantly different strength values from the rest of the data. In addition, Parks Canada avalanche personnel use a system for evaluating what they term "fracture character" (Jamieson, 1999; Jamieson, pers. comm. 2002), and some recent work using this system was presented at the 2002 International Snow Science Workshop by van Herwijnen and Jamieson (2002). Their research defines fractures as *Progressive Compression*, *Thin Planar*, *Sudden Collapse*, or *Non-Planar Breaks*, and found that most interfaces associated with avalanches have either *Thin Planar* or *Sudden Collapse* fractures. During the 2002-03 winter van Herwijnen and Jamieson (2003) refined this system, dividing *Thin Planar* fractures into *Sudden Planar* and *Resistant Planar* categories. This refinement improved their results, with *Sudden Planar* fractures most commonly associated with avalanches. In Switzerland, Schweizer and others (1995) noted the importance of the type of release and the quality of the fracture when interpreting rutschblock tests. The type of release is described as "whole block", "most of the block", or "only a minor part of the block", while quality of the fracture is rated as "clean", "partly clean", or "rough". Schweizer and Weisinger (2001) discussed integrating this information into stability evaluations, and show that when avalanche forecasters rank the relative importance of several variables for interpreting rutschblock results, the highest ranked variables included type of failure and type of fracture plane, both of which ranked higher than the actual rutschblock score.

Independent of the work in Canada and Switzerland, we began to formally collect what we call "shear quality" data in southwest Montana in the mid-1990s (Johnson and Birkeland, 1998; Birkeland and Johnson, 1999).

Table 1: Qualitative ratings of shear quality (from Birkeland and Johnson, 1999, *with significant additions in italics*).

Shear Quality	Description
Q1	Unusually clean, planar, smooth, *and fast* shear surface; weak layer may collapse during fracture. Slab typically slides easily into the snow pit after weak layer fracture on slopes steeper than 35º, and sometimes on slopes as gentle as 25º. *Tests with thick, collapsible weak layers may exhibit a rougher shear surface due to erosion of basal layers as the upper block slides off, but the initial fracture was still planar and fast.*
Q2	"Average" shear; shear surface appears mostly smooth, but slab does not slide as readily as Q1. Shear surface may have some small irregularities, but not as irregular as Q3. Shear fracture occurs throughout the whole slab/weak layer interface being tested. The entire slab typically does not slide into snowpit.
Q3	Shear surface is non-planar, uneven, irregular, and rough. Shear fracture typically does not occur through the whole slab/weak layer interface being tested. After the weak layer fractures the slab moves little, or may not move at all, even on slopes steeper than 35º.

Our method is based on what ski patrollers and other avalanche workers have been doing in the United States and elsewhere for at least the last 20 years and probably longer. Shear quality is subjectively evaluated on a 3-tiered scale from Q1 (clean, fast shears) to Q2 (average shears) to Q3 (irregular or dirty shears). As noted by Schweizer and Weisinger (2001), this is quite similar to the Swiss ratings for fracture quality. Our 'shear quality' actually mixes both the Swiss 'fracture quality' and 'type of fracture' into one rating, though our emphasis is on fracture quality. Our initial work did not adequately address the importance of shears fracturing on thicker collapsible weak layers, so we updated our shear quality ratings to try to better reflect such weak layers (Table 1). Recently, van Herwijnen and Jamieson (2003) provide some useful guidelines for equating their fracture characteristics to typical shear quality ratings, with *Sudden Planar* and *Sudden Collapse* fractures being most commonly associated with Q1 shears.

Despite the long history of avalanche workers noting shear quality, few researchers (with the exception of Schweizer and Weisinger (2001) and van Herwijnen and Jamieson (2002; 2003)) have rigorously tested the idea that these data are helpful for assessing snow stability. Further, though many experienced people feel this is important information, it has not yet been formally included in the Canadian OGRS (CAA, 2002) nor is it typically taught in many avalanche classes or included in most avalanche books (one recent exception is Tremper, 2001). The purpose of this paper is to analyze almost 700 individual stability tests to see how useful our rating of 'shear quality' is for analyzing stability and how it might best be integrated into stability assessments.

2. Methods

At the beginning of the 2001/02 winter we asked a number of experienced avalanche workers who systematically note shear quality to share their data. Eight observers responded to our request, including backcountry avalanche forecasters, heli-skiing forecasters, backcountry guides, and avalanche educators. Observers recorded no result for 35 of 725 total tests. Due to the many factors that could lead to no result, we discarded those tests and utilized the other 690 tests, which included 149 rutschblock, 483 stuffblock, and 58 compression tests. Data compiled included the following: observer, date, mountain range, slope angle, test used, test score, shear quality (rated as Q1, Q2, or Q3), instability observed, avalanche danger for that day, and some snowpack information. This paper utilizes the stability test score, the shear quality, and the instabilities observed. The 'instabilities observed' category is somewhat subjective information that is important for this study. If an observer saw an avalanche, or noticed collapsing or cracking of the snowpack, in an area they felt was reasonably representative of the

stability test location, then we considered instabilities to be present. Data were collected on slopes from Alaska to Chile, but the vast majority of the data are from the intermountain snow climates of Southwest Montana and Northwest Wyoming (Mock and Birkeland, 2000). Slope angles at the pit sites ranged from 24º to 45º, with an average angle of 32º.

First, we simply looked at the data for each of the three stability tests, comparing the percentage of tests associated with signs of instability with those not associated with instability for Q1, Q2, and Q3 shear qualities. After this initial analysis, we filtered the data to look at specific cases. We believe, as do others (i.e., Fesler, pers. comm.; McClung, 2000), that an avalanche danger assessment is essentially a search for instabilities. Therefore, we focused primarily on "false stable" cases, where stability test scores indicate relatively stable conditions but signs of instability exist on similar slopes. We considered rutschblock scores of 5 or greater to indicate fairly stable conditions. Though some might argue that a rutschblock score of 5 does not indicate stable conditions, if we looked only at rutschblock scores of 6 we would have had insufficient data for our analyses. For stuffblocks, we analyzed drop heights of 0.40 m or greater. Previous work showed this is the median drop height associated with a rutschblock score of 5 (Birkeland and Johnson, 1999), and using a higher drop height made our data set too small. We had far fewer compression tests than either rutschblock or stuffblock tests, so we had to consider both "moderate" and "hard" results. We then compared the scores of each test, and the other signs of instabilities observed, for Q1, Q2, and Q3 shears. Due to the number of filters we applied to the data, the sample sizes are relatively small, and these results should be viewed with caution. However, we note sample sizes throughout, and our results roughly match our experience for utilizing shear quality data as a part of a stability assessment.

3. Results and discussion

Results suggest that our measure of 'shear quality' provides important stability information, especially when stability test results appear to indicate reasonably stable conditions, but the shear quality is rated Q1. For all rutschblocks (n=149), 65% of tests with Q1 shears were associated with signs of instability, dropping off to 28% of Q2 and 7% of Q3 shears (Figure 1). Similar percentages existed for the 58 rutschblock tests scoring 5 or 6, with 67% observations with Q1 shears (n=12), 30% of Q2 shears (n=33), and 0% of Q3 shears (n=13) being associated with signs of instability (Figure 2). Interestingly, when all 58 tests with scores of 5 or 6 are considered, 29% were associated with signs of instability and 71% were not, a result that mirrors that for the Q2 shears. These results clearly demonstrate what has been long understood; reasonably strong stability tests still can be associated with obvious signs of instability. However, these results also suggest that those so-called "false stable" tests are much more likely to have a higher quality shear.

Somewhat similar results existed for stuffblock tests. For all tests (n=483), 49% of Q1, 34% of Q2 and 21% of Q3 shears were associated with signs of instability (Figure 3). A total of 96 tests had drop heights of 0.40 m or more, indicating relatively stable conditions. Thirty eight percent of those relatively stable tests that also had a Q1 shear were associated with other observed signs of instability (Figure 4). This percentage fell to 15% for both Q2 and Q3 shears. About 22% of the stuffblock tests with drop heights greater than or equal to 0.40 m were associated with other signs of instability, while 78% were not. Though not as dramatic as the rutschblocks, these stuffblock results provide further evidence that, for strong stability test results, Q1 shears are more commonly associated with signs of instability.

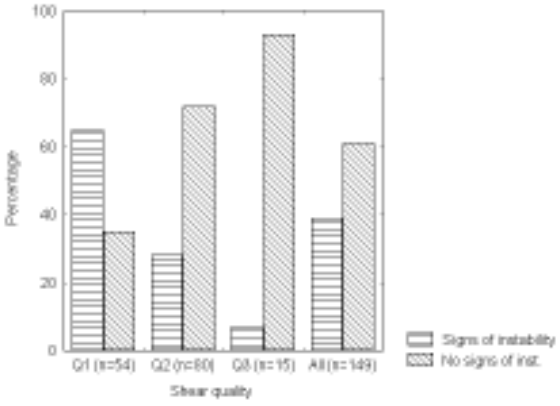

Figure 1: Shear quality and instabilities associated with all rutschblock tests (n=149).

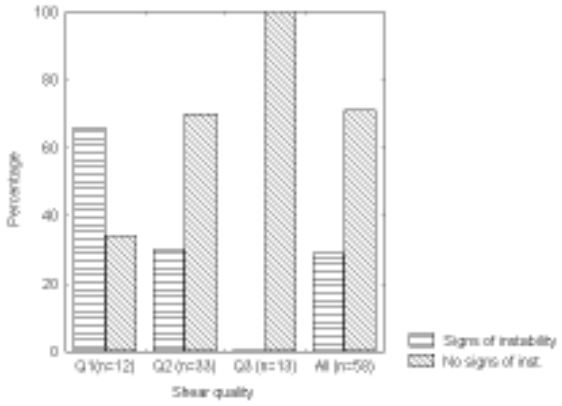

Figure 2: Shear quality and instabilities associated with all rutschblock scores of 5 or 6 (n=58).

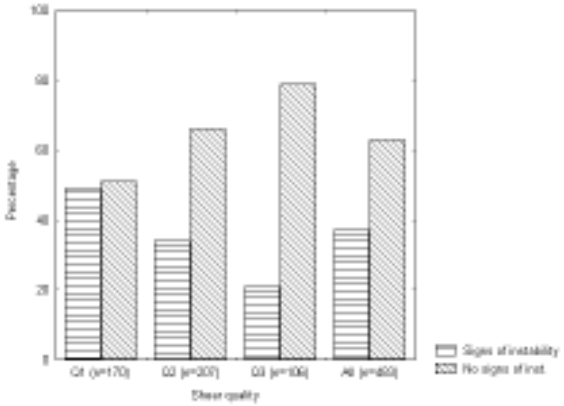

Figure 3: Shear quality and instabilities associated with all stuffblock tests (n=483).

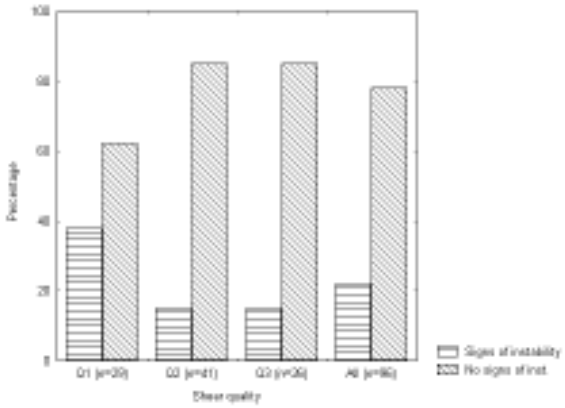

Figure 4: Shear quality and instabilities associated with stuffblock scores of 0.40 m or greater (n=96).

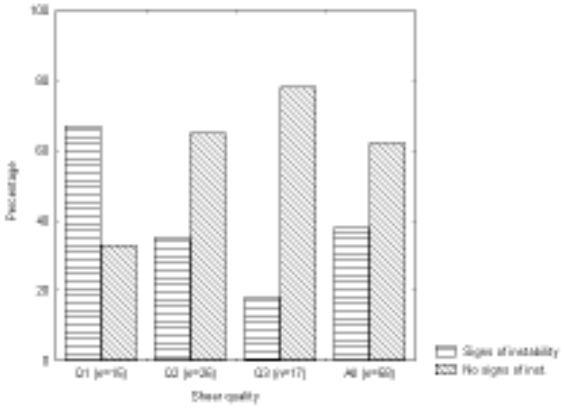

Figure 5: Shear quality and instabilities associated with all compression tests (n=58).

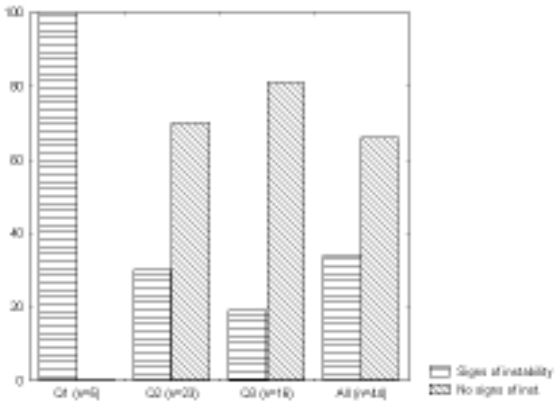

Figure 6: Shear quality and instabilities associated with moderate and hard compression tests (n=44).

We had less data available for compression tests. Considering all 58 tests, 67% of Q1, 35% of Q2, and 18% of Q3 shears were associated with signs of instability (Figure 5). We had hoped to use only "hard" compression test results (CAA, 1995) for our analysis of "false-stable" results. However, we had only 23 tests in this category, which included no Q1 and only seven Q3 tests. Therefore, we expanded our analysis to include "moderate" test results, increasing the number of tests considered to 44. Using both "moderate" and "hard" test results, 100% of Q1 (n=5), 30% of Q2 (n=23), and 19% of Q3 (n=16) tests were associated with signs of instability (Figure 6). Again, a clear trend exists showing increasing percentages of higher quality shears being associated with observed evidence of instability.

Finally, the shear quality results from the aggregated dataset, for all tests types, suggest that Q2 shears do represent somewhat "average" conditions. Of the 690 tests, 35% were Q1, 45% were Q2 and 20% were Q3. Interestingly, for our data Q1 shears are much more common than Q3 shears. This could be the result of selective sampling by our observers, conducting their stability tests on days when higher-quality shears were more likely, or it may be because observers interpreted some Q3 shears to be the same as no result.

4. Conclusions

This research shows that deceptively strong stability test results with a Q1 shear quality are fairly commonly associated with other observable signs of instability. Therefore, integrating shear quality into stability test interpretations is important. It enhances the primary purpose of the stability test, which is a search for instability, reduces the uncertainty associated with a 'conditionally stable' stability test result, and helps to decrease the probability of making dangerous or possibly fatal errors (i.e., a "go" decision in a "no go" situation). While the results of this study should be viewed with caution since the number of observations in some cases is still relatively small, we believe a formal integration of some measure of shear attributes will improve the interpretation of stability tests for avalanche workers as well as backcountry skiers, snowboarders and snowmobilers.

We do not know why Q1 shears are more commonly associated with instability. However, we believe shear quality provides important information about the relationship between the slab and the weak layer, which is a critical consideration for evaluating the avalanche potential (McClung and Schweizer, 1999). Perhaps shear quality provides a qualitative measure (at a small scale) of how well a fracture will propagate through the given weak layer.

We hypothesize at least two reasons why strong stability tests with high quality shears are more commonly associated with signs of instability than tests with lower quality shears. First, if a test is unknowingly conducted in a deeper part of the snowpack, the increase in effective depth might increase the amount of force needed to get the test to fracture, even when the snowpack is unstable (Schweizer and Camponovo, 2001). Secondly, shear quality results may be more spatially homogeneous than the scores of the tests themselves. Landry et al. (2002) documented high variability of shear strength on fairly uniform slopes utilizing the quantified loaded column test (QLCT) method (Landry et al., 2001). However, those trials suggested that shear quality in many cases was relatively homogeneous, and on a few sampling days all 50 tests conducted on a slope had Q1 shears even though shear strength and stability varied considerably. More variable shear qualities existed during tests on one day with a thick weak layer of older faceted snow. Our hypothesis of the relative uniformity of shear quality on slopes is also supported by recent work by Campbell and Jamieson (2003), who documented the uniformity of fracture characteristics on slopes while studying spatial variability during the 2002-03 winter. Thus, more spatially homogeneous shear quality results may be providing important information when a stability test happens to be unknowingly conducted in an area of the slope that has comparatively strong shear strength with respect to the weaker areas of the slope.

Given the observed relationships, we feel shear characteristics are one key component of stability analyses. However, the avalanche community has to decide the best method for documenting shear attributes. Currently there are at least three, and possibly more, methods. Some similarities exist between the Swiss method (Schweizer and Weisinger, 2001) and our 'shear quality' method, and the Parks Canada method (van Herwijnen and Jamieson, 2002; 2003) may complement these two systems. Hopefully the avalanche community can find a mutually agreeable method for formally noting a qualitative measure of shear attributes so that research efforts can be combined and results can be compared.

Finally, we emphasize that assessing 'shear quality' using any method is just one way to enhance the interpretation of stability test results, which are themselves only one component of a comprehensive assessment of the avalanche danger for a particular slope or area. Our data clearly show that even stability tests with high scores and a Q3 shear can be associated with readily observed signs of instability. As noted by Föhn (1987), interpreting stability tests requires experienced observers, and such tests must be supplemented with data such as snow profile evaluations, analyses of meteorological data, knowledge of recent avalanche activity, and knowledge of the terrain for a comprehensive, and holistic, evaluation of the avalanche danger.

