THE AVALANCHE news

canadianavalancheassociation
Volume 72 *Spring 2005*

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inside

Alberta is In

The province commits to funding for the CAC.

The Future of Infoex

New technologies are changing the service. Where do we go from here?

Avalanche Awareness

Photos and reports from the Coast Range to the Rockies.

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Table of Contents

Editor's View 5
Executive Director's Report 6
President's Report 8
Correspondence
- Letter to the Editor 10

Contributor News
- Rescue Resource Directory Funded by BC PEP 11
- Hincks' Memorial Fund 12
- ROI Fundraiser 12
- Alberta Joins the CAC 13
- CAF Fundraising Dinners 14

Public Programs
- Avalanche Awareness Days Wrap 16
- BAA Launches 19

Industry Programs
- BLBC Update 20
- International Snow Classification 20
- Canadian SAR Magazine 21
- Fracture Characteristics Guidelines 22

CAA News
- BOD Membership Drive 25
- InfoEx Gets LIVEly 26
- Profile: Bruce Jamieson 28
- Japanese Avalanche Network 30

Upcoming Events
- CPD Announcement 33
- Event Schedule 34
- Photo Contest 36

Product Information
- GAZ-EX New Owners 37
- GAZ-EX Autonomous Exploder 38
- New Instructional DVD 39
- Automatic External Defibrillators 39
- Barryvox Recall 40
- Ortovox Battery Problems 40

Education
- An Almost Perfect Day 41
- Winter Weather Patterns 44
- Yukon RACs 47

Research
- Poorly Bonded Crusts (Part 3) 48
- Social Science Perspective on Avalanche Risk 52
- Assessing Manual Snow Profiles 57

Humour 63

*TM/MC Columbia Brewery

canadianavalancheassociation **Avalanche News** Volume 72 ❄ Spring 2005

Avalanche News is the official publication of the Canadian Avalanche Association, a non-profit society based in Revelstoke, BC that serves as Canada's national organization promoting avalanche safety. The goal of *Avalanche News* is to keep readers current on avalanche-related events and issues in Canada. *Avalanche News* is published quarterly.

Avalanche News fosters knowledge transfer and informed debate by publishing submissions from our readers. Responsibility for content in articles submitted by our readers lies with the individual or organization producing that material. Submitted articles do not necessarily reflect the views or policies of the Canadian Avalanche Association.

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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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 publish@avalanche.ca.

Editor's View

BY MARY CLAYTON

A few days before this issue went to the printer, we received some very welcome news. The government of Alberta has agreed to provide financial support for the Canadian Avalanche Centre. At press time we don't know the amount of the pledge, but we do have a commitment and that's worth celebrating.

This decision is the result of months of hard work writing letters, making phone calls, lobbying politicians and rallying support. It's been a long road for both sides but now is the time to look ahead to what we can accomplish together. This move shows just how much a group of organized and dedicated professionals can achieve.

Now we at the CAC, and the entire avalanche community, have a moral obligation to live up to the promise implicit with this agreement. The governments of BC, Canada, and now Alberta have made spending decisions that demonstrate a tremendous amount of faith. The taxpayer's money they've dedicated – your dollars and mine – affects, directly or indirectly, virtually everyone working in the avalanche industry. It puts the work of every avalanche professional in the public eye. Many of us are used to that position when tragedy strikes. Now, the attention is becoming more constant. Results are expected and we're confident they will be delivered. *Avalanche News* will continue to keep you abreast of all the new developments coming in the months ahead.

Some more information about Alberta's agreement can be found on page 13, while another example of a recent, hard-won result can be found on page 19. The Backcountry Avalanche Advisory (BAA) originated from the office of Grant Statham, Avalanche Risk Specialist for Parks Canada. He recognized a need for a simpler method of communicating avalanche conditions to a broader range of people. Now his hard work is bearing fruit and it's been exciting for all of us involved to watch this concept go from theory to practice.

Professionalism and all it entails is a hot topic these days. You'll see on page 33 an outline of this year's Continuing Professional Development day. The theme, Professionalism at a Crossroads, seems an accurate reflection of the changing nature of the avalanche patch. Take a look at the lineup. It's going to be a thought-provoking day and your input is more than welcome. We hope you'll make it a part of your week in Penticton.

And speaking of Penticton, there are some other meetings scheduled for that week that should be noted. On Monday, May 2, nothing less than the future of the InfoEx is on the table. It's imperative those who are invested in that service be there. CAA Operations Manager Evan Manners has a report on the recent history of the InfoEx and the developments leading to this juncture. Be sure to read that article on page 26. And on Thursday morning of that week, there will be a unique opportunity to make some history at the first annual general meeting of the CAC. A Board of Directors will be elected and the Centre's founding constitution will be up for approval. Take a look at the events schedule on page 34 for more information.

The CAA has been fortunate to have some incredibly supportive partners over the years. In this issue, we have an example some great cooperation with two of our oldest partners – the Mountain Equipment Co-op (MEC) and the Meteorological Service of Canada (MSC). This winter, MEC launched an on-line series of articles on avalanche awareness. It's a six-part series on a variety of topics all relating to preparing for the backcountry. One of them was written by MSC meteorologist David Jones and is a very informative piece about reading winter weather patterns. You'll find that article in our Education section on page 44.

In the Profile section of this issue, we've taken a look at a well-known member of the community – Dr. Bruce Jamieson. His is an interesting story and it's fascinating to find out more about his roots and what led him to his current position as one of the most well-respected avalanche researchers in North America. See page 28. I hope you enjoy reading it as much as I enjoyed writing it. Bruce's own contributions to this issue are, as usual, certain to be of interest. The final installment to his three-part series on poorly-bonded crusts is on page 48, and on page 57 he brings some new insights into assessing the likelihood of fracture propagation. Learn and live.

In our previous issue, the Executive Director's report related a story that seemed to touch a chord. Clair wrote about a mistake he made while guiding many years ago, an error in judgement that cost a young man in his group many months of healing. Since that was published, Clair received a number of e-mails applauding his honesty. One of them was from Thomas Exner, a German-born guide now living in Jasper. Thomas volunteered to relate his own story of "human factors." An Almost Perfect Day is a great read and you'll find it on page 41.

We always appreciate hearing from our readers. To that end, *Avalanche News* now has an official "Letters to the Editor" section and our first entry can be found on page 10. I'd like to repeat my invitation to all members to feel free to submit your thoughts on any subject relevant to the avalanche industry. While we reserve the right to edit for space considerations, any topic is up for discussion. Debate is a healthy process and this publication is a fitting arena to present different views.

For many of us in the West, spring seems to be a little early this year. Some of us have already put away our snow toys for the winter and replaced them with bikes and rock shoes. That always means the AGM is just around the corner. Hope to see you there.

Mary Clayton
editor@avalanche.ca

Executive Director's Report

BY CLAIR ISRAELSON

It's Sunday February 27, 2005. I'm sitting in the office on a blue-sky day looking out at snow-covered peaks surrounding Revelstoke. Enviously, I'm thinking of all the people from around the world who are out in the mountains today on their skis and snowboards being lifted to the peaks by helicopters, snow cats or perhaps most elegantly of all, by personal physical effort and climbing skins. Today, from summits across Western Canada these visitors will admire snow-covered peaks in every direction as far as the eye can see, with each moutnain top promising potential for a memorable downhill descent. These visitors expend a considerable amount of time and money to come skiing and boarding here because there is simply no other place on earth with better mountains, snow and tourism infrastructure. We are truly privileged to be able to live, work and lead others in such a spectacular world-class mountain environment.

I find myself reflecting on our professionalism, and the future challenges and opportunities for the CAA and sister organizations such as the Association of Canadian Mountain Guides, the Canadian Ski Guides Association, the BC Helicopter and Snowcat Skiing Operators Association and the Backcountry Lodge Operators of BC, and other organizations that share our common interest – winter mountain safety.

Winter mountain tourism is a significant part of our economy, generating more than a billion dollars annually. The upcoming 2010 Winter Olympics will market our area to potential visitors around the globe, enticing even more tourists to come and enjoy our spectacular mountains. As we work toward 2010, it is incumbent on both public and private sector stakeholders to do everything possible to ensure a vibrant and sustainable winter backcountry tourism sector. We are all in this together.

The majority of tourists coming to ski and snowboard in the backcountry are led by professional guides who take their responsibilities very seriously, and take a great deal of pride in the work they do. I'm one of them. When I took the position of CAA Executive Director almost five years ago, the Board of Directors stated that I should continue my involvement in guiding operations so I don't lose touch with the "real world" of avalanche work in Canada. For two weeks each month during January, February and March I leave the business of the CAA in the capable hands of Evan, Ian and Alan to do the other work that I love – guiding helicopter skiing. I return to the office renewed and invigorated from the time spent in the mountains with my head, hands and feet in the snow.

"As professional standards for guiding and avalanche work in Canada have risen, so have societal expectations."

Last week it was my great privilege and pleasure to once again spend six days skiing with a family from Luxembourg. Over the years these people have become personal friends. Father, mother, son and daughter – all wonderful people who see their annual ski holiday in Canada as the highlight of their year. Each morning as our A-Star lifted off into the sunshine I found myself thinking of the challenges of the work day ahead of me. Together with our pilot, we are responsible for the safety of these good people as we try to provide them with the most enjoyable mountain experience possible. I considered the potential hazards I'm expected to manage: avalanches, crevasses, tree wells, open creeks, hidden rocks and stumps, changing snow conditions, selection of helicopter landing and pickup locations, and a host of others. I was acutely aware of the uncertainties that guides face every day in the mountains. The guests rely on my judgment to keep them safe, and it would be arrogant and wrong for me to think that my guiding judgment is infallible. Despite the good snow stability and flying conditions we had, I felt inadequate and vulnerable.

In the end, as guides we rely on our knowledge, training, experience and organizational systems to help us mitigate the risks inherent in the mountains in winter. Despite our best efforts, avalanche accidents in guiding operations continue to occur, and there are increasingly strong signals coming from government agencies and insurance underwriters that we must do an even better job of ensuring safety in commercial winter backcountry operations. As guides and avalanche professionals in Canada, what more can we do, individually and collectively, to ensure all our guests end their holiday like the family from Luxembourg did, with happy smiles and reservations made for their return next year?

In the past 20 years there have been tremendous advances in avalanche safety for winter mountain tourism in Canada. We have established national standards for snow, weather and avalanche observations so the entire Canadian avalanche community can share and analyze data effectively. The CAA Training Schools programs for avalanche workers are widely considered to be the best in the world. The InfoEx facilitates daily exchange of avalanche and other data between more than 80 operations in Western Canada, so that everyone can be aware of what neighboring operations are experiencing, and avoid being blind-sided by a condition previously recognized by someone else. InfoEx is being redesigned to be real-time, database driven so that graphical analysis of that data is possible. The network of remote weather stations in Western Canada is growing and becoming more accessible to commercial operators, providing real-time high elevation data for many locations. The quality and frequency of public avalanche bulletins continues to improve, providing quality regional summaries of forecast avalanche conditions. Weather forecast products and satellite imagery are becoming increasingly sophisticated and useful. Avalanche research programs at UBC, U of C and elsewhere are generating new, relevant knowledge that helps us better understand the complexities of snow and avalanches. Safety devices such as avalanche beacons, ABS packs and other technologies continue to improve. The CAA's annual general meeting and Continuing Professional Development offerings provide opportunities for workers to stay current with the latest advances in "best practice" for avalanche work.

Throughout the years, the guiding associations and

operators organizations have also been proactive by developing and improving their standards and programs. I should not use this forum to detail the good work and successes of these other organizations; they alone should take credit for their efforts. Suffice to say, 20 years ago probably no one would have been able to predict the incredible and positive accomplishments that have been achieved by the avalanche and guiding community in Canada. We have come a long way.

As professional standards for guiding and avalanche work in Canada have risen, so have societal expectations. While many within the mountain community hold as an article of faith that we can reduce but not eliminate avalanche accidents in guiding operations, there are others (including some provincial officials with power to impose regulation on commercial operators) who argue with equal conviction that fatal avalanche accidents in commercial operations are simply unacceptable. These people contend that guides and commercial operators must find ways to become even more safe and professional in the things we do. As almost all commercial operators operate on public lands under terms and conditions set by the provincial government, there may be good reasons not to ignore the perspectives or conclusions of these provincial officials.

"Looking forward, I am confident the guiding community and commercial backcountry operators will rise to the demands of changing times."

As I search for analogous situations in avalanche work in Canada, two examples come to mind. Both examples involve public agencies. The first example is the snow avalanche section of the BC Ministry of Transportation. They have set an operational target of zero tolerance for avalanches that could adversely affect traffic on provincial roads. Any avalanche of size three or larger that reaches a highway open for traffic, or any involvement (vehicle hit by an avalanche, driving into an avalanche or caught between avalanches of any size) triggers a report to a senior provincial official in Victoria. An internal investigation ensues to find out what went wrong and what will be done to ensure similar situations do not reoccur. Road closure is acceptable; avalanche involvements are not. Safety for the public is paramount.

The actions of Parks Canada following the Connaught Creek accident in 2003 is the second example that comes to mind. Following that accident Parks Canada struck an independent review panel of highly qualified individuals to review all aspects of their backcountry avalanche safety programs. Within three months the review panel produced their report which contained 36 recommendations for improving backcountry avalanche safety on national park lands. Parks Canada immediately committed to action all 36 recommendations. Their efforts to date constitute, to my mind, one of the most remarkable and determined efforts I have ever seen any organization undertake. In addition to dramatically improving their internal avalanche safety programs, they also have put considerable effort and money into capacity development and public avalanche safety programs at the Canadian Avalanche Centre. This recognition by Parks Canada of interdependence with the broader avalanche community in Canada is a precedent I hope other organizations choose to emulate.

Looking forward, I am confident the guiding community and commercial backcountry operators will rise to the demands of changing times. Evolution is inevitable. Our biggest challenge may be setting aside some strongly held core values and beliefs about who we are, what we do and how we do things, and seeing ourselves as others do.

To evolve in positive ways we will need men and women with creativity and vision who will, over time, establish a new paradigm for winter guiding operations in Canada. We have some great examples of vision in our mountain history. Cornelius Van Horne had vision, and the Canadian Pacific Railway brought Swiss guides and mountain tourism to Canada more than 100 years ago. Franz Wilhelmson and Hugh Smythe had a vision for what Whistler -Blackcomb could become. Hans Gmoser and Mike Weigele had vision, and developed heli-skiing to world-class status. The list goes on.

Today there is a gold rush going on for winter commercial operating tenures on BC provincial lands, and this will bring new challenges and opportunities to be managed. Government does not know what to do or how to do it. They will need our help.

Does the Canadian avalanche and mountain community have the capacity to be forward thinking and ensure the viability of our winter mountain tourism sector? I am confident we do. It won't be easy, but I suspect we will follow a tried and true process familiar to the CAA and our members. We will need to involve all stakeholders. We will need to listen respectfully to all perspectives, and solicit outside expertise so our thinking does not become circular and inbred. Finally, and most importantly, we will need to have the courage to put aside our immediate self interests and take a long view that is in the best interests of our entire community.

Where are the visionaries of the next generation? Step up, and engage. It's your future at stake.

This year's theme for the CAA's Continuing Professional Development seminar is "Professionalism at a Crossroads." The program starts at 0830 sharp at the Penticton Convention Centre on Friday, May 6th. It promises to be a stimulating day, with great presentations and discussion from the floor. If you are an avalanche professional in Canada, you need to be there. CAA non-members are welcome.

Best wishes,

Clair Israelson
Executive Director,
Canadian Avalanche Association

President's Report

BY JOHN HETHERINGTON

As president of your association, I sent out a letter in January of this year explaining that "membership dues are not covering costs of services presently offered free to all members" and that one way of remedying the situation would be to increase membership dues revenue by encouraging new members. I have received comments in reply requesting some explanation of exactly what members' dues are being used for. This is a very fair request and I will endeavour to clarify the finances of the CAA with special attention to Association and Members' Services.

As the CAA grew in membership, activities, and financially, it became necessary to split the budget process into five cost centres: Public Avalanche Bulletin; National Public Services; Services to Industry; CAATS; and Association Services. Since the incorporation of the Canadian Avalanche Centre (CAC) that process changed. Now all public services, including the Public Avalanche Bulletin, will be produced and financed through the CAC, while Services to Industry, Association and Member Services and CAATS will continue to be produced and financed through the CAA. Among other advantages, this structure allows corporate sponsors and governments to support the public avalanche-related activities while maintaining legal and accounting separation from the other CAA activities.

Members' dues form part of the revenue of the Association Services cost centre. Within that cost centre a wide variety of activities, services, and products are produced:

- Management and administration of CAA programs and assets
- Board of Directors, Committee and volunteer activities and initiatives
- Development, delivery of specified products and services for CAA members
- Operation and maintenance of the CAA's office facilities in Revelstoke
- Special projects (e.g., NSS NIF, other 3rd-party funded projects)
- Administration of CAA / CAC services (allocated across cost centres)
- *Avalanche News* 50%
- AGM activities 60%
- CAA publications, intellectual properties, material sales (not RAC)
- "Members Only" website services 100%
- "Members' Handbook" and members' newsletter supplements 100%
- Membership paraphernalia, pro-products for members
- Marketing & promotions
- Website, advertising of members' products and services 5%
- Management services, special projects
- National and international avalanche community scanning; new product / safety issues advisories
- Representation / advocacy for members' issues
- CAA support to research (50%)

The following tables itemise revenues and expenses for the Association Services cost centre. Amounts are best estimates based on actual amounts to the end of February:

Revenue	
Management Services[1]	$ 78,105
Retail Sales	45,000
Seminars	5,770
Membership Dues	63,990
Miscellaneous Revenue	17,912
Sponsorships	8,778
Canadian Avalanche Foundation	10,000
Total Operating Revenue	229,554
Expenses	
Project Management[2]	45,917
Cost of Retail Products	12,199
Wages and Benefits[3]	92,311
Fixed Expenses[3]	44,674
Printing & Production[4]	17,321
Discretionary Expenses[3]	32,695
Total Operating Expenses	245,117
Net Operating Gain (Loss)	(15,563)
Depreciation	3,934
Surplus(Deficit)	(19,497)

As with all financial statements, various explanations are required:

[1] Management services revenue is derived from projects the CAA performs for other agencies. These projects have helped to subsidize Association operations for several years.

[2] Project management expense is the cost of doing the above-mentioned projects.

[3] These expenses are allocated across the five cost centers as objectively as possible.

[4] Most of these are costs involved in producing the *Avalanche News* and are divided between Association Services and National Public Services.

The total budget for CAA/CAC combined operations for 2004-05 is somewhat under $1.4 million, of which members' dues forms a small but important part. The current deficit in Association activities cannot be sustained. To remedy the situation a combination of decreasing services, increasing membership, and increasing members' dues will likely be required. A number of suggestions have been made, some of which will be discussed at this year's AGM:

- Develop a campaign to increase professional and affiliate memberships.
- Develop a campaign to increase the number of Associate (corporate) members.
- Develop a fee schedule for Associate members based on the number of employees actively involved in avalanche operations.
- Change the venue for the AGM from Penticton, which is becoming more expensive, to Revelstoke.

Other important issues to be discussed at this year's AGM in Penticton include:

- An extended discussion for InfoEx subscribers on future directions for the InfoEx.
- Recent developments with the Coroner's Service and the RCMP concerning avalanche accident investigations.

The Annual General Meeting in May is the one opportunity that CAA members have to get together to renew old friendships and make new ones and to discuss the issues of the day in both organized sessions and informally. Over the many years that I have been attending the AGM's I have seen them become more informative, more useful, and more relevant. This year's AGM promises to be the same and I urge all members to attend.

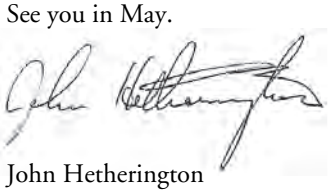
- - -

The BC Snow Bulletin describes snow accumulations in terms of percent of "normal". I think they really mean average, as I am not sure I have ever experienced a "normal" winter. But at the end of February this winter seems to be so far from average that I think it really can be described as "abnormal". At least on the Coast there seemed to be a reasonable start to the winter with snowfalls in early December. But then these were followed by a "pineapple express" in the second week of December and no more snow until Christmas. Following Christmas, Western Canada was under very cold arctic air until mid-January when the "mother of all pineapple expresses" arrived with torrential rain and warm temperatures and stayed around for three weeks. That was followed by sunshine and no snow for the rest of February. There is a hint of snow coming for the first part of March but in the Coastal valleys winter is essentially over.

It is interesting to compare this winter with 2002-03. Both were very low snow winters but the avalanche situation was very different. During the winter of 2002-03 a mid-pack layer of facets developed that contributed to one of the worst years for avalanche fatalities in Canadian history. This winter it appears the number of fatalities will be well below average. The fallout from the 2002-03 avalanche fatalities is still going on, but the fallout from this winter is more likely to be directly economic. On the Coast, several snow-dependent businesses (including Mt. Washington on Vancouver Island) are either not operating or operating on a much reduced basis. Given that in two of the past three winters snowfall has been well below average it necessarily begs the question as to whether we are in a multi-year low snow period. I suspect that in September of 2005 the usual optimism about the coming winter's snow regime will prevail, but if the reality is another low snow winter there will be some measure of economic hardship amongst the businesses that support and employ many of our CAA members.

The 1990s were a period of reasonably good snow winters, with significant growth in winter tourism in Western Canada. In the first half of the first decade of the new millennium, there have been two poor snow years and tourism in general has been flat, for a variety of reasons. It is not uncommon for an industry to go through a period of retrenchment and adjustment (think of the .com boom in the short history of the Internet) and I would suggest that we are within such a period. Such times usually bring both pessimism and opportunity, and the people and businesses that survive and grow are often the ones who are willing to abandon the status quo and change with the times. I predict Western Canada's winter tourism industry will again do well in the future but there will be significant changes from the current situation.

See you in May.



John Hetherington
President, CAA

Letter to the Editor

Dear Ms. Clayton:

Re: History of Avalanche Control in Canada, Avalanche News, Volume 71, Winter 2004-05, Page 54.

Re: Herb Bleuer's remarks "We were the first ones to do heli bombing "
Who is "we"? As some of you know, Monty Atwater at Leduc Mine, an American, first did heli bombing in February 1965. (Refer to his book "Avalanche Hunters"). Next year, 1965-66 heli bombing was done on the original road at Stewart-Tide Road, its first year of operation, in the grey and yellow cliff areas, very limited, because of weather conditions. It was done once again by two Americans, Willis Beach and Norm Wilson. The second and final year of that road the heli bombing was done by Walt Hinds, Jim Chorlton and myself. Walt Hinds and Jim Chorlton were both Americans, and myself Canadian. With the opening of the new road heli bombing was discontinued, as it was not required any more. Heli bombing was continued on the ice road in spring, namely in the Ventury slide path, and at the Leduc Mine. In 1968 all bombing stopped, as the breakthrough of the tunnel from Tide Lake made the ice road unnecessary. I believe Herb Bleuer arrived in 1970, and by then the problems were minor and heli bombing of very little value.

I see you preferred not to correct the historical facts mentioned in my first letter. A truthful magazine or newsletter usually admits its errors and corrects it. From now on I must wonder what is correct or not. It is degrading of a newsletter I considered enlightening and educational.

A member of the outer circle,

Eric Lomas

Eric Lomas, Honorary Member of the ACMG.

An historic photo of the Leduc Mine road in the aftermath of an avalanche.

Photo Eric Lomas

Editor's Reply:

The CAA's oral history project was created in 2003 to record stories from the early days of avalanche control work in this country. The writer, Christine Everts, interviewed 11 people chosen for their roles as pioneers in the Canadian avalanche community. Reasonable efforts were made to confirm and corroborate those memories but extensive verification of every detail was beyond the scope of the project. The CAA regrets that more perspectives, including yours, could not be included; they would likely have enriched the final product. While we appreciate your input, we believe the oral history project has fulfilled its mandate. We now have a historical record that captures the spirit of those exciting times and makes a valuable contribution to our community.

