avalanche.ca

The journal of Canada's avalanche community

Kroschel Films

AVALANCHE SAFETY SIMPLIFIED

A TRIBUTE TO HANS GMOSER

Product reviews, avalanche detective, course schedules, and much more!

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

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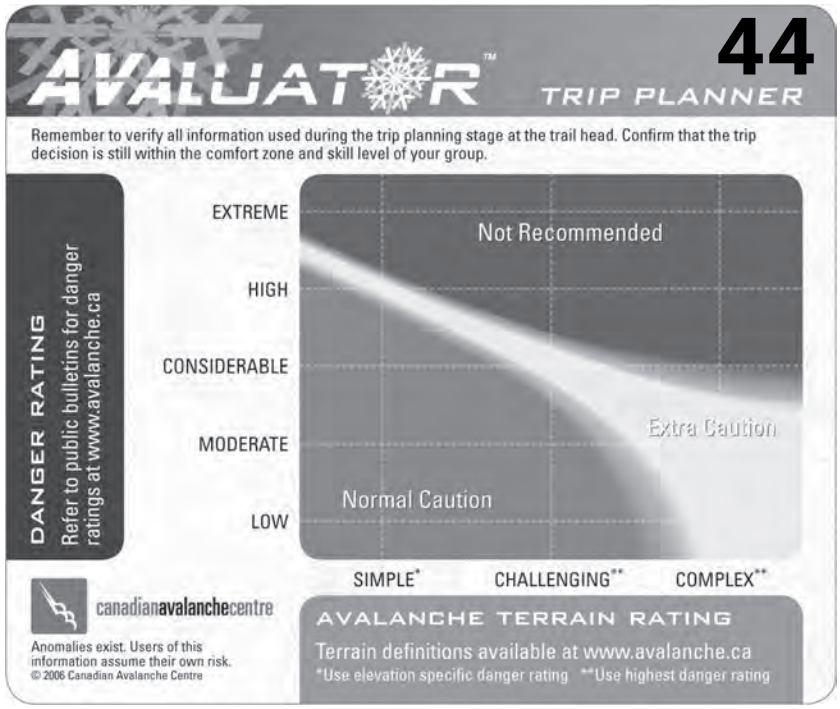
Cover Shot: You better not be here. This image is taken from footage shot by Steve Kroschel in Maunder Creek, about 20 km northeast of Revelstoke in the beautiful Selkirk Range.



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The journal of Canada's avalanche community
Volume 78 Fall 2006

Avalanche.ca 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.

Avalanche.ca 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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avalanche.ca

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

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Karl Klassen

New Look, New Ideas, New Tools

What's in a name? In the case of *Avalanche.ca*, more than meets the eye. The new title of this journal represents a shift in our philosophy. We haven't changed our goal, which is to bring our readers the latest in avalanche research, education and practices. We have changed our strategy to accomplish that goal.

This journal will represent the entire avalanche community. We want *Avalanche.ca* to reflect the interests and accomplishments of every organization with a stake in avalanche safety in Canada. To do that, we've added an important new section we're calling "community." In it, we'll highlight the diversity within our ranks. There are fascinating stories to be told from across this huge country, from people involved in a wide spectrum of avalanche safety. We want to celebrate their contributions, big and small. I hope you enjoy reading these stories as much as we're going to enjoy finding them.

This community is more than the sum of its parts, and Avalanche.ca will honour that which we create together. We feel a responsibility to make sure that everyone who uses our programs and services—whether professional or recreational—know that we depend on a myriad of organizations and individuals to create those products. It's an idea whose time has come.

It was almost a year ago, during a two-day visioning session for the CAA, CAC and CAF, where the seed for these changes was planted. Of the many discussions that rainy weekend, one concept kept cropping up—the need to find one name to encompass all the facets of our common cause. Ensuing brainstorming sessions produced the term avalanche.ca, and suddenly the pieces of the puzzle fell into place. In marketing lingo, the name's got currency with the public.

The idea to make the journal's name the same as the website was put through the wringer, to put it mildly. First accepted, then discarded, we reconsidered, and finally embraced it. A bit of a rocky start, to be sure, but I'm confident our new name will see us well into the future.

Of course, along with the name we have made big changes to the look and feel of this publication. Full colour, even just on the covers, is still out of our price league. But we're very pleased with the decision to go with the more substantial feel and professional look of the new binding and cover. Brent Strand, our resident publications genius, has been working long hours on the new format. He and I have been learning a lot about how to put a journal together.

It's especially fitting that as we debut our new look, we're also introducing an important new addition to avalanche safety. You'll be seeing a lot of the Avaluator this winter, and we've got a number of articles this issue describing different aspects of its development. Don't miss Pascal Haegeli's research article on page 44. It's a terrific summary of all the work that's gone into this project.

Welcome to *Avalanche.ca*.

The view from up here


Mica Heli Guides

The view of Mica Lodge, home of Mica Heli-skiing. The camera is on the shore of Kinbasket lake looking northeast toward Mount Dunkirk.


Clair Israelson Collection

IBM, OGRS and the CAA

Twenty-five years ago, back in 1981, the CAA was incorporated. Lately I've been finding myself looking back at events in our past to try and better understand our trajectories since then. The issues, context, trends and patterns that helped shape who we are today can also help define how CAA programs and services need to evolve in the years to come.

1981 was also the year when the first edition of what we now know as Observation Guidelines and Recording Standards for Weather, Snowpack and Avalanches, or simply OGRS, was published. OGRS created a universally accepted technical language for Canada's avalanche professionals, a milestone achievement. This publication facilitated effective communication within and between operations, and set the stage for comprehensive data collection and analysis.

Interestingly, personal computing is also 25 years old this year. On August 12, 1981 the IBM 5150 was launched, with a pathetic 16 kilobytes of memory, a flickering phosphorous green cathode-ray tube for the screen and audio cassette tapes for loading and saving data. Printers were big, slow, noisy, and excellent paper shredders. No Windows, no point and click, everything was done with DOS commands. Back then it took serious effort to learn to use a computer and get any work done.

Despite their lack of sophistication, the potential for computers in avalanche work was already recognized when OGRS was first published. Soon, a number of organizations started to collect avalanche data in electronic formats. Avalanche forecasting requires ongoing tracking and analysis of several different types of data, over time-scales of hours, days, weeks, months and years. These early computer systems were rudimentary, but the value of using computers to analyze large volumes of data was clear.