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Chris Landry reviewed this paper and provided valuable input and discussions. Bruce Jamieson and Jürg Schweizer also provided interesting discussions on fractures in layers. Our thanks go to those who collected the data: Doug Chabot, Scott Schmidt, Ian McCammon, Don Sharaf, Allan O'Bannon, Ethan Greene, and Tom Kimbrough. We are also grateful for the numerous conversations we've had on this subject over the past several years with many of our colleagues in the avalanche community.

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Fracture Propagation and Resistance in Weak Snowpack Layers

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Introduction

As part of snowpack studies on 24 February 1994, Thierry Cardon, Roddy McGowan and I skied down a glacier in Hume Creek in the Purcell Mountains (Figure 1). We stopped near a small rock outcrop at the skier's right side of the glacier. As the third skier arrived, we all heard and felt a whumpf. Moments later, the heli-ski guide two runs to the north called on the radio to say the slope between his position and ours was avalanching. The guide and his group were able to watch the Class 4 avalanche (Figure 2).

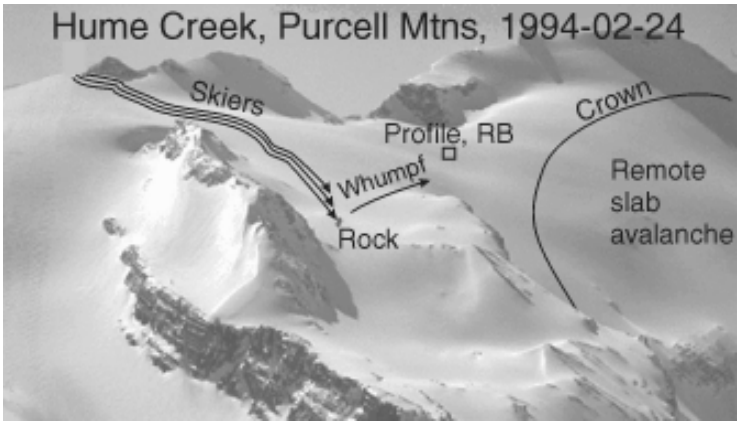

Figure 1. Photo of the glacier in Hume Creek in Purcell Mountains where the whumpf and remote slab avalanche occurred on 1994-02-24

Figure 2. Remotely triggered Class 4 slab avalanche - photo taken from the rock outcrop below the profile site.

Poking with our ski poles revealed that we had stopped where a thin slab was overlying depth hoar and rocks. We had started a fracture in depth hoar that had, presumably, extended into a surface hoar layer in which it propagated about 400 m across the glacier to the slope that avalanched (Figure 3). We chose to observe a profile and rutschblock test on a 28° slope about 150 m from the crown because we were concerned about the potential for the slab above the crown to release. The snow profile revealed that the February 6 surface hoar layer was down about 165 cm. We were unable to get it to slide in a rutschblock test, even when all three of us jumped together on the block. In this case, the snowpack where the fracture started (depth hoar under a thin slab) was very different from the snowpack at the profile site, which was likely typical of the snowpack where most of fracture propagation occurred and at the crown.

In his 1999 review of slab avalanche release, Jürg Schweizer clearly distinguished between fracture initiation and fracture propagation. Schweizer's distinction and this case study raise the question: When using snowpack tests to help assess avalanche risk, should we focus on whether fractures are likely to start in weak layers, or on whether they are likely to propagate far enough to release avalanches?

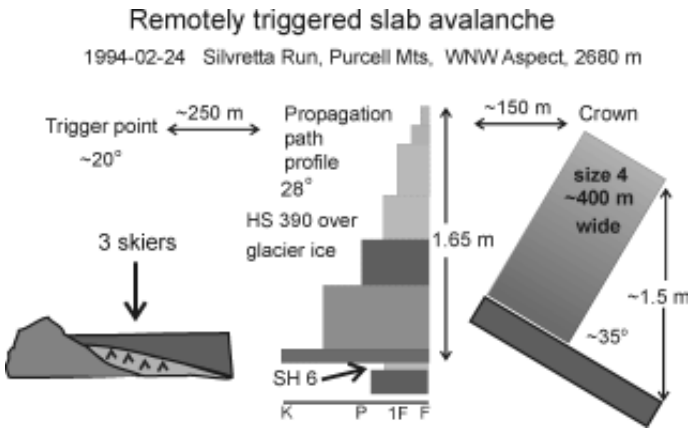

Figure 3. Diagrams of snowpack at the trigger point, the profile site near propagation path, and expected profile at the crown.

Observations of fracture resistance in crown fractures

The shape of crown fractures may be indicative of the *resistance* to fracture propagation along the weak layer. The weak layer fracture that released the slab in Figure 4 ran up to the top of the slope and a short distance over the ridge crest. The fracture appears to have propagated with ease, suggesting low fracture resistance in the weak layer of surface hoar. This is in contrast to Figure 5 where irregular parts of the crown fracture suggest areas of high fracture resistance. I have no profile for this slab avalanche or snowpack tests along the crown but one can imagine the propagating fracture in the weak layer stopping at areas of high fracture resistance.

In terms of fracture mechanics, we expect the fracture to propagate when the driving energy exceeds the fracture resistance. The energy driving the front of the fracture (crack tip) is difficult to observe or measure, so I'll focus on the fracture resistance of the weak layer, keeping in mind that we are only looking at one side of the propagation equation.

One obvious cause of locally increased fracture resistance would be the lateral boundary of a weak layer. If a fracture starts in a weak layer of, say, surface hoar, the propagation may stop where the surface hoar ends. As multiple profiles or snowpack tests in start zones illustrate, some weak layers are not continuous. Other weak layers are interrupted at trees or rock outcrops.

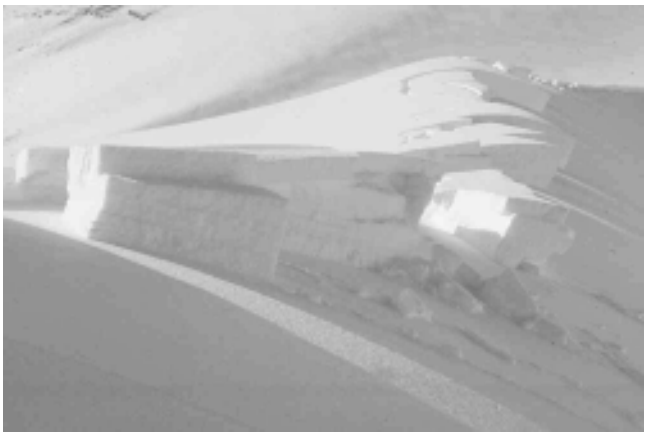

Figure 4. Crown fracture of slab avalanche in Cariboo Mountains in which the fracture in the weak layer propagated over the ridge crest.

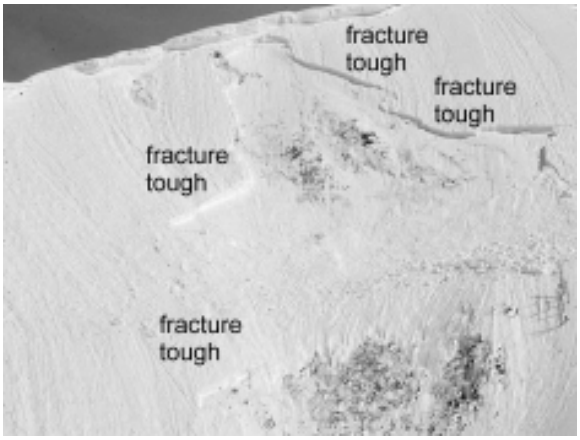

Figure 5. Crown fracture on Mt. Fernie. Irregular shape of crown fracture suggests areas of high fracture resistance (toughness).

Observations of fracture resistance in rutschblock tests

When doing rutschblock tests in the early 1990s, either Mark Shubin or I would often get into the trench beside the rutschblock while the other person loaded the block in the usual sequence: stepping onto the block, pushing down with the legs, jumping, etc. We sometimes noticed that one loading stage would start a fracture (crack) that would not propagate to the front wall. The next more energetic loading stage would cause the fracture to advance farther, sometimes to the front wall (Figure 6). This phenomenon was rare for persistent weak layers (consisting of surface hoar, depth hoar or faceted crystals) and more common for non-persistent weak layers (consisting of new snow forms, decomposing and fragmented particles or rounded grains), some of which seemed more *resistant* to fracture propagation. So the loading required to crack a weak layer was sometimes not enough to propagate the crack far enough to release the block. Clearly, skiers on rutschblocks can crack weak layers without sufficient propagation to release the block.

For rutschblock scores of 3 or higher, Figure 7 shows that skier triggering is more likely if the weak layer is persistent than if it is non-persistent. Most avalanche workers have come to interpret rutschblock scores of 4 to 7 on surface hoar layers with more caution than a similar score on a layer of DF particles because the rutschblock test is a better indicator of skier-triggering for non-persistent layers (less uncertainty) than for persistent layers. Years ago when looking at an earlier version of this graph, Alison Andrews asked *"But why do persistent weak layers release more human-triggered slabs than non-persistent weak layers with the same rutschblock score?"* Since thin slabs are triggered more often than thicker slabs, it might be tempting to conclude that the slabs over the non-persistent weak layers were thicker. However, the slabs over the persistent weak layers were about the same thickness or slightly thicker (Jamieson, 1995, p. 173). It could be that the persistent layers offered less resistance to fracture propagation, or that the thicker (often denser and stiffer) slabs transferred the driving energy more efficiently to the front of the fracture (crack tip).

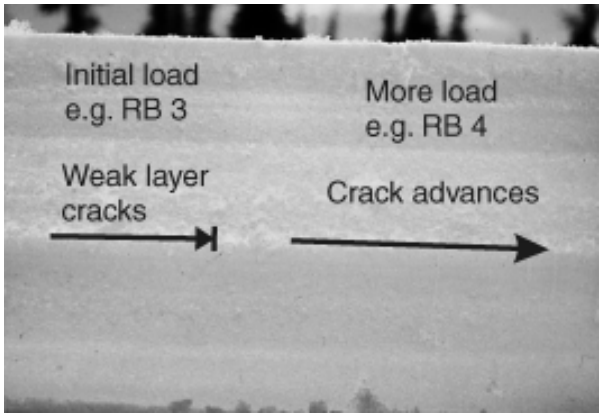

Figure 6. Although this photo does not show the sidewall of a rutschblock, it illustrates the staged growth of a fracture (crack) that can sometimes be observed in the sidewall of a rutschblock.

For rutschblock tests, Swiss researchers classify the release type (whole block, part of block, or only an edge) and fracture type (smooth, not smooth) (Schweizer, 2002). These classifications correlated with human triggering, and release type was more significant than fracture type (Schweizer and Jamieson, 2003). With attention to how much of the block released and perhaps whether the fracture is smooth or not, the interpretation of higher rutschblock scores can likely be improved.

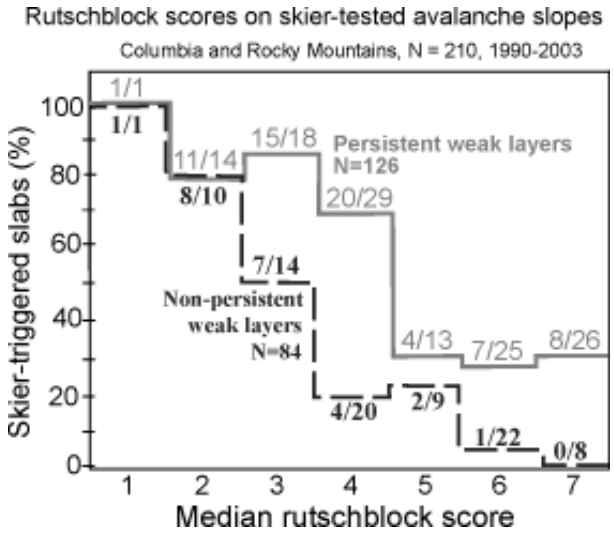

Figure 7. For non-persistent weak layers, higher rutschblock scores are better indications of skier triggering than for persistent weak layers. The percentage of triggered slopes for persistent weak layers and rutschblock scores of 5, 6 and 7 may be biased upwards because University of Calgary avalanche researchers seek unexpected slab avalanches on persistent weak layers.

Are some weak layers more brittle than others?

Glass is brittle: when a crack starts it propagates farther and faster than a crack in a less brittle (more ductile) material like iron, the plastic in many modern kayaks, or putty. Brittle materials have lower fracture resistance than ductile materials. Is there an analogy for weak snowpack layers? Based on fracture toughness tests in a cold laboratory, Kirchner and others (2002) conclude that snow is one of the most brittle materials known. Fukuzawa and Narita (1993) found depth hoar (180 kg/m^3) to be brittle over a wider range of strain rates than denser snow (300 kg/m^3) of rounded grains (Narita and others, 1992). However, such tests have not yet been conducted on weak snow layers of similar density. Both Figure 7, and observations in rutschblock trenches mentioned above, suggest that non-persistent weak layers can offer more fracture resistance than persistent weak layers. Are persistent weak layers often the forecasting challenge because of their persistence, or because of their brittleness (low fracture resistance)? Both, I suspect. Certainly, it sounds like a great research topic!

By the way, *fracture toughness* is a quantity related to *fracture resistance*. A material (including a weak snowpack layer)

with high fracture resistance has high fracture toughness, and visa versa. In Europe, Jürg Schweizer and colleagues (in press) and Failletaz and others (2002) are measuring the fracture toughness of homogeneous snow. Expect to hear more about fracture toughness and resistance in the future because these properties are likely better than weak layer strength for assessing slab instability (McClung, 2002).

Observations of fracture resistance in compression tests

In the previous edition of the *Avalanche News*, Alec van Herwijnen summarized one winter's experience with a scheme for classifying fracture character in compression tests. This five-class scheme includes two types of *sudden* fractures: Sudden Planar (SP) and Sudden Collapse (SC). In both these types of fractures, the fracture suddenly crosses the test column (small column for a compression test, large column for a rutschblock). Sudden fracturing suggests brittleness and – no surprise – most (95%) of the fractures in surface hoar and faceted layers were either Sudden Planar or Sudden Collapse. Not all planar fractures were sudden, some were classified as Resistant Planar (RP) because the fracture required more than one loading stage to cross the column, or the block would not slide easily after the fracture. Only about 26% of new snow and DF layers exhibited sudden fractures (SP or SC). The other fractures in these non-persistent weak layers were Resistant Planar, Progressive Compression (PC) or non-planar Breaks (B).

This link between fracture resistance (or its alter ego, propagation propensity) with fracture character in snowpack tests is not new. At the 2002 ISSW in Penticton, Ron Johnson and Karl Birkeland proposed that *shear quality*, which is an alternative scheme for characterizing fractures, provides a qualitative indication of how well a fracture will propagate through a weak layer.

The fracture characterization scheme in the last issue of Avalanche News does distinguish between sudden fractures with noticeable collapse (SC) and those without noticeable collapse (SP). The Sudden Collapses are more often associated with whumpfs (propagation on low-angle terrain) than are planar fractures (van Herwijnen and Jamieson, 2002), perhaps because the downward movement of the slab provides additional energy to drive the fracture across low angle terrain (BC Johnson and others, 2001)

Ron Johnson and Karl Birkeland also suggested that the character or quality of fractures may be more spatially homogeneous than test scores. In the last issue of *Avalanche News*, Cam Campbell showed that the results of fracture resistance tests in start zones were less variable than similarly sized and spaced stability tests. Figure 8 offers an explanation. As the thickness of the slab decreases from left to right, the scores from stability tests such as rutschblock and compression tests are likely to decrease (Jamieson, 1995, p. 173; Jamieson, 1999). However, the fracture character and scores from a hypothetical test for propagation propensity (see below) might change less as the slab thins.

On avalanche courses, students sometimes ask if the results of non-standard tests such as a dropped column (Figure 9) should be recorded. This varies from operation to operation, but in my opinion, sudden fractures (SP and SC, or clean fast fractures) that are *consistent* are often worth communicating. In field notes, this might read: "dropped column, SP 2/2, down 65 cm in □● 1" where the "2/2" indicates the Sudden Planar fractures occurred in two of two dropped columns.

Observations of fracture resistance in ski testing

In shallow layers of new snow and DF particles, progressive compression (PC) fractures are common in compression tests. Skiers, snowboarders and snowmobilers frequently crush these layers, starting fractures that often do not propagate far enough to release slab avalanches. Apparently, the relatively soft slabs usually associated with these layers do not transfer sufficient energy to the crack tip to overcome the fracture resistance of the layers.