New Sponsor for Rescue Resource Directory

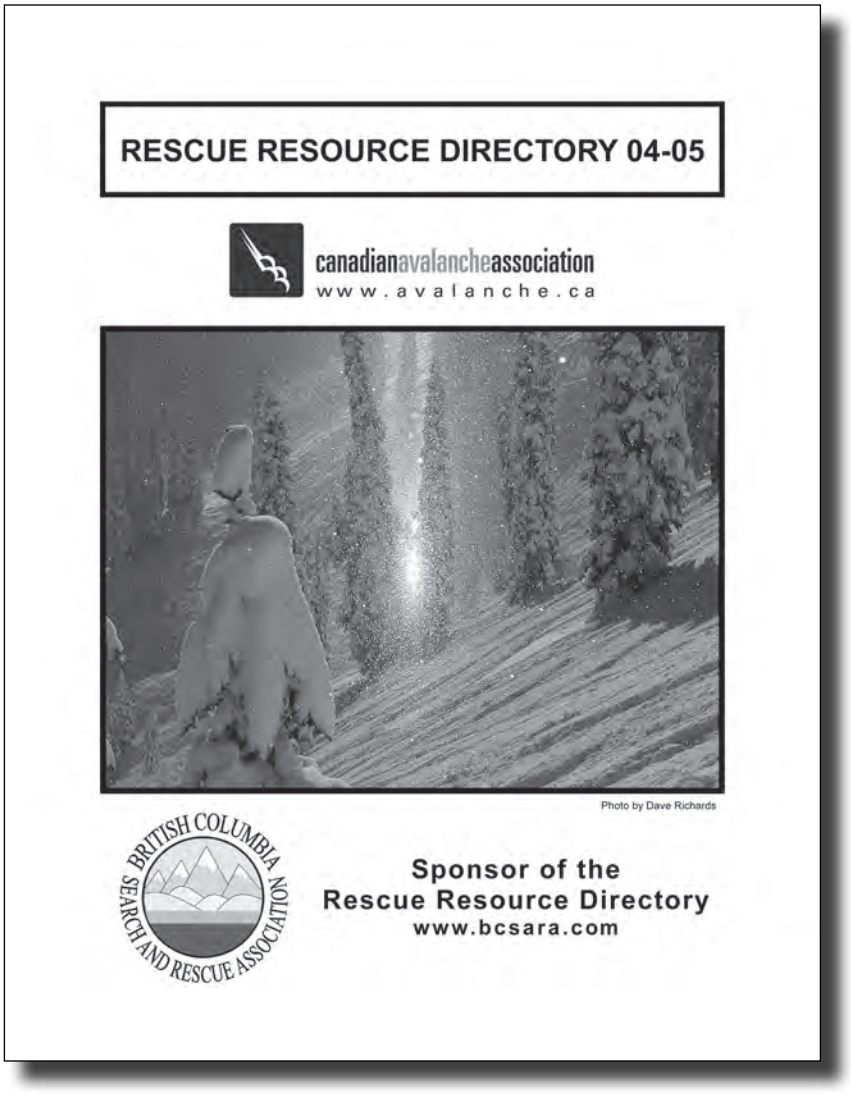
BY MARY CLAYTON

In this age of instant information, spread sheets and data bases, a paper booklet seems almost quaint. But for front-line workers charged with the responsibility of coordinating resuce efforts, the value of a simple list beside the telephone or radio is immeasurable. When the chips are down, it's vital for those people to have instant access to accurate information. That's where the CAA's Rescue Resource Directory comes in.

The Rescue Resource Directory is an extensive and comprehensive list of names and contact numbers for rescue plans, rescue practices and, of course, real rescues. First produced in the early 1980s by BC Highways, it became a joint production with the CAA in 1991. For the next 10 years, the CAA took over the labour costs of updating the information and laying out the document while BC Highways continued to carry the costs of printing and mailing. Keeping the document current is a vital part of the process. Every year, members of the CAA staff are charged with the responsibility for checking and confirming contact names and numbers – a painstaking job, but absolutely necessary to ensure the directory's accuracy and usefulness.

Over the years, the scope of the directory has expanded. And as its contents grew, so did its reputation. Every year, the CAA receives more requests for the directory, adding to production costs. After almost 20 years of subsidizing the project, BC Highways stepped aside in 2002 when a new sponsor, Vertec/Janod, arrived on the scene. Unfortunately, that company decided to move on in July of 2004.

In late 2004, financial help arrived from a source well known for its commitment to avalanche safety. BC's Provincial Emergency Program has agreed to sponsor the Rescue Resource Directory for the next year. This is no small promise; last year the directory was 36 pages and was mailed out to ever rescue office we could find. Thanks to PEP's generous support, this valuable product will continue to be produced and distributed across Western Canada.



Hincks' Memorial Fund

BY MARY JANE PEDERSEN

Hugh and Helen Hincks were tragically killed as the result of an avalanche accident while on an Austrian ski vacation in January. The Calgary-based couple are survived by their three children Morgan, Teddy and Daniel Hincks of Calgary. The Hincks' children want to honour their parents' love for winter mountain travel and their respect for furthering public avalanche safety initiatives, research and education by establishing the Hugh & Helen Hincks' Memorial Fund through the Canadian Avalanche Foundation (CAF).

The response to the memorial fund in their parents' names has been overwhelming. "For the Hincks family to set aside their immediate grief and try to make some sort of positive out of such tragedy by setting up this memorial fund with the CAF, shows amazing character and strength," said Chris Stethem, President of the CAF.

Interested donors to the Hugh & Helen Hincks' Memorial Fund can mail in their donations to: CAF, 409 – 8th Ave., Canmore, AB T1W 2E6 (cheques made payable to the Canadian Avalanche Foundation). You may also donate on-line at www.avalanchefoundation.ca by selecting the on-line donations option and noting in the comments section that it is a Hincks Memorial donation. Or contact the CAF at (403) 678-1235, info@avalanchefoundation.ca.

Canadian Avalanche Centre Fundraiser in Montreal

BY JANE MITCHELL

On January 14th of this year, Recreation Outfitters Inc. (ROI) and Ski Press Magazine hosted a fundraising party for the Canadian Avalanche Centre (CAC). The "Gelunde party" was held during the National Ski Industry Association show in Montreal and was the highlight of the week's social agenda.

More than 100 people were in attendance at the micro-brew club Belle Gueulle, and the party went on until well after 3 am. The most successful aspect of the night was the support demonstrated by the Canadian ski industry for avalanche awareness and safety. More than 40 door prizes were donated and another fundraiser is planned for next year at the same time.

Our thanks to Jayson Faulkner and his team at ROI for their generous support and dedication to avalanche safety.

Alberta Joins the CAC

BY MARY CLAYTON

In the early days of March the Canadian Avalanche Centre received some very welcome news. The Government of Alberta decided to join BC and the Federal Government in funding the public avalanche safety programs delivered through the CAC. This commitment was made during a meeting between CAA Executive Director Clair Israelson, CAC Public Forecaster Ilya Storm and John Kristensen, Assistant Deputy Minister of Parks and Protected Areas for Alberta Community Devlelopment. As this issue goes to press, we don't know the exact level of participation but we expect to have those details by the end of March. We believe that Mr. Kristensen intends to consult with several departments of the Alberta government with an interest in public avalanche safety programs, to determine the services they need and how those costs will be covered.

Alberta's participation is a major affirmation of the role and value of the CAC. The CAC welcomes the opportunity to provide programs and services that will benefit all Alberta residents. Kananaskis Country will once again be included on the CAC's website storefront for Public Avalanche Bulletins, as well as our new Backcountry Avalanche Advisory. We're all very pleased that all public avalanche forecasting services for federal and provincial lands in Western Canada will be available to the public at one place – www.avalanche.ca.

Now it's time to look beyond Western Canada and focus our sights on those areas still developing an avalanche community and public safety programs – the Yukon, Quebec, Newfoundland & Labrador, and the Eastern Arctic. Our work is far from finished. It was just over a year ago that a group of creative and committed stakeholders from across Canada met in Calgary to discuss the future of avalanche safety in this country. That session resulted in some far-reaching ideas – envisioning avalanche education, awareness and safety from coast to coast to coast, and in both official languages. This work can not be done on a shoestring budget, but with the help of our supporters, and the professionalism of our members, we'll continue to move steadily towards realizing the vision of world-class public avalanche safety services for every area of Canada facing the risk of avalanches.

CAF Fundraisers Successful

BY MARY JANE PEDERSEN

The Canadian Avalanche Foundation held consecutive fundraising dinners on February 24th in Calgary at the Calgary Zoo Safari Lodge, and February 25th in Vancouver at the Vancouver Rowing Club. Both events were co-hosted by CAF Director Justin Trudeau and CAF President Chris Stethem. Organizers were very pleased with the number of people who turned out for the evening – 250 in Calgary and 130 in Vancouver.

Vancouver-Burrard MLA Lorne Mayencourt presented a cheque for $125,000 to Justin Trudeau at the Vancouver event. The money was given on behalf of Minister of Public Safety and Solicitor General Rich Coleman, as part of BC's designated three-year funding for the CAC.

Each event held a silent auction for patrons to bid on a wide variety of interesting and entertaining items, including heli-hiking, backcountry lodge skiing, mechanized skiing, photographs, equipment, as well as several days of guiding. Unique to the Vancouver event was the auction of a vintage Cadillac donated generously by the Thorsteinsson family of Vancouver.

CAF board members Hans Gmoser and Justin Trudeau.

Dan Markham, Sr. Manager for Marketing Communications for CPR, enjoys the evening with companion Lynette Demicell.

The highlight of the evening in both Calgary and Vancouver was special guest speaker, Scott Flavelle. His presentation, "The Canadians Behind Eco-Challenge", was a fascinating behind-the-scenes look at the popular international adventure race series. Accompanied by some great images from exotic locations such as Borneo and Fiji, Scott entertained the audiences on both evenings with stories about some of the challenges the team of Canadian guides faced in staging the event. It was a memorable show and thoroughly enjoyed by all in attendance.

The Canadian Avalanche Foundation would like to send out a very special thank you to all of the donors of items to our silent auctions. Once again, the generous and thoughtful donations attracted a lot of attention and created some exciting bidding wars. And, of course, we'd like to thank the many volunteers who make these events work. They were both wonderful evenings and we're already looking forward to next year.

Once again, the Calgary Zoo's Safari Room proved to be a great venue.

CANADIAN AVALANCHE FOUNDATION
FONDATION CANADIENNE DES AVALANCHES

The silent auctions at both events were very successful.

A proud winner of one of the many great items up for bid at the silent auction.

Kyle Hale and Mike Rubenstein from Kicking Horse Mountain Resort join the party at the Calgary fundraiser.

CAF President Chris Stethem, Justin Trudeau and Vancouver-Burrard MLA Lorne Mayencourt.
Photo www.lornemayencourtmla.bc.ca

Guest speaker Scott Flavelle.

Photos courtesy of Alan Jones

Avalanche Awareness Days January 14-16, 2005

National Event in Lake Louise

BY JOHN KELLY

Lake Louise Mountain Resort was the site of the national event for Avalanche Awareness Days (AAD). The structure of AAD has always been two-pronged: community events across the country target local users while a national event at a selected site aims to get the avalanche awareness message out to the media and a broader general audience. Both venues provide opportunities for recreational users to share information and knowledge between each other and also with avalanche professionals.

This year, our national event was held at Lake Louise Mountain Resort. Events kicked off on Friday morning with a press conference. Three major television networks, several radio stations and the major newspapers from the Calgary area were all in attendance. Many well-informed questions were posed to the panel which was composed of Justin Trudeau, Grant Statham, Clair Israelson and Alan Jones. The main themes were Alberta funding of the Canadian Avalanche Centre and the launch of the Backcountry Avalanche Advisory. By all accounts, the subsequent coverage was excellent and very supportive of the cause.

The folks at Lake Louise and Parks Canada, led by Dave Iles and Gord Irwin, proceeded to put on a great demonstration for the cameras on the back side of the mountain. Avalanche control was followed by a rescue simulation, and the ever popular dog demonstration. It took Mike Henderson's dog Attila (she's a sweetheart, really!) all of about five seconds to find Justin Trudeau who bravely volunteered to be buried in the snow on a -35ºC day.

The national event also included activities oriented to the general public. A day of avalanche awareness at the Lake Louise Alpine Centre ("The Hostel" to you and me), produced with the cooperation of Yamnuska Mountain School, was popular with the local backcountry crowd. On-mountain public events oriented towards kids were held at Temple lodge both Saturday and Sunday, and a fundraiser party at the Sitzmark Lounge on Saturday night succeeded in raising $4500 for the public bulletin,

This year, the national event finished up at the Banff Centre with a great evening of presentations and films organised by Deb Smythe. A big thank you to everyone involved for making such a succesful event. We're already looking forward to next year!

Rescue dog Attila showing her stuff.

Photo John Kelly

Lake Louise Mountain Resort avalanche workers preparing for the avalanche control demonstration.

Photo John Kelly

Members of the media watched the avalanche control demonstration with great interest, despite the frigid temperatures.

Photo John Kelly

Community Events

REPORTS COMPILED BY BRENT STRAND

BIG WHITE, Kelowna
By Matt Atton

It has been a banner year for Avalanche Awareness days at Big White Ski Resort. After five years of coordinating the event at Big White, 2005 was the best year ever. All events had a great turnout. As a result, we raised double of last year's amount for a total of $1626.00.

There was an information booth set up in the Village Centre where professionals were able to answer questions, promote avalanche safety and sell raffle tickets. Raffle prizes included a Stepchild snowboard, Voile backpack, Cloudveil pants and two Voile shovels. Friday night at Raakels Ridge Pub a day of heli-skiing with Powder Outfitters from Midway was raffled. Saturday night was our Mountain Film Festival with Job Culture Productions of Kelowna and other local artists. These guys put on an excellent show. Entry fee was by donation and participants were eligible for a number of awesome door prizes.

The Big White Community School had a poster contest focused on the weekend's event, and the posters were on display in the Village. RCMP Constable Garry Creed and rescue dog Axel gave avalanche search and rescue demonstrations on Saturday and Sunday. Snow study and beacon demonstrations were free to the public during the weekend as well.

Our sponsors for this years event were a tremendous help to the success of Avalanche Awareness Days. We had great support from our main sponsor, BigWhite. Without the help from the ski area and its staff, this event would have never happened. Raakels Ridge Pub provided an excellent venue for our "day of heli" raffle. Stepchild Snowboards from Vancouver backed us up for the second year in a row by donating a snowboard and many other local vendors supplied us with tons of great prizes. And of course Brent Strand and the CAC were most accommodating in meeting my demands to help make this event a huge success.

GROUSE MOUNTAIN, North Vancouver
By Peter Marshall

Avalanche Awareness Days at Grouse this year had a good turnout on the Saturday because the weather was perfect. They had a tent set up in front of the chalet and did some transceiver demos and snow profile demos. The media was up and the word was put out on the evening news. It was great to see the media come to this event and help us raise awareness. The weather was not as kind to us on Sunday but we still had some public interest. We managed to raise $130 through our raffle. Thanks to the great prizes supplied by the CAC and contributions from DNA and G3.

KIMBERLEY RESORT, Kimberley
By Dave Hale

Thanks for the support! It was definitely cold, for us anyway. Most of the skiers wanted to max out their chilling time on the lifts instead of talking to us, but it was a good opportunity to get the Kimberley SAR truck and gear out. We set up a stove with hot chocolate and talked to a few people, did a couple of demos and handed out a bunch of whistles. We will definitely ramp it up next year.

Kimberley Search and Rescue volunteers setting up a demo on a chilly day.

Photo John Haner

PANORAMA MOUNTAIN RESORT, Invermere
By Darren Burt

Our efforts for this year's Avalanche Awareness Days were rewarded with perhaps our best turnout yet! Head forecaster Andrew Nelson and assistant forecaster/dog handler Tania Halik (accompanied by Solo, her new partner) gave a presentation, slide show and short movie on avalanches on Saturday evening. Lending a hand was Wayne Sobol, an assistant ski guide from the Golden area. A few lucky audience members had their names drawn and walked away with door prizes.

During the day on both Saturday and Sunday, we gave a demo and primer on avalanche safety and avalanche rescue gear. Folks had the opportunity to test their skill in our beacon races. The fastest times went home with prizes, which included books on avalanche awareness and even a shiny new shovel. We also dug two snowpits, showcasing different snowpack characteristics, and walked people through a basic observation and a few tests. Heading up these events was Phil Burke, one of our patrollers and avalanche technicians. All in all the event was a success, and we're already planning for next year.

MOUNT NORQUAY, Banff
By Felix Camire

At Norquay, we had free workshops running throughout the day. We held two workshops on terrain, each lasting an hour and a half, where we took people on a tour of Norquay showing them avalanche paths and telling them about avalanche control and closures. Participants also got to see some explosive parts. We also held three two-hour beacon workshops. Backcountry Access was there with some Trackers and other avalanche-related gear to demo. Norquay's Beacon Basin was put to the test by avalanche transceiver searchers. Most sessions were full (or close to) and participants were glad to be able to join in such events for free. The experience of participants varied from total beginner to intermediate. It was once again a great success and something similar will be going on again at Norquay next year.

APEX ALPINE, Penticton
By Myleen Mallach

Avalanche Awareness Days at Apex went very well. The Apex Crew stepped in and got the job done. We had our pro patrol, volunteer patrol, local search and rescue, and our mountain hosts all involved. On Saturday and Sunday we had an information table with video and brochures in front of the Gunbarrel Saloon (the area with the most traffic). At the top of the Quad there were beacon searches for prizes, an informal Q & A with the experts, a display of the latest technologies in the avalanche industry, and a snowpit analysis. Later in the afternoon there was a silent auction and a live auction in the Gunbarrel Saloon. We raised the most money ever in all the years we've participated in Avalanche Awareness Days, and sent off a cheque to the CAA for the amount of $500. On Sunday a member of our local media, *Okanagan Today*, came out and interviewed Steve Portman, our local avalanche expert. We hope this event was successful all across Canada. We'll be in touch for next year. Thanks again to the CAC for the donation of goods for our fundraiser.

SHAMES MOUNTAIN, Terrace
By Duncan Stewart

Well, the Mt. Remo Backcountry Society successfully hosted Avalanche Awareness Days up at Shames Mountain. It was a very successful event with lots of public participation. Seventy-six people took part in the beacon practice demonstrations and 14 people took home great prizes for their efforts. Thanks very much to the Canadian Avalanche Centre, Azad Adventures and Weather Tech Services for donating all those fantastic prizes (mainly Avy gear). Thanks to Scott Hicks and Cecil the dog for putting on a great demo on avalanche dog rescue techniques. Thanks to two of our local avalanche technicians, Rod Gee and Steve Brushey, for lending their expertise at the info tent. Finally a big thanks to everyone who helped set up and take down the info tent, and spent time helping people fine tune their beacon skills!

Compression test demonstration at Shames Mountain.

Photo Duncan Stewart

GLACIER COUNTRY AVALANCHE CENTER, Montana
By Courtney Feldt

This was the second annual avalanche awareness days at GCAC. There was a slide show at a local bar for the kickoff on Friday night. On Saturday and Sunday, we held transceiver demonstrations and practices. Participants who found a beacon in less than three minutes were entered in a raffle to win a beacon. We also set up snowpits/snow analysis and rescue dog demonstrations. On Saturday evening, there was a party at our local ski hill bar where we sold raffle tickets and gave away an Avalung, down jacket and t-shirts for prizes. We also had a trailhead program with transceiver scenarios. Again, those who found beacons in less than three minutes were entered in the raffle to win a beacon. One hundred and eighty-five people participated at The Big Mountain, seven people at the trailhead program and we put 60 volunteer hours into the events. We plan on hosting activities annually to coincide with the Canadian Avalanche Centre's Avalanche Awareness Days. Thanks for your support.

MARMOT BASIN, Jasper
By Garth Lemke

Avalanche Awareness Day at Marmot Basin and the night of guest speakers was a huge success. Thanks to all your door prize contributions, advertising and overall support. Lots of people came by for the events at Marmot Basin which included an explosive demo, transceiver demo, Recco demo and dog search demo. There were other ski hill events going on that day also – MEC telemark ski demo, Burton snowboard demo and Rossignol demo. With all the cool banners and the ski/snowboard demo guys lined up next door it was a great picture of support. The guest speaker night was very well attended with 70-80 people of all ages in the room. Even some snowmobilers showed up. There were many good questions and shows of interest in the equipment. People love shiny new things and for those who provided stickers, there was not one left. During the door prize giveaways, all items were popular with the crowd. They crowd went quiet as the ticket was drawn, followed by sighs of disappointment with one cheer of singular joy.

Information tent at Marmot Basin.

Photo Garth Lemke

Guest speaker night well attended in Jasper.

Photo Garth Lemke

BOULDER MOUNTAIN, Revelstoke
By Brent Strand

Once again, Avalanche Awareness Day in Revelstoke was a great success. Since Revelstoke is a major destination for snowmobilers from all over Western Canada, the events took place on Boulder Mountain, a local favourite sledding area. Despite the frigid -27°C temperature we had a great turnout. We had a poker-style format with four stations – snowpit, probing, beacon search and beacon test at the trail head. Each participant rolled dice at each station and calculated the total points and at the end, the one with the highest points won a prize. We encountered riders with RAC courses under their belts to people who have never even heard of a beacon! We had lots of support from the community with many donations for our evening auction and CAC forecaster Greg Johnson gave a short presentation that was very well received.

Cabin on Boulder Mountain.

Photo Owen Day

Backcountry Avalanche Advisory

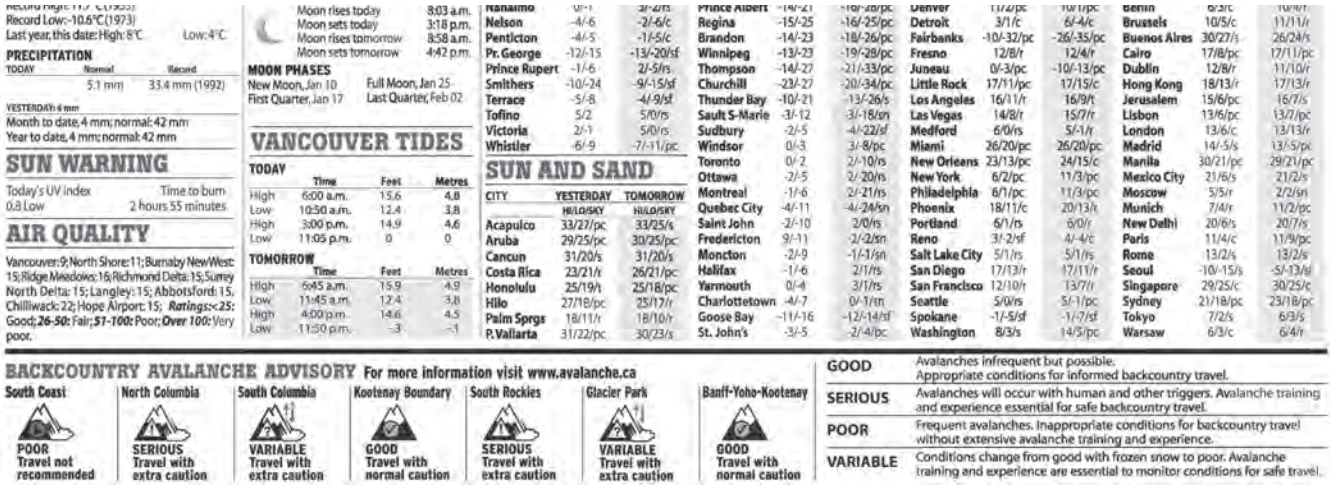
BY MARY CLAYTON

A big part of the national event at Avalanche Awareness Days this year was dedicated to the launch of our new Backcountry Avalanche Advisory (BAA). The media on hand to cover the event were presented with a document outlining how to use the BAA. An electronic version of the "how-to" manual was also sent to a number of other outlets that weren't able to attend the launch.