I remember Ron Perla in his lab at Canmore doing early modeling of avalanche runouts, a series of calculations on his computer that generated a ragged line running down and across his computer screen, approximating the flow of a wet snow avalanche over a particular piece of terrain. Ron advised me to get a computer for our avalanche control program at Lake Louise, sagely telling me to get lots of computing power, recommending "at least 256k of RAM if you're going to do serious data analysis."

The Parks Canada program at Rogers Pass was an early pioneer in the use of computers in avalanche forecasting. Fred Schleiss hired experts from Bristol Aerospace to design and install their systems. On a visit to the Pass in the early 1980's I was proudly shown the computer room, a glass-fronted, hermetically-sealed, temperature and humidity controlled space containing mysterious boxes that whirred and blinked, connected to a huge plotter graphing the data the computer churned out. It was an exciting time as good people explored new technologies, setting the stage for our work in the years to come.

Not to be outdone, in 1984 (I think) BC Ministry of Transport's Avalanche Programs manager Geoff Freer issued his roving avalanche technicians with portable computers and printers, so they could work with their data when they were on the road. I remember the day Bill Moffat, a former Parks Canada colleague who had gone on to work with the BC MoT, proudly showed me the new electronic equipment. He dragged two huge metal boxes, each the size of a large suitcase, into the room. The "portable" computer was in one box, the printer in the other. Bill opened the boxes like they were treasure chests, and there they were, the technological marvels of the day. The computer was about the size of a microwave oven. It was powerful for the time, with over 500k of RAM, comparable to the processing power we find today in cell phones. The dot matrix printer was about the same size as the computer. It used special paper with holes along each side that usually ripped, jamming the print feed mechanism and ruining the print job. Bill's portable computer didn't have a screen; they were still too fragile to bounce around in vehicles, even in well-padded protective cases.

Twenty-five years later, our computers are faster and more powerful than any of us imagined possible even a decade ago. Through InfoEx we share snow, weather and avalanche occurrence data every day with hundreds of other avalanche workers across western Canada. In remote mountain lodges we can connect to the internet through a satellite and with a few key strokes we can pull real-time data from hundreds of remote weather stations across BC and Alberta. Every morning we look at satellite images of weather systems moving across our regions, many with fronts and isobars shown on the images to help us assess the intensity and speed and track of the weather systems affecting us. Technology helps us work smarter, and do our jobs better than ever before.

"OGRS facilitated effective communication within and between operations, setting the stage for comprehensive data collection and analysis."

When people ask me what the CAA does, my simple answer is that we are a non-government organization providing support services for front-line avalanche operations and avalanche workers; we do things that help the Canadian avalanche

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A Brief History of a National Standard

Standardized reporting has long been one of the strengths of the Canadian avalanche industry. The road to standardization has been an interesting journey, driven by changes in scientific understanding and professional best practices. With the help from the memories of two long-standing members of the community, Peter Schaerer and Bruce Jamieson, we have prepared a general overview of how these standards have developed.

The National Research Council (NRC) originally become involved with snow observations during World War II. NRC staff, testing the performance of aircraft skis, produced a kit with snow observation tools. George Klein designed and built the first snow observation instruments, a man Peter Schaerer refers to as "the pioneer of formal snow observations in Canada."

Later, the NRC Sub-Committee on Snow and Ice, recognizing a continuing need for snow studies in Canada, asked an international committee to create a document for this purpose. The International Classification for Snow was based on Swiss guidelines for snow observers and produced by the Associate Committee on Geotechnical Research of the NRC. It was published in 1954.

The first industry avalanche courses in Canada began in December 1971. Students received a copy of the observers' instructions from the Snow Research and Avalanche Warning Section at Rogers Pass, along with a copy of the International Classification of Snow. The weather and snowpack instructions were revised annually. Eventually, on a recommendation from Ron Perla, a chapter focusing on avalanche observations was added.

The need for a common guideline was becoming very evident, and not only by industry avalanche courses. At the time, the mountain national parks (Banff, Jasper, Yoho and Glacier) were hoping to establish an information exchange among their workers, and needed a uniform reporting system. In the late 70s, Banff Park's Alpine Specialist Peter Fuhrmann organized a meeting. "We had wild discussions during the meeting and parted without conclusions," recalls Peter Schaerer. Later that same evening, Peter sat down to dinner with Walter Schleiss of Rogers Pass. Together, over the dinner table, the two men made a list of standard weather observations. "It took us less than one hour to do it," says Peter. "The national parks never introduced their reporting system, because at the same time we were producing the guidelines for the avalanche courses."

"We had wild discussions and parted without conclusions." - Peter Schaerer

In 1981, Canada's first edition of Guidelines for Weather, Snowpack, and Avalanche Observations was published by the NRC's Associate Committee on Geotechnical Research. The people involved in creating this document were some of the industry's pioneers. Peter Schaerer led the group, with major contributions made by Paul Anhorn of the National Research Council, Fred and Walter Schleiss of Parks Canada at Rogers Pass, and Geoff Freer of the BC Ministry of Transportation

In 1989, OGRS was revised under the banner of the Canadian Avalanche Association. The revision committee was selected to represent the varied interests of the avalanche industry. Herb Bleuer represented guides and heli skiing, Roger McCarthy the ski areas, Walter Schleiss for national parks and Janice Johnson for BC Highways. Peter Schaerer drafted the revised guidelines and the group discussed the document in detail at a meeting in Vancouver. Again, the Associate Committee on Geotechnical Research printed and distributed the publication. The CAA gave each of its members a free copy in the interest of widening the application of the guidelines.

The next revision was in 1995, and changes included renaming the publication to its current title: Observation Guidelines and Recording Standards for Weather, Snowpack and Avalanches. The addition of the words "recording standards" caused quite a discussion at the CAA's annual general meeting, and was one of a number of controversial amendments that year.

"Every member of the committee received about a foot deep of faxes."

- Bruce Jamieson

Reflecting the growing use of computer spreadsheets, a trace of snow was changed from T to 0.1, a move indicative of other changes for the digital use of data. The rutschblock was introduced with general approval but the compression test ruffled a few more feathers. Committee member Bruce Jamieson remembers the many faxes exchanged during the discussions. "Only a couple of us had e-mail at that time, so every member of the committee received about a foot deep of faxes."