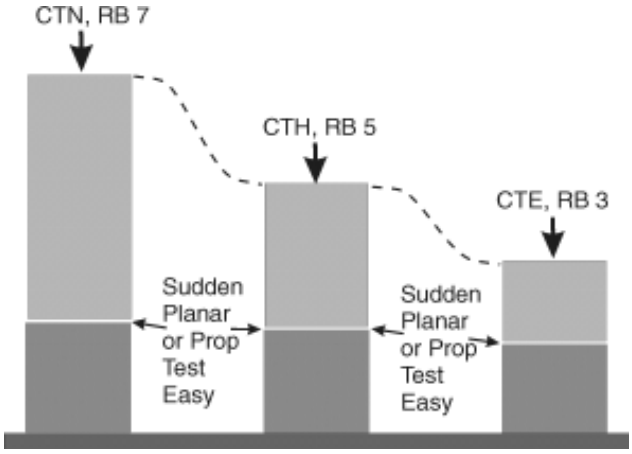

Figure 8. The results of rutschblock and compression stability tests may be more variable than observations of fracture character or experimental tests of propagation propensity because rutschblock and compression test scores are more affected by slab thickness

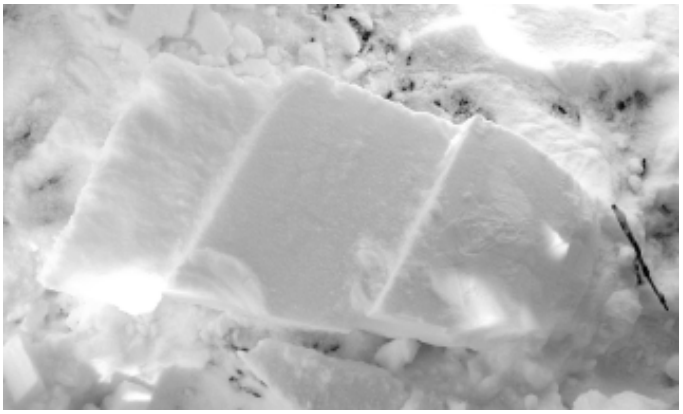

Figure 9. A snowpack column dropped in a snow pit showing two planar fractures. Are such results worth recording and communicating?

At the Canadian Avalanche Association Technical Meeting in May 2003, Alec van Herwijnen showed a dramatic high-speed video (250 frames per second) of a skier starting a fracture in a weak layer, but the fracture only propagated about a metre and no slab avalanche released. Clearly, skiers, snowboarders and snowmobilers can crack weak layers without sufficient propagation for slab release. Hence, determining the propagation propensity of a combined slab and weak layer is relevant to assessing slab avalanche risk.

Towards a field test for propagation propensity

In the mid 1990s, when the compression test was gaining popularity and we were learning its limitation for deep weak layers, a guide showed me a variation. For years he had been removing the upper column, leaving only about 25 centimeters above a deep weak layer. I felt this deep or modified compression test should not be called the compression test since, without the upper column, the scores would be substantially reduced. With the upper slab removed, the test would not be indicative of whether skier triggering was likely where snowpack conditions were similar. But the guide felt this modified compression test could help determine if the deep weak layer being targeted was "still a problem". In other words, was a fracture – perhaps initiated where the slab was thin – likely to propagate in the layer being tested? I now believe he was interested in a test of propagation propensity, in determining whether the resistance to fracture propagation was low or high. Some guides continue to use this deep variation of the compression test.

Since researchers are interested in how much energy is required to get an existing crack to propagate, last winter we altered the test by introducing a crack in the weak layer and making other minor changes. This *Deep Tap Test* (DTT) involves a 30 cm x 30 cm column, with only 15 cm of consolidated snow above the weak layer at the back wall, and a 5 cm notch (initial crack) cut into the weak layer along one of the sidewalls with a straight snow saw (Figures 10, 11). We tap on a shovel blade placed on top of the short column using the same loading steps as for compression tests (10 easy taps, 10 moderate and 10 hard taps). When shown the test, Jürg Schweizer and Kalle Kronholm from Switzerland were quick to ask whether cutting a 5-cm notch yields the same results as a 25 cm wide column. The short answer is that we don't yet have sufficient data, but more comparisons are planned to answer the question in the coming winter. Certainly, the stress wave from tapping the shovel blade should concentrate at the notch, but it is too soon to be sure whether the results of Deep Tap Tests indicate whether or not deep slab avalanches or remote triggering are likely.

There are concerns that the Deep Tap Test may not be a good indication of fracture resistance. One issue is that the downward stress wave in the column from tapping on the shovel blade is quite different from the mostly slope-parallel shear stress applied to a weak layer during slab avalanche release. This is true; however, the Deep Tap Test is only intended to provide an index of the resistance to fracture propagation. Also, the fracture toughness of snow in tension (Mode 1 in fracture mechanics jargon) is roughly similar to fracture toughness in shear (in-plane shear, Mode II) (Kirchner and others, 2002; Schweizer and others, in press). Since snow with low fracture toughness will also have relatively low fracture resistance, the downward stress wave at the notch may not compromise the Deep Tap Test, especially since it is only intended to provide an index of fracture resistance.

The radius at the end of the saw-cut notch for these experimental tests is substantially greater than the radius at the tip of a propagating fracture in a weak layer or interface; this is a relevant concern that may not be resolved until we determine if the results of these tests correlate with deep slab avalanches and remotely triggered avalanches.

Another concern about the Deep Tap Test is that it is qualitative (resulting in a number of taps) and not quantitative (measuring the energy required to advance the fracture). For this reason, we are also studying a quantitative test, that we call the Fracture Resistance Test (FRT) (Figure 12). The technique for the Fracture Resistance Test loads a column with the same dimensions as for the Deep Tap Test. The difference is that the load is applied to a 30 cm x 30 cm stiff plate by a donut-shaped brass weight (hammer) dropped down a rod from 5 cm, 10 cm and so on, until the crack (notch) fractures across the

Figure 10. For this Deep Tap Test, the upper column has been removed to test a deep weak layer. Along the sidewall, the deep weak layer has been notched 5 cm with a straight snow saw. The tapping is the same as for a compression test.

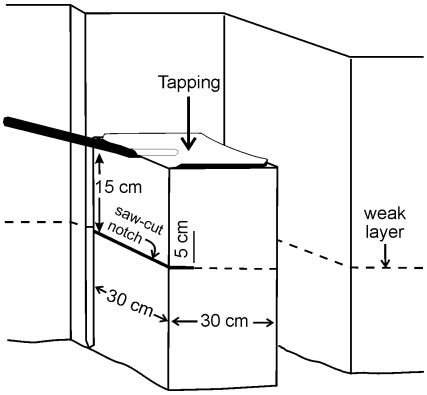

Figure 11. Diagram of Deep Tap Test showing the dimensions and the saw cut notch.

column in the weak layer. We use mostly 0.3 and 1 kg hammers. In the last issue of the *Avalanche News*, Cam Campbell showed that, in side-by-side tests, the results of the Deep Tap Test correlated with results of the Fracture Resistance Test.

Using a drop hammer tester to apply dynamics stress through a column to a weak layer is not new. Martin Schneebeli called his drop hammer tester the *Rammrutsch* (Schweizer and others, 1995). Kalle Kronholm, Kyle Stewart and Cam Campbell have used drop hammer tests extensively to study spatial variability in Switzerland and Canada (Kronholm and others, 2002, in press; Stewart, 2002; Stewart and Jamieson, 2002; Campbell and Jamieson, 2003). But before you add a drop hammer tester to your pack, realize the equipment is heavy and specialized. Also, while drop hammer tests have yielded important results for spatial variability, neither the Fracture Resistance Test nor its lightweight cousin, the Deep Tap Test, have yet been correlated with fractures in deep slab avalanches, remote triggering or whumpfs. Field studies will determine if these tests prove valuable. It is encouraging that these techniques are variations of a test technique some guides have used for about 10 years.

Figure 12. Cam Campbell demonstrates a drop hammer tester, consisting of a rigid 30 cm x 30 cm plate with a perpendicular guide rod. A brass weight (hammer) is dropped along the guide rod from 5 cm, 10 cm, etc. until the weak layer fractures across the column. From the weight of the hammer, 300 g in this photo, and the drop height, the energy delivered to the top of the snow column can be calculated. For these deep tests, the snow in the column is consolidated and no crushing is observed. Since much of the energy from the tester probably arrives at the weak layer, the energy required to fracture the weak layer can be calculated.

Anticipating deep slab avalanches

Since the compression test as described in the CAA observation guidelines (CAA OGRS, 2002, p. 33-34) is not well suited to testing weak layers deeper than a metre or so, what tools do we have to assess the potential for deep slab avalanches? Existing techniques include: shovel tests, paying attention to persistent weak layers and slab properties in snow profiles; avalanche observations and test results from neighbouring operations; whumpfs and remote triggering, and triggering from thin areas. Some newer techniques include recording and communicating the propagation distance for whumpfs and remotes as well as the character of fractures in snowpack tests. In time, experimental snowpack tests of fracture resistance or toughness may also prove useful as indications of propagation propensity.

Summary

Snowpack conditions where a fracture initiates may be different, e.g. shallower, from conditions where much of the propagation occurs or where a slab avalanche releases.

A dynamic near surface load such as a skier or tapping a shovel blade can crack (start a fracture in) a weak snowpack layer. Additional dynamic loading can cause the fracture to advance. More propagation is required to release a slab avalanche than a rutschblock, either of which require more propagation than a test on a smaller column.

The fracture toughness or resistance of weak snowpack layers varies spatially. Irregular crown fractures may indicate areas of increased fracture resistance (and toughness).

Observations of fractures in rutschblock tests and compression tests suggest that many non-persistent weak layers may be more resistant to fracture propagation than many persistent weak snowpack layers.

Weak layer fractures in snowpack tests that are sudden and planar (SP, Q1, "pops", clean and fast) may indicate less fracture resistance than most fractures without these characteristics. Weak layer fractures in compression tests, stuffblock tests and some other snowpack tests can be classified according to schemes developed in Canada and the US. Fractures in rutschblock tests can be classified according to a Swiss scheme. For higher scores, the interpretation of rutschblock, compression and stuffblock tests can likely be improved by considering the character of the fracture.

Stability tests such as the compression test or rutschblock test are not well suited to determining the fracture propagation propensity of a thick slab (e.g. > 1 m) over a deep weak snowpack layer. Tests for propagation propensity in deep weak layers are under development.

The anticipation of fracture propagation in deep weak snowpack layers may be improved by observing and communicating the propagation distance for whumpfs and remote avalanches as well as the fracture character (or shear quality or fracture/release type) in snowpack tests.

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As an adjunct professor in Civil Engineering and Geophysics at the University of Calgary, Bruce Jamieson heads a group of graduate students and technicians that conduct field studies for applied research on avalanche formation and initiation. He teaches graduate courses on snow avalanche formation and hazard mitigation at U of C. Bruce also consults on avalanche related projects in Canada. He is a past president of the Canadian Avalanche Association. In addition to research papers, he has co-written one book on avalanche accidents and three short books on recreational avalanche safety.

Avalanche Education for Snowmobilers: Efforts of the Gallatin National Forest Avalanche Center

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Abstract: *The Gallatin National Forest Avalanche Center, located in Bozeman, Montana, serves an area that receives tremendous snowmobile use. Backcountry snowmobiling in avalanche terrain is on the rise in the Western US and so is the number of riders being caught in slides. Montana had nine fatalities last winter, all of them snowmobilers. Nationally, 94 snowmobilers died in avalanches over the last 10 years, leading all other recreation groups. The best way to mitigate this upward trend is through avalanche education. Recognizing this, we've begun to offer avalanche courses aimed specifically at snowmobilers throughout Montana. This paper will help answer the question "How can we effectively teach snowmobilers about the dangers of avalanches?" Most educators come from a skiing background and consequently are handicapped in talking to snowmobilers about avalanches. In order to appreciate the challenges for educating this group we'll look at the unique problems riders face, list the stereotypes associated with them and their perceived myths. Finally, we'll offer practical solutions to the complexities of teaching this group.*

Keywords: avalanche education, snowmobiles, avalanches

1. Introduction

Snowmobiling has boomed in the last 10 years and consequently so have the number of avalanche accidents and fatalities. Nationally, 94 snowmobilers died in avalanches over the last 10 years, leading all other recreation groups. There are many reasons for this, such as an increase in snowmobile sales, very powerful machines and more skilled riders. Obviously, with more riders venturing into avalanche terrain, terrain that was impossible to reach 15 years ago, we're seeing more of them getting caught and buried in avalanches. The media has also found this sport profitable with audiences watching extreme snowmobile movies and televised snowmobile races, hill climbs and freestyle events. The sports popularity helped push it into a mainstream activity. Unfortunately, avalanche education has not kept pace with this explosion and as a result we're finding many uneducated riders in the backcountry.

In the US, "94 snowmobilers died in avalanches over the last 10 years, leading all other recreation groups."

At the Gallatin National Forest Avalanche Center (GNFAC) we're trying to reach as many snowmobilers as possible through our varied education programs created specifically for this user group. We're offering courses ranging from one-hour lectures to multi-day classes for riders of all abilities with great success.

2. History

Educating snowmobilers about avalanches is nothing new or revolutionary. Our efforts are a continuation of what others have done before us. Doug Fesler and Jill Fredston have incorporated snowmobilers into their courses for years. Craig Gordon, Don Sharaf, Bill Glude, Jim Frankenfield, Bruce Jamieson and Darcy Svederus and many folks at the Canadian Avalanche Association have also taught and written extensively about riding and educating people in avalanche terrain. Additionally, Karl Birkeland wrote a piece as early as February 1992 in the *Avalanche Review* about "Avalanches and Extreme Snowmobilers".

Snowmobiler avalanche fatalities rose like a cresting wave through the 90's and avalanche professionals across North America took notice. Everyone increased their education efforts, however the results were mixed. We knew riders needed avalanche awareness skills, but we were all following our own hit or miss strategy. It was easy to identify the thousands of riders who would benefit from our efforts, but, feeling like a tourist in a foreign land, it took time to get oriented and acquire the skills needed to reach this group. Fortunately, riders have been requesting more avalanche education in response to mounting fatalities and we're attempting to meet the demand.

3. Goals/Objectives

Our goal of educating snowmobilers is simple: We want to teach snowmobilers how to make educated decisions about snowpack and terrain so they can ride safely. Our objectives to achieve this goal are equally simple: We want to offer varied and numerous education programs to riders of all abilities. In order to provide high quality education we've had to become riders ourselves in order to understand the problems they face. It's important to remember that our goal is NOT to tell snowmobilers they shouldn't ride in avalanche terrain, but to equip them with skills so they can minimize their risk of getting caught and killed.

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4. Identifying the audience

4.1 General

In the US there are over 1.6 million registered snowmobiles, most of them located in the Midwest. The western US, including Alaska, have about 16% of that total number. Although snowmobile growth has been flat the last two years, it's booming in the west, especially among backcountry riders. Unlike the rest of the country where only 20% travel off trail, in the west it's estimated that over 50% recreate in the backcountry. Additionally, every winter there's a migration of snowmobilers who head out west to taste the powder and expose themselves to avalanche terrain, often with fatal results. Just last winter the GNF had over 350,000 snowmobile user days which is almost tenfold more than any other winter backcountry sports.

4.2 Specific

Our audience varies wildly, although we're finding that off trail mountain riders fit into four specific profiles. The first group is young, athletic men who often come from motocross or another motorized sport background. Some of them are serious snowboarders too and occasionally dovetail the two sports into their day of play. They take the sport seriously and have invested thousands of dollars and hundreds of hours into their machines. Many of them are skilled riders who've taken the acrobatics of freestyle motocross and adapted it to snowmobiling. They are expert riders: very proficient, athletic and daring. We've found that reaching these riders is paramount because when the sponsored or professional riders get educated others follow. This is what happened with skiing. Once the star athletes in the movies started wearing shovel packs and carrying beacons others followed suit and the same holds true for snowmobilers. Even though this elite group is difficult to reach, we need their public relations help in attaining our educational goals.

"Just last winter the Gallatin National Forest (US) had over 350,000 snowmobile user days which is almost tenfold more than any other winter backcountry sports."

The second group is riders that have been doing it for years, perhaps decades, and have evolved with the sport. Many of these are middle-aged, not as daring as the first group, but possess excellent riding skills. Contrary to many skiers perception that all snowmobilers are reckless with sub par IQs, we're finding that many are educated professionals in the community who enjoy pushing themselves and their machines. Most in this group have first or secondhand experiences with avalanches and recognize that avalanches present deadly problems, but they're not sure what to do about it. They have a good handle on the risks of the sport and are hungry for education.

The third group of riders isn't necessarily novice, but is characterized by little or no knowledge about avalanches or avalanche terrain. These people are basically in the dark since they don't understand the risks they're taking and are in dire need of avalanche awareness skills, but don't realize it.

There also exists a fourth group of riders identified as experienced daredevils who choose to go into avalanche terrain during dangerous conditions. They possess the skills to assess the stability of a given slope and choose to ride it in hopes of triggering a slide. Given that these snowmobilers already have backcountry skills, but choose to find rather than avoid avalanches, there's not much we can do to prevent their demise. In some ways they're the only ones truly worthy of the title "extreme" since they're consciously playing a game of high risk with serious consequences. In some ways it's no different than technical high-altitude climbing, class V+ boating or base jumping to name a few other "extreme" sports. This group gets a lot of press since their escapades defy reasoning. However, as educators we can comfort ourselves in knowing that they understand the high risks they're taking.

5. Stereotypes

Let's face it, as educators we're holding onto a lot of baggage and stereotypes regarding snowmobilers. As skiers we focused on teaching our fellow skiers. Most of us either aren't riders or only started to learn recently, and some of us haven't even gotten that far since we just don't like snowmobiling. Many see it as a noisy, smelly sport with no place in the backcountry. I can only recommend that if you feel strongly against it then you should NOT be in a position to educate them. Who wants to learn from someone who hates their sport?