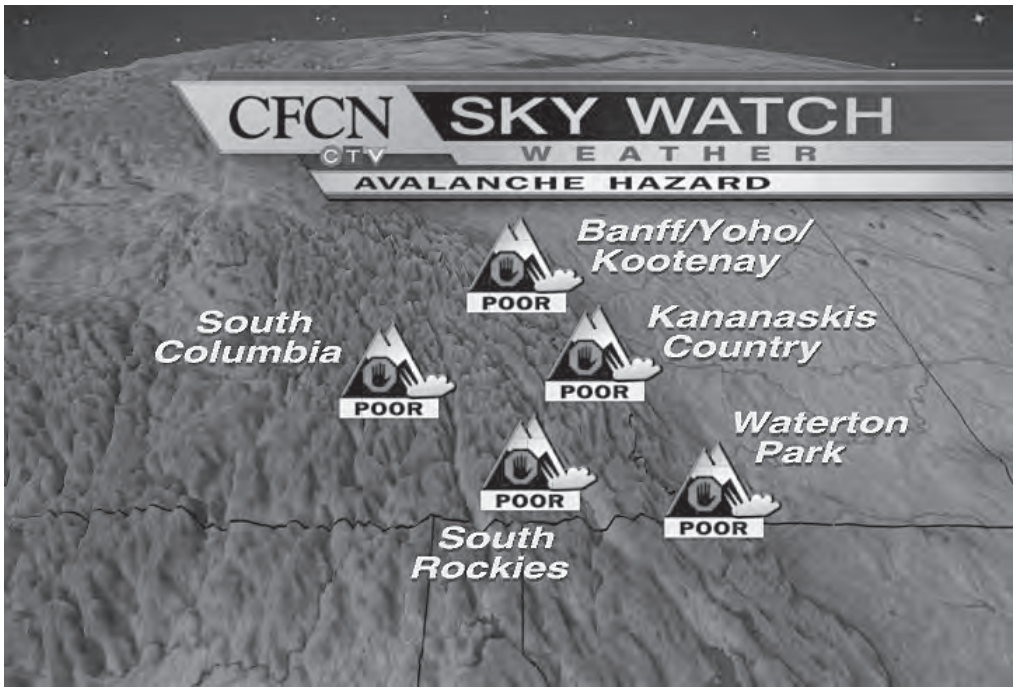
The BAA is a simplified, icon-based version of the public avalanche bulletin, covering the same forecast regions but distributed daily. Each day at 4 pm PST, CAC forecasters download a 48-hour forecast for each region to the Meterological Service of Canada's (MSC) website. The MSC then puts the icons and their accompanying text on their media portal, to which media outlets have free access.

The examples below demonstrate how the BAA is being used by the media across Western Canada. These images are mock-ups sent to us as each organization worked out how they were going to present the icons. Now, both CFCN in Calgary and the *Vancouver Province* are carrying the BAA on a daily basis. In the Bow Valley, Mountain FM and the weekly paper, the *Rocky Mountain Outlook*, are also distributing the BAA. While it's not being used everywhere yet, we're encouraged by the reception we've had so far and we're looking forward to a wider distribution next winter.

From the Vancouver Province



From CFCN Calgary



Backcountry Lodges of British Columbia Association or BLBC "eh" - a Canadian organization

BY MARGIE JAMIESON, EXECUTIVE DIRECTOR, BLBC

"We've come a long way baby!"

In a few short years we have managed to accomplish a lot with our fledgling organization. The Backcountry Lodges of BC Association was birthed in the spring of 2003. Apparently the timing was right to get this segment of the industry to organize into a professional body. All 28 backcountry lodges in the province are members in good standing. Members have done a huge amount of hard work on behalf of the non-motorized commercial backcountry industry.

Based on a template generously shared by the mechanized sector and a fully consensus-driven process, we have put into place a set of operational guidelines. These guidelines cover a broad range of topics from licensing, guiding requirements, avalanche forecasting programs, wildlife issues etc.

With a huge amount of support from "Mr. Waiver" himself, lawyer Robert Kennedy, we have a standardized waiver for all BLBC operators. These waivers cover both seasons as many operators run both summer and winter operations.

Within a widely varied industry we have found a lot of common ground and are looking to the BLBC as a vehicle for support on a huge range of issues. Land tenures, multiple land use, insurance and combined advertising are just a few of the issues we have successfully addressed by working together.

Currently we are working on an information exchange program for our members. Some of our bigger operators are members of the InfoEx but this program is unattainable for much of our membership. Options being considered range from an exchange just within our membership to a "third tier" in the public bulletin. The BLBC is committed to trying to work with the CAC to accomplish such a program. It is agreed that inputting information for use in the public bulletin is a high priority.

As BC's oldest backcountry lodge operator (both ways of reading this), I am heartened by the support of everyone. These days when we hold a meeting we no longer occupy a single booth at Smitty's. We now fill an entire meeting room. It is also a privilege to work within an industry where I count my competitors as some of my best friends.

Second Call for Comments: International Classification for Seasonal Snow on the Ground

In 2003, the International Commission on Snow and Ice (ICSI) formed a Working Group to revise the International Classification for Seasonal Snow on the Ground (Colbeck and others, 1990). The primary goals of this Working Group are:

- to revise and adapt the 1990 classification to actual state-of-the-art, not including either perennial snow (firn) or snow in the atmosphere;
- to promote an even more widely used and accepted snow classification, including efforts in translating the classification into languages that are not currently available.

The main objective of the former classifications is to *"… set up a classification as the basic framework which may be expanded or contracted to suit the needs of any particular group ranging from scientists to skiers. It has also to be arranged so that many of the observations may be made either with the aid of simple instruments or, alternatively, by visual methods. Since the two methods are basically parallel, measurements and visual observations may be combined in various ways to obtain the degree of precision required in any particular class of work."*

The Working Group is soliciting comments from both the scientific and field practitioner communities. Comments regarding the classification of wet snow and crusts are of specific interest, but comments regarding all aspects of the classification are welcome. Let us know how the classification works and does not work for your particular application.

The Working Group will meet next in late April 2005 at the European Geophysical Union (EGU) annual meeting, and hopes to published a revised version of the classification in 2007. Comments can be submitted to Charles Fierz, Working Group Chair (fierz@slf.ch), Dave McClung, Co-Chair (mcclung@geog.ubc.ca), or Ethan Greene, Field Practitioner Representative (greene@cnr.colostate.edu).

Plans Change for Canadian SAR Magazine

BY JOHN D. BIRKBY
GROUP PUBLISHER, ANDREW JOHN PUBLISHING INC.

As you may know, we planned to launch *Canadian Search and Rescue Magazine* (CSAR) in March 2005. The initial response we received from personnel within the area of SAR, both volunteer and professional, was overwhelming. It solidified the fact that the people who work in the field of SAR wanted a national magazine that covered land, sea and air.

CSAR was going to be a controlled circulation, distributing to all professional SAR workers of the various police, fire, EMS and Armed Forces units across Canada. As well, we have built a substantial list of executive members of national and regional volunteer groups. The main business model for the publication was that revenue would be generated through advertising sales.

Unfortunately, there has not been enough industry backing to support the planned business model and therefore, I regret to say that *Canadian Search and Rescue Magazine* will not be published as a quarterly journal. This is very disappointing for people in the field, as there was great anticipation for CSAR.

HOWEVER! We have decided to make one more attempt at servicing this very important market. It has been decided that we will publish *Canadian Search and Rescue Magazine* as an annual directory of services and products. We will incorporate much of the editorial content planned for the initial publication, with listings of companies supplying products and services to the SAR industry. This new publication will publish in October 2005, and will be distributed, initially, in all attendees' welcoming kits at the 2005 SAR*SCENE* Conference (held in Charlottetown, Prince Edward Island). We will also distribute the publication to the SAR staff at the OPP, RCMP, Fire, EMS and Armed Forces units across Canada. More than 3,000 copies will be distributed in 2005.

Listings will be broken down into products/services and associations/organizations. Listing are available at the very cost effective rate of $75 and may be a maximum of 60 words, plus contact information. Advertising pages are also available, in full page and 1/2 page sizes. A full-page black and white advertisement will cost $650, and a 1/2-page advertisement will cost $475. Full-page colour positions are available on the three covers only, and cost $1,000 per cover.

Although we are disappointed that *Canadian Search and Rescue Magazine* will not be launched as a full-fledged quarterly magazine, we are pleased to be able to offer the industry and personnel this opportunity and we know that this new CSAR annual will prove to be of significant value to readers and the industry. Our targeted distribution at the 2005 SAR*SCENE* Conference will provide a very cost effective way to market products and services to the right people.

If you would like any more information about how to advertise in this publication, please contact our Customer Service Coordinator Brenda Robinson at brobinson@andrewjohnpublishing.com.

Listings will run in alphabetical order and advertising is on a first come first service basis. Please do not hesitate to call me (John Birkby) directly at 905-628-4309 with any questions or comments regarding the new CSAR Magazine Annual Directory.

Fracture Characteristics Guidelines

BY ROB WHELAN

The CAA Technical committee has approved Interim Guidelines for the observation and recording of fractures, shears and related failures that occur in isolated small column snowpack tests. These observation guidelines are intended to capture the character of the fracture while performing snowpack tests on small isolated columns of snow, such as compression tests, deep tap tests, burp tests and shovel tests. The observation procedures and recording standard are still under development, and the Technical Committee of the CAA is keen to get feedback this winter on these guidelines as they are proposed. Please use this system this winter in your operations, and as issues arise send comments to: techcom@avalanche.ca. Have a productive and safe winter!

Rob Whelan
Chair, CAA Technical Committee

INTERIM
Guidelines for Observation and Recording of Fractures in Small Column Snowpack Tests.

Objectives: Research suggests that careful observation of the character of the fracture in small column snowpack tests (such as compression tests) is an important factor in improving the interpretation of these test results (van Herwijnen and Jamieson, 2005).

Procedure: The front face and side walls of the test column should be as smooth as possible. The observer should be positioned in such a way that one side wall and the entire front face of the test column can be observed. Attention should be focused on weak layers or interfaces identified in a profile or previous snowpack tests as likely to fracture. After a fracture occurs, and if necessary and practical, carefully remove the portion of the block above a fracture to observe the fracture surface. Replace the block before continuing the test. For tests on low-angled terrain that produced planar fractures, it may be useful to slide the two fracture surfaces across one another by carefully grasping the two sides of the block and pulling while noting the resistance.

Observations: Use the following table to characterize the test results:

Fracture Character	**Code**	**Fracture Characteristics**
Sudden Planar *(pop, clean & fast fracture)*	SP	A thin planar* fracture suddenly crosses column in one loading step AND the block slides easily** on the weak layer
Sudden Collapse *(drop)*	SC	Fracture crosses the column with a single loading step and is associated with a noticeable collapse of the weak layer
Progressive Compression *(indistinct)*	PC	A fracture of noticeable thickness (i.e. non-planar > 1 cm) which usually crosses the column with a single loading step, followed by additional compression of the layer with subsequent loading steps
Resistant Planar	RP	Planar or mostly planar fracture that requires more than one loading step to cross column and/or the block does NOT slide easily** on the weak layer
Non-planar break	B	Non-planar fracture
No Fracture	NF	No Fracture

* "Planar" based on straight fracture lines on front and side walls of column
** Block slides off column on steep slopes. On low-angle slopes, hold the sides of the block and note resistance to sliding.

Recording: Record the results of the test as follows:

<type of test> <test score> <(Fracture Character)> @ <Depth in Profile>, < Layer Characteristics (form, size, date of burial if known)>

e.g. CTM 17 (SC) @ 34 on SH , 8mm, Jan 22

If multiple tests at the same site produce results on the same layer, record the results as follows:
<type of test> <test score #1> <(Fracture Character #1)> , <test score #2> <(Fracture Character #2)>, <test score #3> <(Fracture Character #3)>, etc , @ <Depth in Profile>, < Layer Characteristics (form, size, date of burial if known)>

e.g. CTM 14(SP),17(SP),19(RP) @ 45 on SH (rounding) , 6mm, Feb 12

Examples:

Example #1

Compression Test: 36-degree slope, Weak Layer (SH 3 mm) at 45 cm below the surface.

Results:

Column fails @ 45 cm on the second tap from the elbow (CTM12). When the column fails, the fracture crosses the column suddenly ("pops"), and the block slides off the column.

Recording:

CTM12 (SP) @45 on SH size 3

Example #2:

Compression Test: 25-degree slope, Weak Layer (SH 11 mm) at 65 cm below the surface. Date of burial known to be Jan 12.

Results:

Column fails @ 65 cm below the surface on the seventh tap from the elbow (CTM17). When the column fails, the fracture crosses the column suddenly and the block drops noticeably before displacing 2cm off the column. When the sides of the block are pulled, it slides easily on the fracture surface.

Recording:

CTM17 (SC) @65 on SH size 11, Jan 12.

Example #3:

Two Compression Tests in the same profile: 20 degree slope, 20 cm wind affected storm snow overlying PP's and DF's.

Results:

First Test: Column fails @ 22 cm on the third tap from the wrist (CTE3). When the column fails, there is crushing of at least part of the thickness of a soft snow layer but there is no displacement of the block. Additional loading steps continue to crush the soft snow layer.

Second Test: Column fails @ 22 cm on the seventh tap from the wrist (CTE7). When the column fails, there is crushing of at least part of a soft snow layer but there is no displacement of the block. Additional loading steps continue to crush the soft snow layer.

Recording:

CTE 3 (PC), 7(PC), @ 22 on PP 4 mm

Example #4:

Shovel Burp Test: Testing near surface layers, a 30 cm x 30 cm column of snow is isolated on the shovel blade and the bottom of the blade is tapped until a fracture appears in the column.

Results:

A fracture crosses the whole column 18 cm below the surface after tapping with moderate force on the blade of the shovel. The weak layer appears to be small DF's and the block above the weak layer does not slide easily on the fracture surface.

Recording:

Burp Test M (RP) @ 18 on DF, 2mm.

Notes:

- "Small Column Snowpack Tests" refer to snowpack tests performed on an isolated column of snow where the objective is to load the column until a fracture (or no fracture) occurs. Typical small columns are less then 50cm x 50 cm in cross section.
- Fracture Depth: Whenever the test is performed in conjunction with a snow profile, the depth of the fracture should be recorded in relation to the depth of the weak layer in the profile.

e.g. Snow profile shows a weak layer of 6 mm SH at 35 cm below the surface. In a compression test, a SP fracture occurs in the column at 38 cm below the surface of the column in the SH layer. This test is recorded in the profile as occurring at the SH layer.

BOD Membership Drive

Attention all members:

As outgoing Past President, it is my duty to act as the "nominations committee" for the upcoming CAA Annual General Meeting (AGM) in May. We will be looking to fill the positions that will become vacant at the spring meeting – just weeks away. (See the table below.)

Each year the membership gets to nominate and vote for a Board of Directors (BOD) to govern and direct our organisation. Committees also do much of the behind-the-scenes work that the CAA is involved in. Being on the BOD or becoming a member of a CAA committee is a great opportunity to contribute and can be very satisfying and fulfilling.

Currently the CAA's Board of Directors looks like this:

Position	Name	Standing	Nominations
President	John Hetherington	Yes	Not needed
Vice-President	Anton Horvath	Yes	Not needed
Secretary Treasurer	Steve Blake	Yes	Not needed
Membership Chair	Alison Dakin	No	Required
Director at Large	Rob Rohn	Yes	Not needed
Director at Large	Alan Jones	Yes	Requested
Associate Member Rep	John Birrell	No	Required
Affiliate Member Rep	Lori Zacaruk	Yes	Requested

If you are even remotely interested, or have a suggestion or nomination, please contact me. We are also putting together a list of people interested in volunteering for the CAA, if not for the Board then for various committees, both standing and ad hoc. It is also a great way to earn CPD points!

Employers, too, are encouraged to support any employee who may be considering running for a position. BOD membership is a time of great personal growth. Board members gain a variety of skills, of which many are transferable to their work. As well, there are benefits less tangible but equally valuable, such as developing connections within the avalanche community.

When you contact me please note the role or type of position you are interested in and also your background and experience in committee work. We encourage every member to consider participating. Having different perspectives and strengths on the BOD is an asset to our association and we welcome the chance to hear from a variety of backgrounds. This is a period of tremendous growth and change for the CAA. Why not think about being part of the group navigating these exciting times?

Bill Mark
Immediate CAA Past President
billmark@direct.ca

InfoEx Gets LIVEly

BY EVAN MANNERS

The Industry Information Exchange, more commonly referred to as InfoEx, has reached a milestone of growth and change in its history and evolution. These developments have taken InfoEx to a juncture where big decisions have to be made about its future and its focus. Before we go there, let's explore what's been happening lately in the InfoEx world that's brought us to this crossroads.

InfoEx is now a live, real-time information product, rather than simply a once-a- day decision making tool. This new development has been a direct result of the introduction of the SnoInfo tool, released in February, 2005 to all InfoEx subscribers. The SnoInfo tool interacts with the InfoEx data server, and allows operations to submit their InfoEx data online. It also incorporates built in viewers that, although they are currently just scratching the surface of possibilities, allow operations to view InfoEx in new and more useful formats.

The development of SnoInfo began at the CAA's InfoEx Subscribers Meeting three years ago, when Colani Bezzola and Jan Bergstrom of Canadian Mountain Holidays(CMH) demonstrated a database-driven tool called WebEx that CMH had developed for their own operational needs. Since Pascal Hägeli of the University of British Columbia had earlier that same day presented the results of his research, which among other things included the conversion of 12 years of InfoEx data to a Microsoft Access database, the discussion following the CMH presentation naturally turned to possibly creating a database-driven InfoEx system for all subscribers to use. A second meeting resulted, and the majority of subscribers were in favour of pursuing this.

An Information Technology committee of the CAA was established, and they developed an avalanche industry specific XML data standard, which has become known as CAAML. This data standard was used to develop the first SnoInfo tool during the winter of 2003-04, with some very generous help from CMH. The basic InfoEx tool and server function was demonstrated at the CAA meetings in the spring of 2004. Perhaps more importantly, the server also allowed for InfoEx subscribers to submit their InfoEx data directly to the CAA server, in CAAML format, using tools specific to the subscriber company. During the summer of 2004, CMH and BC Ministry of Transport developed interfaces for their existing systems that did exactly that. Soon after, Parks Canada began work on a similar system.

When the InfoEx season began in November, 2004, this CAAML standard and the new InfoEx tool were used by the CAA staff in Revelstoke to produce InfoEx each night. After extensive refinements and updates from this first test phase, an updated version, named SnoInfo, was distributed for testing to 15 companies within the InfoEx subscriber community in January, 2005. These companies were chosen primarily because of previous expressions of interest in what was being developed, but also because they spanned the spectrum from small family-run lodge operations with perhaps one staff member with a passing interest in computers to large heli-ski companies and ski resorts with extensive IT departments. The feedback from these 15 test clients was incorporated into a production release version of the tool which was broadly distributed to all InfoEx subscribers in February, 2005.

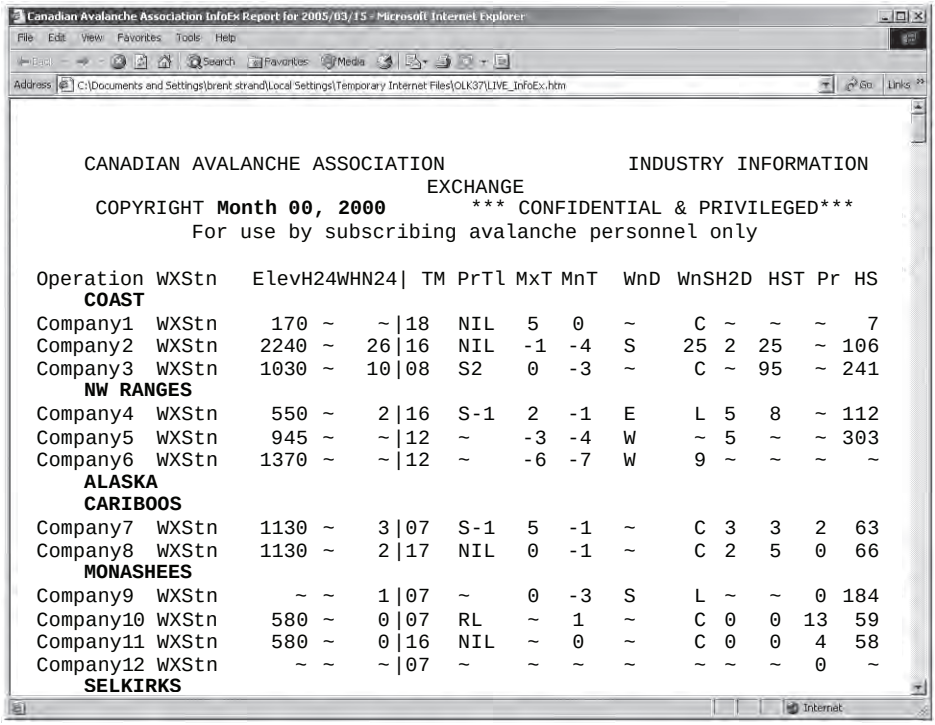
With the release of this tool, new InfoEx products are now a reality. When an InfoEx subscriber submits their data, it is immediately viewable to the other subscribers through the Live InfoEx viewer built into the tool. This means that morning weather readings begin to appear in the Live InfoEx as early as 6 am Hopefully, datalogger readings will soon be incorporated as well, giving every subscriber a snapshot of weather data from the previous night during their morning decision making. Once a day, the published version of InfoEx is produced and distributed by the InfoEx staff in Revelstoke, just as it has been done since 1991. This published version is now available in two formats, the classic e-mail friendly text version and the new HTML version similar in format to the Live InfoEx.

The InfoEx subscriber base has grown steadily since 1991, and in recent years the number of companies seeking access to the exchange has even accelerated. With this growing subscriber base, the character of the exchange has been altered from a small co-op of companies exchanging data between a known group of individuals to literally hundreds of legitimate users employed by the 75 or so companies currently on the exchange. In addition, as the InfoEx database grows, its potential for use in research and avalanche forecasting models continues to expand as well. As the data and its use grew in complexity, it became apparent that the loose principles of the exchange established by group consensus in 1991 may no longer be adequate or even appropriate.

An InfoEx Subscribers Advisory Group established this winter has proposed some fundamental changes to the program, which have the potential to radically change the exchange and how it operates. Due to the increasing complexity of the existing exchange, not changing the program to meet these changing needs threatens to bring about its collapse. Also, the InfoEx Subscribers Advisory Group has proposed topics for discussion such as better defining the principles of the use of the database by researchers, as well as the possiblity of making the InfoEx completely server-based with little or no human involvment once the data is submitted.

In order to address these issues, a full-day meeting has been set up to take place at the Ramada Penticton Inn on Monday, May 2nd, from 10 am till 4 pm. THIS WILL BE AN IMPORTANT MEETING AND EVERY COMPANY PARTICIPATING IN THE EXCHANGE IS ENCOURAGED TO SEND A DELEGATE WHO CAN SPEAK TO AND VOTE ON ISSUES THAT MAY HAVE IMPORTANT POLITICAL AND FINANCIAL EFFECTS ON THE COMPANY.

The text version of InfoEx, which most CAA professionals have used daily since 1991, has changed very little in format over the years. While that kept it viewable on almost any computer, and easy to print or convert to an e-mail, it has caused problems by limiting the amount of data that can be included.