A decision on snowboard nomenclature was also among the more contentious amendments. Prior to that point, the HN board was being used to describe once-a-day reading for some operations, twice-a-day for others. The committee decided to adopt the international naming convention, which was a Standard board for twice-daily readings, and HN for once-a-day readings. This was not an easy transition for some operations," says Bruce, "and some people were bound to be unhappy with it."

Members of the 1995 committee were Peter Weir (chair), Peter Amann, Roger Atkins, Colani Bezzola, Torsten Geldsetzer, Bruce Jamieson, Ken Little, Tom Riley, Dave Skjonsberg and Greg Thompson.

2002 marked the next round of changes. Operations began to record and report the number of taps for the compression test, in addition to the VE, Easy, Moderate and Hard ratings already established in 1995. Ironically, after all the controversy in the last go-round, the Standard and HN boards were changed once again—to HN 12 hr and HN 24 hr. Also, stability ratings were tweaked by separating avalanche activities into natural or human-triggered. "That separation has really improved the interpretation of the stability table," notes Bruce. "Stability ratings are always controversial," he adds, "but the rumblings since 2002 have been much less than after 1995.That's good news. It means we're on the right track."

Members of the 2002 committee were Doug Kelly (chair), Jeff Goodrich, Sue Gould, Bruce Jamieson, Tom Riley, Rob Whelan, Doug Wilson, Dave McClung, Bob Sayer, Simon Walker and Brent Strand

The next update is scheduled for the winter of 2007/08. Stay tuned.

“Our data bases will come to be seen as our information heritage, containing the experience and transferring the wisdom of avalanche workers long since retired.”

community function at a high level of professionalism. In recent years we've done some innovative things to facilitate the effective use of technology in avalanche operations.

The Information Technologies Committee (Alan Jones, Donna Delparte, Jan Bergstrom and Jeff Goodrich) has worked with a team of skilled contractors (Roger Atkins, Pascal Haegeli and Chris Larson) to develop and refine the CAA Markup Language (CAAML), an internet browser protocol that allows all computer systems, regardless of their operating system, to effectively exchange OGRS and other data. Over the past summer CAAML has been updated to be compliant with international geographical information system standards under ISO 9000, so avalanche data integrates seamlessly into standard GIS applications.

All InfoEx data, including historical records going back over a decade, will soon be entered into the CAA's Canadian Avalanche Information System (CAIS), facilitating analyses that have never before been possible. The Canadian Avalanche Data System initiative has been launched, and I predict that over the years to come this cooperative system will become the operational data management standard for most avalanche operations in Canada.

Where might technologies take us in the future? Here's a bit of speculation. Working with partners like the Meteorological Service of Canada (MSC) we'll use CAIS data and MSC data on winter weather patterns to map western Canada into geo-climatic regions that have similar winter weather patterns. Global-scale upper atmosphere weather will help us to type seasonal weather patterns, determine “nearest neighbour” winters in our data bases, and anticipate the storm tracks and snowpack and avalanche characteristics for the upcoming months. This information could be used by all manner of avalanche operations to develop the most effective risk-reduction strategies for the anticipated conditions. I foresee these trends being graphed on a CAA website so all operators can track, in simple graphical formats, critical indicators as they evolve over the winter season.

Within individual avalanche operations I see numerical models being used to predict snowpack structure and the evolution of weak layers. Nearest-neighbours models will crunch data from all operations within a given geo-climatic region, providing historical comparison and context and supplementing our human capacity for operational decisions. Data reporting will be real time, with cell phones uploading through satellite links to a CAA data base. Notable occurrences will be sent automatically, in real time, to all operators within the geo-climatic zone where the event occurred. Other operators in adjacent regions will be able to choose whether they wish to be alerted automatically, or wait until the end of the day to catch up on these unusual events.

Satellites and camera/GPS/cell phone units will be used to map avalanche activity in near real time. Operators will be able to look at these maps and photos of avalanches that happened that day within their operating area, in other operations in their region, or over the entire western cordillera. Our data bases will come to be seen as our information heritage, containing the experience and transferring the wisdom of avalanche workers long since retired. Researchers will analyze this data, and their accumulated efforts will lead us to improved understanding of all aspects of avalanche hazard management.

The CAA, national standards for avalanche-related data, and personal computing are only twenty five years old. As we move into the future the synergy between the three will result in continuing improvements in avalanche protection in Canada. Still, in the end, it will be individuals who have to make daily operational decisions about avalanche safety, and hold the accountability for their choices.

What does this mean for the CAA in the years to come? I suggest it means we'll need to continue to evolve our data-management technologies and our worker training and continuing professional development programs in lock step. To manage avalanche hazards and achieve Canada's future economic and recreational potential we will need highly trained and experienced people adept at using powerful information management tools to make high quality operational decisions. I'm betting the next twenty five years will be even more innovative and exciting than the past twenty five have been. If you're a young person planning for a career in avalanche work in Canada, get ready. It's going to be a great ride.

Executive Director
Canadian Avalanche Association/Center

Phil Hein

Welcome to Avalanche.ca!

In writing these words I can say that I am very proud and excited about the new look of our old friend *Avalanche News*. Of course I won't have seen the new look until everyone else has, but I am excited none the less.

From the board of directors' perspective, we didn't pursue this change for change's sake. As our organization has evolved to meet the needs and demands of our members and stakeholders, we offer this as the next step in the evolution of *Avalanche News*. Just as we have the CAA and CAC working in an integrated fashion to deliver products and services to avalanche workers and to the winter recreating public, we have *Avalanche.ca* as the common platform for news and issues relating to the two.

We also recognize that in the Canadian avalanche community there is much more going on than simply the activities of the CAC and CAA. With that in mind we welcome interested contributors from the avalanche community. We hope to see contributions from the ACMG, CSPS, PEP, CSGA, to name a few, and any other individual or organization with an interest in reducing risks related to snow avalanches. We especially want to welcome the Canadian Avalanche Foundation to the publication. I really think the synergy created by the Canadian Avalanche Association/Centre/Foundation triad allows all Canadians to actively contribute to the enhancement of avalanche safety. Welcome everyone.