Snowmobilers are overwhelmingly NOT the overweight, ignorant red necks we've portrayed them as. In fact, our experience at the GNFAC has been quite the contrary. They're less opinionated and more open to learning than many of the skiers we've taught. We're not going to be respected if we continue to make sweeping generalizations, especially when they're erroneous. All you need to do is become a rider and see for yourself.

6. Myths

Many snowmobilers have only a mythical understanding about avalanches. Our job is to educate them so they can make informed decisions based on real data instead of fantasy or wishful thinking. We present these myths in our programs and try to squash them with facts. One example is the belief that they can always outrun avalanches on their machine. "What happens if you're facing uphill when the slope fractures?" we ask. A professional hill climber died 2 years ago in Montana when this happened. Another misconception is that snowmobilers are always found next to their sled if they're caught in an avalanche. Using accident reports we point out that this is not always the case. One more popular myth is, "This slope never slides". Really? We educate them that it certainly can slide if it's in avalanche terrain with an unstable snowpack.

We need to remember that what's obvious to us, may not be to them. Sitting on a huge snowmobile can provide a false sense of power and invulnerability. We need to take extra time to point out the reality of snowmobiling in avalanche terrain so they can accurately assess the risks associated with it.

One (myth) is the belief that they can always outrun avalanches on their machine. "What happens if you're facing uphill when the slope fractures?" we ask

7. Concerns

7.1 Snowmobiler

Snowmobilers gather meaningful snowpack information very differently than skiers. They're insulated from one another and their environment as they ride since wearing a helmet creates tunnel vision, especially traveling at high speeds. Riding also makes it difficult to survey surroundings at great depth since you're forced to focus on the terrain to avoid hitting a tree or another rider. Unlike skiers who can usually sense subtleties in the snow over short distances, a rider has a difficult time noting anything but the most obvious snowpack changes. For example, a rider can sense depth hoar once his back end digs to the ground, but may not notice a crust eight inches under the surface since he just plows through it.

The insular aspect of snowmobiling from the helmet, noise and distancing of riders all lead to a lack of communication. In essence, they loose the ability to share observations on the fly which works against them when decisions need to be made. Compounding the situation is the fact that they rarely get off the machine in areas that will give them valuable snowpack information. Additionally, snowmobilers cover tens of miles on many aspects and elevations making them more apt to find pockets of unstable snow.

All of these snowmobiler concerns need to be addressed since they affect their decision making process.

7.2 Avalanche Educator

As mentioned earlier, we've predominantly taught skiers and snowboarders who look at the snow differently than snowmobilers. As a consequence we need to tailor our education programs to them. Contrary to skiers, snowmobilers are not going to dig snowpits and they may only do a few stability tests (usually a low pass on an embankment or slope). Sure, you can show them layering in the snow and talk about avalanche mechanics, but you're dreaming if you expect them to dig pits to gather snowpack information. The more you ride, the more you'll see how impractical it is.

In order to think like a snowmobiler we have to *be* a snowmobiler (very Zen). They're out there doing tricks, catching big air and high marking at a level that boggles our mind. If we have any hope of getting their respect and educating them we cannot cast judgment and be condescending about what they're doing. They're smart people who are passionate about a sport. If you truly believe that highmarking is stupid, then stick to teaching skiers. You can't fake it.

8. Being Better Teachers

An old saying from Outward Bound is "A failure to learn is a failure to teach". While I think there are exceptions to every rule, this saying definitely has some truth to it. We've tried many different approaches in order to increase our effectiveness as teachers and have come up with some ideas that work well for us. Many of these ideas are not new since we collaborated with other professionals about various teaching techniques. However, we've coalesced many of these ideas into a successful curriculum. Last winter we taught over 500 snowmobilers and can attest that the following general guidelines have worked well for us.

"In order to think like a snowmobiler (you) have to be a snowmobiler…If you truly believe that highmarking is stupid, then stick to teaching skiers. You can't fake it."

First and foremost we've taken the last few years to become proficient riders. We practice, wipe out, high mark, dig ourselves out of trenches and tree wells, and tip over in our quest to get better. When we're teaching a class we don't want to be the worst riders in the group. The goal is to not be seen as a bunch

of goobers getting stuck at every turn. Knowing how to ride also helps us answer questions in the classroom since we have personal experience to back up our answers. Riding on mountain sleds also adds to our legitimacy. We found that riding two-up on a wide track trail sled while everyone else is on their 800cc muscle sled gave us an inferiority complex and was wildly impractical for teaching backcountry riding.

"Education works. Just last winter southwest Montana had three live recoveries of buried snowmobilers by their partners using beacons."

Experience tells us that no matter how new a sled is, Murphy's Law will prevail and they'll break down at some point. In just about every field session we had to deal with repairs, so learn some basic mechanical skills and to carry a tow rope when you teach. I guarantee you'll use the repair kit 10 times more than the first aid kit. With breakdowns in mind we try and hold our field classes in areas where avalanche terrain is within 10-15 miles of the trailhead. Anything more the potential for mechanical failure seems to rise exponentially.

For our field sessions, 6-8 riders per instructor is ideal. Unfortunately this is impractical for us since we only have two mountain sleds and have a difficult time finding instructors who are good enough riders to actually teach. Our small pool of instructors is a major handicap in out education efforts. Consequently, we've run field sessions as high as 12:1 with success; it just required extra diligence and militant rules to make it work. Make sure you outline your expectations and meeting places along the route in order to keep together.

In contrast to the field, the classroom settings are pretty easy to manage. We've had great success getting local snowmobile shops to host our classes since they get future customers and we get some legitimacy by associating ourselves with the pros. Shops are also where you'll reach hard core riders since they typically shy away from organized clubs.

During your lectures use snowmobile example's, and lace your program with pictures of riders. Over the last few years we changed all our pictures from skiers to snowmobilers. Even though the concepts we're teaching is similar, having shots of people in helmets looking at a fracture line or folks high marking a slope really drives home the lesson. Imagine teaching an avalanche class to a room full of skiers with pictures of only snowmobilers. It wouldn't work.

Another obstacle to prepare for is that undoubtedly someone in the class will try and rope us into a debate about snowmobiling in the National Parks, or wilderness, or ask for your thoughts on some other hot political issue. Stay clear! Our goal is to teach folks about avalanches, not give them our views on the state of the snowmobiling industry. However, we can be better teachers if we stay current on the issues and advances in the sport, so we read the snowmobiling magazines to learn about all the hot new sleds, 4 vs. 2 stroke technology, and most importantly to get the lingo down.

An unseen benefit of being good riders and providing snowmobile specific education programs are the contacts we've made. We've met owners of other shops, guides, professional riders and community leaders who talk about their positive experiences with us to their friends. This translates into higher attendance at our classes and an improved relationship with the snowmobile community.

"learn some basic mechanical skills and to carry a tow rope when you teach. I guarantee you'll use the repair kit ten times more than the first aid kit."

9. Curriculum Ideas

The actual nuts and bolts curriculum in an avalanche awareness class is similar no matter who the audience is. We've just tailored our lectures from skiers to snowmobilers with minimal effort. We still teach topics like snow metamorphism, weather, terrain and rescue; however the emphasis of our message is a little different. Throughout the class we repeatedly focus on their behavior since small changes on how they ride can easily lower their chances of getting caught in avalanches. We've had success targeting three core points:

1. In Montana, over half the people killed in avalanches last winter (9) would be alive today if they exposed only one rider at a time on a slope. By stopping this one behavior we'd see avalanche fatalities plummet not only in Montana, but across the nation. Think about it. If they walk out of your class and put into practice this one concept we've saved lives. And that's without even talking about stability or rescue gear.

2. Another way to rapidly bring down these numbers would be if all snowmobilers carried rescue gear and knew how to use it. There's nothing worse than going to an accident scene and finding someone dead from a shallow burial where a transceiver may have saved their life.

3. Avalanches are a matter of timing. There are certain times when the snowpack is stable and others when it's quite unstable with the most obvious signs of instability being recent avalanche activity. We strongly emphasize that when we see these signs we need to be extra careful traveling in avalanche terrain.

None of these ideas are revolutionary or mind bending. They're simple and have been used for years by many others. Our hope is that if we if we all make a concerted effort to repeatedly enforce these ideas throughout the class and field sessions we'll stem the tide of rising fatalities.

10. It Works/Conclusion

Education works. Just last winter southwest Montana had three live recoveries of buried snowmobilers by their partners using beacons. Two of these involved riders who had taken avalanche education classes through the Forest Service.

We're in the business of reducing and managing risk. As educators we can give riders the tools to make better decisions while not being judgmental about their sport. Part of this is helping them understand how their behavior can lead to accidents. Certain backcountry rituals like riding one at a time on a slope and carrying rescue gear can make the difference between living and dying. Hammer it in. And most importantly, get out there and ride!

ACKNOWLEDGEMENTS

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A Snowmobile Primer for Skiers

BY LORI ZACARUK

Editor's Note: *Lori Zacaruk is a member of the CAA's Board of Directors and one of Canada's most outstanding proponents for avalanche safety for snowmobilers. Lori also is an Alberta Snowmobile Association Safety Trainer and Sled Smart Instructor. She noticed a need for greater understanding between skiers and snowmobilers, especially those who teach avalanche safety, and has put together this informal introduction to the sport to help fill that need. Lori cautions against quoting any of her stats, as they are mostly estimates based on conversations within the snowmobile community. She raises some good points here so kick off your skis and start your engines…*

Snowmobiling as a Recreational Activity

Snowmobiling is an excellent sport that challenges all levels of physical abilities. Although the average snowmobiler is a 42-year old male, snowmobiling is considered a family sport and is enjoyed by young and old alike. I have even ridden with people with upper and lower body amputations. For them, motorized recreation is their only option to experience winter wilderness that would otherwise be inaccessible.

The organized snowmobile community continues to expand their trail systems, which provides a comfortable and safe way to be more active during the winter months. Snowmobilers, once viewed as careless hot-rodders have dramatically improved their safety and environmental records thanks to national and regional associations that promote the use of safety equipment, designated trails, Zero Tolerance, and environmentally friendlier and quieter machines. Snowmobiling offers a second-to-none appreciation of the outdoors, health benefits to its participants and contributes to the economic and tourism benefits of many communities.

Now more than ever, backcountry skiers and snowboarders are using snowmobiles for quicker access to more remote terrain. As our population ages, I wonder if more of those in the self-propelled community will look to snowmobiling for what it is - a low impact method of continuing to enjoy the backcountry?

For general articles related to the snowmobile industry, safety mandates, values, and press releases please look to the website of the International Snowmobile Manufacturers Association (ISMA). http://www.snowmobile.org. While you are there check out the 2002-2003 ISMA Snowmobile Fact Book which includes statistics related to snowmobiling in North America and northern Europe. You can find it at http://www.snowmobile.org/pr_snowfacts.asp . It is a good source of general information related to the

sport: ages, income levels, sleds sales, economic impact. For example, in 2003 there were 186,627 snowmobiles sold worldwide (114,927 in the U.S. and 50,209 in Canada), the economic impact of snowmobiling in Canada is $4.7 billion CDN annually; and the average snowmobiler spends $4,000 each year on snowmobile-related recreation.

Snowmobile Manufacturers

There are currently four main snowmobile manufacturers worldwide: Arctic Cat, Polaris, Skidoo (manufactured by Bombardier), and Yamaha. There is a high degree of competition between the brands, which adds to the evolution of equipment and the enjoyment of the sport. Three American companies are attempting to produce specialty snowmobiles for general sale (versus special order custom sleds): Snow Hawk, Redline, and Blade. These units have radical design differences from the 'stock' sleds. There are approximately 190 snowmobile dealers throughout British Columbia and Alberta.

Stock Snowmobiles vs. Modified Snowmobiles

The vast majority of riders are content with standard *stock* snowmobiles, direct from their dealer. Sleds 'straight out of the box' have come a long way in the last few years. Reliability and ease of operation has greatly improved, reducing the time necessary to maintain the unit and reducing the mechanical experience necessary by the rider. For example, many stock sleds now automatically adjust the carburetion for altitude and air temperature. Even a stock snowmobile can climb slopes up to 40 degrees, even steeper grades for short distances. Today you can buy a snowmobile directly from the dealer for under $12,000 that can likely keep up with a $35,000 modified snowmobile from 5 years ago.

"As our population ages, I wonder if more of those in the self-propelled community will look to snowmobiling as a low impact method of continuing to enjoy the backcountry?"

Even with the advancements of stock machines, some riders make *after-market* modifications to their sleds. While on public lands or trails, organized snowmobiling does not endorse the use of after market pipes that increase noise. Virtually all parts on a snowmobile can be modified or replaced to increase horsepower or torque, to reduce weight, or to enhance the appearance of the sled. Motors, clutches, gearing, and carburetion can be tuned or adjusted in the search for the most efficient combination to turn fuel into horsepower and finally into track speed and torque. Many riders are capable of performing the parts replacing themselves but often have the more technical adjustments completed by their original dealers or specialty shops. The level of modifications is limited only by the amount of money the rider has or his nerve to ride the sled he builds. Riders of highly modified sleds usually work hard and earn well in order to play hard. Many work in industries that deal with machines and sledding gives them an opportunity to put their experiences and ideas to the test.

Modifying sleds is highly contagious. It is a great challenge and source of pride. The modifications and adjustments can be highly technical and often require a great deal of calculation and thought. Those who can successfully achieve the results of higher, faster or lighter are highly regarded by their peers. This is not a race to spend money. Only a lucky few are not working within a budget.

At a non-sanctioned hill climb event last year, I estimated four of the 40 competitor sleds would have cost close to $50,000 CDN each and another 20 worth approximately $35,000 each. The most popular sized engine for a stock mountain sled is currently the 900cc at approximately 150+ horsepower. The largest mod on the hill at this hill climb event was 1800 cc! 1200cc engines were a popular size in these high-end sleds. In addition, 15 sleds were equipped with nitrous oxide. Some nitrous systems can add up to 100 horsepower. Some of these highly modified sleds are putting out 300+ horsepower. The combination of high horsepower and low-weight parts leads to an extremely high power-to-weight ratio. Remember, it is only a select few that have the money and ability to ride and design sleds of this caliber.

Different Riding Styles and Machines

Various models of snowmobiles are produced to suit specific terrain and riding styles. Here is a summary:

Snowcross Sleds - built for quick horsepower, tight corners, and jumps, similar to motocross bikes. Many of the top snowcross and freestyle jump competitors are also motocross competitors as well.

Trail sleds – General purpose snowmobiles. Used by those who explore the backcountry using signed, groomed snowmobile trails, just like at ski resorts. Trail sleds typically have less power than mountain sleds or hill climbing sleds. They are built for comfort, sometimes for two people. For the most part the track of trail sleds is less aggressive (shorter and flatter) and rider comfort is placed ahead of lightweight snowmobile parts. Touring the trails is more popular in areas where avalanches are less a concern. I have heard that Quebec has more snowmobile trails than they have paved highways – hotels, restaurants and fuel stops are all accessible from the trails. Western Canada has good trail systems as well, and there has been much work by local clubs to develop links between the regional trail systems and communities. Agreements have been negotiated to access both crown and private lands. Provincial snowmobile associations have combined efforts and completion of the TransCanada Trail is near, which effectively links the East coast to the West Coast.

Youth sleds - The original child's snowmobile was the Kitty Cat. They have little suspension and are only useful in hard packed snow. Top speed is about 7 mph. Skidoo, Polaris and Arctic Cat have all designed a youth sled, with a 120cc motor and with many of the same features as the larger models. As with all sporting activities, parental supervision is recommended.

Utility snowmobiles – In a country covered by snow for almost half the year, there are plenty of people who use snowmobiles for work, for example, oilfields, forestry, seismic, trappers, or farmers. Workhorse snowmachines often have a wider and longer track for floatation and traction. They are designed for better towing and hauling capabilities.

Mountain sleds – are typically higher horsepower, lighter weight machines, with longer tracks for added floatation and longer paddles for traction in deep powder snow. Powder riding requires more technical experience and good physical conditioning; otherwise the rider will spend the majority of the day stuck in the snow and out of breath! Balance and body positioning on the snowmobile are very important for cornering, crossing hills (side-hilling), and climbing. The rider's ability is as important as the snowmobile's performance.

Hill Climbers – Riders that test their abilities and their machines by trying to climb steep inclines. *High marking* is an activity where a rider climbs a hill until his snowmobile loses power or traction, or until the rider loses his nerve. At this point, they turn out (turn around) and ride back down the hill. The hills enjoyed by hill climbers are the same hills that skiers would choose.

Visitors in Avalanche Terrain

The main snowmobile areas in Western Canada requiring avalanche safety equipment are located throughout BC, on Alberta's western provincial border and the Yukon region. Many of the mountainous areas along the eastern slopes of the Rocky Mountains in Alberta are closed to motorized activity. This means that many people from Alberta and even a few from Saskatchewan travel between two to eight hours to enjoy the powder and the terrain that BC has to offer. Such long travel requires a reliable snowmobile, truck and trailer, the costs of which can quickly add up. Some of these visitors only make 2-3 trips/year to the mountains with the majority of their winter's activities taking place on low angle terrain on trail systems or private property.

Lori's husband Randy checks out a 1500cc sled with a nitrous boost. Estimated retail price: $35,000. Estimated horespower: more than your car!

Many tour operators and resort owners are also beginning to attract snowmobilers from the highly populated areas of Eastern Canada. Ontario snowmobilers are potential consumers of multi-day snowmobile holidays to the mountains. This market will likely be further developed in the coming years.