Canadian Avalanche Association InfoEx Report for 2005/03/15 - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address C:\Documents and Settings\brent strand\Local Settings\Temporary Internet Files\OLK37\LIVE_InfoEx.htm

CANADIAN AVALANCHE ASSOCIATION INDUSTRY INFORMATION EXCHANGE
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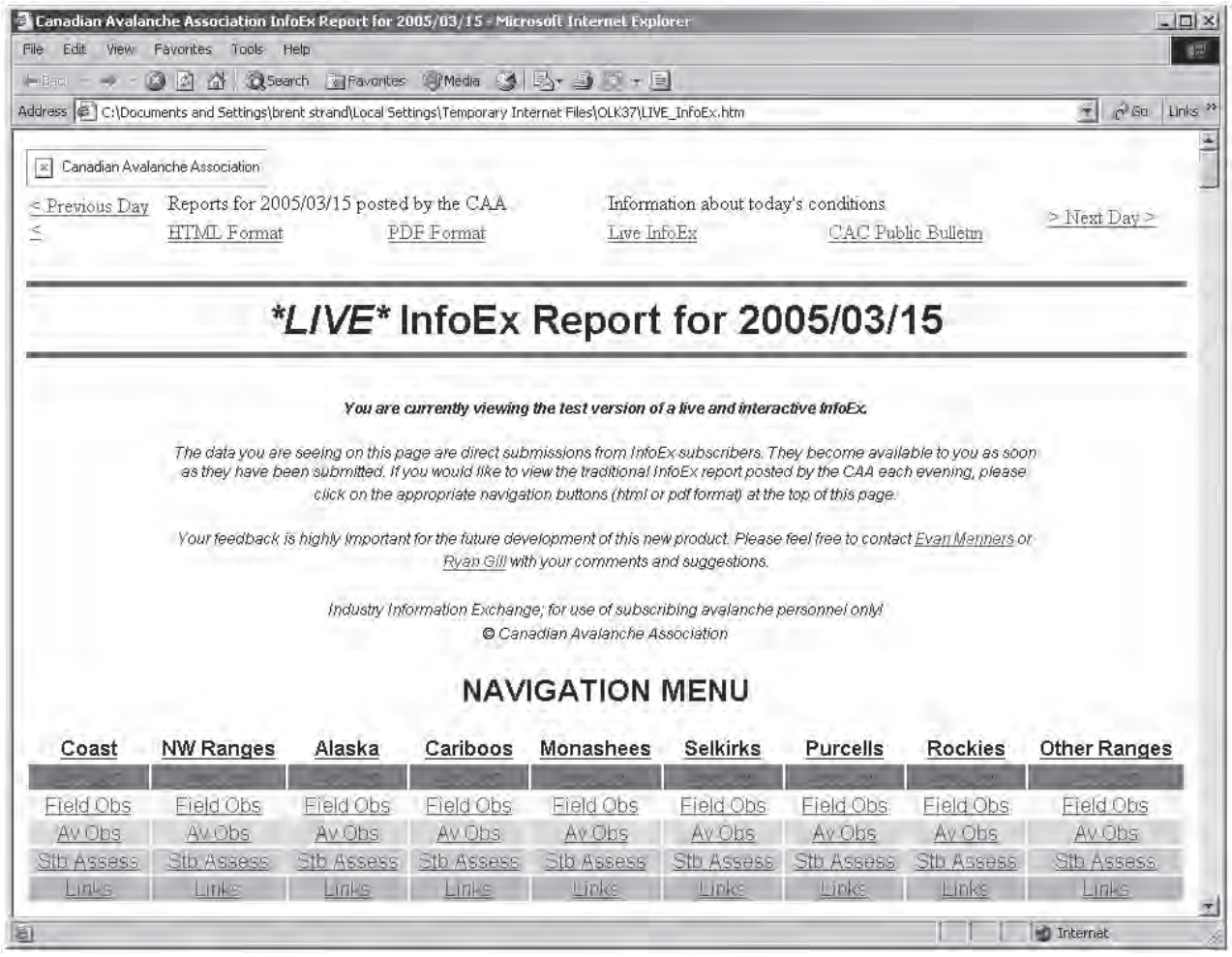
For use by subscribing avalanche personnel only

Operation	WXStn	ElevH24	WHN24	TM	PrTl	MxT	MnT	WnD	WnSH2D	HST	Pr	HS
COAST												
Company1	WXStn	170	~	~	18	NIL	5	0	~	C	~	~	~	7
Company2	WXStn	2240	~	26	16	NIL	-1	-4	S	25	2	25	~	106
Company3	WXStn	1030	~	10	08	S2	0	-3	~	C	~	95	~	241
NW RANGES												
Company4	WXStn	550	~	2	16	S-1	2	-1	E	L	5	8	~	112
Company5	WXStn	945	~	~	12	~	-3	-4	W	~	5	~	~	303
Company6	WXStn	1370	~	~	12	~	-6	-7	W	9	~	~	~	~
ALASKA												
CARIBOOS												
Company7	WXStn	1130	~	3	07	S-1	5	-1	~	C	3	3	2	63
Company8	WXStn	1130	~	2	17	NIL	0	-1	~	C	2	5	0	66
MONASHEES												
Company9	WXStn	~	~	1	07	~	0	-3	S	L	~	~	0	184
Company10	WXStn	580	~	0	07	RL	~	1	~	C	0	0	13	59
Company11	WXStn	580	~	0	16	NIL	~	0	~	C	0	0	4	58
Company12	WXStn	~	~	~	07	~	~	~	~	~	~	~	0	~
SELKIRKS												

Internet

The new HTML version of InfoEx, which allows users to view data by mountain range, is much more efficient at gathering pertinent information about your near neighbours. However, it is best viewed live, projected on a wall or with a large computer monitor and it is not suited to printing on paper.



Canadian Avalanche Association InfoEx Report for 2005/03/15 - Microsoft Internet Explorer

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Canadian Avalanche Association

< Previous Day | Reports for 2005/03/15 posted by the CAA | Information about today's conditions | > Next Day >

< | HTML Format | PDF Format | Live InfoEx | CAC Public Bulletin

LIVE InfoEx Report for 2005/03/15

You are currently viewing the test version of a live and interactive InfoEx.

The data you are seeing on this page are direct submissions from InfoEx subscribers. They become available to you as soon as they have been submitted. If you would like to view the traditional InfoEx report posted by the CAA each evening, please click on the appropriate navigation buttons (html or pdf format) at the top of this page.

Your feedback is highly important for the future development of this new product. Please feel free to contact Evan Manners or Ryan Gill with your comments and suggestions.

Industry Information Exchange; for use of subscribing avalanche personnel only!
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NAVIGATION MENU

Coast	NW Ranges	Alaska	Cariboos	Monashees	Selkirks	Purcells	Rockies	Other Ranges
Field Obs	Field Obs	Field Obs	Field Obs	Field Obs	Field Obs	Field Obs	Field Obs	Field Obs
Av Obs	Av Obs	Av Obs	Av Obs	Av Obs	Av Obs	Av Obs	Av Obs	Av Obs
Stb Assess	Stb Assess	Stb Assess	Stb Assess	Stb Assess	Stb Assess	Stb Assess	Stb Assess	Stb Assess
Links	Links	Links	Links	Links	Links	Links	Links	Links

Internet

Profile: Bruce Jamieson

BY MARY CLAYTON

You can't go far in Canada's avalanche world without running into the work of Dr. Bruce Jamieson. His research has had a significant effect on how snow is studied, records are kept and safety is taught. Perhaps most importantly, his studies have changed how avalanche professionals think about snow and assess its stability. But for all his influence, Bruce remains approachable, welcoming input and ideas from anyone working with avalanches.

No ivory tower academic, Bruce's choice of research stems from a desire many of us can relate to – finding a job that allows him to work outside in the mountains. Born in Ottawa, he came to Western Canada in 1975 with a degree in math and a love for the outdoors. Among other jobs, he worked for Outward Bound in Canada, the US and Australia, developing his mountain skills the entire time.

After two years of travelling and climbing, mostly in South America and New Zealand, he returned to Canada in 1980 to work in avalanche control. He ended up in Fernie, where he met his wife, Julie Lockhart. "It was wonderful there," he remembers, "but after five years Julie was getting frustrated career-wise, so it was her time to pick a place to live. She got a job in Calgary and I followed."

Bruce soon found work at Nakiska, preparing the Kananaskis Country ski area for its role in the 1988 Winter Olympics. It was during the winter of 1985/86, while doing everything from avalanche control to manning snowmaking guns, that Bruce decided to pursue graduate school. "I was very interested in avalanches, and it seemed a perfect application of science that would let me work outdoors."

Bruce Jamieson at the office.

Photo Matt Wylie

The way was not exactly paved. He recalls how he knocked on a lot of doors at the University of Calgary, not knowing which department to go to in his search for someone to supervise his research. He first approached the Physics department, then Environmental Design, before finally trying Civil Engineering. That's where he met Dr. Colin Johnston, the man who would become one of his mentors.

It wasn't the easiest introduction. "It didn't start very well," Bruce admits. "Colin said, 'I don't have any time for another grad student.' And just as I was walking out the door, he asked 'Did you have a topic in mind?' When I said snow avalanches, he said 'Come in and sit down.'" When asked for his memories of the meeting, Colin Johnston describes "a long-haired guy walking in out of the blue, wanting to study in the area of snow." Initially sceptical, Colin's intellectual curiosity eventually won out. "I didn't have any money at that time for avalanche research specifically," he says, "but I thought, why not, this could be interesting."

Despite that inauspicious first impression, Bruce had found the right person. Colin's expertise was in materials testing, but his heart, like Bruce's, was in the mountains. "Colin was very active with the CSPS (Canadian Ski Patrol System) and had taught avalanche awareness courses for them," says Bruce. "He was always interested in avalanches but never had the worker bee to do the fieldwork." Bruce was more than willing to take on that role, and the two began a long and productive relationship.

Bruce has been lucky enough to have two mentors in his academic life. The second is someone with an international reputation in the avalanche world – Peter Schaerer. They met while Bruce was working in Fernie, and he remembers well that first encounter. "Peter corrected my shovel test technique," says Bruce. "I thought, the bigger the shovel the wider the column. Peter set me straight." That lesson would prove to be the first of many. "Once I started my Master's, I turned to Peter for advice right away," says Bruce. "His vast experience and insight into snow and avalanches makes him an exceptional source of important information. I continue to seek his advice today."

Bruce's masters' research, partly funded by Alberta Recreation Parks and Wildlife Foundation, focussed on the strength of snow layers. He points out now that its real value lay in teaching him how to take a field study from concept to completion. "Planning and organizing the field work, analyzing the results, getting a paper published, making contacts in the avalanche world – I learned more about those aspects at that point than snow," he says.

Those lessons would serve him, and the avalanche industry well. After working as a research associate for a few years, his work attracted the attention of Mike Wiegele. Mike suggested teaming up to do avalanche research, and a new chapter began. Colin, Bruce and Mike put together a proposal to NSERC, the Natural Sciences and Engineering Research Council of Canada. NSERC is the main federal agency investing in university research in the field of natural sciences and engineering. In December, 1989 a new three-year avalanche research project was announced, funded jointly by Mike Wiegele Heli-Skiing and NSERC, and operating through the University of Calgary.

That three-year program was funded by a CRD grant – Collaborative Research Development. Four more CRD projects followed, with a growing list of backers. First Canadian Mountain Holidays (CMH), then the BC Helicopter and Snowcat Skiing Operators Association (BCHSSOA), and by 1992, Canada West Ski Areas(CWSA) and the CAA had all joined in to help fund the expanding research. Over the years, the helicopter and snowcat skiing sector would donate more than $1million, demonstrating an exceptional level of commitment to avalanche safety as well as a tremendous amount of respect for both Bruce and his research.

His work as a research associate was proving very rewarding and in 1992, he received an offer to undertake a PhD program. Intellectually, the prospect was exciting but financially, it wasn't so attractive. It would mean becoming a graduate student again, earning graduate student wages. During his Masters, Bruce and Julie had to borrow money to make ends meet. Bruce was now 40, with a mortgage. He felt forced to decline the offer.

Colin remembers the situation well. "The pay for graduate students was at that time – and still is now – a pittance. Bruce was a mature student and we needed to find a way to get an amount commensurate with his experience." Colin took a closer look at the funding arrangement for CRD grants and discovered that, while there was a ceiling to the government's contribution, the total could be topped up by industry. It was great news, but time was ticking. "This was in August," Bruce recalls, "way too late for September start up. But somehow it happened. He knocked on every door and pulled every string." After a flurry of activity, Bruce began his PhD studies in September, 1992.

Bruce on the commute home.

Photo John Schwirtlich

Money problems weren't the only thing on his mind at that time. In May of that year Bruce had become the president of the CAA, a position he held for the next three years. Sound nuts? It was. "In hindsight, I never would have taken the two on at the same time," he admits. "I was crazy busy." Bruce points to two people who helped him keep his sanity. "Jack Bennetto (Vice-President at the time) took on many roles that would have normally been done by the President," he says. "And for me, Julie earned sainthood during those years."

In 1995, Bruce completed his PhD and stepped down as president of the CAA. In addition to everything else, he had been taking courses to become a professional engineer, accomplishing that goal in 1996. By that time he was back working as a research associate with Colin Johnston, becoming an adjunct professor in 1997. In academic circles, the person who heads up a research project is called the Principal Investigator, or PI. When Colin retired in 1998, Bruce became PI, an unusual role for an adjunct professor. His star was definitely on the rise.

As PI, Bruce received two more three-year CRD grants for his research but, by then, he had a strong feeling "the odds were going down for receiving another grant of the same type." The need for more long-term funding was also pressing. He began exploring the possibility of an Industrial Research Chair, a program also under the auspices of NSERC. Industrial Research Chairs are prestigious appointments, and securing one would not be an easy task.

In the summer of 2003, backed by his industry supporters and the CAA, Bruce applied for a research chair position. He had prepared a proposal that included three projects designed for use by industry. But after the tragic accidents of that year, he added another one – working with the CAA and Parks Canada on a decision support framework for use by amateur recreationists. This project, still in progress, has a different flavour than his other studies. "My research is primarily of importance to industry, with spin-off for the public," Bruce explains. "This project contributes directly to improving public safety."

The projects were accepted for review and, in November of that year, Bruce attended a high-level meeting with NSERC and University representatives, industry supporters and independent reviewers from around the world. The one-day meeting would determine if his proposal was sound – in terms of research, funding commitment, and cooperation between industry and the University. "It's a wonderful process," says Bruce. "The NSERC philosophy is visionary in terms of looking ahead to what Canada needs in research and the way they direct funds."

Within weeks NSERC had committed its support. A few months later, the University created a tenure-track position for Bruce, making him an associate professor and eligible to accept the position as Industrial Research Chair. He began that new role in September, 2004. The official announcement took place in November of that year, celebrating an innovative and progressive partnership between NSERC, the University of Calgary, the CAA, and the skiing sector.

Now, as he settles in to the next phase of his academic career, Bruce is looking forward to continuing his close working relationship with industry professionals. His research has contributed greatly to Canada's international reputation, and he intends to maintain that standard. He also enjoys the continued collaboration with people in the field, who put his theories in to practice. "I learn so much from the exchange of ideas," he says. "We need to keep communicating our understanding of snow and avalanches, especially when the different languages of practitioners and researchers present challenges."

Japanese Avalanche Network

BY IAN TOMM

During the spring of 2000, Asuza Degawa of the Japan Avalanche Network (JAN) approached the CAA for assistance and support in his pursuit to bring professional standards of communication, training and practice to the Japanese mountain community. Shortly thereafter, the CAA's Board of Directors approved the use and translation of the CAA Observations Guidelines and Recording Standards in addition to giving support to develop and implement standardized training programs. Since that time much has been accomplished and the momentum is building for the JAN. While they are up against considerable barriers, primarily cultural in nature, positive change is starting to take place.

Japan's geographic area comprises some 380,000 km^2 spread over roughly 6,000 islands. Seventy-five percent of the land mass is considered mountainous. The Japanese Alps are an impressive range rising more than 3000 m in only 50 km from the western coastline. They give new meaning to orographic lift. Mt. Fuji is the highest peak in Japan weighing in at a hefty 3,770 m. Japanese snowfalls are what dreams are made of in most parts of the world with five metre snowpacks the norm and one ski area, Arai, reliability ending most seasons with 10 m of settled snow on the ground. As Nori, one of our interpreters and instructors put it, "You start the season with trees on the ground and by the end it's wide open slopes because all the trees got buried."

To paint a picture of the Japanese mountain community, consider a country of 127 million people, of whom 30 million live in mountainous environments. To put that into perspective, that's slighter smaller than one-third the size of the province of BC and BC's population is only four million people. Skiing and snowboarding are alive and well in Japan with a staggering 600 ski areas, more than 200 being large resorts[1]. Many mountain towns have several ski hills in the area to choose from. Backcountry skiing is primarily restricted to valley bottom cross-country skiing, spring ski mountaineering and a very small and generally cautious community of mid-winter snowshoers, snowboarders and ski tourers. Traditionally, travel in the mountains for the Japanese has had a spiritual focus, with the journey taking precedence over ski quality. There is a growing sector of youth, however, who are now venturing out into the backcountry mid-winter and riding lines that make Alaskan big mountain riding seem tame. This is the future of Japan.

Students heading out for the day on a Level 1 course.

Photo Ian Tomm

Guiding is prevalent, albeit somewhat disorganized nationally and lacking a standardized training and certification program. They also seem to be prone to frequent disagreements as to which, out of the 50-odd guiding organizations, is actually the IFMGA-recognized body. Certified guiding in Japan is worthy of a whole new article so I won't expand upon it here in the context of avalanche training and the CAA's involvement, but it, too, is changing with a very recent push to unite all guide organizations across Japan under one umbrella. It is my understanding our friends and colleagues at the New Zealand Mountain Guides Association are assisting with this transition.

The Japanese are proud craftsman and this goes for electronics through to woodworking and structural engineering. The government has poured incredible amounts of money from the national budget into highways construction and management, but there are no active highway avalanche safety programs in place. Most avalanche terrain affecting roads and communities has been engineered with snow fencing, diversion barriers and other construction projects to eliminate avalanche hazard, or so the government thinks. However, there are cases where there is a somewhat different picture in reality.

Understanding the Japanese culture, more specifically its safety culture and how it interacts with the commercial skiing industry, is a daunting challenge to a visiting westerner. Ski area operators consider themselves transportation businesses only with little regard to continued area development beyond that of the lifts. Skiing is limited to on-piste skiing, and they mean it. All terrain not designated as a run, including under the lifts and all tree skiing, is perceived as being too dangerous to the public and is off limits at most ski areas. This is culturally unique to Japan and contributes greatly to the wonder of the people, but it is the reason for the limited use of backcountry terrain and any desire to open and manage avalanche-prone terrain within ski area boundaries. In terms of avalanche hazard and risk management the Japanese, in by far the majority of cases, practice total avoidance over forecasting and active management.

Times are changing and if you visit Japan bring your snowshoes. Backcountry touring is about snowshoeing in Japan with the minority of backcountry travelers on split boards or skis. In fact, the Japanese way of ski touring is to put your skis on your pack and walk up using snowshoes. As you can imagine, this technique is somewhat limiting. While back home at Rogers Pass we're dealing with moguls on the traditional powder lines, entire ranges of the Japanese Alps with snowfalls bordering on outrageous remain untracked all season[2].

[1]No this isn't a typo.

[2]You don't know how hard it was to write that sentence. Forget what you just read.

Avalanche Training in Japan

For the most part there is little in the way of structured avalanche training for the public or professionals in Japan. Those interested in getting training have typically gone abroad to New Zealand, Canada or the US but, as can be expected, language barriers and the lack of Japanese language publications to date have made the transfer of knowledge limited at best.

In 1995 a new ski hill had an avalanche accident soon after opening. While details are somewhat limited the avalanche event affected people and lift operations. Immediately after this accident the regional resort association started a very basic avalanche awareness program for its patrol teams as a token gesture to show they were genuinely interested in avalanche safety. It was classroom-based only and fizzled out after a few years. There was little upper management support for it, or interest from the ski patrol for that matter. Ski patrols have next to no avalanche training and those that do have usually received it in another country as mentioned above. A few, leading-edge ski areas are starting to use modified fireworks for stability testing but still maintain little in the way of avalanche awareness or rescue training for their staff. This is particularly interesting to me, as with the sheer number of ski hills in Japan one would think there would be a well-established and healthy ski area avalanche management profession.

A mountain hut in the Japanese Alps.

Photo Ian Tomm

Mountain and avalanche rescue services are not performed by patrollers and are the jurisdiction of local authorities, all of whom have little in the way of avalanche awareness training. During my short two-week stay I heard several stories that would alarm even the most seasoned rescue professional.

As mentioned above, mountain guiding in Japan is an interesting story in and of itself. In terms of avalanche training for guides, there is currently a somewhat under-subscribed five-day awareness program, held intermittently in Hokkaido prefecture. It is almost entirely classroom-based with little field travel, let alone snow profiling and advanced avalanche risk management and decision making skills.

The Japan Avalanche Network (JAN)

Enter Asuza Degawa. At 43 his background in the skiing industry is nothing short of impressive. His experience ranges from racing and film making to editing publications for the Japanese skiing community. He has traveled to many places around the world including heli-skiing in Alaska, cat-skiing in Canada and much time spent on the slopes in Europe. Currently he is the editor of several Japanese skiing publications including the national ski area guide, the Japanese edition of *Powder Magazine* and creator and manager of the Japanese Avalanche Network. A kind, generous and highly motivated man he is the sole driving force in Japan to unify the Japanese avalanche community and bring standardized communication (CAA OGRS), training and certification (CAATS) and avalanche forecasting and active management practices to the country.

Projects so far include the translation and publication of the following materials:

- *Free riding in Avalanche Terrain*, by Bruce Jamieson
- *Staying Alive in Avalanche Terrain*, by Bruce Tremper
- CAA *Observation Guidelines and Recording Standards for Weather, Snowpack and Avalanches* (OGRS)
- CAATS Level 1 Ski Operations Manual
- CAATS Level 1 Overhead Set
- JAN's Snow & Weather Observations Field Book (based on CAA field book)

Of note in this impressive list of achievements in the past three years are the translations of the CAATS Level 1 Ski Operations Manual and Bruce Tremper's excellent book, *Staying Alive in Avalanche Terrain*. There are few in Japan better versed in international literature, as well as best practices and standards in avalanche safety and management than Degawa. He has a thorough understanding of the phenomenon and the subtle intricacies of working with avalanche hazard. Furthermore, Degawa represents the single greatest communication link between the Japanese mountain community and technical observation standards and training in Canada and abroad. Technical translation of the OGRS and CAA Level 1 Manual was no easy feat. When asked how hard the translation projects were Degawa shakes his head, smiles and says calmly "It was very difficult." Straight-across translations never work as each language has subtle differences in grammatical structures that dictate contextual meaning. From working in Japan and talking with Degawa and his translators I had a strong sense that it is an order of magnitude more difficult when translating technical concepts, such as those used in the CAA OGRS, into Japanese. For example, in Japanese script avalanche is written with four different characters

meaning rain, snow, mountain and collapse. Together they mean "nadare" or avalanche, but you only know that if it's written and used in the right context.

It has been a challenging road for the JAN team but things are changing. The CAA held its third Level 1 Ski Operations course in four years this January. This year's course marked a departure in the student body from previous years and included a cross-section of students much the same as is found in Canadian Level 1 courses, though the mean age was about eight years older. This level of avalanche education is starting to attract Japanese guides, advanced recreationists and, most notably, Japanese pro-snowboarders who are very highly regarded within the riding communities. There were 17 students on this course and all passed with flying colours. In the three courses run to date there have been 53 students with an overall pass rate of 95%, very similar to Canadian courses.

The in-class sessions in Japan involve a lot of technology.
Photo Ian Tomm

SPIN - Snow Profiling Information Network

JAN is truly an organization with vision. Their most recent project was the development of a data-information exchange network for the public and professional avalanche community. The website, accessed through the JAN website, has volumes of snowpack data from around the country submitted by JAN members. Profiles are available in graphical as well as field book displays and, at the press of a button, locations are linked to an online GIS mapping system so you can see exactly where the profile was dug and/or observations taken. The online maps are at a resolution of 1:25,000 and 10m contour intervals so all combined it's an incredibly valuable and powerful data exchange program. Only Level 1-certified or grandfathered members of JAN with demonstrated profile and observational skills are able to submit data to the website. Anyone can view it for free, however, and that is the key feature. When I saw it, I wished Canada had something like it.

Japanese Level 1 Class of 2005.
Photo Ian Tomm

Japanese Weather Forecasting and Information Systems

The Japanese weather information infrastructure is nothing short of award winning. Combined with the proliferation of technology in the country and the fact that common cell phones are better equipped than most North American home computers, the weather information services, all run by the federal government, provide easily accessible and extremely detailed weather information to users. Forecasts and weather maps are updated hourly, including actuals, and all of this information is available in graphical form on your cell phone including most mountain areas and backcountry destinations[3]. Mr. Tonouchi Michihiko is a senior manager with the Japanese Weather Data Network and wrote the weather section for the JAN/CAA Level 1 Manual used in Japan and also teaches the weather lectures on the Level 1 courses held every year.

In Summary

There is much more to tell about JAN and the efforts of Azusa Degawa and it is my hope that in the next few issues of *Avalanche News* I may be able to relate some of them. One thing is for certain – the JAN initiative is picking up speed and the CAA is an integral part of it. We are currently starting discussions for the development of a JAN Level 2 program, potentially involving students coming to Canada for the course, in addition to a whole host of other projects all centered on education and awareness in Japan. The CAA is proud to be a part of this initiative and we look forward to a strong and long-term relationship with the Japanese.

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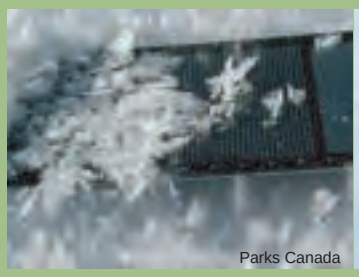
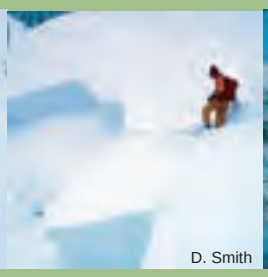
[3]Cell phones are enabled with high speed, full-graphic interface web browsers. The detail of pictures is impressive, although completely in Japanese so an interpreter is needed.

CAA 9th Annual CPD Seminar


Parks Canada


Parks Canada


D. Smith


D. Smith

Continuing Professional Development in support of Avalanche Professionals in Canada

8:30 am to 5:00 pm - May 6, 2005: Penticton Convention Centre

Professionalism at a Crossroads: *Science, Technology & Common Sense*

A full day of ideas and discussion on risk in the avalanche workplace and how science, technology and common sense are contributing to the evolution of safety culture.