Welcome too our new CAA Active Members. This category of membership was formally voted into the CAA bylaws last spring and was created also to meet the evolving needs of our association and its members. I really consider the Revelstoke workshop of Fall 2004, when a variety of our members sat down and discussed the long-term vision for the CAA/CAC—including our relationship with the CAF—as the foundation for our moving forward.

The message was clear. The CAA desires to be an inclusive organization that fosters professionalism at all levels of the avalanche industry. Active membership gives individuals who have not attained all the criteria for professional membership a well-defined status in the association. Active members are encouraged to enhance their skills through formal training and obliged to maintain their skills through the CAA CPD program. Our collective voice is stronger by creating this membership category and by granting Active Members a voice in our association.

For those visiting Avalanche.ca on the web, you may notice some changes. The look and feel will be the same but some big changes have gone on behind the scenes. Spend some time getting reacquainted with Avalanche.ca. Let us know how we're doing with the website and any our current activities for that matter. The strength of our association depends on the input of our members. We have a great track record of maintaining an active and involved membership. Let's keep it up, and contact me if you have any feedback or questions. It's as simple as president@avalanche.ca!

Have a safe and adventure-filled winter. I know I will!

President
Canadian Avalanche Association/Centre

Steve Blake Collection

Building the Canadian Avalanche Data System

From Concept to Reality in Fourteen Days

By Ian Tomm

Sylvain Hebert

At the spring InfoEx subscribers meeting, Phil Hein made a request that articulated what many in the room had been dreaming about. Phil asked if the CAA could investigate the possibility of developing a comprehensive data management system for a variety of avalanche operations. As things turned out, the time was right for this idea.

After consulting with software guru Roger Atkins, we had a rough idea of what it would cost to develop such a system. An e-mail to InfoEx subscribers went out in the third week of June, but at that point we weren't really sure the idea would fly. According to our plans, we needed $20,000 by July 15. We put the initial seed money at $2500, so eight clients were needed to raise the seed money required to develop a beta version ready for use this coming winter.

We had a tight deadline, and no one knew if there was really enough interest to support a venture of this size. What happened next took us all by surprise. On the last day of June we sent out the concept document, outlining the details of the deal. That same day, Phil Hein and Jim Bay of AvaTerra handed us their cheque. Within two weeks, we had more than eight clients and the Canadian Avalanche Data System was good to go.

Now the dust has settled and we're on our way to making the beta version a reality, we're finding out why this is such a good idea. It seems the benefit of pooling resources was obvious to everyone who has jumped on the first wave. A number of the initial investors had already investigated the possibility of developing their own data-management software, and they told us of sky-high quotes for very basic systems. Even Roger Atkins said this project would be a nightmare for any software developer trying to make money.

"This isn't a viable commercial project," Roger explained. "The market just isn't big enough to support the effort." Citing the extensive and complex technical requirements of our relatively small and very specialized industry, Roger said, "Anything useful would be prohibitively expensive. The only way a project like this can fly is through a not-for-profit organization like the CAA to represent the community as a whole."

Below you'll find a point-form analysis of the CADS initiative, followed by an outline of what the software will do, and the direction of its development. If you want any more information, please contact me at ian@avalanche.ca.

Core Functionalities as "common to all"

- Terrain Atlas: zones, mountain features / ski runs, individual avalanche paths, data unique, (inserted by each client), geo-referenced and GIS compatible
- Weather, base and field
- Snow, base and field
- Avalanche occurrences data

Additional "plug in" modules specific to sector needs, developed over time as funds become available. Examples of plug in modules include:

- AM / PM team meeting format
- Snow profile graphing
- Image sharing, "write on" functionality
- Avalanche Control, explosives use, inventory
- Sightings – wildlife, snowmobile use, ski tourers, etc.
- Run lists
- Group lists, vertical (flight hrs) accumulated
- Helicopter revenue, non-revenue flight times
- Skier use data, use by locations
- Zone, run, road, rail closure records
- Daily conditions reports to operator's websites
- Incident / accident records
- Employee, training records
- Others, as requested by clients

Why should the CAA undertake this initiative?

- To provide a service requested by our members and the Canadian avalanche community. The proposed service supports at least three of the CAA's purposes as stated in our constitution. Specifically:
  - To establish and maintain high standards of professional competence and ethics for persons engaged in

avalanche-related activities.
  - To exchange technical information and to maintain communications between perso ns engaged in avalanche-related activities.
  - To promote research and development in avalanche safety.
- Once operational, the system will move the CAA (and the Canadian avalanche community) closer toward our vision: *To be a world leader in avalanche awareness, education and safety services.*
- The CADS initiative builds on work already completed in the InfoEx – CAIS project, and uses intellectual properties proprietary to the CAA.
- For clients who are also InfoEx subscribers, CADS can be fully integrated with InfoEx or any other CAA data exchange groups. This will facilitate data analysis and simplify daily operations.
- CADS revenues accruing to the CAA will pay for required ongoing upgrades to national avalanche data standards (OGRS, CAAML, etc) that presently have no income stream to cover the costs for this work. These national standards for avalanche operations are vital to all operators, demonstrating professionalism and "due diligence".

CAA brings to the CADS project
- Observation Guidelines and Recording Standards (OGRS) for Snow, Weather and Avalanche Observations – the national data standard for avalanche work. Value $150,000
- CAIS – InfoEx system, code, associated intellectual properties. Value $200,000
- CAA Markup Language (CAAML) as open source data transfer protocol, fully GML compliant and certified. Vlue $50,000
- Historical subscriber InfoEx data to populate each clients system with all of their own specific InfoEx submissions since they began subscribing (up to 15 years of data). Immediate realization of the benefit of having a comprehensive historical database that the operator can access and use for their own benefit.
- IT infrastructure (web servers) and staff capable of supporting these services
- Proven project management expertise
- Proven software development team (Atkins, Larson, Haegeli)
- Experience with InfoEx as "industry service" operational support tool. Proven ability to bring stakeholders together for collaborative endeavors.
- Reliability and credibility. CAA is a not-for-profit organization with proven business skills, serving and supporting front-line operators and avalanche workers for 25 years; we'll still be here down the road.