Snowmobiler Avalanche Awareness in Canada

"...some of my students have estimated that only 50% of mountain sledders carry avalanche gear"

The social norms are beginning to change towards responsible use of the backcountry including snowmobile safety and avalanche safety education, as well as maintenance and cleanups of the riding areas.

I would estimate that five years ago only 20-30% of riders actually carried avalanche safety gear. Now I would estimate that 70% of people own or rent a beacon (some of my students have estimated that only 50% of mountain sledders regularly carry avalanche gear). I would guess that 30% of riders have likely had some form of training – either self-guided with a book, through an evening avalanche safety seminar, or through a RAC program. Only 5% have had any form of hands-on training. The provincial snowmobile associations continue to stress the importance of avalanche education and carrying the proper avalanche safety and survival equipment.

We find that sledders accumulate their avalanche awareness and safety gear in phases. Riders typically start with a shovel, since it is useful for digging out a stuck snowmobile. A year later they may purchase a beacon, a few even purchase a probe. At this point most of the gear is stored under the hood of the snowmobile. Soon they learn that a backpack is the best location to store rescue and survival items. Finally, once their wife insists, riders may take an avalanche course…as long as it "doesn't interfere with a good riding day". This prompts the remainder to invest in an avalanche probe.

Those people traveling without the gear are obviously tempting fate, in their minds it may be a factor of cost, but many riders honestly do not believe that they are in avalanche terrain, especially those who visit the mountains infrequently.

Canadian Snowmobile Media

For more information on snowmobiling in Western Canada, check out the following:

SnoRiders West – Official magazine of the Snowmobile Association's of Alberta, BC, Saskatchewan, Manitoba and the Yukon Territory. This family oriented magazine is distributed to all members of the associations. The magazine features a large amount of information related to snowmobile destinations, riding areas, and services. An online version of the magazine is available at www.sniderswest.com.

SnoWest Canada – Sister company to US-based *SnoWest* magazine. This magazine is distributed to all snowmobile club members and anyone who has purchased a new snowmobile in the past five years. This magazine is interesting and well put together. The editors and employees are all avid sledders. This Canadian publication also hosts www.snowmobile.ca, which is relatively new, but growing. They promote avalanche safety through articles and links. The US website is at www.snowest.com. The site is host to a very active 'Forum' with more than 10,000 registered members. 'Avalanche Awareness' is one of the nine categories. Some excellent discussions regarding beacon brands, avalanche safety tips, the Avalanche Airbag, current accidents, the necessity of training and current conditions were conducted over the past season.

Snowmobile Associations in Western Canada

The British Columbia Snowmobile Federation (BCSF) includes approximately 8000 members in 80 clubs throughout the province of BC. Ten percent of these members are Albertans that are riding in the BC communities. The BCSF estimates that there are close to 60,000 snowmobiles in BC. Learn more about their organization at www.snowmobilebc.ca. The BCSF also has a Racing Division that approves and coordinates approximately 12 snowcross and hill climb events per season. You can check out the schedule at www.bcsfracing.com.

Alberta Snowmobile Association (**ASA**) represents 5,000 members in 45 local clubs throughout the province. It is estimated that there are over 130,000 sleds in Alberta, only 26,000 of which are registered and insured. According to the ASA head office, approximately 5,000 new snowmobiles are sold in Alberta each year, down slightly from the previous 7-8000. It is felt that this is largely due to the low snow conditions experienced throughout the province over the last few years. Information on the ASA can be found at www.altasnowmobile.ab.ca.

Klondike Snowmobile Club (KSA) represents 500 members. Approximately one third of the Yukon riders use snowmobiles for work, one third are families, one third are mountain riders. http://www.ksa.yk.ca

www.altasnowmobile.ab.ca

phone. (780) 427-2695

Local Clubs - Many local snowmobile clubs also have websites to promote their events, values and membership. Links are available on their provincial association website. Snowmobile club members develop and maintain their local snowmobile trails and are often quite active in their local community through charitable donations and in volunteer organizations such as Search and Rescue. In general, I believe that the members of snowmobile clubs are more aware of the existence of the CAA than the general population and the majority have participated in some form of avalanche safety training.

Organized Snowmobiling in Canada

One of the main mandates of organized snowmobiling is the promotion of safety and many groups are involved in continuously improving safety standards and delivering safety programs through proactive leadership, stakeholder partnerships, public education, driver training and trail enhancement. A limiting factor on snowmobile safety is that many riders are not currently members of organized clubs. As land use negotiations continue (and seem to never end) it is increasingly important for all sledders to support the Clubs and Associations that are representing the interests of the snowmobile community to government. The Catch 22 of land use is that as more land is closed to the motorized community, more participants are dislocated, which leads to greater demands on the remaining terrain.

Professional Snowmobile Guides Association - This organization is in its infancy. An association joining professional snowmobile tour operators and rental companies is desperately needed. One very strong reason includes the development of standard policies to ensure safe practices throughout the industry. I hope that this group of proactive sledders can learn from the proven systems and practices currently followed by the commercial operators in the ski industry. No sense reinventing the wheel. I believe that more formality and control amoung professional snowmobile operators would benefit the image of all operators within the backcountry recreational industry – we're all in the same boat. The ripples created by an avalanche accident are felt by all recreation categories to a certain extent.

I hope that this article will help offer some insight into the snowmobile community. For those that are planning to instruct snowmobile based RAC classes, I encourage you to check out a few of the websites. It always helps your image if you can keep up with some of the lingo!! Feel free to contact me at zacs@nucleus.com .

The BCSF / CAA Snowmobile Course Development Committee

Photo by Phil Hein

Front row (left to right): 1) Scott Barsby - Owner/Operator of Toby Creek Adventures Ltd. Sled Tours, CAA Level 1 Graduate 1997, Invermere BC; 2) Lance Amos - Director of Quesnel Snowmobile Club, SAR; 3) Darcy Svederus - Snowtec Services, Elnora AB, Alberta Snowmobile Association Past Safety Director, CAA Level 1 Graduate 1996, Sled RAC Provider; 4) Lori Zacaruk – Zac's Tracs: RAC Instructor, CAA Level 1 Grad1999, CAA Director, Black Diamond, AB; 5) Randy Zacaruk – Zac's Tracs; 6) Ryan Gallagher - Snow Research Technician (U of C), CAA Operations Level 2 Graduate, Skier & Sledder, Golden BC; Back row (left to right): 7) Phil Hein - ACMG Mountain Guide, CAA Professional Member & Instructor, Past CAATS Coordinator 1995-2002, Skier & Sledder, Golden BC; 8) Pat Whiteway - Executive Director of BC Snowmobiling Federation, Kelowna BC; 9) Paul Fossberg - Toby Creek Adventures Ltd, CAA Operations Level 2 Graduate, Skier and Sledder, Sled Operations Forecasting, Invermere BC; 10) Grant Dowdy - Vice-President & Past President of Revelstoke Snowmobile Club, BCSF member, Revelstoke BC; 11) Carole Dascher (RPF)- Pioneer Forest Consulting Ltd., President of Golden Snowmobile Club; Parson, BC 12) Bob Zimmerman – VP of BCSF, Director of Quesnel Snowmobile Club, Member of RCMP, SAR 13) Ian Tomm - CAA Training Schools Program Coordinator & Instructor, Ski Guide, Calgary AB; 14) Janice Johnson - Adult Education Specialist, CAA Affiliate Member, Past BC Highways Avalanche Control Program, Langley BC; 15) Wayne Houlbrook - Kinbasket Adventures Ltd. Sled Tours, BCSF Member and Patroller, Golden BC; Missing from group photo: 16) Randy Stevens - Stellar Consulting, CAA Professional Member & Instructor, Highways and Industry Avalanche Program Specialist, Skier & Sledder, Pilot, Rossland BC

Overhaul of Avalanche Training Program for Snowmobilers

BY IAN TOMM, CAA / PAT WHITEWAY, BCSF

We are very pleased with the outcome of the **Avalanche Training Curriculum** workshop held September 13th and 14th in Revelstoke, BC. Janice Johnson, B.Sc., M.A., moderated the workshop, kept us all on task and a lot was accomplished. The goal was to enhance the CAA's Level 1 avalanche training course and student manual so it would become more responsive to needs the needs of snowmobilers.

The meeting had in attendance some 16 people: 11 representing snowmobile interests ranging from recreational to commercial tour operators and five CAA members with very strong backgrounds in ski / boarding avalanche training. The input and ideas were no less than amazing. From this we were able to develop a draft list of objectives that will fulfill the needs of snowmobilers while not compromising the scientific fundamentals of the current CAA Level 1 training manual.

For the first year, the course will remain seven days in length, with the thought of developing the course into two modules so it can be run in two parts (a three and five day segment) in future years. The first new Level 1 curriculum was run between November 28-December 5, 2003.

Reviewing the workshop and it's importance, we couldn't help but realize that this training is costly and that the high level of quality instruction it demands cannot be sacrificed to lower costs. When we look at what clubs are trying to accomplish – getting education out to members – we cannot help but think that clubs should consider sponsoring a member who is willing to take the course and then become an instructor themselves in order to teach the two-day Recreational Avalanche Course (RAC) to other club members.

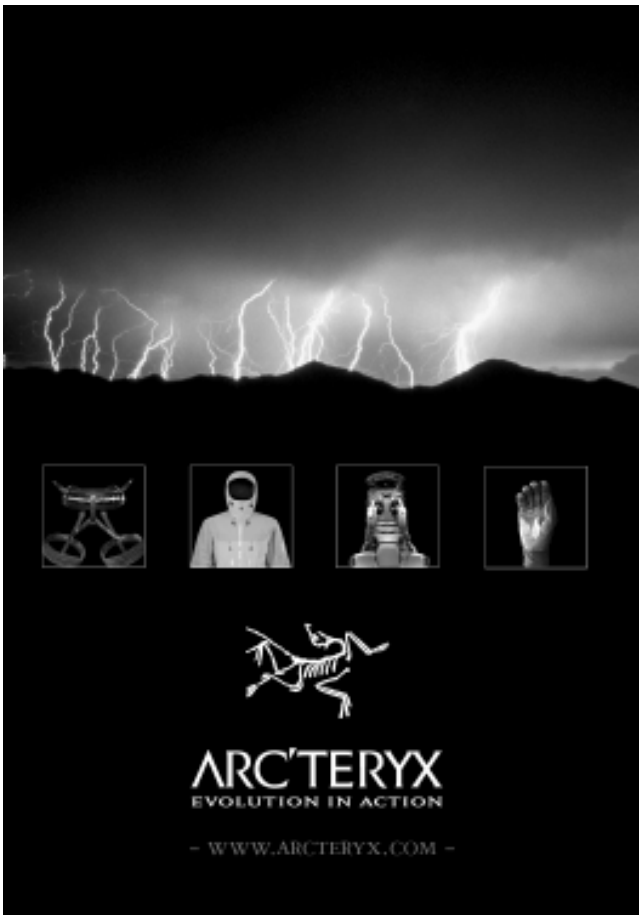
New CAA Snowmobile Operations Level 1 Course Completed

BY IAN TOMM, CAA Schools Coordinator

On December 5, 2003 the newly revamped CAA Snowmobile Operations Level 1 course finished at Monashee Powder Adventures Lodge. There were 20 participants on the eight-day course that ran Nov. 28 through to Dec 5. All students passed and the student feedback received was very positive about the new curriculum. The CAA will continue to upgrade and enhance the program to meet the needs of the snowmobiling sector. Participants on the course represented a good cross-section of the snowmobiling community including RCMP, forestry, guides, commercial operators and community club members all in attendance.

Special thanks to Pat Whiteway and the Directors of the BCSF. Without their support this project and course would not have been possible. The CAA looks forward to continued partnerships in snow avalanche safety initiatives for the snowmobiling community in Western Canada with the BCSF.

As of printing time, the course report and student feedback was not yet compiled. Look for a complete project report and summary of student feedback in the next issue of *Avalanche News*. If you are interested in attending this course next season (2004/05), please continue to monitor the CAA's website. Course dates and location information for next year will be posted by mid May 2004.



Snow Avalanche Management in Forested Terrain

Snow avalanches are a common phenomena in most mountain ranges of British Columbia. This land management handbook is a must have for natural resource managers, ski hill and land developers, backcountry tour guides, forestry workers, and winter recreationists. This book presents a risk assessment procedure suitable for incorporation in the terrain stability field assessment process. This book outlines harvest design and silvicultural strategies to reduce the risk of snow avalanches. Approaches for managing avalanche risks in winter are also presented. An extensive bibliography is included, along with links to relevant publications, data sources, and resources available on the internet.

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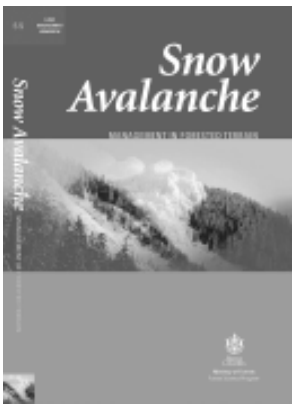

The CAA's Oral History Project

BY CHRISTINE EVERTS

Editor's Note: *In the spring of 2003, the CAA Board of Directors decided to use funds from the Art Twomey Memorial Fund to capture the oral history of the Canadian Avalanche Association, as remembered by key avalanche pioneers. A steering committee, comprised of Margie Jamieson, Simon Walker and Gord Burns, helped determine the terms of reference and the individuals to interview for this project. Christine Everts was contracted to interview these key avalanche pioneers and Susan Hairsine volunteered to provide overall project management and report collation and distribution.*

In the next four issues of Avalanche News*, we will publish chapters of this report in its entirety. This first installment includes an introduction to the Oral History Project and a biographical summary of the participants. In subsequent issues, we will explore:*

- The Role of Industry-Related Avalanche Accidents
- The Widespread Development of Recreational Pursuits
- The Evolution of Public Safety Practices
- The Evolution of Avalanche Control and Forecasting Techniques

Acknowledgements

The Canadian Avalanche Association's Art Twomey Memorial Fund, with assistance from Parks Canada, was used to finance this project.

Art Twomey, an acclaimed mountaineer and photographer, came to Canada in 1968. He was an instructor and course leader of Level One Avalanche Courses for various organizations including the National Research Council of Canada, the British Columbia Institute of Technology, and the Canadian Avalanche Association. Friend and colleague Peter Schaerer described Art as "an excellent, patient instructor who combined good theoretical knowledge with experience in the snow."

In addition to his commitments in the avalanche industry, Art was actively involved in wilderness protection in the province of British Columbia. He lobbied for the protection of the Purcell Wilderness Area, where a summit now bares his name.

This project is dedicated to the memory of Art Twomey, and to the avalanche pioneers who came before and who will come after.

Note from the Author: On behalf of the Canadian Avalanche Association, I would like to thank all those who participated in this project. Their knowledge, stories, insight and experiences were essential to this project.

Sincere thanks to:

- Tim Auger
- Herb Bleuer
- Geoff Freer
- Hans Gmoser
- Toni Klettl
- Willi Pfisterer
- Ron Perla
- Gord Ritchie
- Peter Schaerer
- Jim Sime
- Norm Wilson

I would also like to thank those who contributed to this project through their ideas, assistance and patience.

- Don Borden – Whyte Museum of the Canadian Rockies
- Gord Burns – CAA
- Kathy Calvert – Parks Canada
- Susan Engler-Potts – Alpine Films
- Lena Goon – Whyte Museum of the Canadian Rockies
- Susan Hairsine – CAA
- Clair Israelson – CAA
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- Evan Manners – CAA
- Don Mickle – Parks Canada
- Peter Spear – CAA
- Chris Stethem – Chris Stethem and Associates Ltd.
- Brent Strand – CAA
- Simon Walker – CAA
- Rod Wallace – Parks Canada
- Brad White – Parks Canada

Introduction

"We knew the avalanche paths, but we didn't have any way of evaluating the information... It had to all be set up… "[1]

Avalanches: "Falling bodies of snow or ice, loosened from their hold by the heat of the sun."[2] This description was used to explain the snow phenomena in the Alpine Club of Canada's original 1907 journal. While it is now known that the avalanche process is much more complex, "involving steep slopes, gravity, accumulation and deformation of snow cover, and short-term fluctuations in

weather" it took years of research and experimentation to reach this conclusion.[3] The impetus for avalanche research was based on the need to protect natural resources, facilities, commercial ventures and people involved in recreational pursuits from the destructive forces of avalanches. Avalanche accidents and subsequent research are the foundations of the Canadian avalanche industry, and have led to the formation of a national organization dedicated to avalanche safety.

The roots of the Canadian Avalanche Association (CAA) date back to the spring of 1979, when Peter Schaerer of the National Research Council of Canada (NRC) organized a meeting for the country's avalanche safety workers. Approximately 30 individuals attended, including national park wardens, provincial park rangers, highway avalanche technicians, ski patrollers and mountain guides. Together they discussed individual operations and the avalanche accidents of the past winter. The meeting was constructive. In the spring of 1980 another meeting took place. Shared issues faced by those involved in the avalanche industry such as explosive control, standards of training and the legal consequences of avalanche warnings were identified. The result of that meeting was recognition of the need to establish an organization to represent avalanche safety operators in Canada. At a workshop in the fall of that year, the original group met again and decided to form an association.[4] The CAA, a non-profit society, formed in 1981 to promote excellence in avalanche safety in industry and recreation.[5]

During the summer of 2003, the CAA, with valuable support from Parks Canada, commissioned Christine Everts to conduct an oral history project. The goal of the project was to document the origins and history of the Canadian avalanche industry as remembered by key avalanche pioneers. Four main themes were examined:

1. The role of industry-related avalanche accidents – as the impetus to improve avalanche protection in Canada.
2. The widespread development of recreational pursuits – the interdependence between avalanche safety capacity and development of the winter mountain recreation industry in Canada.
3. The evolution of avalanche public safety practices.
4. The development of avalanche forecasting and control systems.