Robert Lee

Assistant Professor, U of C Faculty of Medicine

What is Risk?

What are ways of managing risk, and what are the cost implications and tradeoffs? An overview of how risk is managed in other industries and professions and what the avalanche industry can learn from these views.

Bruce Jamieson

NSERC Research Chair in Avalanche Risk Control, U of C

The Evolution of Occupation Risk Control

A look at one operation's experience with developing a safety culture. We'll examine such concepts as staffing, safety training, standard operating procedures, safety meetings, safety equipment, the debriefing of near misses and the importance of employee buy-in.

Ian McCammon

NOLS Instructor and Researcher

Heuristic Traps in Decision Making

Previous studies have shown that a number of heuristic traps characterize many recreational avalanche accidents. In this presentation, we'll look at the origins of these traps, and see why even the most experienced and well-trained decision makers will find them difficult to avoid. We'll wrap up by looking at ways to minimize these biases.

Fracture Mechanics and You

Recent field studies and theories of avalanche release are converging on a radically new view of snow stability based on fracture mechanics. In this presentation, we'll see why traditional stability assessment methods sometimes fail to predict dangerous conditions, and how principles of fracture mechanics can be applied in the field to make better evaluations of slope stability.

Pascal Haegeli

Avisualanche / ADFAR Project Manager

The Future of Rule-Based Decision Making

This presentation will focus on how people evolve from beginners to experts and how rule-based decision methods can be used to facilitate this learning process. It will also identify that professionals generally operate at a much more sophisticated level, particularly in respect to snowpack analysis and terrain knowledge, where simple rule-based methods would not lead to better decisions. However, there are aspects in professional decision making, such as human factors, where these methods could lead to improvements in safety.

Additional presenters to be announced.

Potential topics to include: Dealing with Complexity, Culture of Near-Misses, The Challenges of Safety Program Development & Implementation

canadianavalancheassociation

Hosted by the CAA Education Committee and the CAA Training Schools.

When: 8:30 am to 5:00 pm May 6, 2005
Where: Penticton Convention Centre Penticton, BC
Cost: $60.00 CAA Members
$120.00 Non-members

10% early bird discount for pre-ordered tickets, Offer ends April 22.

Tickets on Sale April 1, 2005. For more information contact the CAA @ (250) 837-2435

Events Schedule

April 11-14, 2005

Western Snow Conference 2005: Exploring New Frontiers in Snow Hydrology – 200 Years After Lewis and Clark.

The North Continental Area of the Western Snow Conference is hosting the 73rd annual conference in Great Falls Montana. This year, special emphasis is being placed on new technologies in the field of snow science, especially remote sensing.
Where: Heritage Inn, Great Falls, Montana
Info: www.westernsnowconference.org
Contact: Gerald Beard, North Continental Area Chair: jerry.beard@mt.nrcs.usda.gov

April 23-27, 2005

Mountain Rescue Training Seminar

Three days of hands-on learning and open discussion with some of the most experienced mountain rescue workers in the world. The focus will be on the latest techniques and methods in searching for avalanche victims and lost skiers by helicopter, crevasse rescue with tripod, and long-line rescue.
Where: Blue River, BC
Contact: Call Margot Venema (250) 673-2464 or e-mail mvenema@wiegele.com

April 24-29, 2005

European Geosciences Union General Assembly

As part of the Natural Hazards and Cryospheric Sciences program, there will be two sessions on snow avalanches at this year's meeting. The focus of these sessions will be 1) snow cover and avalanche formations and 2) snow avalanche dynamics and risk assessment. The deadline for pre-registration is April 8, 2005.
Where: Vienna, Austria
Info: www.copernicus.org/EGU/ga/egu05

May 2-6, 2005

CAA Annual General Meeting and Spring Meetings

Come join your colleagues and help shape the future of the avalanche patch. There will be a full day dedicated to the InfoEx as it changes to meet new challenges. The Annual General Meeting will take place from 1:00 - 5:00 pm on Thursday, May 5 at the Ramada Inn Ballroom. Friday is CPD day. This year's theme is Professionalism at a Crossroads: Science, Technology and Common Sense – a full day of ideas, discussion and debate on the avalanche profession in Canada and abroad.
Where: Ramada Inn, Penticton, BC
Contact: Call Evan Manners (250) 837-2435 or e-mail: em@avalanche.ca.

May 4, 2005

Canadian Avalanche Foundation Annual General Meeting

Where: Ramada Inn Ballroom, Penticton, BC
When: noon - 1:00 pm
Info: www.avalanchefoundation.ca for more agenda details.
Contact: Call Mary Jane Pedersen (403) 678-1235 or e-mail: info@avalanchefoundation.ca

May 5, 2005

Canadian Avalanche Centre's First Annual General Meeting

All CAA and CAF members are invited, as well as any interested member of the public. The agenda includes the approval of the Centre's founding constitution as well as an election for the Board of Directors.
Where: Ramada Inn Ballroom, Penticton, BC
When: 10:15 am - noon
Info: www.avalanche.ca for more agenda details.
Contact: Call Evan Manners (250) 837-2435 or e-mail: em@avalanche.ca

Events Schedule

May 6, 2005

CSGA General Meeting

Where: Silver Star Mountain, Vernon, BC
Contact: Call Margot Venema (250) 673-2464 or e-mail info@canskiguide.ab.ca

May 7, 2005

BCHSSOA Annual General Meeting

Where: The Vernon Room, Prestige Inn, Vernon, BC
Contact: Call Andy Spencer (250) 542-9020 or e-mail helicat@bchssoa.com

May 9-12, 2005

CWSAA 37th Spring Conference and Trade Show

Where: The Grand Okanagan Lakefront Resort & Conference Centre, Kelowna, BC
Contact: Call Andy Spencer (250) 542-9020, or e-mail office@cwsaa.org

June 10-12, 2005

CAF Golf Tournament

Tee off June 10th at the Canadian Avalanche Foundation's "Welcome to Summer Golf Tournament" in Kimberley, BC. Tournament guests will enjoy two nights accommodation at the Trickle Creek Residence Inn, a round of golf at the Trickle Creek Golf Resort and one round of golf at the Bootleg Gap Golf Course. All breakfasts and lunches, opening night reception, silent auction & banquet on the Saturday evening are included.
Where: Kimberley Alpine Resort, Kimberely, BC
Info: Download a registration package at www.avalanchefoundation.ca or contact the CAF office (403) 678-1235 for registration by April 30, 2005.

October 5-8, 2005

SAR*SCENE* 2005

The 14th annual Search and Rescue Workshop is organized by the National Search and Rescue Secretariat and the PEI Emergency Measures Organization. Don't miss the games, workshops, tradeshow and search and rescue demonstrations. Early registration deadline is August 31, 2005.
Where: Charlottetown, Prince Edward Island
Info: www.nss.gc.ca
Contact: Call 1 (800) 727-9414 or e-mail: sarscene2005@nss.gc.ca

October 28-30, 2005

12th Annual Wilderness Risk Management Conference

Held annually in the fall, the WRMC strives to educate wilderness practitioners on risk management and practical safety skills. We share field and administrative techniques in risk management, and work together to influence risk management standards in the wilderness adventure and education industry.
Where: Salt Lake City, Utah
Info: http://wrmc.nols.edu
Contact: Call Cheryl Jones (307) 335-2210 or e-mail: wild.risk@nols.edu

the caa second annual photo competition

categories

Events and Occasions: Best image of gatherings or a little bit of dirt on a member.

CAA Members at Work: Best image of people working in the avalanche patch.

Avalanches: Best image of the white dragon itself!

People's Choice: Best overall image selected by the membership at the AGM. All entries will be submitted automatically.

prizes

There will be awards (first place, second place and special mention) in each of the four categories listed above.

1st Place: Marmot Sawtooth Sleeping Bag

2nd Place: Deuter Guide 35+ Backpack

rules

Entries: The CAA Photo Contest is open to all members of the CAA.

Entry Deadline: Entries must be received by April 22, 2005.

How to Enter: Each person may submit up to a maximum of three (3) images. Only one entry form is required per submission. You must be able to supply a signed release from any person(s) appearing in the photograph, but do not send with submission.

Specifications for Accepted Formats: 35mm slides (transparencies), unmounted prints up to 8 x 10 inches and high resolution digital (300dpi or 1200x900 pixels minimum). Digital images must be from original work. No digitally altered images will be accepted. Images must be JPEG, TIFF or RAW format only; no other formats will be accepted.

Identification: Each participant must fully complete entry form provided. Please identify the top of each image.

Publishing Agreement: The CAA reserves the right to reproduce and or publish (in print and on the CAA website) for various not-for-profit uses supporting educational and public awareness efforts. Photographer will be credited with caption on any images used.

Return of Images: If you want your images returned, you must include a self-addressed stamped envelope with sufficient Canadian postage (stamps only). We can not return submissions which are accompanied by US or other international postage.

Responsibility: The CAA will take due care in handling all entries. However, the CAA is not responsible for any loss or damage to entries, regardless of the cause, or for any delays in receipt of entries.

Judges: Images will be judged in terms of their appropriateness to the category theme, creativity and technical quality. Decisions of the judges are final.

Winners: Contest entrants may only be awarded one first place prize. For example if you win first place in "avalanche" category then win first place in the "people's choice" award at the AGM you must relinquish your first place in the "avalanche" category. Prizes will be adjusted accordingly.

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entry form must be fully completed for entry into the contest

Name (please print) _____

Address _____

Telephone _____ Fax _____ Email _____

I understand and agree to the rules of this photo contest.

Signature _____ Date _____

photograph details for each photo submitted, please provide the following information: **title, category, photo location**

mail in entries Photo Contest, Canadian Avalanche Association
Box 2759
Revelstoke, BC V0E 2S0

email entries publish@avalanche.ca

GAZ-EX News Release

BY KARL ERNST

Dear Clients,

Avatek Systems Ltd. of Vernon, BC is pleased to announce a change in ownership of the manufacturer of the well-known GAZ-EX Avalanche Control System.

After 30 years of activity in the ski and avalanche control sector, Mr. Jakob Schippers decided to sell his companies TAS (Technologie Alpine de Sécurité) S.A. and Schippers S.A.. The buyers are a French-Italian group with extensive experience in the supply of mountain safety equipment.

The new company is called Montagne & Neige Development and is headed by:

- MR. XAVIER GALLOT-LAVALÉE, CEO
  Managing Director of M.B.S.company, specializing in safety and protective material for mountain areas.
- MR. ERNESTO BASSETTI, Commercial Manager
  CEO of Obiettivo Neve company and representative of TAS for 20 years
- MR. AGOSTINO GUARIENTI, Technical Manager
  Avalanche Consultant and Civil Engineer

Avatek Sytems Ltd. and Karl Ernst, who have represented the CATEX and GAZ-EX products since 1985, are pleased to continue their affiliation with the new owners.

Some of the new owners are planning to attend the Snow Trade Shows and meetings during the coming year and look forward to meeting the ski and avalanche community in Canada and the U.S.A.

Thank you for your continued interest in existing and new products.

Yours truly,
Avatek Systems Ltd.
Karl Ernst
President

GAZ-EX Autonomous Exploder

BY KARL ERNST

In answer to demands from industry, GAZ-EX has come out with a new addition to its preventive avalanche release system. The Autonomous Exploder is a self-contained alternative to the classical GAZ-EX installation (exploder, pipeline and shelter). The Autonomous model is ideally suited for isolated slidepaths without any or very short pipelines.

Technical Data:
1 or 2 exploders per chest from 0.8m^3 to3m^3 (Standard or Inertia).

The autonomous chest contains all tanks and valves including 30m^3 of oxygen and propane bottle.
1 – 0.8m^3 exploder = 60 firings
1 – 1.5m^3 exploder = 30 firings
1 – 3m^3 exploder = 15 firings

The autonomous chest is designed to withstand natural snow forces of 4,000 kg/m^2.

The 2 main components (exploder and chest) are designed to weigh not more than 740 kg, which can be lifted by an A-Star B2 or a Bell 407 helicopter.

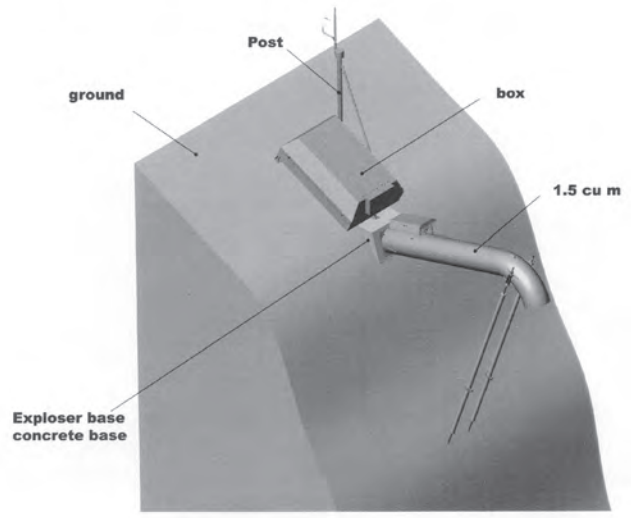
The explosion can be initiated via buried cable control or radio controlled system with a seismic sensor.

Powder Free (no explosives, no fuses) safe operation.

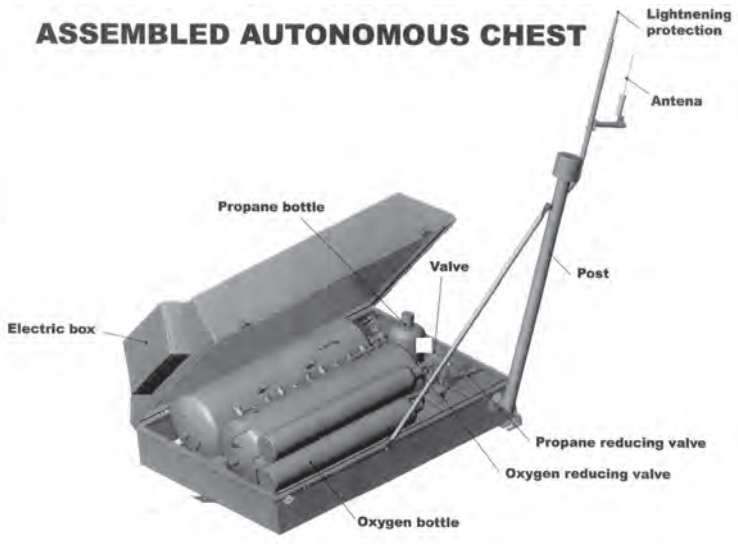
0.8m^3 exploder = 5 – 7kg explosives equivalent
1.5m^3 exploder = 9 – 12kg explosive equivalent
3m^3 exploder = 18 – 15kg explosive equivalent

For further information, please contact: Avatek Systems Ltd. Vernon, BC
Phone (250) 542-4176 / Fax (250) 542-2263 / e-mail avatek@250net.ca

Autonomous 1.5 cu m standard exploder



ASSEMBLED AUTONOMOUS CHEST



New Instructional DVD

BY ALAN JONES

The Friends of the Utah Avalanche Center in Salt Lake City recently produced a new avalanche awareness video in DVD format. This DVD is about 18 minutes in length and contains some remarkable footage of skiers, snowboarders and snowmobilers getting caught in avalanches. This footage is set to a good soundtrack and is of very high quality. Many of the outtakes are professional-quality footage and are courtesy of the folks at Teton Gravity Research, well known for their films of modern skiers testing the boundaries of the steep Alaska-style freeriding. The DVD also includes footage of avalanche rescues, interviews with avalanche survivors, and interviews with avalanche experts. The DVD is both entertaining and educational, and should be included in any avalanche educator's video library.

The folks at the Utah Avalanche Center have been kind enough to provide this DVD to the Canadian Avalanche Association free of charge for educational purposes, and are happy to see it distributed widely to other avalanche educators. The CAA has reformatted this film into three formats. In order of decreasing quality and size they are: the original DVD; high resolution .mpeg4 format for Quicktime Player; and low-resolution .avi format for Windows Media. These videos are now available from the CAA for a nominal cost to cover reformatting, production, shipping and handling services. If you'd like a copy of this video, please contact Brent Strand at publish@avalanche.ca or by phone (250) 837-2435.

Automatic External Defibrillators

BY ANDREW TAIT, HELM SAFETY TRAINING

An Automatic External Defibrillator (AED) is a small, lightweight device used to assess a person's hearth rhythm. If necessary, it administers an electric shock to restore a normal rhythm in victims of sudden cardiac arrest. They are designed to be used by people without medical backgrounds. Anyone trained in CPR can be trained to use an AED.

When someone suffers a sudden cardiac arrest, CPR alone is effective about 2% of the time. The remainder, 98% of victims, require defibrillation within 3-8 minutes to effect survival. In urban settings, EMS response times are 5-15 minutes. In rural to remote areas, it could be 30 minutes to hours. The need for AED's is evident.

The new, third-generation of AED's now available incorporate some of the most advanced technology available in the treatment of sudden cardiac arrest. They are not only extremely easy to use, they also perform self-diagnostics daily, weekly, and monthly to determine the status of the unit and its pads. Most older units test readiness only upon deployment – not a great idea!

As with any portable electronic safety device, battery reliability is an issue. There are a number of models out there powered by "D" cells, which can be difficult or slow to replace. A few of the new models have one large sealed battery, accessed by a much easier snap in/snap out system. Battery expectation should be a minimum of four years (attainable through lithium). If the batteries are difficult or slow to replace, the unit should be replaced by a snap in/out system. This, combined with the daily diagnostic, eliminates 99% of reliability issues.

Professional models allow automatic, semi-automatic, and manual responses, all with the press of a button. In the automatic mode, the AED recognizes different heart rhythms and makes the shock/no shock decision. The manual mode allows trained medical personnel the option of making that decision themselves. Having an AED that can be used by EMR's, EMT's and paramedics offers more flexibility with less infrastructure. The new software also allows hardcopy ECG's to be downloaded after a rescue, as well as various animation mode options.

Training consists of a four-hour course with your local first aid instructor. Many AED's are already in use at larger fire departments, police and constable services, ski patrols, airlines, sports centres and arenas. AED's are an important component in today's rescue environment, and will one day become as common an item as a trauma kit or wall-mounted first aid box.

Andrew Tait is a registered Emergency Medical Responder. He has worked for the Alberta Forest Service, Alberta Parks, Parks Canada Warden Service, Canadian Ski Patrol System, and volunteer fire departments. He's currently a trainer with his own company, Helm Safety Training. He is also a part-time personal trainer.

Mammut Recalls Most Recent Series of Barryvox Avalanche Transceivers

Tension cracks may appear in the red plastic casing of some of the Mammut Barryvox Opto 3000 avalanche transceivers produced for the winter 2004/05. Despite these cracks, the device functions properly under normal circumstances. However, it can not be completely ruled out that moisture may penetrate through these cracks und potentially impact the correct functioning of the device.

Only a small number of units from a specific case delivery is affected by this manufacturing error. To avoid any risk for the user, Mammut Sports Group AG has, nonetheless, decided to recall all the devices of the production series in question and remove them from the market as a precautionary step. Returned units will immediately be replaced with properly functioning new units. Mailing costs will be refunded.

Devices with the following serial numbers are being recalled:
M0080000 – M0088419
M0089616 – M0089800
M0090000 – M0090419

The units came on the market in August 2004 and can be identified by the included interactive training CD. On the outside of the box it says "Includes Bonus CD / Barryvox interactive Training." The serial number can be found inside the battery compartment under the bar code. All devices that were bought prior to August 2004, which were sold without the bonus CD, have different serial numbers and are working properly and are not subject to this recall.

The quality of the plastic was corrected immediately after the problem was detected. All devices produced with the new plastic have a red sticker on the box reading: "new case." These devices were produced after the faulty series and are also not subject to the recall. Mammut Sports Group AG has set up a hotline at +41 (0)62 769 81 99 which is open Monday through Friday from 9 a.m. to 6 p.m. Central European Time.

Return address for Canada is:
Uvex-Toko Canada UTC
180 Industrial Parkway North
Aurora, Ontario L4G 3H5

Battery Problems Reported with Ortovox M2

Earlier this winter, e-mails from both Canada and the US were circulated, describing a problem with the Ortovox M2 transceiver and its battery connections. The issue concerns the possibility that after the unit receives even a moderate blow, some smaller-sized batteries may shift position within the transceiver, causing it to shut off. It appears that AA batteries vary in size, and using smaller ones could lead to this very serious problem. One e-mail recommended using "the most robust AA batteries you can find," ensuring they are wide, long and with large terminal ends.

When asked about this problem, Ortovox's chief designer Franz Kroll sent this message: "We take this information serious and we would like to do a detailed investigation in our labs! We already know about different battery sizes on the market and usually this is compensated by the carefully design of the battery compartment. Nevertheless there may be batteries on the market which may not comply to the battery standard." In order to "get more and precise information," Kroll is requesting any transceivers that had experienced this problem be sent to back to Ortovox. The address for the service centres in Canada and the US are below.

Ryan Johnstone of Ortovox Canada said, to date, he had not received any complaints about this issue. Although his office provides all new Ortovox transceivers with Energizer batteries, he said "we're not really in a position to recommend any particular brand of battery." But he does give some battery advice to users. "We tell our customers to use only alkaline batteries, never rechargeable or lithium." The trouble with those types of batteries, he explained, is that they don't lose power on a steady curve. "They can show a very high output in the morning and by noon be stone dead." Alkaline batteries, on the other hand, lose power at a much slower and steadier rate, allowing the user to identify when the battery is getting weaker.

ADDRESSES:
Ortovox Canada, 4610 Bowness Rd. NW Calgary, AB T3B 0B3
Phone: (403) 288-8944, fax: (403) 283-8446, e-mail: ryan@ortovox.ca

Ortorvox USA, 455 Irish Hill Road, Hopkinton, NH 03229,
Phone: (603) 746-3176, fax: (603) 746-6360, e-mail: ortovoxusa@aol.com

An Almost Perfect Day

BY THOMAS EXNER

At around 5:30 in the morning my girlfriend Jacqui and I drank our morning tea while gathering our tools and crampons in preparation for our last climb of the season. I was visiting her in Canada for the second time that season and had already spent a few weeks in the Banff area prior to that day. Our objective was Professor Falls. A nice classic, mellow ice route with a great reputation, it would be the first time climbing it for both of us.

Every time we ventured out in the mountains we put a considerable amount of effort into planning. Most of the time we would gather all the information available to us, such as checking out the avalanche bulletin, analysing weather maps and talking to the public safety wardens. This was the only day we didn't do our usual homework. We were familiar with the local conditions and comfortable with our decision relying on the information we had. We didn't know that by not calling the safety warden we were missing crucial information. That decision almost cost us our lives.

That morning we rode our bikes along the long approach until we could not take them any further. Professor Falls is located on the north side of Mt Rundle, a popular climb with close proximity to Banff. As we rode along on that chilly morning, I remember discussing the weather and the frost on the ground. This was a good sign for that early March morning. We expected to finish the climb before noon when temperatures were going to get too high. Winter was starting to feel a little warmer by that time and signs of overnight freezing were encouraging to us. We wanted to climb the route a few days earlier, but a snowfall forced us to postpone our plans. It was now about four days since this last snowfall and we were the first party to start the climb that day.

Walking up the last metres to the climb we saw the first pitches in really impressive conditions. We were totally excited about the climb and the opportunity to spend our last day in the Rockies on such a nice piece of ice. Viewing the surrounding terrain from this point of view there is no obvious avalanche danger, although we knew the potentially dangerous slopes were way above. It looks more like a wonderful climb in impressive surroundings with minimum objective dangers. Everything seemed to be perfect.

Professor's is popular for a good reason. The approach leads along the Bow River, offering impressive views of the huge north face of Mt. Rundle and an area known as Trophy Wall, where some of Canada's hardest and most famous ice climbs can be found. Professor's itself consists of several steps of steep and fat ice, separated by flat bands and gullies. The first pitch, just a short walk off the Bow Valley trail, offers moderately steep and excellent ice squeezed in between two rock faces. The flat bands on top of each step provide comfortable belaying and offer good views above the Bow Valley.

"It was growing incredibly fast and I knew for sure – a huge avalanche will come right down over us."

When we started the climb we were just ahead of another party. It took us a while to get going on the the first pitch, but after warming up and getting a feeling for the ice everything ran smooth and we enjoyed the excellent ice pitch after pitch. At one point, somewhere near the middle of the climb, we met a solo climber heading down who seemed to appear out of nowhere.