Clients bring to the CADS project
- Pooled financial resources; development fee on entry and annual licenses.
- Operational expertise and experience; many clients know what they need and want.
- Essential input into functionality, design, future needs.
- Annual listings of priorities for "next steps" through surveys, face-to-face meeting, etc.
- An advisory group comprised of selected "sector" leaders to serve as a sounding board and provide perspective on developmental and operational issues.

Proposed CADS operating principles
- Clients share a common desire for a comprehensive, integrated information management system for avalanche and other operational data. The sole purpose for CADS is to serve the operational and information management needs of the clients.
- Clients agree that it is far more economical, and in the long run more functional, to develop CADS as a collective effort, rather than developing individual data management systems that are incompatible with each other, InfoEx and the CAIS.
- CADS will use CAA Markup Language (CAAML), an open source standard for structuring and transferring data.
- CADS will be fully integrated with the CAA's InfoEx – CAIS functionalities.
- CADS must be structured to be fully integrated with commercially available GIS software. This will be achieved by ensuring CAAML is certified compliant with the GML (Geographical Markup Language), an international standard for GIS data and commercial software applications
- To ensure effective CADS management and system security, the CAA will be the sole owner and custodian of the CADS and all associated intellectual properties. CADS source code, system architecture and other system programming will be proprietary to the CAA, and will not be shared with any third party.
- Each client will be the sole owner and custodian of all data they accumulate in their CADS program.
- Clients may develop customized extensions to their individual, licensed CADS programs in circumstances where the CADS source code is not required, and CADS core functionality is not compromised.
- To join, this year and at any time in the future, clients must contribute a minimum specified "entry fee" to the CADS development fund.
- Clients may contribute more than the minimum specified entry fee to the CADS development fund. They may be compensated for their over-contribution through:
  - A one-third reduction in their annual licensing fee (the portion of that fee dedicated to annual CADS system development) until the amount of their over-contribution has been redeemed.
  - A 50% reduction in the rate charged by the CAA for system support.
- Clients will be licensed to use CADS through an annual fee to the CAA. One-third of the license fee will go the CAA as repayment for CAIS contribution to CADS; one-third will go to the CADS development fund for system development work in the upcoming season, and one-third will go the CAA to cover off CADS system management.
- If one or more clients wish to see a specific module or functionality developed, the CAA will contract with the development team to do the work requested, and bill this work back to the client(s).
- All CADS system modules that are developed will be available to all clients.


Mark Klassen

>> Ian Tomm is the CAA Operations Manager

Planning CADS

An outline of what to expect from the industry's newest software

By Roger Atkins

By investing in the cooperative development of CADS, operators will benefit not only from the amount of funds generated by pooling their resources, they will also benefit from the fact that they are investing in a system with a future. It is a system designed to be flexible and extensible, that can grow and change as the world changes. It has "critical mass" because of the combined commitment of the users. Also, it has a benefit in that it may become a standard, and employees who are familiar with it can transfer those skills from one company to the next. So, if you hire someone familiar with the system, you will not have to re-train them on how to use your specific system. These are ways that the investment in the CADS system can be leveraged over time.

$2500 to start and $1500 a year may seem like a lot in this world where you can get amazing software for word processing, and spread sheets for next to nothing, but this is custom software. This kind of expense looks really cheap compared to the hundreds of thousands of dollars spent on custom snow/avalanche software by virtually everybody who has gone down that path.

General Concepts:

- The CADS should be built to use as many existing CAIS components as possible, and/or add or enhance components for use in CAIS. Duplication of effort should be kept to a minimum.
- In the first year of development, CADS should be introduced as a test version only to selected organizations willing to use the software as a beta test.
- In the first year of development, the data components available in CADS should be restricted to data components already implemented in CAIS. In subsequent years, data components should be added simultaneously to both CAIS and CADS when possible.
- CADS will interface to CAIS by producing CAAML packets for data submission, initially via the InfoEx web service. It is possible that future CADS users will not be InfoEx subscribers, and they may be subscribers to other information exchanges or may be stand-alone systems.
- CADS needs to be capable of functioning as a stand-alone installation, not dependent on any CAIS information exchanges and not dependent on any internet connectivity.
- Exiting SnoInfo installations can be easily converted to CADS installations, with the user CADS database being created from the CAIS database built from past two years of SnoInfo submissions. This means that CADS users (testers) can start the season with the past two years' of their data already in the database, including location data. It also means that any InfoEx users that convert to CADS in the future can start their installation with all of their historical data from the CAIS. This also extends to InfoEx data older than two years, once the historical data is imported into the CAIS database. (Bonus!)
- CADS installations that are interfaced to the CAIS via the InfoEx web service can be re-created from the CAIS database at any time. This is not recommended as a substitute for making back ups, but it is a feature of the system.

CAIS/CADS Shared Components:

- Database structure can be shared. The database is designed such that it will evolve into a geodatabase that is directly accessible to ESRI GIS systems.
- DAOs (data access objects) to transform data between business object, CAAML, and database representations can be shared.
- SnoInfo can evolve into a shared-user interface component for data entry.
- Time profile graphics components can be shared between CADS and CAIS. If the time profile graphics module is capable of operating from CAAML files, then the time profile graphics can also by used by external systems that are capable of producing CAAML files (eg. MoT)

First Year Objectives:

- Run CADS in a basic configuration for a limited number of test users.
- Use an extension of SnoInfo for data input.
- Provide some form of inter-

Paul Langevin

"The only way a project like this can fly is through a not-for-profit organization like the CAA to represent the community as a whole."