Letters were sent to 15 individuals who were influential in the development of the avalanche industry. These individuals included: Tim Auger, Herb Bleuer, Geoff Freer, Hans Gmoser, Toni Klettl, Ron Perla, Willi Pfisterer, Gord Ritchie (Brad Geisler), Peter Schaerer, Fred Schleiss, Walter Schleiss, Jim Sime, Hugh Smythe, Mike Wiegele and Norm Wilson. The letters explained the project and invited participation. From those 15 letters, 11 responses were received. Participants representing various organizations such as the NRC, Parks Canada, Environment Canada, the heli-skiing and ski-hill business, the resource industry and the British Columbia Ministry of Highways were interviewed.

The oral history project spanned a 30-year period (1950s-1980s), with the majority of comments coming from memories of the 1960s and 1970s. The oral histories and the document research collected during the summer of 2003 are combined in the report that follows. In addition, a brief biographical summary of each participant is included. Their contributions and insight have been fundamental in establishing an understanding and appreciation of the individuals and events that shaped the Canadian avalanche industry.

Biographical Summary of Participants

Tim Auger
Place and Date of Birth: Toronto, Ontario. 1946.
Occupations: In 1969, Tim Auger started working as a seasonal warden in Yoho National Park. He spent six seasons in Yoho, and during this time he took a Level I Avalanche course at Whistler. After qualifying for his guide's license, he became a fulltime warden in 1975. A member of Parks Canada's original public safety team, Tim is a Public Safety Specialist for Banff National Park.
Additional Information: Tim is an avid climber who still enjoys turning his skis.

Herb Bleuer
Place and Date of Birth: Wengen, Switzerland. 1944.
Occupations: Herb Bleuer came to Canada in the late 1960s to work on avalanche control at the Granduc Mines. He spent five seasons at the mine and in between stints he also worked for Canadian Mountain Holidays (CMH). In 1975, Herb started Whistler Heli-Skiing, as well as what is now known as Tyax Lodge Heli-Skiing. Over the years he also instructed various avalanche courses. Herb is currently involved in cat-skiing. In the past

five years, he has helped Nicole Smith develop Monashee Powder Cat-skiing. They are in the process of developing their second area.
Additional Information: After guiding all over the world, Herb now stays closer to home to raise his family. Along with riding his horses, he occasionally guides in the summer for the odd Eco-Challenge.

Geoff Freer
Place and Date of Birth: Ocean Falls, British Columbia. 1950.
Occupations: After attending an avalanche course instructed by Peter Schaerer and Willi Pfisterer in 1970 at Marmot Basin near Jasper, Geoff Freer began his avalanche career in 1971. His first job in 1971-72 was working as a ski patroller at the Bridger Bowl Ski Area near Bozeman, Montana. Upon his return to Canada in 1972-73, he worked for two winters as Schaerer's assistant in Rogers Pass. In 1974, seven people were killed by an avalanche in the North Route Café accident near Terrace, B.C. Geoff, Schaerer and three others were appointed by the British Columbia Minister of Highways to an Avalanche Task Force. The Task Force's recommendations resulted in the formation of the Ministry of Transportations' Snow and Avalanche Program. This program grew into the largest avalanche safety program in Canada.[6] Geoff continued with the program until 1988 when he became more involved in the transportation business including the reconstruction of the Lions Gate Bridge in Vancouver, B.C. He is now the Director of the Fraser Gateway Program for the Province of British Columbia and Translink.
Additional Information: Geoff continues to enjoy skiing, the mountains and white water rafting. In 2003, his contributions to the avalanche industry were recognized when he was awarded the Queen Elizabeth Golden Jubilee medal for outstanding service to the public.

Hans Gmoser
Place and Date of Birth: Braunau, Austria. 1932.
Occupations: After coming to Canada in 1951, Hans Gmoser began to take ski tourers into Rogers Pass. Two years later, he worked for Lizzie Rummel at Assiniboine. In 1965, he founded his heli-ski business, Canadian Mountain Holidays, at an abandoned lumber camp in the Bugaboos. CMH is the world's original and largest helicopter skiing operator. There are currently 11 CMH heli-skiing lodges in B.C. spanning more than 20,000 square kilometres.[7]
Additional Information: Since retiring in 1991, Hans and his wife Margaret have enjoyed biking in Europe and Asia – a bit more forgiving on the back than deep powder parallel turns!

Toni Klettl
Place and Date of Birth: Neackirchen, Austria. 1927.
Occupations: In 1955, Toni Klettl became a warden in Jasper National Park. He spent 30 years with the warden service, retiring in 1985 as the Assistant Chief Warden in charge of Public Safety. His districts included Maligne Lake, Blue Creek, Cavell and the Jasper town site. He began working on avalanche control for Parks Canada when Marmot Basin opened in 1964. In addition to working on avalanche control at the ski area, he did control and forecasting along the Banff Jasper Highway.
Additional Information: Toni spent many years skiing at Marmot Basin with his family. His daughter, Loni was on the national ski team and both his sons were on the Alberta ski team. Toni is an avid wood carver who developed an affinity for the North. He came to Canada in 1951, and prior to starting with the warden service he worked for a season up in the Yukon.

Ron Perla
Place and Date of Birth: New York City, New York. 1935.
Occupations: Upon reflection, Ron Perla notes that his best job was delivering telegrams by bicycle for Western Union in Brooklyn, and his most dangerous job because of the rough clientele, was lifeguarding at Cooney Island! After working as an Electrical Engineer for the U.S. Marine Corps, Ron headed to Utah where he worked as a high school physics teacher during the week and a ski patroller at Alta on the weekends. He then began work as a Snow Ranger for the U.S. Forest Service and started doing avalanche research under the direction of Ed LaChapelle. In 1974, Ron moved to Canada when he was offered a job with Environment Canada in the Glaciology Division where he worked until his retirement in 1991.
Additional Information: In the early 1970s Ron wrote a revision of the *Avalanche Handbook*, which was published by the U.S. Department of Agriculture and Forest Service in 1976. Ron continues to enjoy wandering around the mountains whether he is rock climbing or cross-country skiing. He is now working on an Avalanche Dynamic Model to be used by consultants.

Willi Pfisterer
Place and Date of Birth: Salzburg, Austria. 1926.
Occupations: After coming to Canada in 1954, Willi Pfisterer opened a ski shop in Jasper and worked as a mountain guide in the summer. During the summer season, he would also assist local wardens with rescues and climbing schools. Following his three years as a snow observer in Rogers Pass, where he learned the science behind avalanche control, Willi became the Alpine Specialist for Parks Canada. He retired in 1987 after 20 years of service.
Additional Information: Along with instructing climbing schools, Willi worked with Peter Schaerer as an instructor on the first avalanche safety courses. His knowledge and humor is credited with making him "a very successful and appreciated teacher."[8] Due to Willi's public safety and mountaineering contributions, he has been awarded the 2003 Summit of Excellence Award, which was presented at this year's Banff Mountain Film Festival.

Gord Ritchie (providing memories of Brad Geisler)
Place and Date of Birth: Trois Rivieres, Quebec. 1954.
Occupation: Director of Investor Relations for Petro Canada.
Additional Information: In 1980, after finishing university, Gord Ritchie and his wife Debbie moved to Calgary, Alberta. Together they joined the Canadian Ski Patrol System at Lake Louise. One of the early avalanche orientation rescue courses they attended was taught by Brad Geisler. Gord remembers, "It was a good day and it got me interested in the whole subject." After taking a number of avalanche courses, Gord was asked to teach introductory avalanche safety courses for new patrollers. He subsequently became the National Avalanche Coordinator for the ski patrol system, and focused on promoting avalanche education and public safety. With Peter Spear, Gord established an avalanche safety awareness program for high school students in Calgary which became the forerunner of the Snow Smart program. In 2001, he was the recipient of the CAA's Glacier Summit Award for Public Education. Gord and Debbie continue to enjoy backcountry hiking and skiing in the mountains.

Brad Geisler 1925-2002
Born in New York City, Brad Geisler was a member of the U. S. Army's 10th Mountain Division. With his wife Nancy, he moved to Calgary in 1955 to work in the oil industry. Brad soon joined the Canadian Ski Patrol System and spent his patrolling years at the Lake Louise Ski area where he influenced many people in the avalanche community.[9] Former student Gord Ritchie describes Brad as "a very good teacher because he was passionate in what he knew of and loved about the mountains."

Peter Schaerer
Place and Date of Birth: Bern, Switzerland. 1926.
Occupations: After graduating as a Civil Engineer, Peter Schaerer began his career as a demonstrator and research assistant with Swiss Professor Max Stahel, working on road, railway and tunnel engineering. In 1956, Peter went to Korea after the war as a member of the Swiss delegation with the Neutral Nations Supervisory Commission. After hearing from his brother about opportunities in Canada, he successfully applied and was hired by the National Research Council (1957-1961) to develop avalanche control for the Trans- Canada Highway at Rogers Pass. Prior to coming to Rogers Pass, he spent two months at the Federal Institute for Snow and Avalanche Research in Davos, Switzerland. In 1961, Peter returned to Switzerland for three years to work with the Department of Public Works for the Canton of Solothurn. In 1964, he resumed his work with the National Research Council where he stayed until his retirement in 1991. Following his retirement, Peter continued with his consulting work and involvement in the organization he pioneered, the CAA.
Additional Information: In addition to playing a key role in the formation of the CAA, Peter is credited with developing avalanche safety courses for members of the various industries affected by avalanches. In addition, he is the author of numerous technical reports and co-author of avalanche works such as *The Avalanche Safety Handbook*. In February 2000, Peter Schaerer received the Order of Canada for his lifelong contributions to avalanche safety.

Jim Sime
Place and Year of Birth: Golden, B.C. 1924.
Occupations: Jim Sime started with the Warden Service in 1946. After working briefly in Glacier National Park, he moved to Kootenay National Park. In 1947 Jim moved to Yoho National Park where in 1954 he became the Chief Park Warden. Following his supervision of the clearing of the right-of-way for the Trans-Canada highway, Jim was appointed the Assistant Chief Warden in Banff National Park. After working in Riding Mountain,

and then in Ottawa at Park headquarters, Jim retired in 1979 from the position of Warden Operations Manager for the Western Region.[10]

Additional Information: As a young boy, Jim spent time with the original Swiss Guides in Golden, B.C., as well as with the early wardens in Glacier National Park. In 1955, Jim was one of the three wardens sent to the Advanced Snow and Avalanche Training School in Alta, Utah. The following year he worked with friend and alpine specialist, Walter Perren, on the possibility of developing a ski hill at Lake Louise. Jim also played an integral role in establishing Park Canada's search and rescue dog program for avalanche work.[11] Since retiring, Jim has become an active member of the Golden Museum.

Norm Wilson

Place and Date of Birth: San Mateo, California. 1929.

Occupations: Norm Wilson became involved in the avalanche industry in 1952 when he began working at the Sugar Bowl ski hill in northern California. After spending a year at the University of Innsbruck in Austria, Norm was hired in 1958 as a member of the ski/avalanche patrol team at Squaw Valley in preparation for the 1960 Winter Olympics. Following the Olympics, Norm worked as a snow ranger at Squaw Valley until 1965. That summer he was hired as the avalanche controller for the Granduc Mine northwest of Stewart, B.C. In 1966, Norm returned to the United States. He accepted the job as the mountain manager of the Alpine Meadows ski hill and began moonlight consulting for various entities. In 1971, he became a fulltime avalanche consultant and advised many operators in the Canadian avalanche industry, including B.C. Highways, ski areas, such as Whistler, and heli-skiing organizations like CMH.

Additional Information: Norm continues to work as a consultant for the avalanche industry. He also helped Monty Atwater develop the Avalauncher by providing feedback and occasionally doing some demonstration firing for prospective clients. In addition to his consulting work, Norm still finds time to ski in the backcountry

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Christine Everts, author of CAA's Oral History Project, was born in Banff and grew up in hte mountains. She graduated from Simon Fraser University with a Bachelor oa Arts in History and Anthropology nad recently completed a Bachelor of Education at the University of Ottawa. In the fall she will begin teaching a Grade 2/3 class at the Chief Jacob Bearspaw Memorial School in Eden Valley, AB. She valued the opportunity to learn from friends, mentors and co-workers about an industry loved by her Dad, Keith Everts (1942-1999), former National Research Council of Canada employee and Banff park warden.

A Pioneer in Profile: Willi Pfisterer

Adapted from The hightest calling: Canada's Elite National Park Mountain Rescue Program,

BY R.W. SANDFORD

The name Willi Pfisterer is synonymous with modern mountain rescue in Canada. His contribution to the establishment of the Association of Canadian Mountain Guides, The Canadian Avalanche Association and the rescue dog program in Canada is legendary. Pfisterer received the 2003 Summit of Excellence Award at the closing night of the Banff Film Festival on November 9th. The Summit of Excellence Award is sponsored by One Step Beyond World Wide in memory of Calgary climber Bill March, an internationally respected mountaineer, author and educator.

Pfisterer grew up in a family of climbers and mountain guides. Born near Salzburg, Austria, during the Depression, he climbed his first 3000 metre peak at age 11. A champion nordic skier, he was ranked fourth in Austria when he decided to take a job teaching skiing in the Laurentian Mountains of Canada in 1955. In the spring of 1956, he drove west to see the Rockies. After opening a ski shop in Jasper, Pfisterer began guiding in the area during the summers, focusing principally on mounts Edith Cavell and Robson. In 1959, Hans Gmoser invited him on the successful first Canadian ascent of the East Ridge of Mount Logan, Canada's highest mountain. Afterwards, Pfisterer celebrated the achievement with sixty ascents of mountains in the Jasper area.

Pfisterer eventually got a job with the avalanche research and control in Glacier National Park and began to learn everything he could about snow. It was while at Rogers Pass that he began working with Walter Perren, providing training at warden rescue schools for the region. Perren was particularly impressed with Pfisterer's skills in avalanche condition assessment and his ability to use explosives to trigger slides in controlled situations.

A warden service position was subsequently created for Pfisterer in Jasper, with an emphasis on snow and avalanche research and training. He quickly advanced warden service understanding of snow dynamics and avalanche rescue. Ski areas were also interested in avalanche forecasting and control, and so were provincial highways administrations. It was out of this expanded mutual interest that the Canadian Avalanche Association was ultimately born.

By placing growing responsibility on those he trained, Willi freed himself to focus more strategically on the further development of warden service rescue capability. He was able to take warden training schools on increasingly bigger trips and in 1973 took a park warden expedition to Mount Logan to attempt the West Ridge. Despite horrendous conditions, the party was able to reach 17, 000 feet.

Members of Willi's expeditions remembered and talked about them for the rest of their lives. And none of them will ever forget Willi Pfisterer. His love of mountains, his teaching skills, and his humour and pride in his colleagues make him a legend in mountain rescue circles all over Canada and throughout the world.

Willi Pfisterer is a man of action who during his career climbed approximately 1600 mountains and was involved in some 700 rescues. When Peter Fuhrmann sold the idea of using helicopters in the park service mountain rescue program to national park managers and superintendents, it was Willi who tested and perfected its applications.

Willi Pfisterer saw a great advantage in the Canadian system of mountain rescue as practiced in the national parks. He examined European equipment and techniques and found ways to modify them for Canadian conditions. Through his insight and vision, park wardens gradually became better equipped and trained. Rescue times compressed from days to hours. Hundreds of people owe their lives to Willi Pfisterer and the men and women he trained.

New Board Member Profile

Four Members were elected to the Board of Directors the AGM in Penticton, May 5-9, 2003: Alan Jones (Director at Large), Alison Dakin (Director at Large), John Birrell (Director for Associate Members) and Lori Zacaruk (Director for Affiliate Members). To introduce these member representatives, we are featuring a profile of each in four issues of *Avalanche News*.

Name: Alison Dakin
Age: 39
Residence: Golden, BC
Employer: Golden Alpine Holidays
Years involved in avalanche safety: 18
Preferred method of snow travel: Skis
No. of days on snow per year: 50+

What motivates you to serve as a Director?
My main reason is to contribute to the CAA from my background as a ski-touring guide and lodge operator. The CAA has largely shaped and defined how my company, Golden Alpine Holidays (GAH), is run with regards to avalanche safety and training. I wish to contribute my time to the CAA and its members, in recognition of the valuable information and training that I have benefitted from over the years.

What do you think is the biggest challenge facing backcountry users today?
Access and potential limits to access due to insurance and liability issues.

What do you think is the biggest challenge facing avalanche professionals today?
A potential downturn in the market due to a number of different issues last winter (economy, snowpack, accidents, Canadian dollar), not to mention the ongoing issues of insurance and liability.

If you could change one thing to make our membership stronger, what would it be?
We need consistent and reliable funding, both federally and provincially.

What is the biggest lesson you have learned about avalanches in the last year?
Clients want to be safe. One must clearly look at a client's level of acceptable risk, and honour that. They are usually more conservative than their guide.