As Jacqui arrived at the anchors after seconding the pitch before the last crux pitch, she continued ahead on the final horizontal ice section. Walking a rope length ahead of me, she and I moved together as we approached the final pitch. My eyes were focused on the crux pitch, anticipating these last metres of perfect ice. I was coiling up a few slings of the rope since I was walking a bit faster than Jacqui. Time-wise, we were doing pretty well since it was still well before noon. We were about to finish the climb soon, rappel down, and still have enough time to enjoy the afternoon.

Suddenly I heard a bang above me, forcing me to look way up over the huge rocky cliff several hundred metres above us. What I saw was shocking – a huge powder cloud. At first I thought it was too far to the right to reach us and tried to relax. Keeping my eyes on the cloud for a couple of seconds, I realized I was wrong. It was growing incredibly fast and I knew for sure – a huge avalanche will come right down over us.

I yelled to Jacqui who hadn't yet noticed anything. "Avalanche, go to the right!" She turned around to me with a frightened expression on her face. She couldn't see what was going on from her perspective and yelled with a fearful voice, "What should I do?

What should I do?" I told her again to go to the right and hold on.

Since the powder cloud was coming from the right, I hoped the little rocky cliff on the right hand side of the gully would provide shelter. I was positioned near the edge of the gully and jumped to the right under some slightly overhanging rock, getting out of sight from Jacqui and possibly seeing her for the last time. I tried to get into a comfortable position while trying to build some air space with my hands and arms in front of my head. Then I noticed a small tree just to the left of me. I ran around it once, wrapping the rope around its trunk. This would be the our only anchor.

I was sitting back pressed against the cliff and waiting – for the end? I remained surprisingly calm. I don't know why, because we would probably die. I can't tell how much time passed since I heard the bang. Maybe it was 10 seconds or maybe 30, I don't know. It seemed like an eternity. We did have enought time to communicate, position ourselves, run around a tree, reposition, and even wait.

At that moment I expected a huge shock wave which would probably kill us before the solid snow hit. I could see the enormous powder cloud quickly approaching the gully, gaining size and strength as it got closer. It was getting dark all around, stormy and loud like a huge snow storm with extreme winds. There was a heavy rumbling sound. I couldn't see what was going on.

There was no shock wave, we are lucky. But most likely the flowing snow would cover us with metres of debris. Then it became silent and light again. I couldn't feel any snow burying me, I was just covered with a thick layer of blown snow. I looked back down the gully. There was still snow flowing down into the main gully, totally blocking it. Most of the snow was funneled around us and managed to pile in the gullies behind us.

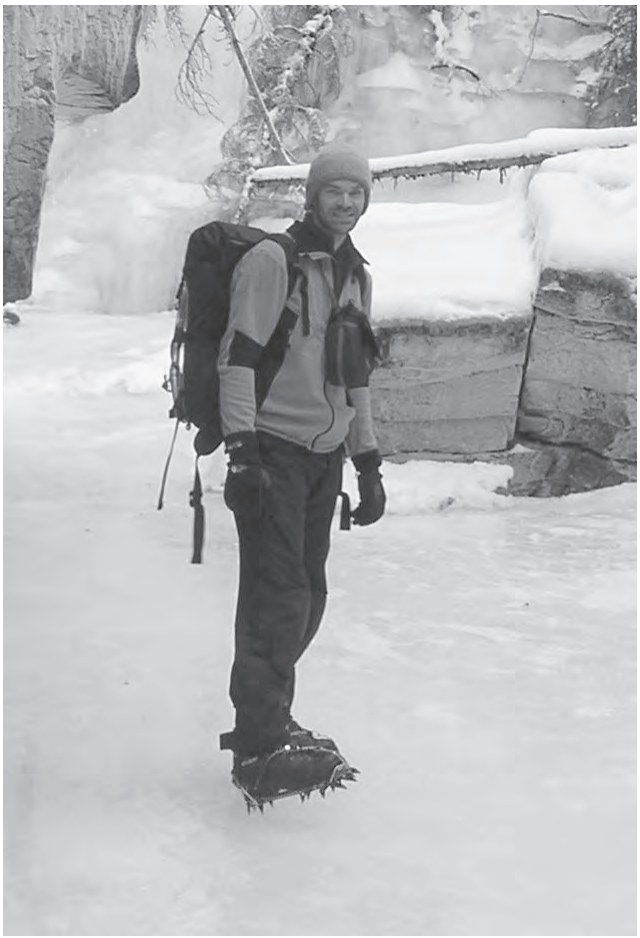
There must have been more than six metres of snow piled up just a few metres behind me. I waited a few more seconds until nothing was moving. I stepped forward, yelling for Jacqui. She was last located closer to the middle of the gully and I was scared, knowing her position and the massive amount of snow that just used our climbing route as a funnel. Then I heard her voice. She was a bit freaked out but fine, thank God. She told me later she had bruises on her knees and legs from clinging so hard to that little rock cliff.

We thought of leaving the gully to the side as quick as possible, fearing more avalanches to come. But there was still the other party below us and the solo climber. All three people would be not too far below us and we were suddenly overwhelmed with additional fears that they didn't make it. We turned our transceivers to search and went down the gully as quickly as possible. Jacqui used her cell phone to contact the Park Wardens, informing them about the avalanche and the possibility of three climbers caught.

The gully was totally changed. The middle part, where we were walking just minutes before, was deeply filled with avalanche debris. The smaller steps we had climbed were practically gone and one shorter pitch had totally vanished in the debris. We were able to slide down much of the gully before we came to some anchors to rappel the rest of the climb. Surprisingly, we saw the other party doing well and on their way up to look for us. They had kept a steady pace behind us for most of the climb, but luckily managed to lose some speed and just missed the many tons of heavy snow that might have killed them. The solo climber had passed them on his way down and was well out of danger.

We called the wardens again to report no one was caught but the helicopter was already on the way – almost Euro style. Later, the warden told us they were planning to sling us out since there was still snow in the start zone. The fracture line was about 150 m wide and averaged a half-metre in depth. The avalanche fell about 700-800 m, then hit flatter terrain where it probably lost much of its energy before it reached us. The debris piled up everywhere around us except the side of the gully where Jacqui and I were hiding. It was incredible, and eerie, to look around and see the snow piled in every direction except for the two places where we s tood.

We decided to rappel down together with the other party and finish this adventure quickly. At the top of the final pitch we met an American party on the way up, regardless of the powder cloud that had even reached the base of the climb where they had been standing. We really had to convince them not to continue, despite



Happy to be alive.

Thomas Exner Collection

the obvious clues of avalanche danger. It was already noon at this point and so warm that it was slightly raining.

On our way back to the car we could see the top of Mt. Rundle covered in clouds with strong winds. We observed a small slide on the steep cliff to the right of the climb. As we got back to Banff the skies were clearing a bit and the sun came out. It was really nice and warm just like nothing happened. In the safe shelter of a pub we reflected upon the past few hours and a mix of emotions came up in me. I was just too calm up there in the gully. I slowly started to realize what happened to us that morning and what a huge gift it was that we were still alive. All our guardian angels had a pretty busy day.

"It was incredible, and eerie, to see the snow piled in every direction except for the two places where we stood."

So what went wrong that day? Is it just a freak thing that happens, an acceptable part of being in the mountains? "Yes" would be a really discouraging answer. It would be difficult for me to avoid all climbs with possible avalanche risk above. This cannot be the answer. We tried to figure out what went wrong in our decision-making process that day.

We postponed the climb due to a snowfall with significant winds. On the evening before our last day in Banff we discussed the situation again. The daytime temperatures had been relatively mild but still below freezing overnight in the alpine, promoting a settling of the storm snow. Everything that hadn't avalanched already should not be triggered naturally. The hazard was rated considerable, focusing on sun-exposed slopes that might become dangerous due to daytime warming. We didn't expect any natural activity on north-facing slopes. To be on the safe side, we decided to start at the break of day to get off the climb before noon. Based on this information we decided it was safe to go for this climb.

We didn't know about the warmer temperatures at higher elevations, which might have been one reason for the release of such a big natural avalanche. The little storm just around Mt. Rundle put more drifting snow on the slopes above the climb, enough to trigger it. This new wind loading and the temperature inversion were hard to foresee, neither of which were forecasted. But the crucial information we missed was that natural avalanches occurred on all aspects the day before we went on the climb. This knowledge would have been a clear indicator not to climb Professor Falls that day and was easily available by a simple check with the Wardens. It was our mistake to not utilize all the information available to us.

The other factor in our mistake is less obvious. It was our last day in the area and we wanted to spend it on a nice, popular climb that neither of us had done. Looking back, I am pretty convinced that subconsciously this influenced our decision. We possibly would have made a different decision if there wasn't the subtle pressure to end our season with a classic climb of the Rockies.

In avalanche country, most of the time you have no way of knowing if your judgement matches the real conditions. You never know how close you are because most of the time there is no feedback. It's the feedback, though, that can sometimes be fatal. Going too long without any feedback might suggest that you always make the right decision. Looking back on the lesson from the Professor, I am happy that I experienced it. It brought me back to the ground. I might have been out in the mountains too long without any feedback. I am sure it could have been avoided and it wasn't just Mother Nature playing tricks on us. There were mistakes in our decision making progress. This sounds promising to me, because it can be improved.

Jacqui asked me once how I know whether it's safe or not. I told her you never really know. It's sometimes just a gut feeling. She was not amused by my non-scientific answer and responded with, "Great. Thanks," and kept skiing. The night before the climb that was so close to being our last, she suffered from great discomfort while sleeping and woke up with a troubled and unsettled feeling. At least we both know now what I was trying to say.

Thomas Exner was born in Garmisch-Partenkirchen, Germany. He earned his IFMGA Mountain Guide certification in Austria and holds a Masters degree in Meteorology from the University of Innsbruck. Recently, he's been working on his PhD at the Swiss Federal Institute for Snow and Avalanche Research in Davos. He currently lives in Jasper where he works as an avalanche forecaster at Marmot Basin.

Winter Weather Patterns in Western Canadian Mountains

BY DAVID JONES

Editor's note: *This article has been reprinted with the kind permission of our friends at the Mountain Equipment Co-op. It is one of a series of six website articles on avalanche awareness that were posted throughout the winter. Each article is on a subject relating to avalanche awareness, and written by a person chosen for their expertise in each field (including our own Alan Jones, coordinator of the CAC's public avalanche warning service). You can find the complete series at www.mec.ca.*

A meteorologist's motto says: if you can predict the wind direction, you can predict the weather. It's not quite that simple in the mountains or elsewhere, but given certain wind directions or 'flows', it is possible to generalize about expected weather. In addition to the direction, the strength of the flow, the source and stability of the air, and the topography are key factors in mountain weather.

To make a forecast, you need detailed knowledge of the topography because the most important questions regarding the future weather are:

- Is the flow upslope or downslope?
- Is the flow onshore or offshore?

In a storm, dynamic processes cause air to rise and cool, forming clouds and precipitation. Air in a storm encountering a sloping mountainside is further accelerated upward, causing heavier precipitation. On the downwind (lee) slopes the opposite process occurs: subsiding air dissipates the clouds and warms as it descends – the familiar Chinook wind.

Coastal BC Weather Patterns

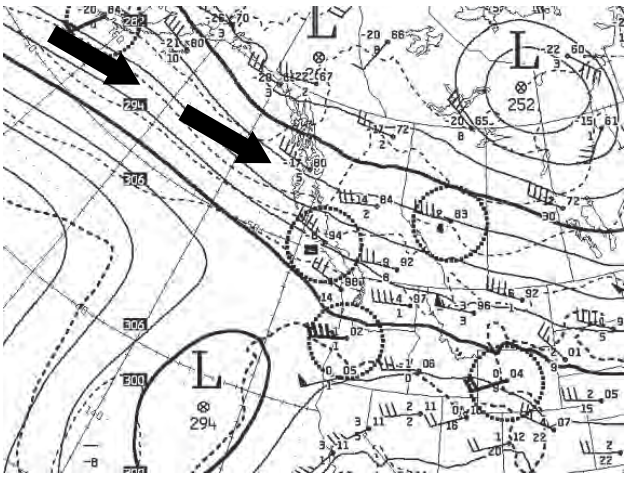
Across the mountains, the most common flows are from the west – a consequence of latitude. The 'Westerlies' are so-named, supplying abundant Pacific moisture that falls as winter snow in the mountains. The source of the air establishes the moisture content and thus the precipitation rate on the windward slopes. Onshore upslope flow of sub-tropical maritime air across the Coast Mountains unleashes monsoonal rainfall rates with enormous wet snowfalls in the high alpine. Conversely, an offshore downslope flow of continental air fosters sunshine downwind of the mountains.

What follows are some examples of the characteristic patterns associated with typical BC winter weather. The examples are from particularly dynamic and strong flows that produced intense storms. In this article the flow refers to the wind at 700 millibars (mb) (a unit of atmospheric pressure), a pressure which is roughly at the mountaintops or about 3000 metres above sea level. The flow is represented neatly by the orientation and spacing of what meteorologists call the height contours (a line on a map joining areas of equal elevation of the 700 mb pressure surface) on a '700 mb chart'. The area most affected by poor weather and storms lies within the closely-spaced contours. This 'packing' of the contours reflects the strength of the temperature contrast across the storm track or frontal zone: the stronger the temperature contrast, the stronger the flow and the greater the energy available for embedded storms (a storm in the strong flow) to exploit.

I hope this discussion and the examples provided give you a better understanding of how the 'flow' relates to winter weather in the mountains. When all else fails, go with the flow!

Characteristics of Westerly Flow:

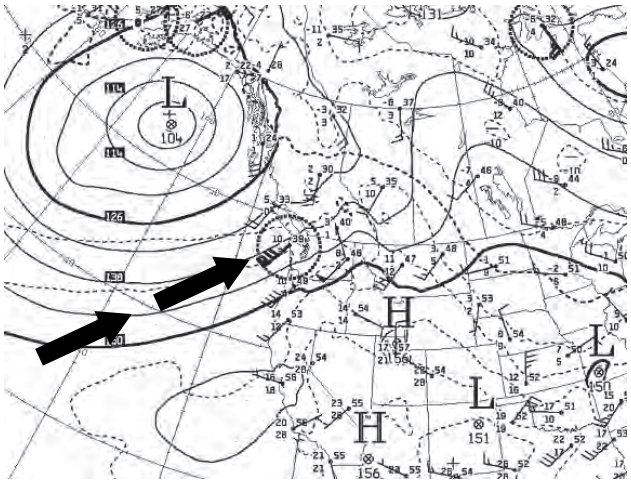
- Upslope flow and enhanced precipitation is greatest along north-south oriented ranges and especially at the convergent ends of west-east oriented valleys and inlets along the coast.
- Warm air cannot move northward in this flow so the freezing level remains relatively unchanged, rising only briefly with each approaching system before falling again on cold frontal passage. Warm 'noses' of air ahead of systems are sometimes pinched off entirely and slump southeastward, maintaining low freezing levels, while sustaining heavy accumulations of snow above 1000 to 1500 metres.
- Embedded storms are fast-moving and often followed by periods of rapid clearing that may last for a few hours but can persist for a full day. Timing of systems beyond day two is extremely difficult due to their rapid motion, so confidence in the forecast beyond day two is low. Satellite imagery shows smaller comma-shaped systems moving onshore followed by post-frontal cellular convective clouds (bright cauliflower shaped clouds) that form in the unstable air behind a cold front.



Westerly flow at 700 mb

Characteristics of Southwesterly Flow:

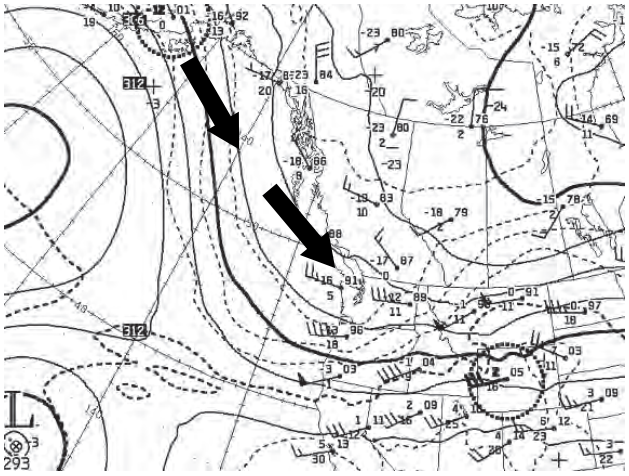
- Southwest flow is perpendicular to most mountain ranges, maximizing the upward forcing of the air and the precipitation on the upslope (windward) side of the range. Southwest flow correspondingly maximizes subsidence on the lee (downwind) side, especially over the Okanagan and the Interior Plateau. Heavy precipitation is guaranteed along the Coast Range, with extreme amounts in southwest to northeast oriented valleys and inlets. Heavy snow is likely across the eastern ranges as the air is forced upward again by the towering Rocky Mountains. With rising freezing levels heavy wet snow persists only at the highest elevations while lee slopes/valleys remain bone-dry in subsidence breaks.
- Freezing level rises dramatically to over 3000 metres as a steady flow of warm stable air floods Western Canada.
- Embedded storms can be fast-moving with very brief clearing (or none) between. If the offshore trough digs in and a series of waves ripple along the frontal zone, a nearly stationary moisture-laden northeast to southwest-oriented cloud mass can linger for one to three days causing record rainfalls and flooding - the Pineapple Express - when air originates in the sub-tropics.



Southwesterly flow at 700 mb

Characteristics of Northwesterly Flow:

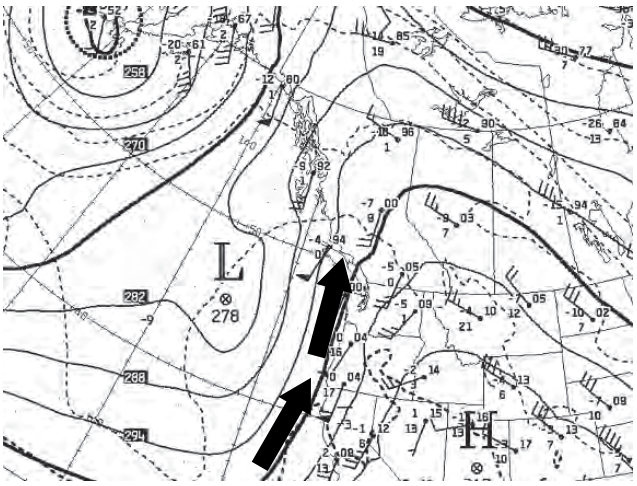
- The skier's flow. A cold airstream gathers moisture over the Gulf of Alaska, becomes increasing unstable, and moves onshore in the form of bubbling convective cells (bright cauliflower shaped clouds that form in unstable air) that give brief but locally heavy snowfalls from the tops of peaks to near valley bottoms.
- Freezing level usually drops to 500 metres or lower.
- Occasional embedded storms appear as swirling comma-shaped conglomerations of convective cells moving swiftly southeastward. The duration of snowfall is limited by the small scale and rapid motion of these storms but snowfall rates can be very high.
- Heaviest accumulations along the Coast Range but if the comma cloud crosses the Coast Range, dry powder snow can accumulate over the interior.



Northwesterly flow at 700 mb

Characteristics of Southerly Flow:

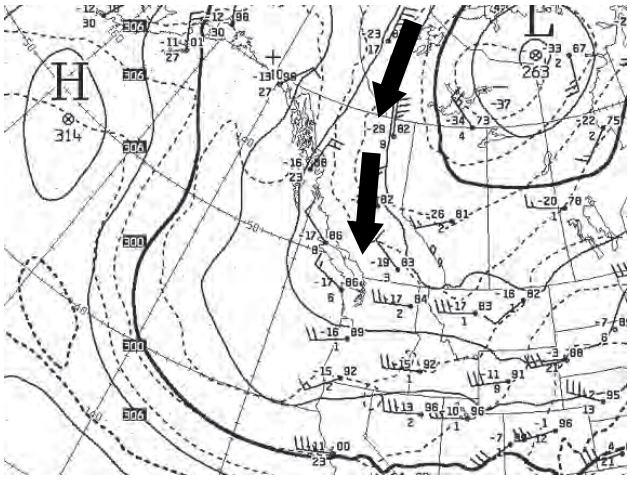
- Upslope flow occurs over the southern interior as air is forced upward from the Columbia Basin of Washington State. There is no significant subsidence.
- Extremely high (3500 metres) freezing levels as warm air spreads to northern BC.
- A nearly stationary north-south oriented front may linger for days across the North Coast Mountains. Storms rippling along the front maintaining wet, mild conditions.
- Warm southerly over-running of cold air in valleys east of the front creates persistent temperature inversions with little weather associated. Fog and low clouds clog interior valleys while the peaks of mountains remain relatively warm and sunny. Moist air flowing northward can give persistent low clouds and rainfall to the otherwise dry southern interior valleys. If arctic air is entrenched in those valleys then significant snowfalls occur.



Southerly flow at 700 mb

Characteristics of Northerly Flow:

- Dreadfully cold flow of arctic air is aligned with the mountain ranges and valleys. Upslope flow now occurs off the Interior Plateau to the eastern slopes of the Coast Range. Associated weather usually constrained to a few flurries as the arctic front moves southward followed by rapid clearing and bitter cold conditions that can persist for days or weeks. On rare occasions, an embedded system from the north brings light snowfalls (5 to 10cms) of exceptionally dry snow.
- Freezing level lowers to the surface everywhere.
- This pattern breaks down with a gradual shift to southwest flow and the arrival of maritime air resulting in heavy snowfalls to sea-level on the coast. Quickly followed by a rapid transition to milder Pacific air that spreads inland via the Fraser Canyon in developing southwest flow.



Northerly flow at 700 mb

Appendix:

700 mb Analysis Charts can be found at: http://weatheroffice.ec.gc.ca/analysis/index_e.html

Animated 700 mb (or 700 hPa) Analysis Charts can be found at: http://cirrus.unbc.ca Select WX Viewer, ANALYSIS, 700hPa

700 mb Forecast Charts can be found at: http://weatheroffice.ec.gc.ca/model_forecast/global_e.html (The lower left-hand panel is the 700 mb level)

Animated 700 mb Forecast Charts can be found at: http://cirrus.unbc.ca Select WX Viewer, PROG, GEM OOZ or GEM 12Z (The lower left-hand panel is the 700 mb level)

David Jones is a Warning Preparedness Meteorologist with the Meteorological Service of Canada. A native of Vancouver, he grew up at the foot of Grouse Mountain. A skier all his life, he became interested in meteorology through his quest for dry powder. He's also an avid soccer player and enjoys coaching his two children.

Northern Avalanche Education: Learning from Aboriginal Students

BY KIRSTIE SIMPSON

In the past 15 years there has been a steady increase in the number of aboriginal participants in RAC programs in the north – from northern BC, the Yukon, NWT and Nunavut. Many of the participants have been key members of community-based volunteer search and rescue groups. Others have been recreational and subsistence backcountry users, mostly trappers and hunters on snowshoe as well as snowmobile. Of late, more and more have been students in outdoor pursuits programs heading into professional careers as guide outfitters in the northern bush and on the land.

A snowshoe ruschblock test at the Giant Goldmine Tailings Pond in Yellowknife.

Photo courtesy Kirstie Simpson

Some of the students struggled with literacy issues which created welcome challenges to instructor teaching styles, some were old hands at the public end of the guide/outfitter business and some were young men (all but one aboriginal student over the years has been male) opening doors for themselves by expanding their knowledge base. Each student had two things in common – a wealth of knowledge to share about living and working on the northern landscape, and nothing to prove but a willingness to learn.

Although the digital and electronic world has been a part of the north for a long time, there were still a number of students who found transceiver skills a challenge. Stubbornly still at it well beyond six in the evening after a long day outside, the students were bound and determined to perfect the skills. No one was too proud to admit they didn't get it, no way were they going to leave the site until they were ready. By the end of the lesson they had it and they would never forget it.

It was always fascinating to hear stories about how traditional knowledge had been passed down in the community and family about places to travel, trap, hunt and camp. We always visit the northern schools when running northern RAC training and the kids invariably know someone who had been involved in an avalanche incident while out on the land. One told about her stubborn granny who refused to get out of her rocking chair and leave her home in Telegraph Creek. She was found in that same rocking chair in a house full of snow after an avalanche had tumbled the house down the slope towards the river, at home forever.

Digging pits at the abandoned town site of Cassiar, north of Dease Lake, BC.