“$2500 to start and $1500 a year may seem like a lot in this world where you can get amazing software for word processing, and spread sheets for next to nothing, but this is custom software.”

face to the local CADS database tables (not a sophisticated interface, but allows tabular access to data).
- Interface CADS to the CAIS InfoEx web service to submit observations.
- Provide capability to produce printed daily observation reports from CADS.
- Use SQL Server MSDE (or Express) database for local data store, with identical structure to the CAIS database.
- First year key functionality:
  - **Terrain** – Allows maintenance of local terrain location hierarchy, including existing terrain feature classes (operating area, operating zone, weather sites, avalanche paths, ski runs, etc). Interface will be much improved from existing SnoInfo interface. A terrain image catalog will probably be possible, but without capability to draw overlays. No support for spatial data (GIS component) at this time. We foresee that feature appearing in one or two years, depending on funding and priorities.
  - **Weather** – Manual weather observations as per OGRS will be supported for multiple weather sites. Data entry is via SnoInfo derived forms, weather data can also be viewed in tabular form. Automated weather data is NOT supported at this time. That feature will be in one or two years, again depending on funding and priorities.
  - **Field Observations** – Field observations for multiple regions will be supported, analogous to existing field obs in SnoInfo. Data entry is via SnoInfo derived forms. Field observations will also be accessible in tabular form.
  - **Snowpack Structure** – Snowpack structure summaries and stability assessments will be supported. Data entry will be via SnoInfo derived forms. Snowpack structure and stability summaries will also be accessible in tabular form. Snow profiles will not be supported this year. That feature will take one or two years, depending on funding and priorities. Possibly snow profiles entered via third-party software can be catalogued by date.
  - **Avalanche** – Avalanche observations and avalanche activity summaries will be supported. Data entry is via SnoInfo derived forms, and avalanche observations and activity summaries are also accessible in tabular form. Avalanche control record keeping is not yet supported. That will be in one or two years depending on priority. It will be possible to catalog images related to avalanche observations or summaries, but without capability to draw overlays. Avalanche incident/accident reporting may or may not be supported this year, but it will be possible to tag events as notable.
  - **Outside Information** – The CADS system will be compatible with the InfoEx web service to allow submission of data by InfoEx subscribers and will include links to the InfoEx web portal for access to InfoEx reports and products as well as additional third party postings (eg. MoT data) on the InfoEx web portal.
  - **Database** – The CADS system will be built on a database in identical structure to the CAIS database. Information in the database will be accessible through non-CADS methods (such as export to excel, etc) to allow additional analysis. For existing InfoEx subscribers, their database will contain their past two years’ data. Their entire data history could also be made available. (Perhaps a fee could be charged for this and that could fund the effort to capture the historical InfoEx data into CAIS?)
  - **Presentation** – Some graphic presentation of data might be possible, but the system will not be very sophisticated at this time. That will improve over the coming years.

Roger Atkins’ name is becoming increasingly familiar to anyone whose work combines avalanches and computers. For nearly 20 years, Roger has been developing software for storing and analyzing avalanche data. His work has been instrumental in the move towards creating a standardized data base for the avalanche industry. Originally from the US, Roger became a Canadian citizen this year. He and his wife Carol Carrigan live in the idyllic setting of Johnsons Landing, BC.

Roger Atkins Collection

The Canadian Avalanche Data System Update

New CAA industry initiative takes shape

By Ian Tomm

On August 10, 2006, 14 representatives from various organizations in the Canadian avalanche community meet in Golden to discuss the new Canadian Avalanche Data System (CADS) initiative. The objective of this four-hour meeting was to introduce interested parties and current CADS Members to the development team and to introduce the development road map for this powerful new software project.

So far the CAA has 11 confirmed members in the project with numerous others considering active involvement. The confirmed operators are as follows;

- Kicking Horse Mountain Resort
- Monashee Powder Snowcats
- Great Canadian Heli-skiing
- Powder Cowboy
- Island Lake Lodge
- Ava Terra Services
- Chatter Creek Lodge
- Panorama Mountain Resort
- Whistler Heli-skiing
- Northern Escape Heli-skiing
- Mica Heli

Individuals in attendance at the Aug 10 meeting included;

- Mike Rubenstein - Kicking Horse Mountain Resort
- Tom Morgan - Monashee Powder Snowcats
- Greg Porter - Great Canadian Heli-skiing
- Darcy Chilton - Powder Cowboy
- Shane Kroeger - Island Lake Lodge
- Phil Hein & Ryan Gallagher - Ava Terra Services
- Isabelle Thibeault & Josh Milligan - Chatter Creek Lodge
- Andrew Nelson - Panorama Mountain Resort
- Mark Vesely - Fernie Alpine Resort
- Steve Conger - UBC Avalanche Research Group
- Colani Bezzola - Canadian Mountain Holidays
- Roger Atkins - CAIS and CADS Programming Manager
- Ian Tomm - CAA Operations Manager
- Clair Israelson - CAA Executive Director
- Yves Richard - CAA IT Manager

Colani Bezzola of Canadian Mountain Holidays was present at the meeting as CMH sees long-term value in the project even though they have a well-developed internal proprietary data management system already in place. Colani's input, representing CMH's perspective, was highly valued and he offered many insightful observations on the initial stages of the CAA's CADS project. CMH has done much to help the CAA start this project off on the right foot, by sharing the knowledge gained in over 10 years of experience in custom data management software development.

This first meeting between CADS members, interested parties and the CAA management and development team was highly successful. The ideas and concepts discussed here will help guide the initial stages of this project and will help ensure that a beta version of the software will be ready for the 11 members this winter. Version 1.0 is expected to be ready for the winter of 2007-08.

The CAA is encouraging all organizations with any interest in this project to contact Clair Israelson or Ian Tomm at any time for additional information. The more members we have, the more functional and powerful the project promises to be. With enough interest and investment, we will be able to offer customization capabilities to ensure the divergent needs of the broad spectrum of avalanche operations in Canada can be met. Through this collaborative approach all parties will realize a significant cost savings.

Organizations are encouraged to join this project at any time. However, due to the complexity of software development and testing, only the 11 initial CADS members will receive the beta version this winter.

CADS Rates and Fees: Current as of Aug 31, 2006

- One-time CADS Membership Buy In Fee: $2500.00
- Annual Licensing Fee (includes services as outlined in concept document): $1000-$1500/year. Exact figure still to be determined. Not charged for the 06-07 season during beta testing period.

Members of the CADS project meet in Golden to discuss the future of the data system.

The Doctors Are IN

A conversation with the main brains behind the Avaluator

In early September I arranged a conference call with Pascal Haegeli in Vancouver and Ian McCammon in Salt Lake City, Utah. Pascal is the manager of the project aimed at developing the Avaluator, and Ian has been an important component in its research and design. There's been a real creative spark between these two, and I wanted to find out more about their collaboration. Here's our conversation.