In Memory of Kel Fenwick

Kel Fenwick, the CAA's first InfoEx writer, passed away this past November 21, 2003, in Whistler, B.C. at the age of 49. Kel got his start in the snow business 30 years ago, barely out of his teens, working as a lift operator then a ski patroller for Whistler Mountain. By the age of 30, he was forecasting for the resort, one of the largest ski area avalanche control programs in North America. A self-taught computer enthusiast, Kel recognized the usefulness of remote weather station information and the role computers would play in the future of avalanche forecasting and pushed for the installation of remote weather stations on Whistler Mountain. Kel is also credited with revising the Whistler Mountain snow safety plan, originally written by Norm Wilson, Monty Atwater and Chris Stethem, when the Peak chairlift was installed. He left patrol in the early 90s but remained a keen and frequent skier in Whistler. Kel is survived by his wife Anne and his two children, Sarah and Kimberly

Kelvin Stewart Fenwick

Getting Through the First Anniversary

BY BETH STEWARD, Founder of Parents of Lost Skiers (POLS)

It creeps up on you before you realize it, that painful first anniversary of the death of your child. Sometimes it seems like only yesterday that you lost them – and other times it seems like forever. Here are some thoughts from those of us who have been there. We hope this will help you.

Above all, plan out exactly what you are going to do on that anniversary day. An unplanned anniversary will bring you unanticipated pain. When you have specific plans, you will make it through the day much more successfully. Plan whom you will spend it with and what you will do to mark the day. Some people erect a monument, others create a race day in perpetual memory, still others journal their feelings while others plant a tree or light a candle. Doing what you feel *you* want to do is key. Don't give into the "*I should….*" For some, getting together with the entire family is helpful; for others, it doesn't work at all. Remember to tell your loved ones what you need, including lots of hugs.

Getting together with friends of your son or daughter can really help. They so closely walked the day-by-day journey as well. Creating a collage can be comforting; writing a poem can help. Perhaps there is somewhere you and your loved one frequented that has particular significance: For me, I always drop by the same pub, wearing one of his cozy shirts and raising a Heineken in his memory.

Get lots of rest ahead of time. Be gentle with yourself. Cry when you need to because grief suppressed is illness manifested. Share your feelings of apprehension and loss with others. Talk as much as you need to because talking about it helps to soften the painful edges. Remember that no one can take away the unique experiences you and your special one had. Clutch them tightly to your heart, for they will be with you always.

POLS
PARENTS OF LOST SKIERS

POLS (Parents of Lost Skiers) is a non-profit organization dedicated to helping and supporting those family members who have lost their child to the mountains while skiing, snowboarding, climbing or snowmobiling. For more information, visit www.polsonline.ca, e-mail pols@shaw.ca, mail Box 50035, #15-1594 Fairfield Rd., Victoria, BC V8S 5L8, or call Beth Stewart at (250) 595-6523.

Shawn's Game

BY SCOT RICHES, Brother of avalanche victim Shawn Riches

On June 21, 2003, the family and friends of Shawn Riches gathered for a day of golf. This is the third annual golf tournament that we've held as a way for us to get together and remember Shawn. This year, more than 100 people participated by golfing, pretending to golf, or dropping by to enjoy a drink on the clubhouse patio. Through everyone's participation in the tournament, we've been able to raise money to pass along to the Canadian Avalanche Centre as well as the non-profit group Sleeping Children Around the World.

Shawn died on February 14, 1999 when caught in an avalanche while skiing with friends on Mount Baker in Washington State. The conditions were amazing that day, with a record snowfall and bright sunshine. Shawn was an accomplished and responsible skier but was one of two young men killed on the mountain that day.

We remember Shawn as a determined, skilled, and talented young man. He had moved from Toronto to Vancouver to start his career in accounting at KPMG and was on the verge of great things. He leaves behind hundreds of close friends and relatives that miss him very much.

This February, it will be five years since Shawn died. Our hope is that by contributing to the CAC we can help to prevent such avalanche-related tragedies.

To the family & friends of Shawn Riches: *On behalf of the Canadian Avalanche Association, thank you for your donation in memory of Shawn Riches. Contributions like yours go a long way in helping us provide services that will help keep the backcountry safe and enjoyable for all.*

US Film Company Works Avy Info into DVD's

BY BRUCE EDGERLY

For more than a decade now the Extreme/Freeride scene has been the main focus of ski and snowboard filmmakers and magazines. This exposure has created a new backcountry user group that is perhaps different culturally than the traditional users of the past. Teton Gravity Research (TGR), having been one of the most popular and influential film companies popularizing this movement recognizes it's responsibility in not only promoting the sport, but also safe and responsible backcountry use. Thanks to the support of snow safety gear manufacturer Backcountry Access, TGR has developed an introductory backcountry skills video that is aimed specifically at this new user group.

Making use of current and former professional ski and snowboard athletes, TGR hopes to speak to the young freeride crowd in a language they can relate to, and with personalities that have credibility in their culture. The main athletes in the video are Jeremy Nobis (skier) and Victoria Jealouse (snowboarder), with TGR lead guide Jim Conway hosting.

Jeremy Jones (star snowboarder) learns how to do a shovel shear test

About 15 minutes into it, the video covers required equipment, basic avalanche beacon skills, route finding, and snow pits. TGR recognizes that no one can travel safely in the backcountry simply by watching a video, so viewers are encouraged to take an avalanche course and to begin the life long learning process of becoming a responsible backcountry user. This is a non-profit enterprise by TGR and the first of a series of educational projects that will become progressively more detailed.

Also, TGR is running an interactive online educational project, the "Online Avalanche Class". This project is under development and is being produced by Jim Conway. The first three lessons are available at www.tetongravity.com under Conway's Corner. With the support of the ski industry, TGR hopes to expand this to 25 lessons ranging from basic to advanced subjects.

The backcountry video will be an added feature on all DVD sales of TGR's newest film "High Life". Interested educators may also obtain a copy by contacting Dirk Collins at TGR ((307) 734-8192 or dirk@tetongravity.com). To offer feedback on content or other technical issues, contact Jim Conway ((801)-278-5534 or sarge@aros.net).

Public Feedback

E-mail written by Garry Ford, Senior Environmental Specialist,
AMEC Earth & Environment, received by the CAA on Nov. 12, 2003.

Congratulations to Clair Israelson and Staff of CAA

Congratulations on the opening of your new offices in Revelstoke. The services you and your staff provide are essential to backcountry safety and the powder skiing industry. May we never see another incident like last February's tragic backcountry accident in the Rogers Pass area. I was snow cat-skiing near Revelstoke that day when the news of the accident arrived. I will never forget how I felt at that moment and how the news impacted my family and close friends. Organizations like yours help enthusiasts like me, and others, to understand the dangers and how to evaluate the risks so that we can safety use the backcountry to its fullness within its natural and sometimes limited access. Without the CAA's help, many of tomorrows regulations may set draconian limits on our ability to access these areas, and that would also be a dark day.

E-mail written by Jacqueline Louie
recieved by the CAA on Dec. 8, 2003

Avalanche Awareness Seminar

Hello,

I attended Sunday's avalanche awareness seminar in Calgary and I wanted to let you know I thought it was excellent. Almost all of the speakers were outstanding and I feel the information presented was extremely valuable. (And what a treat to have Werner Munter among the speakers!!)

I feel this kind of presentation would be of benefit to anyone who goes out into the backcountry and hope that if the CAA holds another seminar in the future, that it could be advertised more - so that more backcountry users could benefit from attending. Thank you. I really appreciated the opportunity to attend.

Donors Fund Youth-Focused Avalanche Awareness Initiative

Thanks to the family and friends of David Finnerty for their recent donation to the CAA in his memory. At their request, their donation has been directed toward the printing of stickers that will help target youth with the message of avalanche safety.

As Marty Benson explained in a recent e-mail to the CAA:

> "My best friend was killed on January 20, 2003 in an avalanche in Revelstoke. His name was David Finnerty and he died in the tragic backcountry accident that claimed the lives of seven people. This was a great loss for the family, friends and community that knew Dave and loved him.
>
> I decided that I wanted to have some type of memorial for Dave, in his hometown, New Westminster, BC. My wife and I decided on purchasing a memorial bench in a neighbourhood park directly behind the house that Dave grew up in. In order to pay for the cost of the bench, I organized a fundraiser at a local bar in New Westminster. My band provided live music and approximately 175 people attended. The fundraiser was very successful and we raised enough money to pay for the bench. We would like to donate the additional money to the Canadian Avalanche Association in Dave's name."

The funds donated will help the CAA print approximately 2500 stickers to be distributed to young ski racers through the BC and Alberta Alpine Ski Associations and to youth during Avalanche Awareness Days, January 9-11, 2004. Thanks to those who helped us reach out to these groups.

A Public Point of View:
CAA's Backcountry Avalanche Workshop 2003

BY TIM BESTER, posted on Biglines.com on December 12, 2003

Editor's Note: *The CAA hosted two Backcountry Avalanche Workshops in Vancouver and Calgary on the weekend of December 6th-7th. Since we regularly host programs for backcountry beginners (Columbia Brewery Avalanche Awareness Days, January 9-11) and for snow pros (CAATS courses), these workshops targeted those people in the middle – the bulk of backcountry recreationalists, those who lead their own trips. In eight hours, eight of the world's top avalanche experts explored the nature of the risks faced in the backcountry and presented the latest strategies and techniques for decision making and managing their risks. The following article is written by the kind of person we targeted, an experienced recreational backcountry skier, who came out to the event in Calgary.*

Last Sunday, friends of mine were out in Kananaskis enjoying some of the best early season backcountry conditions we've seen around these parts in recent years. Meanwhile, I stayed in town and paid $30 to sit in a lecture theatre from 9 to 5 and watch Power Point presentations. That's right, I had opted to attend the CAA's 2003 Backcountry Avalanche Workshop - Calgary Edition. Thanks to the commendable efforts of the organizers and presenters I came away feeling I made the right decision.

The venue was the Boyce Theatre at Stampede Park, an excellent choice due to its central location, C-Train access, ample parking and proximity to a wicked lunch buffet at the Big 4 Building. My guess is that attendance was pushing 300…not bad.

Here's a demographic analysis of the audience (these facts and figures were compiled using Tim Bester Crowd Scan Methodology - so don't use them in your thesis).

The vast majority of the audience were the usual suspects, you know, the fleece and waterproof breathable mountain types. I also noticed a highly visible contingent from the snowmobiling community and if you've ever seen a sledneck jacket you know what I mean by "highly visible". Among the mountain types it's hard to estimate the breakdown of steelmakers, Alters, boarders, climbers and so on, because, for example, the modern steelmaker does a good job of looking like a normal person.

I spotted a couple ski guides I knew in the stands and there were various other professionals in attendance as well. At lunch I was fortunate enough to chat with a retired engineer who had taught at the University of Calgary and had been involved in establishing the snow science branch of that institution's faculty of Civil Engineering. A fringe benefit of these types of events is that you often bump into interesting cats like that.

Left: Notepads were seen everywhere to record the rare presentation from swiss snow guru Werner Munter explain his Reduction Method in person. Right: Werner holds it together after the seventh person in a row asked, "Will this work in Canada?" Actually, he was describing how decision-making is governed by both hemispheres of the brain – the logical left side and the emotional right side – his method takes both into account. Photo courtesy of Bob Manson.

Looking at age groups I had the impression that, unfortunately, the 20-somethings were under-represented. With respect to sex, the female population was very well represented, proportionally speaking… (oops, that didn't come out quite right).

Evan Manners, Operations Manager of the CAA, was our MC. In his intro he pointed out that the raison d'être for the workshop was to glean some lessons from last winter's abnormally high number of avalanche accidents and fatalities in Canada and move towards making sure a winter like that never happens again. He indicated that the domestic and international media coverage of the Rogers Pass and SME accidents, in particular, created a "crisis of confidence" (at home and abroad) in Canadian mountain recreation and there were even calls to "close the backcountry" in the interest of public safety.

Left: Doug Chabot, Director of the Gallatin National Forest Avalanche Center in Montana, discussed ways snowmobilers can identify avalanche terrain. Right: Dr. Dave McClung Dr. Dave McClung, NSERC Chair in Snow and Avalanche Science, explained the latest thinking on snow slab instability (e.g. fracture toughness) and what it means to the backcountry skier, boarder or sledder. Both photos courtesy of Bob Manson, Justice Institute of BC.

Doug Chabot, Director of the Gallatin National Forest Avalanche Center in Montana, was the first speaker. Doug's talk was intended for the snowmobilers (sledding is huge in the States) but the concepts he discussed were certainly applicable to any form of recreation in avalanche terrain. He had some very cool video footage, including a clip of a guy high-marking a gully, who on the descent triggered a spectacular slide that no amount of horsepower was going to outrun (the individual was subsequently extricated and lived to tell the tale). Doug also got the prize for best comedic moment of the day: If your buddy forgets his shovel just say, "No problem man," and give him yours.

François Sivardière, head of France's National Association for Snow & Avalanche Research (ANENA), spoke about French decision-making tools for recreationalists. Photo courtesy of Bob Manson.

Next up was **Werner Munter**, mountain guide/scientist from the Swiss Federal Institute for Snow & Avalanche Research. I would say that he was the big draw for many in attendance as his "Risk Reduction Method" for skiing in avalanche terrain has received a lot of press lately.

A side note, Munter is also the inventor of the Munter hitch, a simple knot that eliminates the need for a belay device when climbing. This fact is telling, because Werner Munter is a low-tech kind of guy and his avalanche risk reduction system is simple and easy to use. The user makes a few basic field observations and then does a quick calculation to get a 'go' or 'no go' result. The method is being widely used in Switzerland with much success. I can't remember the exact figures but he presented a graph of avalanche fatalities in Switzerland and in the years after the method was implemented the line goes WAY down. I'm not going to go into the details, but if you want to learn more about the man and his work search the net on "Munter" and "Risk Reduction Method", you'll get plenty of hits. The question is: Will such a system work in Canada? (Mr. Munter did present his proposal for a Canadian variation).

François Sivardière from the French National Association for Snow & Avalanche Research (ANENA) kept the Euro thing going with his presentation on


Left: UBC Snow Science Researcher Harpa Grímsdóttir dicusses her findings from data she collected from Canadian Mountain Holidays about patterns in the snowpack. She spoke at the Vancouver workshop, while Cam Campbell (middle), Snow Science Researcher at U of C, spoke at the workshop in Calgary about his field work on variability in the snowpack. Right: Lars Andrews, IFMGA Mountain Guide, discusses terrain choices for ski touring in Vancouver. Photos courtesy of Bob Manson and Cam Campbell.

NivoTest ('nivo' = 'snow' in Latin). It's a pocketsize card his organization has developed to help tourers make route-finding decisions in avalanche terrain. The card has 25 easily answered and scored questions about terrain, weather, snowpack and experience. The score is tabulated on a revolving disc and a description of the risk level for various scores is provided. The questions on the card are very much like the types of things an experienced backcountry traveler thinks about all the time. For more information take a look at meteorisk.com (need to speak French for this one).

Cam Campbell, a grad student from the U of C, did a presentation on a topic that weighs heavily on the mind of every winter backcountry traveler: Spatial Variability. Did you know that if you perform a grid of 200 evenly spaced Rutschblocks on a seemingly uniform slope you wouldn't always get the same result? But, all kidding aside, he reinforced a point brought up by many of the presenters – snow pits are overrated. Werner Munter stated that the snowpack is a chaotic patchwork and that basing your decisions on strictly scientific methods is a mistake. Cam's presentation was a bit technical for most of the audience, myself included, but like good Canadians we applauded politely (I think many of us just felt sorry for a guy who had dug that many Rutschblocks when he could have been skiing!).

Dr. Bruce Jamieson spoke in Calgary. Photo courtesy of Bob Manson.

Dr. Bruce Jamieson from the University of Calgary Avalanche Research Program and former Fernie ski bum (I don't think he had the title 'Dr.' when he was a ski bum) spoke on his vision for a decision support scheme for recreation in avalanche terrain. I got the impression that he would like to see some of the European concepts implemented in Canada. He presented an excellent example of how photographic and colour-coded map data for recreational terrain can make safer route choices much more obvious. That struck a chord with me; I like maps.

Chris Stethem gave an entertaining talk on how human factors enter into decision making for travel in avalanche terrain. You always have to remember that despite any amount of analysis and logic there's just no telling what those wacky humans will do! Among other things, Chris is the president of the Canadian Avalanche Foundation, a registered charity raising funds in support of the CAA.

Local mountain guide, **Grant Statham**, did a good job of keeping up the interest level right to the end. Officially his topic was how professionals translate avalanche bulletin information into appropriate terrain choices. He talked about many practical matters but I also found some of his anecdotal comments quite enlightening. He spoke of how even the pros have their moments of doubt and fear and sometimes you've got to trust your gut feelings in the mountains.

Above: Chris Stethem, President of the Canadian Avalanche Foundation, discussed human factors of decision making. Right: Grant Statham, IFMGA Guide, gave a slide show discussion on terrain choices. Photo courtesy of Bob Manson.

What I have described here is a general overview of the material presented at the workshop. There was a huge amount of information, from reinforcement of the basics to new ways of looking at the decision-making process while enjoying the mountains in winter.

At the close of the workshop the representatives from the CAA invited comments or suggestions about the event and hinted that future workshops are in the cards. I would highly recommend taking one in if you ever get the chance.

Avalanche Funding

BY CATHY ELLIS – Rocky Mountain Outlook

The Alberta government is under an avalanche of pressure to pony up big bucks to prevent another year of deadly slides in the mountains.