Photo courtesy Kirstie Simpson

Teaching aboriginal students means recognizing we are often dealing with English as a second language, so teaching styles have to incorporate less in the way of the written word and more in the way of hands-on demos, class exercises and props. Bugle chips between bricks equal surface hoar, Dixie cups with books piled on them equal depth hoar, upside down glasses of water sliding down cafeteria plastic trays (did you know that a Styrofoam cup on a plastic tray starts to move at exactly 38 degrees?) allows for a bit of excitement – and sometimes mess – and an easy way to work on measuring angles and understanding gravity.

Lessons learned also included: the best snow for making tea while out in the bush; what students know about the habits of subnivean (below the snow) creatures like voles and pikas; and how ring seals use subnivean lairs on the sea ice. Layers of snow were invariably discounted or identified as being good for shelters (iglus and quin-zhees) or travel by foot, snowmobile or dog team.

But the lesson that was most valuable to me was to build in time to share and listen to stories, don't be in a hurry, and be prepared to drink a lot of tea.

Kirstie Simpson is a government biologist who has worked all over the High Arctic and Northern Canada for the past 24 years. She has had an avalanche education business in the Yukon for 13 years, teaches avalanche education for CSPS and has been a CARDA avalanche dog handler for 14 years.

Between a slab and a hard layer:

Part 3 - Two field studies of facets growing above wet layers

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[1]Dept. of Civil Engineering, [2]Dept. of Geology and Geophysics
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1. Introduction

Poorly bonded crusts can release dry slab avalanches weeks or occasionally months after facets form on the buried crust. One way that facets on crust can originate involves a strong temperature gradient when dry snow overlies a wet layer (e.g. Jameson and others, 2001; Colbeck and Jamieson, 2001). The first article in this series (Avalanche News 70) focused on the formation of poorly bonded crusts and their distribution over terrain. The second article (Avalanche News 71) summarized field data from the Columbia Mountains regarding the persistence of facets and surface hoar above melt-freeze crusts. This third and final article describes two field studies of facets that formed above wet layers – and became poorly bonded crusts. These results were presented at the International Snow Science Workshop in Jackson Hole, Wyoming.

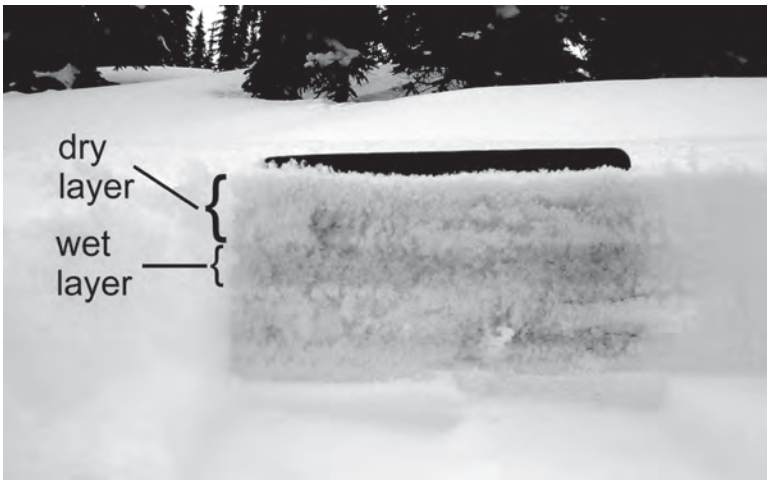

Fig. 1. Photograph of a pit wall of the upper snowpack showing the wet layer and overlying dry snow on 14 March 2003 on Mt. Fidelity

In the winter of 2002-03 on Mt. Fidelity, and again in 2003-04 on Mt. St. Anne, we monitored cases of dry-on-wet faceting (Fig. 1) and the evolution of the resulting facets on crusts. For each of these cases, the measurement sites were near automated weather stations at approximately 1900 m that provide hourly measures of temperature and precipitation. The temperature gradient across the dry layer was measured with thermistors (Fig. 2) calibrated to ±0.1°C and recorded hourly with a datalogger. Manual snow profiles were observed several times within a week. By pulling a 250 cm^2 shear frame placed a few millimetres above the wet layer or crust (Fig. 3), the shear strength was measured (e.g. Perla and Beck, 1983) and adjusted for size effects (Sommerfeld, 1980).

Fig. 2. Photograph showing three vertically oriented pairs of thermistors that were placed in wet snow before dry snow fell. Only the top thermistor of each pair is visible above the dry snow. The thermistors are connected to a datalogger in the white box that reads each temperature every two minutes and records the average temperature of each thermistor every hour.

2. Wet layer buried 2003-03-14 at Mt. Fidelity

On 2003-03-14, dry snow fell on a wet layer at 1890 m elevation on Mt. Fidelity. At 1300 h with light snow falling at –2.5°C, we observed 3.5 cm of dry new snow (PP) on a 1.8 cm thick wet layer (Fig. 1). A pair of thermistors was placed across the dry layer. Overnight the air temperature approximately 2 cm above the snow surface cooled to –4°C and the magnitude of the temperature gradient across the dry layer reached 59°C/m at 2100 h. Data from an upward-facing long wave radiometer approximately 200 m from the study site indicate the sky remained overcast overnight except from 0300 to 0500 h. The upper boundary of the wet layer

froze at 0200 h on 2003-03-15. At 0900 h, the crystals just above the crust and 2 cm above the crust were FC 1, and DF 1 FC 0.5-1, respectively, indicating the faceting was more advanced just above the crust. On 17 March 2003, the crystals just above the crust were observed to be FC 0.5-1 indicating that no further faceting was apparent. In subsequent observations on 17, 18 and 22 March 2003, the crystals just above the crust showed evidence of rounding (Fig. 4).

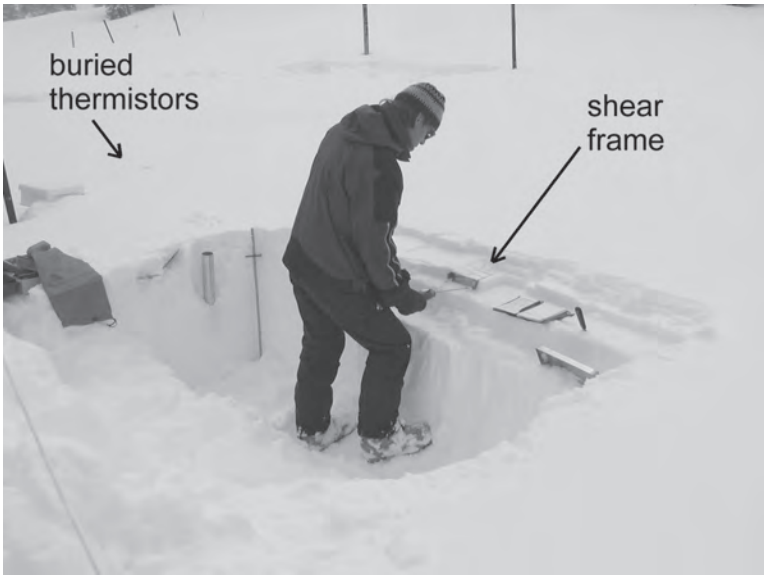

Fig. 3. Photograph of operator performing a shear frame test on a layer of facets on a crust. The bottom of frame is placed a few millimetres above the facet-crust interface and pulled to fracture within a second. The layer being tested was buried 2004-01-15 at Mt. St. Anne.

For the grains at the interface, the mean of 12 shear strength tests on each of the observation dates is plotted in Figure 4. The strength change from 14 to 15 March was statistically insignificant. The expected strength gain given the warm snow temperature favourable to densification and bonding (0°C then cooling to –4°C after the wet layer froze) did not occur probably because the strong temperature gradient caused faceting of the crystals just above the wet layer. As with many other cases of small faceted crystals (e.g. 0.5 mm) we have observed, this layer gained strength quickly. At Glacier National Park and at nearby backcountry ski operations, no slab avalanches were reported on this weak layer. On 19 February 2003 at a site 50 m lower and about 250 m south of the 1890 m study slope, a snow profile showed 1 mm rounded facets (FCmx) on a 1.2 cm thick crust, indicating that the facets-on-crust existed outside the study slope, at least within a narrow elevation band.

3. Wet layer buried 2004-01-15 at Mt. St. Anne

During the night of 2004-01-14, light rain was reported at lower elevations in the mountains near Mt. St. Anne. At 1200 h on 2004-01-15 (Fig. 5) at 1600 m elevation on Mt. St. Anne, 4 cm of dry new snow (PP) had accumulated over about 5 hours on a 6-cm-thick layer of rain wetted (moist) snow classified as Wet grains (WGcl). The air temperature was 1°C, snow was falling at 2 cm per hour and the sky was obscured by fog. Four thermistors were positioned similarly to the placements in shown Figure 2. Initially, the upper thermistor was about 3.5 cm above the snow surface. The shear strength of the dry snow just above the moist snow was 0.36 kPa (Fig. 5). The moist layer had a hand hardness of 4-Fingers (4F). According to readings from an ultrasonic snow depth sensor at 1900 m on the same mountain, the upper thermistor was buried by 1600 h.

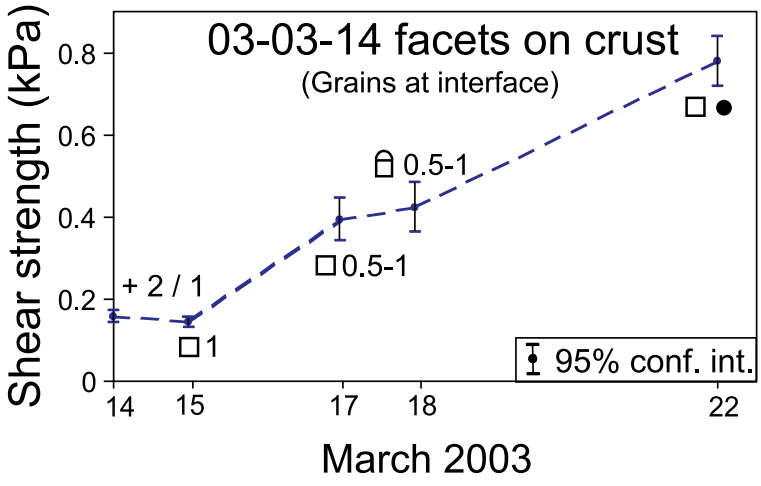

Fig. 4. Change in shear strength and type of grains just above the wet layer (later a crust) buried on 2003-03-14 on Mt. Fidelity in the Columbia Mountains.

At midnight, 16 h after the wet layer was buried by dry snow, the magnitude of the temperature gradient between the top two thermistors spanning most of the dry layer was 63°C/m. Three hours later, the magnitude of the temperature gradient in the dry layer reached a maximum of 91°C/m. The top of the initially moist layer froze between 21 h (Fig. 5) and 26 h after burial by dry snow.

The next day at 1000 h (about 27 h after the start of dry snowfall on the rain-wetted layer), the air temperature was –2°C, snowfall had stopped and the sky remained obscured by fog. The upper 3.5 cm of the initially moist layer had frozen and was a Pencil-hard (P) crust. The grains at the interface were classified as decomposed and fragmented particles (DF) and faceted crystals (FC). Shear frame tests revealed a 50% drop in shear strength (Fig. 6), which we attribute partly due to the formation of facets at the interface and partly to a shear stress concentration resulting from freezing wet layer and consequent stiffening of the crust.

At the site of thermistors, profiles and shear frame tests (elevation 1600 m) on 2004-01-17 at 1100 h, 7 cm of dry snow lay on the initially moist layer that had now frozen into a knife-hard (K) crust. The dominant grain type in the 2-mm-thick layer on top of the crust was facets (FCfa), overlain by decomposed and fragmented particles. Shear frame tests showed a slight increase in the mean shear strength. Observations and tests on this layer on 20 and 23 January showed rounding of the grains at the interface and substantial increases in strength (Fig. 6).

On 2004-01-16, the crust was found in a profile on Mt. St. Anne at 1900 m but it was only 1.6 cm thick—much thinner than at 1600 m. No facets were found on the crust, probably because there was insufficient latent heat in the initially moist layer to sustain the temperature gradient in the overlying dry snow. These observations at 1600 and 1900 m apparently bound the minimum conditions for forming a weak layer of facets.

On 2004-01-21, profiles 10 km to the south-southwest at 1745 m and 1905 m revealed the crust, 2 cm and 0.2 cm thick, respectively, but no facets were found on the crust at these elevations. We attribute the thinner crust and the absence of facets to less rain on the night of 2004-01-14 at these elevations and hence less latent heat to sustain the temperature gradient in the overlying dry snow. Two kilometres to the west and 100 m lower, the rain crust and the overlying facets were more developed. Between 2004-02-06 and 2004-02-12 (23 to 29 days after the wet layer was buried), we observed a total of five profiles, 37 rutschblock and 12 compression tests. The facet layer produced fractures in all these tests. The median rutschblock score was 4 and the average compression score was moderate (19 taps). As further evidence of the instability at this elevation, while traveling on skis, we triggered two whumpfs where the faceted layer fractured but the slab only moved a few centimetres down-slope. Compared to the site of the thermistors and shear strength measurements located 100 m higher on the mountain, the profiles revealed a thicker layer (1-1.5 cm) of larger facets (1-2 mm) on a thicker rain crust (> 10 cm) that was, by this date, 52 to 72 cm below the snow surface. Clearly, the facets on the rain crust were more developed and less stable for longer at a slightly lower elevation where more rain created a thicker wet layer with more latent heat to sustain the temperature gradient in the overlying snow for longer.

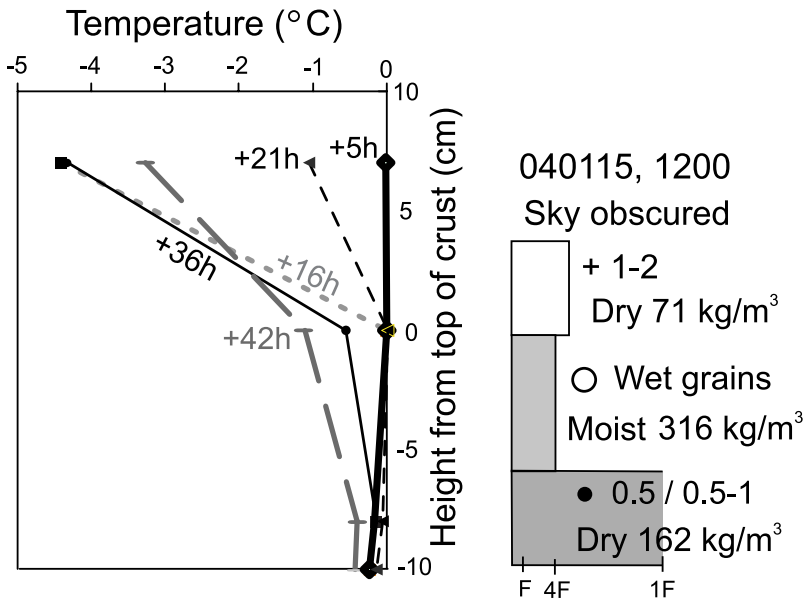

Fig. 5. Graph of five different temperature profiles taken from the hourly profiles of the dry-on-wet interface buried 2004-01-15 at 1600 m on Mt. St. Anne.

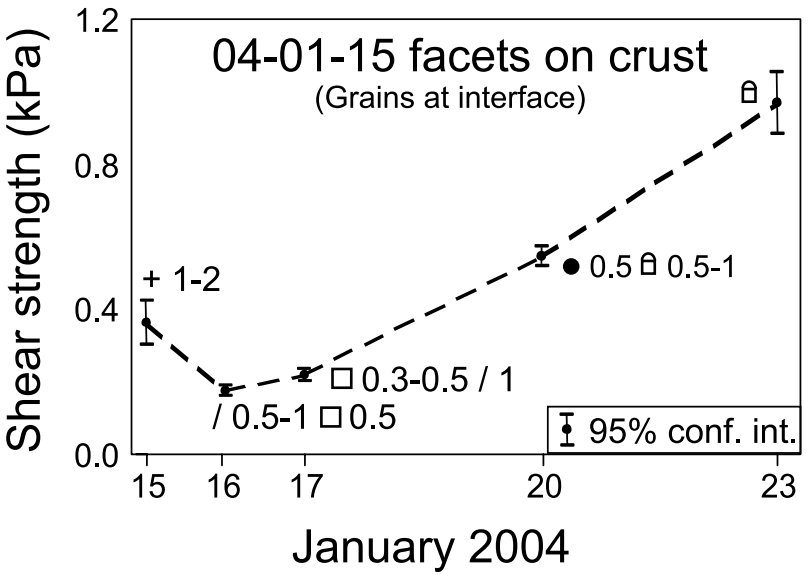

Fig. 6. Change in shear strength and type of grains at the upper boundary of the wet layer (later a crust) buried on 2004-01-15 on Mt. St. Anne in the Columbia Mountains.

4. Conclusions

The magnitude of the temperature gradient at a dry-over-wet interface can exceed 50°C/m for hours while heat is drawn upwards towards the cooler surface of the snow. Facets can form within a day at the interface where dry snow overlies wet snow and the snow surface temperature is below 0°C.

As outlined in Avalanche News 70 and described in Section 3, facets that form in dry snow on a wet layer can be better developed – resulting in a weak bond to a crust – within an elevation band.

Facets can continue to grow after the wet layer freezes (Jamieson and Fierz, in press); the relatively small area of bonds between facets and the tendency of facet layers to resist densification can contribute to additional faceting.

As noted in the first article in this series, facets that form at the base of dry snow overlying wet layers form an important portion of the facet-on-crust combinations in the Columbia Mountains. These include poorly bonded rain crusts in early and late winter and poorly bonded sun crusts in March and April.

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PERSPECTIVES ON AVALANCHE RISK: THE NEED FOR A SOCIAL SCIENCES AND SYSTEMS THINKING APPROACH

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The presence of risk resulting from exposure to avalanche hazard is inherent in mountain snow environments. In this article, I discuss avalanche risk from a social sciences and systems thinking perspective. I explore how we conceptualize and perceive risk, what factors influence our risk tolerance, and why it is important to consider the context and boundary conditions that inhere in the avalanche risk assessment process. I suggest it is essential to understand how risk is perceived and evaluated within this holistic viewpoint in order to design informed and effective strategies for avalanche risk management and communication.

What is Risk?

Risk can be thought of as an expression of uncertainty in the world. Multiple conceptions of risk exist at individual, organizational and societal levels, as well as between the physical and social sciences. In statistical modeling, for example, risk is a known parameter. A common definition of risk in the physical sciences is the chance or probability that exposure to a hazard will result in damage, injury, or loss of life (McClung, 2002). However, risk, as viewed by social scientists, is a social construct invented to help us cope with and understand the dangers and uncertainties of life (Mellers et al., 1998). Slovic (2001) argued that risk does not exist externally, waiting to be measured. "Risk assessment is inherently subjective and represents a blending of science and judgment with important psychological, social, cultural, and political factors" (p. 23). These differing conceptions of risk highlight the reality that avalanche risk is a multi-dimensional phenomenon, and how we think of it is complex and multi-faceted.

How Do We Perceive Risk?

We all experience different levels of perceived risk resulting from our attitudes, beliefs, feelings, and cognitions about risk (Aven & Kørte, 2003; Coleman, 1993). How we perceive risk depends upon our knowledge of the hazard, our past experience with that hazard, our personal attitude towards risk taking, our assessment of the probability of our exposure in the current situation and conditions, and our degree of decision confidence in relation to the level of situation uncertainty. Our propensity to take risks also has a significant effect on our behaviours, and depends upon individual factors such as our personality, life experience and lifestyle, as well as social and cultural factors such as our age, being part of a group, or having a family (McClung, 2002; Wilde, 2001).

Photo courtesty CAA

The sense of control we feel about accomplishing a behaviour is another variable in perceived risk. People who have a high sense of control are more likely to follow positive, healthy behaviours than those who have a low sense of control (Litt, 1988). Bruns (1997) suggested the degree of control is directly related to the extent of our risk perception, and that a high sense of control is exercised by avalanche terrain avoidance, mitigation techniques, and conscious choice.

McClung (2002) identified human factors and variations in human perception and estimation as a key uncertainty in avalanche decision-making. Most avalanche deaths in North America and Europe result from people triggering the same avalanche that kills them (McClung & Schaerer, 1993). McClung suggested the root cause of these avalanche accidents is a failure in human perception, where the victim's perception did not match the current reality of the avalanche danger.

What Factors Influence Our Risk Tolerance?

Voluntariness in risk exposure is an important consideration in perceived risk. Research suggests our tolerance for risks that we choose to expose ourselves to is far greater than in those situations where we do not voluntarily make that choice (Wilde, 2001). For example, while the risk perceptions of winter backcountry users may vary widely, these users are voluntarily exposing themselves to the hazards inherent in winter mountain environments. This conscious choice is in contrast with people traveling on highways threatened by avalanches, since they may be completely naïve to the existence of avalanche hazard or their exposure to it. Thus, their risk tolerance is minimal. A third example lies somewhere in between, in situations where people hire a guide to assume responsibility for their enjoyment and safety, and while they may have an awareness of avalanche hazard, they may have little active role in the assessment and associated decisions regarding their risk exposure.

Affective (emotional) responses to risk directly correlate with whether we over or underestimate our likelihood of harm (Slovic, 1987; Wilde, 2001). McCammon (2004) identified two risk characteristics that significantly impact behaviour in winter mountain terrain: first, a great deal of control is exercised over exposure to avalanches, and second, this exposure is typically associated with highly positive, affective experiences. The physical, aesthetic, and social elements of winter backcountry environments are highly prized by winter mountain users across the world, and this poses an additional complexity in the avalanche risk equation.

Familiarity is another influence in perceived risk, since we tend to underestimate the frequency and consequences of familiar risks and overestimate those that are unfamiliar. For example, in a study of recreational avalanche accidents in the United States, McCammon (2002) found that 69% of avalanche accidents occurred on slopes that were very familiar to the accident victims. He suggested that in victims with avalanche training, familiarity with a slope tended to negate the benefits of knowledge and experience.

Personal Vs Societal Risk Perceptions

The risk equation is qualitative and complex, resulting in a broad conception of risk across the population, especially between experts and laypeople. While avalanche experts may recognize *real* risks in hazardous situations, laypeople often have a wider dimension of *perceived* risk (Coleman, 1993; Slovic, 2001). Therefore, the risk assessment of laypeople is best described with subjective risk characteristics, such as dread or controllability, than with objective risk indicators, such as expected mortality (Gurabardhi et al., 2004).

Research indicates that we make very different risk assessments for ourselves as compared to when we are making those same assessments of others (Tyler & Cooke, 1984). Our tendency is to underrate our own vulnerability to risk, yet we judge others as having a greater susceptibility (Gurabardhi et al., 2004). Thus, risk needs to be described in personal and societal categories, since the factors contributing to our personal sense of risk are not the same factors that contribute to our view of societal levels of risk (Tyler & Cooke, 1984).

What Boundary Conditions Influence Avalanche Risk Assessment?

The traditional view of risk characterized by probabilities and consequences does not capture the subjective and contextual factors inherent in avalanche risk assessment. While the search for accurate and objective probability values is a goal of the risk assessment process, the process is driven by the boundary conditions of the decision problem (Aven & Kørte, 2003). Boundary conditions in the avalanche domain include the natural and physical environment, the knowledge, values, and attitudes of the decision maker, the cultural dynamics within groups, the goals and objectives of the clients and the organization, economics, and societal and political values. Avalanche judgments and decisions need to be assessed and characterized within the context of these boundaries. In addition, considering these dimensions of risk may have a significant influence in the formation of attitudes towards risk (Slovic, 2001).

Why is it Important to Consider the Risk Context in Avalanche Decision-Making?

The avalanche risk analysis process strives to produce predictions of exposure that are complicated by inherent uncertainty resulting from complex physical (terrain), environmental (weather, snowpack), and human factors. Thus, avalanche risk assessment is dynamic and complicated, and the weighing of risk and its associated benefits and consequences lie at the heart of the decision process. The context of the decision problem must be a key consideration. While traditional risk assessments often utilize cost benefit analyses, the benefit component is not constant in the avalanche decision equation. Let's consider the different contexts between avalanche forecasting for backcountry skiing versus highways public safety as an example.

Photo Steve Kroschel

In backcountry skiing, the decision problem is oriented to providing the best quality of skiing while minimizing exposure to avalanche hazard. While the cost of exposure may result in injury or death, the benefit of exposure is an exhilarating ski down a deep powder-covered mountainside. Backcountry ski guides and their clients are therefore faced with a tangible trade-off between the quality of skiing and client satisfaction, and increased exposure to avalanche hazard. Conversely, avalanche decision-making for public highways has a different context. Drivers and their passengers are deriving little benefit from being exposed to avalanche hazard, other than avoiding a road delay. In this case there is less tangible benefit to increasing their exposure. The onus is on the highways avalanche forecaster to make conservative estimates of the present and forecasted avalanche risk. Highways forecasters are therefore faced with a different kind of trade-off, where the cost of increased exposure does not provide equally perceived increases in benefits

What is Acceptable Risk?