Mary Clayton: First off, congratulations Ian on becoming a married man.
Ian McCammon: Thank you. It's a wonderful thing. I'm very honoured and clearly one lucky guy.
MC: And that's exactly the right thing to say. Pascal, we're closing in on the eve of the launch. How does it feel?
Pascal Haegeli: It feels like there's still a lot of work left to do before we launch at the ISSW. I'm very happy how things have come together and I'm looking forward to presenting this to the avalanche community. Ian and I will be presenting at the same session. I'll basically introduce the Avaluator and Ian will present on the statistical background. It'll be a joint effort.
MC: We're all excited to see what sort of reception you get.
PH: So are we (laughs).
MC: Pascal, when did you first meet Ian?
PH: I met Ian at a US avalanche forecasters' meeting. They hold them in the fall and I was invited by Karl Birkeland to give a presentation about the Munter Method at one of these meetings, it was in Snowbird I think.
IM: That's right, and as I recall the reception you got was a little contentious. I thought it was great that Pascal was willing to stand up and talk about rule-based decision making.
MC: Ian, when did you get involved with the ADFAR project?
IM: After Pascal gave his presentation at Snowbird, in 2003. One of the things that I had wanted to do was to compare all the European methods for preventing avalanche deaths. You know, there's the Munter Method, the Snow Card, the Stop or Go, the NivoTest. I wanted to see how they would work in the US. And Pascal had obviously done a lot of research and translation and understood how these methods worked. So we decided to collaborate on a paper that we presented in 2004 at the ISSW, basically evaluating these methods and seeing how they would work in North America. That was I guess the beginning of my involvement with the ADFAR project.
MC: Ian you were at the original design meeting in Calgary two years ago. What were your impressions of what the ADFAR project was trying to accomplish?
IM: I always thought that simple rules for recreationists were a great idea for preventing avalanche accidents. One of the things that really struck me at the meeting was the high caliber of people involved. There were a lot of great ideas at the meeting and everybody was enthusiastic. Overall it's an excellent concept and I guess you could say it's an idea whose time has come.
MC: Pascal, the trip-planning grid on the Avaluator looks very simple but I know the process to decide where those lines sit was actually very complex. Can you tell me how the borders between the colours were determined?
PH: Well I created a prototype initially, with these three different areas for 'Normal Caution,' 'Extra Caution' and an area where we wouldn't recommend backcountry travel. Then I went to a whole bunch of guides' meetings, the fall CPD session of the ACMG, some CMH guide training sessions, I talked with the forecasters at the CAC, and I talked to Grant (Statham of Parks Canada). I asked these people how they would draw these lines on this graph. I basically asked them how they would expect recreationists to behave with respect to danger rating and avalanche terrain. So in the end I had about 30 opinions. All I had left to do was to amalgamate them into the chart.
MC: So how did those lines move with your analysis of accidents?
PH: It's interesting that you would bring that up. After we gathered this expert opinion, we had a look at accidents. We expected that accident pattern would show something similar—the peak of accidents would be with higher danger rating in simple terrain and in lower danger rating in complex terrain. But it actually didn't show up like that. The data shows us that no matter what terrain you are in, the peak of accidents is always under considerable avalanche danger. This was an interesting, but rather unexpected result. To get back to your question, we did not change the lines based on the accident data. But the analysis allowed us to calculate prevention values for these lines. We could tell how many accidents would have been prevented if people had followed these lines. Maybe Ian can fill in the blanks here.
IM: You're doing great. But I would add that this opens the door to a really new understanding, and that is if we had based the trip planner solely on the accident statistics, we wouldn't get the same accidents prevented that we get from the experts. In other words, I think expert opinion is a critical element and I think the tool is actually better as a result.
MC: So it's more valuable to look at experts' opinions rather than amateurs' mistakes?
IM: I would say it's valuable to look at both.
MC: Ian, the obvious clues on the backside of the card seem just that—obvious. Tell me more about how they were developed.
IM: The fundamental idea has been around for a long time. My friend Dale Atkins put it very succinctly when he said, "the names change but the accidents remain the same." People have noticed over the years that the circumstances of avalanche fatalities repeat themselves over and over. So my goal was to basically quantify those patterns for my research in decision-making.

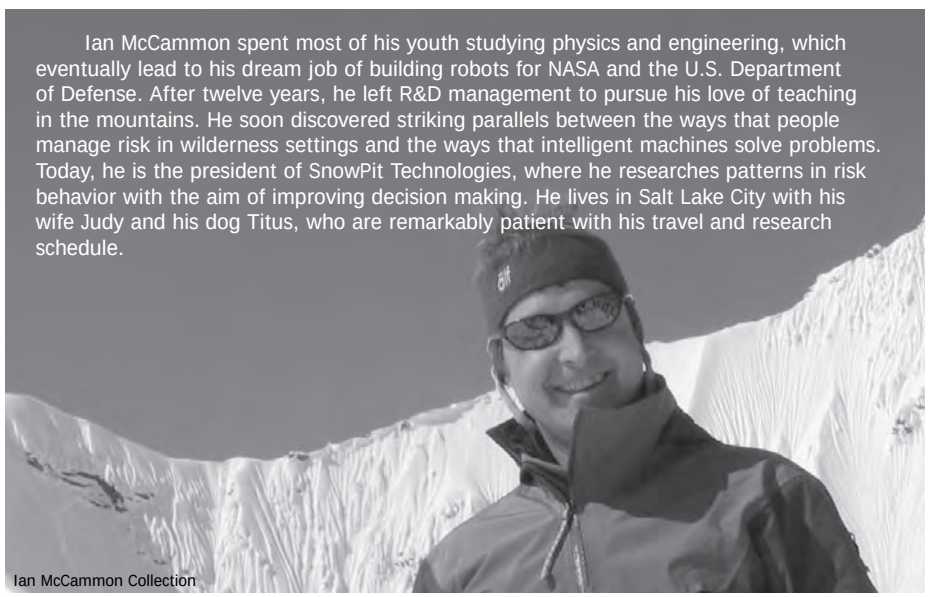
Originally from Switzerland, Pascal Haegeli is now a Canadian citizen. He lives in Vancouver where he is pursuing post-doctorate studies in human decisions at Simon Fraser University. As a long-time skier and mountaineer, he's appreciating the opportunity to combine an academic career with his passion for the outdoors. Pascal is looking forward to introducing the Avaluator to the public this winter.