The B.C government, which is contributing $125,000 a year for the next three years to expand a public avalanche bulletin, has written to Alberta counterparts requesting that that amount be matched.

It is a first step towards the creation of a national avalanche centre, aimed at coordinating avalanche safety programs, warnings and education by public and private agencies.

B.C.'s funding commitment comes on the heels of one of the deadliest avalanche seasons on record. Twenty-nine people died in slides in Canada last winter, including 24 in B.C. alone.

Nearly one-half of those fatalities involved Albertans, including seven students from Calgary's Strathmore-Tweedsmuir high school on Feb. 1.

Alberta also experienced death in the mountains, including the death of an American snowshoer near Lake Louise and a Sylvan Lake man snowmobiling in the Ram Mountain region in March.

Officials with the Canadian Avalanche Association (CAA) say the federal government is indicating strong support for paying its fair share, but there has yet to be a commitment from Alberta.

Executive director Clair Israelson said the CAA, which is also contributing $125,000, wants the Alberta government to recognize a public sector role in avalanche accident prevention.

"We know that 23 per cent of people who died in avalanches in B.C. in the last five years are from Alberta," said Israelson.

"We think it's reasonable that Alberta want to have a partnership and help with programs that save lives of Albertans," he added. "With winter here, and every day that goes by without that support, the time crunch becomes more intense."

The B.C. government's avalanche safety review, released this summer, found the demand for public avalanche safety services would increase an average of 20 per cent over the next five years.

The study, prepared by Bhudak Consultants Inc, found that research in Europe shows that public avalanche safety awareness can significantly reduce the loss of lives.

The multi-agency review also recommended the B.C. government approach Alberta and Ottawa to share the costs of avalanche awareness and risk.

Alison Gates-Kriston, a spokeswoman for Alberta Municipal Affairs, said Emergency Management Alberta is reviewing the B.C. government's request with other Alberta ministries.

"We are reviewing the situation and will try to sit down with the B.C. government in the near future," said Kriston.

The funding to date, however, still falls far short of the key proposal of the B.C. review, which recommends a safety program on par with other international winter tourism destinations.

To do that, the study recommends the creation of a national avalanche centre, a central organization managed by the CAA for coordinating public avalanche safety programs.

It would also provide an avalanche warning system, provide avalanche training to amateur backcountry enthusiasts and deliver avalanche awareness and education to the public. The cost of such a program is pegged at $1.25 million a year.

Over the past decade, an average of 15 people have been killed in avalanches in Canada each year, while another 75 people have been injured.

Garry Gonis last week to raise funds for the CAA secured $2,500, after expenses were paid. "It's a lot more than (Banff-Cochrane MLA) Janis Tarchuk and her government has raised," said Gonis.

The B.C. review found that last winter's mass avalanche fatalities created a crisis of public confidence, causing immediate and widespread economic impacts.

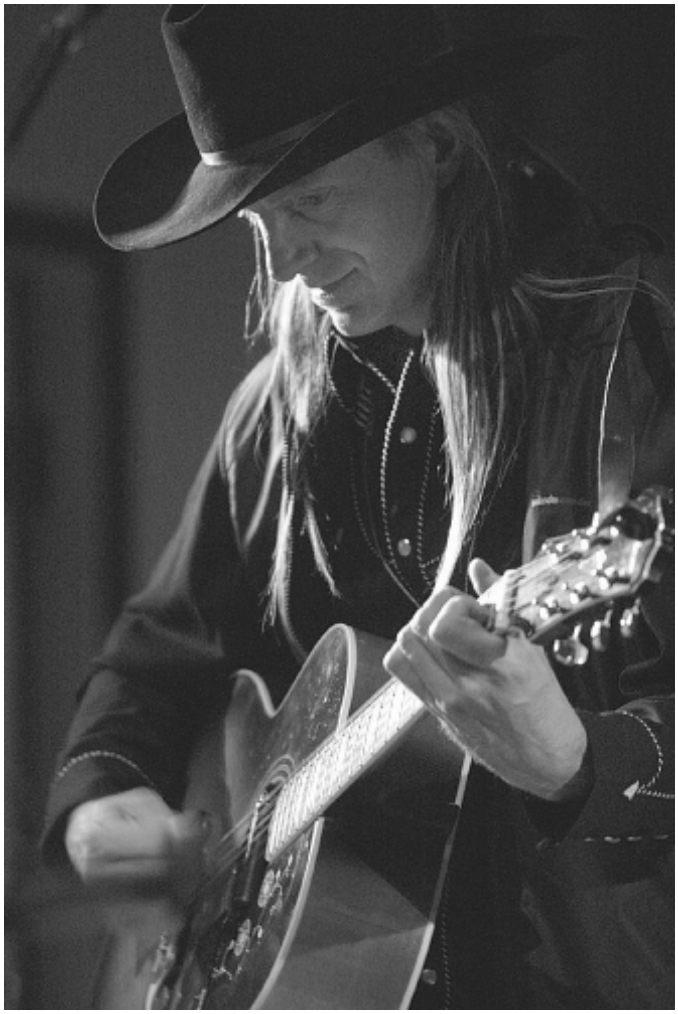
It is estimated it resulted in $1 million worth of cancellations in the heli-skiing industry alone and an estimated $10 million loss to transportation, accommodation and service sectors.

In B.C., commercial and non-guided backcountry skiing, snowboading, heli-skiing, snowmobiling, cat-skiing and snowshoeing generates more than $1 billion of economic activity.

Winter mountain tourism is the fastest growing sector of the tourism industry and is a close second only to forestry as an economic driver, the study concluded.

Meanwhile, a benefit concert organized by Banff diehard skier Garry Gonis last week to raise funds for the CAA secured $2,500, after expenses were paid.

"It's a lot more than (Banff-Cochrane MLA) Janis Tarchuk and her government has raised," said Gonis.



Dave Stobbe / Rocky Mountain Outlook

Garry Gonis (above) merged his passion for music and the mountains at the Harmony Fundraising Concert in Banff this past October 29th. CAF Director Peter Fuhrman spoke to the crowd about the need for public safety services, then Garry, his friends, and local supporters raised more than $2500 for exactly that - thanks to all who helped out!

Don't take chances with an avalanche

Learn about the risks but never gamble your life for the thrill of skiing outside the ropes

BY MARK MALLET, Originally printed in the Vancouver Sun

Monday, December 01, 2003

Picture this: Three young back-country skiers stand atop a snowy mountain ridge, 500 metres of trackless powder below them. A gentle breeze cools the hard-earned sweat on their backs. The snow sparkles in the sun.

"What do you guys think?" asks one.

"Looks pretty good."

"Yeah. The snow felt pretty solid on the way up."

They sit on their packs and eat a bite of lunch, considering the slope. Before long, two more skiers come over the ridge. They take one look at the pristine snow below them, whip their climbing skins off their skis, and drop in. They carve perfect, arcing turns through the powder, and two minutes later disappear into the thick canopy of trees at the bottom. The three skiers at the top look at each other, smile, and go for it.

Chances are they'll have the run of their lives and tell their friends about the "epic pow" they found. The next time they go touring, they'll remember that when things look good, they probably are good.

The only problem: they'll be wrong.

This past weekend — for many of us the first big ski-and-snowboard weekend of the season — the Canadian Avalanche Association issued a special avalanche warning. Conditions were ideal for avalanches, with heavy snowfall, strong winds and rising temperatures in the forecast areas.

On the heels of Canada's deadliest winter in almost 40 years, back-country skiers and boarders across B.C. will be preparing for the snow while asking the same question: Do I have enough experience and knowledge to keep myself safe in the mountains, or should I consider hiring a guide? It's a tough choice, and the stakes may be your life.

"This past weekend — for many of us the first big ski-and-snowboard weekend of the season — the Canadian Avalanche Association issued a special avalanche warning."

Each winter, thousands of British Columbians head into avalanche territory. Some know exactly what they're doing, some have only a vague idea, and some know next to nothing. As Evan Manners, operations manager of the Canadian Avalanche Association, puts it: "There is a level of knowledge that you know so little, you don't know that you don't know." Often, he says, those are the people caught in slides.

I should know. I was one of them. Fifteen years ago I ducked under a boundary sign at Whistler and made a bee-line for the nearby powder fields. I wasn't alone; a dozen others had packed down a trail in front of me. An hour later, as I prepared for my first turns in the untouched snow, a nearby avalanche buried three people. I rushed over to the site to help find them, but I had absolutely no idea what to do. It was only luck that saved two of them; the third didn't survive.

"One sunny spring afternoon I watched two people duck under the boundary rope, ski straight into the middle of a huge avalanche path, and sit down for lunch."

The story, says Manners, was a "classic" avalanche scenario: "Somebody's skiing at a resort, they decide to take a few runs outside the area, and they have powder on their mind. All of a sudden an avalanche happens, and it wasn't even on their radar."

So how much should you know before you head into the winter back-country without a guide? The bare minimum, according to Manners, is the ability to "recognize potential avalanche terrain so you can avoid it. We wouldn't recommend going into the back-country unless you can at least do that."

Sounds easy, but is it? A few years ago I was working as a ski patroller in the Kootenays. One sunny spring afternoon I watched two people duck under the boundary rope, ski straight into the middle of a huge avalanche path, and sit down for lunch.

Realizing that I probably would have done the same thing a decade before, I skied out and warned them as politely as I could about the danger. They quickly moved to safer ground. An hour later, an avalanche swept over their picnic site.

Recognizing avalanche terrain is not an innate ability. To help

people learn skills, the CAA has developed a curriculum for recreational avalanche courses, taught by independent providers across the province.

However, back-country skiing pioneer and guide-book author, Chic Scott warns these courses are no guarantee of safety. "These people who take a two-day course, they don't know nothin'," he says, only half-joking. When on the mountains, he says, it's far more important to have "a healthy respect and a certain amount of fear," than a certificate.

> ***"There is a level of knowledge that you know so little, you don't know that you don't know."***
>
> ***- Evan Manners***

Scott even admits that after 40 years of ski touring, he still has a hard time telling whether some slopes are stable or not. "I can tell if it's completely stable, or I can say it's completely unstable, but that middle ground, boy, that's tough. That middle ground has fooled experts all over the world."

Manners agrees. "Everyone thinks the greatest problem in avalanche safety is when conditions are 'extreme' [the highest level on the avalanche danger scale], but few people die in an avalanche when conditions are extreme, because it doesn't take very much knowledge to determine danger when you have a multitude of natural indicators."

Instead, he says, the time to worry is when the danger is "in the middle of the scale, in the 'considerable' range." That's when judgment comes into play, mistakes are made, and people are caught.

So what hope does the average weekend warrior have when even the experts can't always be sure which slope will slide and which won't? The key, says Manners, is to know the limits of your knowledge, and to ski or board accordingly. "You need to make realistic goals, being fully aware of what your level of knowledge as a group is. You can be safe with a small amount of training if you have realistic expectations."

If you know nothing about avalanches, stay in bounds; if you can recognize avalanche terrain but know nothing about snow stability, stick to places where avalanches can't touch you; and if you know about terrain and snow stability, ask yourself how much you know. Then evaluate each slope according to its characteristics, and don't be cocky.

You've taken an avalanche course. You know enough to avoid the obvious hazards, and you're playing it safe. The only problem is you're bored. How can you increase your knowledge and experience without killing yourself?

Chris Gora, a Vancouver lawyer and recreational back-country skier, recommends hiring a guide occasionally, especially if you're skiing somewhere for the first time.

"Having a guide gives me a greater sense of security." That security allows him to ski terrain he wouldn't touch if he were on his own, when he tends to play it safer. "Being with a guide gives me an opportunity to search for better snow if the conditions aren't as good, or to explore terrain I wouldn't be sure about because I didn't know if it was stable."

Dwayne Congdon, technical director of the Association of Canadian Mountain Guides, the governing body that certifies guides, agrees, saying even experienced skiers should consider hiring a guide if they're new to an area. Not only will it give them access to the safest skiing, but probably the best skiing. Or, he says, you might want someone to do all the work for you: plan the trip, organize logistics, and then work like a dog "breaking trail through all that knee-deep powder." They've even been known to crack a few jokes.
For skiers such as Gora, there's a bonus to having a guide: he gets to learn something. "Not only about the avalanche danger, but also about the terrain, the weather and different kinds of snow."

Let's face it, the B.C. mountains can be dangerous. Although they're beautiful and many of us love exploring them, they're certainly not worth dying for. If you're heading into the back-country this winter, remember: always err on the side of caution. As the saying goes, there are old mountaineers, and there are bold mountaineers, but there are no old bold mountaineers.

Mark Mallet is a freelance writer living in Vancouver. He has a Masters Degree in Creative Writing from UBC, and he is a regular contributor to Ski Canada, the Vancouver Sun, British Columbia Magazine, and Vancouver Magazine, specializing in outdoor and environmental writing. He is also an Assisant Ski Guide with the Association of Canadian Mountain Guides, a CAA Level 2, and an Outward Bound instructor. He can be reached at markmallet@hotmail.com.

New GAZEX Installation in Banff

On September 29, 2003, the new GAZEX installation at Mount Bourgeau slidepaths 4 (left) and 5 (right), near Sunshine Village Road in Banff National Park, was handed over to Public Works and Parks Canada. The two 3- cubic metre INERTIA exploders are the first of this type in Canada. The difference between the standard and inertia type system is an articulated counterweight, which replaces the deep hold-down anchors at the front of the exploder (like those used in the Kootenay Pass, which were drilled down 4 m into shale).

The system is equipped with the latest LEAS control system and software. As a standard feature it includes total system security through rotary random codes and shot verification on the computer screen through seismic sensor software.

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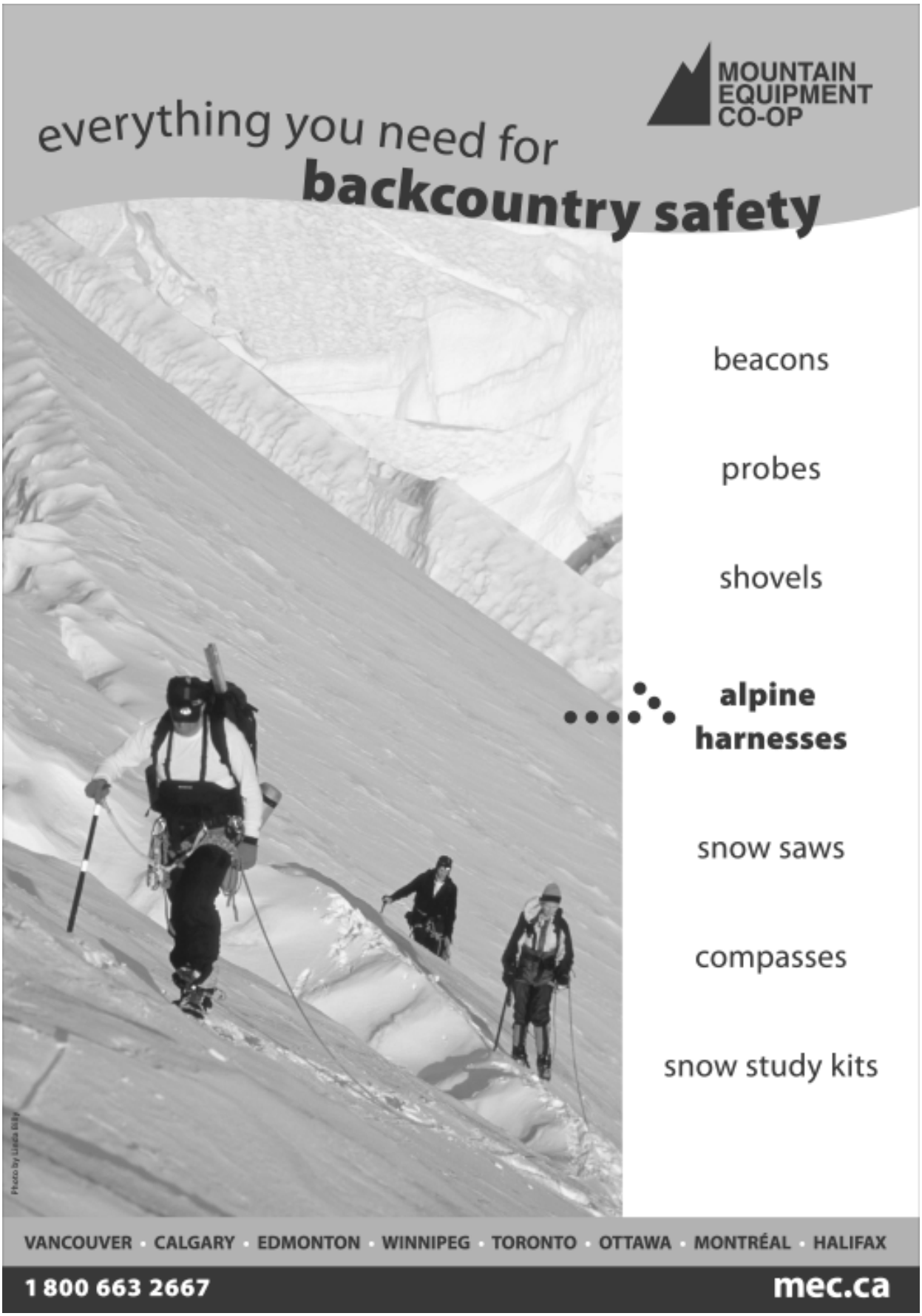

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