Acceptable risk is a subjective judgment for the level of risk to which people are willing to expose themselves. This level is uniquely personal and depends upon the variables discussed earlier. Wilde (2001) proposed the Risk Homeostasis Theory to explain how people accept a certain level of subjectively estimated risk to their health, safety, and property in exchange for benefits they hope to receive from engaging in risky activities. This 'target' level of accident risk is determined by four categories of motivating factors: (1) The expected advantages of the risky behavior, for example, an exhilarating powder run; (2) the expected cost of the risky behavior, for example, injury or death from avalanche involvement; (3) the expected benefits of safe behavior, for example, returning home at the end of the day; (4) the expected costs of safe behavior, for example, failing to ski a desirable line. As a result of these theories, Wilde (2001) suggested that the only way accidents will be effectively reduced is through strategies aimed to reduce the level of risk accepted by people and society in general.

McClung (2002) proposed the Risk-Decision Matrix for backcountry skiing that describes the relationship between risk propensity, risk perception, and decision-making. He suggested that error-free decisions fall within an operational risk band (ORB) delineated by two types of errors: accidents and excessive conservatism. These decisions are achieved by estimating the costs associated with exceeding the band limits. Decisions that exceed the upper limit of the ORB result in injury, death or structural damage, while those exceeding the lower limit include loss of freedom, loss of credibility in forecasted warnings, or significant economic implications, for example, excessive delays in opening roads or ski runs.

How is Avalanche Risk Determined?

There are stochastic (random) occurrences for which we can calculate risk over long time periods and broad scales using empirical data. This kind of quantitative assessment of risk can be described in relation to actual avalanche occurrences and return periods. Avalanche return periods are the frequency in which avalanche debris reaches the run-out zone in a specific avalanche path classified in a temporal scale of years. The avalanche return period can vary significantly, from several times per year to one event per 300 years, and is used to determine the level of acceptable risk for human use and structures in the area (McClung & Schaerer, 1993). However, in Canada, data is limited in many areas, and therefore risk assessment predictions are bound to be less accurate. Broad trends in avalanche activity are predictable to some extent, but no one can predict exactly when and where an avalanche will occur. Quantitatively predicting avalanche risk is therefore scale dependant.

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Risk can also be described qualitatively, and this method is used in Canada with the Avalanche Danger Scale. This scale describes the probability of avalanches occurring in relation to the likelihood of triggering using qualitative descriptors of low, moderate, considerable, high, and extreme. It is interesting to note that research indicates expressions of terms such as "likely" or "probable" are vague, and that people have dramatically different ideas about what these terms mean (Hönekopp, 2003).

An additional complicating factor in comprehensive avalanche risk assessment to consider is in relation to the social sciences perspective that addresses the human construction of risk. While formal assessment procedures are relied upon to minimize risk, for example snow stability evaluation forecasts and checklists, it is important to recognize that these methods are fraught with complexity and uncertainty, requiring the exercising of considerable value-laden judgment. Stefanovic (2003) argued that while scientific facts can be used to support one's position, the facts alone are not sufficient to ensure sound decision-making. "It is simply naïve to assume that the generation of data or the interpretation of that data is ever value-free or presuppositionless" (p. 241). In relation to avalanche forecasting, McClung (2002) stated, "the only entities that can truly reduce the uncertainty are more (new) information data of the right kind, or actions that deal with the resolution of variation in human perception" (p. 114).

Avalanche-related decision making strives to minimize uncertainty about the instability in the snow cover, and to match the human perception of this instability with reality (McClung, 2002). In order to gain a better understanding of how this perceptual matching can be achieved, empirical data related to human factors in avalanche decision-making is needed. Current methods of avalanche accident data recording describe the physical properties of the avalanche and associated demographics of accident victims; however the human factors contributing to the accident are only occasionally captured. I suggest that defining criteria for the recording of human factors in avalanche accidents will offer future insight and greater accuracy in avalanche risk assessment and communication.

How Can Avalanche Risk Be Communicated Effectively?

Avalanche risk communication is an important societal need since it aims to exchange critical information that describes potential threats to people's health, safety, property, or general well-being. The concept of communicating hazard and risk contexts has been a central focus of risk management initiatives for decades. However, how to achieve this effectively has been an issue of lively debate amongst scientists and practitioners. In an attempt to define the best way to conceptualize risk communication, researchers have tried to understand public risk perception in order to design more effective risk communication that could be used by practitioners. A number of solutions resulted. Kunreuther et al. (2002) suggested the development of *prescriptive heuristics*, rules of thumb that enhance the accuracy of risk perceptions, can be an effective aid to decision-making. Presenting risk as frequencies instead of probabilities (Karelitz & Budescu, 2004), adjusting the time frame to consider the immediate consequences (Slovic, et al., 1978), and framing the outcome, (e.g. describing mortality vs. survival, Kahneman, 1991), are several examples of prescriptive heuristics. However effective these methods may be, incorporating strategies that reduce the level of risk acceptance should be an underlying principle of risk communication and management strategies (Wilde, 2001).

A Systems Thinking Approach to Avalanche Risk Management

Quantifying a phenomenon by breaking it down into its component parts is a reductionism approach that drives the thinking of contemporary natural hazards assessment (see Stefanovic, 2003). I suggest that understanding the complexities of avalanche risk requires considering the relationships between the human, physical, and environmental systems that inhere in avalanche phenomena. This approach utilizes a systems thinking perspective, and is considered essential to adequately studying and understanding complexity.

Systems thinking is integral to the study of living systems (for example ecology). However, it has only recently been applied to understanding humans (Senge, 1990; Flood, 1999; Wheatley, 1999). In the science of living systems, understanding interrelationships provides insight into the emergent properties of the system. The notion is that we simply can't achieve a holistic understanding through reducing a system down to its component parts, since the system is more than the sum of the parts. As the system properties combine, different properties emerge. A classic example is water. Knowing about the components of hydrogen and oxygen tells us nothing about water, which is an emergent property of the system and bears no resemblance or similar properties to its parts. It is important to consider this approach to understanding avalanche complexity, since we are part of the very system we strive to understand.

A Few Parting Words

This discussion of risk demonstrates how we think about avalanche risk at individual, group, organizational, and societal levels is indeed complex. I suggest it is critically important to understand how risk is perceived and evaluated within this holistic viewpoint, in order to design informed and effective strategies for avalanche risk management. "There is no single body of knowledge that explains what works and what doesn't when it comes to helping people make better decisions in the face of risk" (McCammon, 2004, p. 2).

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Using a checklist to assess manual snow profiles

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1. Background

In recent years it has become increasingly apparent that our favorite snowpack stability tests are better indicators of whether a skier is likely to *initiate* a fracture in a weak layer than whether — once initiated — the fracture will propagate. Since in most cases, fracture propagation in a weak layer on a sufficiently steep slope leads to slab avalanche release, we could write

Fracture initiation + fracture propagation = slab release

Probably because stability test scores are primarily indicators of fracture initiation and because they can exhibit substantial spatial variability (e.g. Campbell, 2004), practitioners and researchers have been seeking tests and indicators of fracture propagation (e.g. Jamieson, 2003) other than whumpfs and slab avalanches.

2. Progress

For decades, avalanche practitioners have been observing and communicating the appearance of fractures, e.g. clean and fast. In 1995, Jürg Schweizer and others concurred with such observations, and emphasized observation of the portion of the block that released in rutschblock tests, e.g. whole block, most of block, only an edge. Seven years later, Schweizer proposed that rutschblock tests were large enough for their *fracture characteristics* to be indicative of fracture propagation potential, e.g. the release of the whole block suggests that propagation is possible. In the same year, Ron Johnson and Karl Birkeland suggested at the 2002 ISSW that the *appearance* of the fracture in stuffblock and other small column tests might be indicative of fracture propagation. They classified the fracture appearance in three classes known as Shear Quality, which is similar to Fracture Character (Birkeland, 2004). In a recent article in *The Avalanche Review*, Ian McCammon and Don Sharaf (2005) interpreted *sudden* fractures (Quality 1, or Sudden Planar and Sudden Collapse fractures) as indicating that the release of energy was favourable to fracture propagation. In his 2004 ISSW paper and recent thesis, Alec van Herwijnen showed that weak layer and interface properties for a large dataset of *sudden* fractures were associated with weak bonding and stress concentrations favourable for fracture initiation and propagation. So it seems that sudden fractures may be indicative of fracture propagation potential in weak snowpack layers.

Of course, two indicators can be better than one. In a poster at the 2002 ISSW, Ian McCammon and Jürg Schweizer developed a simple method for scanning snow profiles and flagging certain characteristics associated with instability of the interfaces between adjacent layers. These five instability flags, called "Lemons", include the hardness difference and grain size difference across interfaces. The Lemon count for the profile is the maximum number of Lemons for any interface in the profile. The Lemon count for profiles correlated with the stability assessment on similar slopes, i.e. more Lemons, lower stability. In 37 of 41 profiles on slopes that had avalanched, the bed surface had the most Lemons, or was tied for the most. Ian and Jürg proposed that the Lemon count was a good indicator of instability, partly because it selected interface characteristics favourable to propagation.

Using a large dataset from the Columbia Mountains of Western Canada in his thesis, Alec showed that snow layer and interface characteristics similar to Lemons (more on these later) were favourable to fracture initiation *and* fracture propagation. This means we may have two indicators of fracture propagation potential, as shown in Figure 1, which is based on the "stability circle" developed by Ian McCammon and Don Sharaf. In the diagram, we show that while stability test scores may be primarily indicative of fracture initiation, structural instability indices, such as

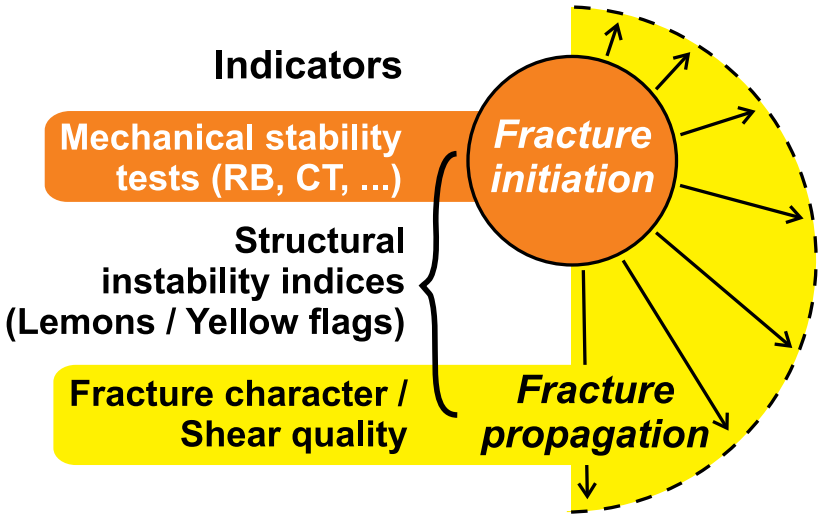

Fig. 1. Recent studies suggest that stability test scores are primarily indicative of fracture initiation, and fracture character or shear quality are primarily indicative of propagation, whereas structural instability indices may indicate whether fracture initiation **and** *fracture propagation are likely.*

the Lemon count in a profile, are likely indicative of fracture initiation *and* propagation.

To summarize these recent ideas:

- Scores from stability tests such as the rutschblock, compression test or stuffblock test are indicators of whether skiers are likely to *initiate* fractures. These scores vary considerably over the terrain, and false stable scores are not uncommon.
- Fracture character or shear quality are indicators of whether fracture propagation in the weak layer or interface is likely or not. Cam Campbell (2004) showed that sudden fractures are often quite consistent within avalanche start zones.
- *Structural instability indices* such as McCammon's Lemons correlate with skier triggering probably because they are indicative of fracture initiation *and* fracture propagation.

3. Yellow flags

At the 2004 ISSW, Schweizer and others developed a set of critical layer and interface properties, similar to McCammon's Lemons, but based on several hundred profiles from the Swiss Alps and Columbia Mountains. They showed the maximum count of these critical snowpack properties in any interface of a profile could distinguish most profiles on skier-triggered slopes from most profiles on slopes that had been tested by skiers but not triggered.

The optimal critical ranges for these properties were different for profiles from the Swiss Alps and from the Columbia Mountains of Western Canada. In this article, we'll use the set of Columbia Mountain profiles from the ISSW paper by Schweizer and others, and modify the critical ranges to make them easier to use. Because the approach is different from but based on McCammon's Lemons, each layer or interface with a property in the critical range is marked with a Yellow Flag.

Although based on data, the approach and the ranges have similarities to assessments by experienced practitioners and by expert systems (e.g. McClung, 1995).

Table 1. Yellow flag criteria for identifying potential failure layers

Property	Critical range (Columbia Mtns)
Layer properties	
Average grain size	> 1 mm
Hardness*	< 1F (3*)
Grain type	Persistent (SH, FC or DH)
Interface properties	
Difference in grain size	> 0.5 mm
Difference in hardness*	> 1 *
Depth of interface	20 to 85 cm

* hand hardness F, 4F, 1F, P, K is assigned values of 1, 2, 3, 4, 5, respectively. Fractional values are allowed, e.g. 4F+ and 1F- are 2.3 and 2.7, respectively.

4. Method

There are three layer properties and three interface properties to check (Table 1). Start with the first layer property: average grain size. In a column, put a flag (or checkmark) beside each layer with average grain size *larger* than 1 mm (Table 1). (For crusts without a reported grain size, use 1 mm.) In the second columns, flag each layer that is softer than 1F (1-finger), and in the third, flag each layer that consists of persistent weak grains (surface hoar, facets or depth hoar). In three more columns, flag each interface that is critical according to each of the interface properties in Table 1. See Figure 2 for an example.

Now scan down the interfaces, add the number of flags for each interface and for the adjacent layer that has the most flags. For example, suppose an interface has one flag, the layer above has two flags and the layer below has one; the total for that interface is three. This gives each interface in the profile a number (count of flags) between 0 and 6. The predicted failure interface(s) are those with the maximum number of flags, and there can be more than one interface with the same maximum. Similarly a rutschblock or other snowpack test can identify more than one critical interface.

The maximum number of flags for any interface is the structural instability index for the profile.

5. Results

Two hundred and sixteen profiles from skier-tested slopes in the Columbia Mountains were used to optimize the critical ranges of the yellow flags. One hundred and seventeen of these were on slopes triggered by skiers and the others were on slopes that had been skier tested but not triggered. A separate set of 54 profiles was used to test the yellow flag method, 16 of these were on skier-triggered slopes. (For more on the learning and test samples, see Schweizer and others, 2004).

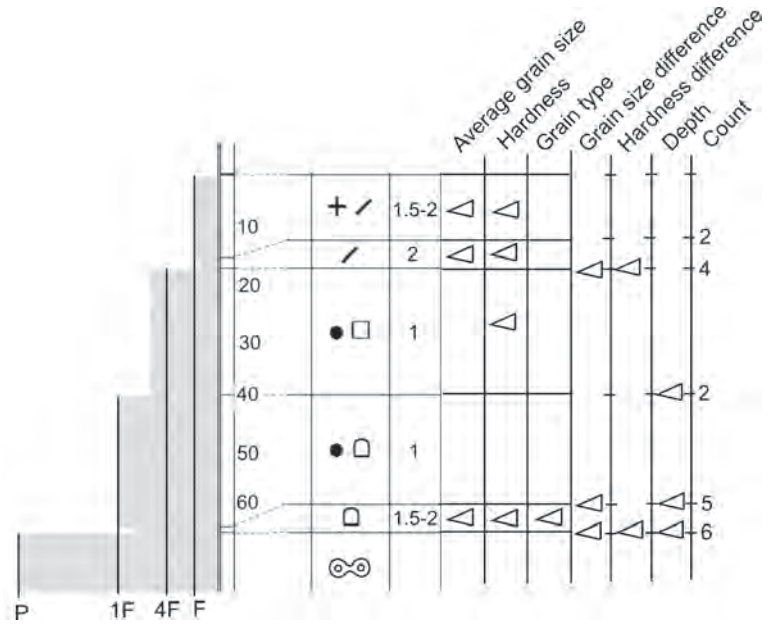

Figure 2. Example of using flags to find critical interfaces (those with higher scores more likely to release slab avalanches and fracture in stability tests) and to assess the profile (skier triggering likely if at least one interface has 5 or 6 flags). The flag count for this profile is 6, and the observer triggered a whumpf on the adjacent slope. The fracture occurred on the layer of rounded facets 64 cm below the surface.

On the slopes that were not triggered, Table 2 shows 59% of the profiles in the learning sample and 66% of the profiles in the test sample had no interfaces with 5 or 6 flags. For the slopes that were skier triggered, at least one interface had five or six flags in 67% of the profiles in the learning sample and in 75% of the profiles in the test sample. Apparently, using the critical ranges in Table 1, the method recognizes unstable slopes better than stable slopes.

Table 2. Accuracy of Yellow Flag method for Columbia Mountain profiles on skier-tested slopes

Sample	Slopes not triggered by skiers	Skier-triggered slopes
Learning	59% (58 of 99) flag count of 4 or less	67% (78 of 117) flag count of 5 or 6
Test	66% (25 of 38) flag count of 4 or less	75% (12 of 16) flag count of 5 or 6

6. Limitations

The method only identified 67% to 75% of unstable slopes. This means it did **not** identify 25% to 33% of the unstable slopes! The inaccuracy is partly because the count of Yellow Flags is too simple to capture all the information relevant to skier triggering, and partly because profiles are point observations of the snowpack—and some avalanches are triggered from a point where snowpack properties are different from the profile site. Site selection is important, although perhaps less critical than for common stability tests.

The profiles were quite detailed. Research is required to determine the accuracy of the method when applied to less detailed profiles.

Like the count of McCammon's Lemons, the maximum number of Yellow Flags in a profile is a promising objective index of instability. However, its value in making decisions about avalanche risk is unclear, especially for experienced avalanche practitioners. Decisions regarding avalanche risk should include terrain as well as proven indicators such avalanche observations, recent weather and ─ where available and applicable ─ snow profile information and snowpack tests.

7. Summary

A set of layer and interface properties was proposed to objectively assess manual snow profiles, i.e. to find the most critical interfaces. The maximum number of flags for any interface is the structural instability index for the profile.

The simplistic interpretation of the index summarized above (5 or 6 flags indicative of instability) was correct for about 67% to 75% of skier-triggered slopes in the Columbia Mountains. The critical ranges of the layer and interface properties

presented in Table 1 are based on dry snow profiles from this range. They were evaluated *only* for skier triggered avalanches, and may not be relevant for other types of triggers. For similar approaches to assessing profiles from other snow climates, see McCammon and Schweizer (2002) and Schweizer and others (2004).

While skill and experience are required for site selection and snow profile observation, experienced and inexperienced people and computer programs should calculate the same index from the same profile. The index does not require a rutschblock or other stability test, although such tests remain valuable as independent indicators of instability.

The method can be used in training for snow profile interpretation.

While site selection for profiles is important, structural instability indices such as the count of Lemons or Yellow Flags are probably less sensitive to site selection than results of stability tests such as the rutschblock test.

Structural instability indices such as the Yellow Flag count provide an objective index (0 to 6) that can be averaged (or otherwise aggregated) to identify differences in *structural instability* between drainages, aspects, elevations, zones, etc.

Structural instability indices are an active research topic. The described method is likely to be updated as more profiles from more areas become available.

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Man peed way out of avalanche

FROM ANANOVA.COM, JANUARY 28, 2005

A Slovak man trapped in his car under an avalanche freed himself by drinking 60 bottles of beer and urinating on the snow to melt it.

Rescue teams found Richard Kral drunk and staggering along a mountain path four days after his Audi car was buried in the Slovak Tatra mountains. He told them that after the avalanche, he had opened his car window and tried to dig his way out. But as he dug with his hands, he realised the snow would fill his car before he managed to break through.

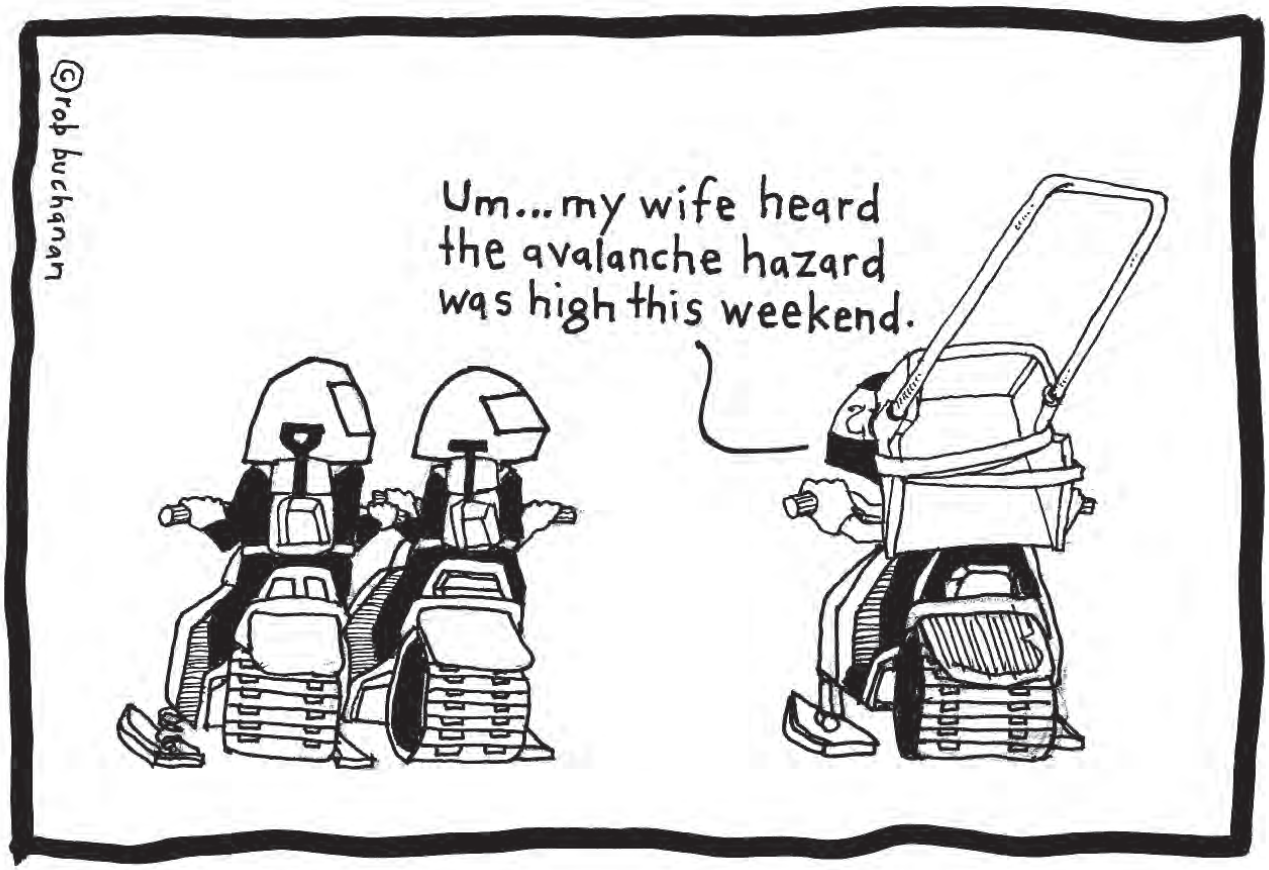
He had 60 half-litre bottles of beer in his car as he was going on holiday, and after cracking one open to think about the problem he realised he could urinate on the snow to melt it, local media reported.

He said: "I was scooping the snow from above me and packing it down below the window, and then I peed on it to melt it. It was hard and now my kidneys and liver hurt. But I'm glad the beer I took on holiday turned out to be useful and I managed to get out of there."

Parts of Europe have this week been hit by the heaviest snowfalls since 1941, with some places registering more than 10 feet of snow in 24 hours.

Flakes

BY ROB BUCHANAN



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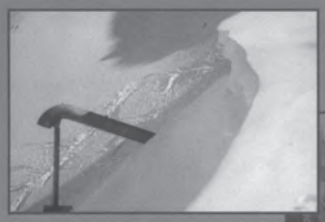

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