Pascal Haegeli Collection

"I hope the Avaluator will create a discussion about rule-based decision making and its use in the avalanche community." - Pascal Haegeli

MC: And the linguistic side of your brain played around with that list until you found a memorable acronym. That must have been an interesting exercise?
IM: That was a lot of fun but I think there's some more work to be done. We'd like to have the clues in the order that a recreationist encounters them. I don't know, perhaps we could offer a case of Kokanee beer or a free Avaluator or something (laughs). Pascal and I both recognize that the Obvious Clues Method still needs some further work. It's certainly a functional tool right now but like most tools early in their evolution it could benefit from a more rigorous look at some details.
MC: I'm interested in the collaboration between the two. Pascal, your background is in meteorology and snow science while Ian's is more in decision-making science. How do you complement each other?
PH: Well I think it's been a very good collaboration. We've both brought good things to the table.
IM: I should clarify that my formal background is in engineering rather than decision science. I consider myself still a novice when it comes to understanding human decisions. I think one of the reasons this project is working is that we both have an appreciation for the structure and rigour of science as well as the value of intuition. It's kind of neat for me to work with someone who isn't just a scientist, and isn't just a humanist, but is a mixture of both.
MC: Well, the whole industry is interested and fortunate that you two found each other.
IM: I'm not sure our significant others would agree. My new wife has already noted how much time I spend on this project (laughs).
MC: Pascal you're currently in post-doctorate studies in decision making. How has this project affected that development in your academic career?
PH: I think I was very lucky since this project just showed up at exactly the right time for me. The CAA was looking for a project manager about six months before I was finishing up my PhD as UBC. I think I primarily got involved in this project because I was very familiar with all the existing methods. During my PhD studies I realized the human aspect plays at least as big a role in this whole avalanche problem as the snow science aspect. So I got more and more interested in the human component and working on this project just seemed like a natural fit. One of the goals of the ADFAR project is to get a better understanding of how amateurs currently make decisions, their awareness of avalanches and how they perceive their risk. So we contracted that component out to Wolfgang Haider of SFU and I got very involved in the design of the survey project. I found it very fascinating and in the end we submitted a new proposal to SHRCC, which is the Social Science and Humanities Research Council of Canada, to investigate the topic a little further. I received funding to do a two-year post-doc on this topic at SFU. So it's been a very natural progression that came from the ADFAR project. For me, it's very fortunate. It's always been my plan that this ADFAR project could plant the seed for further research and development in this area. So I'm happy with this for me personally and from a project manager's point of view.
MC: Ian, I'm interested in how this project may expand to the US. Obviously there's a pretty big hurdle without the ATES rating, but are you working towards that in any way?
IM: There has been a tremendous amount of interest in the U.S. I've gotten a lot of queries and requests to reprint the obvious clues so I think, as I said earlier, it's an idea whose time may have come. It will be interesting to see how people respond to the Avaluator and see what interest is generated.
MC: What is your vision for this coming winter and the release of the Avaluator? If you could write the script for what's going to happen, what would you like to see?
PH: I would hope that recreationists will find that the Avaluator adds something to their decision making, even if it is just something little. I also hope that the launch of the Avaluator will create a discussion about rule-based decision making and its use in the avalanche community. Hopefully a lot of people will find it useful for their decision making and courses. I would like to see a big discussion, so by the end of the winter we can take all these comments and make any modifications that we find would be necessary. That's what I'm hoping for this winter.
IM: For me, I see the Avaluator as an experiment with huge stakes. The response from users on a social and marketing level will tell us a lot about how recreationists manage avalanche risk. I also think there's another dimension and that's how it affects avalanche accidents. The CAA and the CAC have done a great job of revamping the accident data base, so that we'll hopefully be able to see trends in the near future that will tell us how successful this experiment has been.
MC: Anything else you'd like to add?
IM: Make sure to say that Pascal should be paid more. And be sure to say that he needs a vacation too!
PH: You just want to make sure that the whole crop of tomatoes will be flying in my direction at the ISSW.
MC: Well, I sure hope I'm there for that!

Ian McCammon spent most of his youth studying physics and engineering, which eventually lead to his dream job of building robots for NASA and the U.S. Department of Defense. After twelve years, he left R&D management to pursue his love of teaching in the mountains. He soon discovered striking parallels between the ways that people manage risk in wilderness settings and the ways that intelligent machines solve problems. Today, he is the president of SnowPit Technologies, where he researches patterns in risk behavior with the aim of improving decision making. He lives in Salt Lake City with his wife Judy and his dog Titus, who are remarkably patient with his travel and research schedule.



Ian McCammon Collection

Chris Christie

The Rating Game

Greg Johnson and Karl Klassen

The new Avaluator will soon be on the market. The prototypes for this tool show great promise as an effective solution to a complex problem, and have garnered critical acclaim from risk specialists. However, to apply the trip-planner effectively, the user depends on two important factors: an avalanche danger rating and an avalanche terrain exposure scale (ATES) rating. The first is a well-established system, and a current danger rating can be found for most places in western Canada frequented by winter backcountry users. The ATES system, developed by Grant Statham and Bruce McMahon of Parks Canada, is newer and to date has been implemented almost exclusively within the National Mountain Parks.

The ATES is a three-level scale that rates terrain as simple, challenging, or complex. These ratings give backcountry users an idea of the risk that is presented by terrain prone to avalanches. In preparation for the Avaluator's public launch this winter, project manager Pascal Haegeli contracted us to rate popular ski trips beyond national parks boundaries. In addition to this not insignificant challenge, the contract included doing something that had never been done before: developing ATES ratings for snowmobile trips.

The process of assessing ATES ratings equires using the scale's technical version. The development of this scale is discussed in an excellent article written by Grant and Bruce for the Fall 2004 issue (vol. 70) of Avalanche News. You can also find the ATES technical version on the Parks Canada webpage by entering "avalanche terrain exposure scale" in the keyword search. The technical version employs 11 weighted terrain factors for use by trained professionals to generate ratings that remain consistent from one area to the next and from one assessor to the next.

Karl, who is busy building a house in Revelstoke, landed the easier side of the job—rating the ski trips. Greg, who had only to deal with buying and moving into a new house and planning his own late-August wedding, took on the more complex task of adapting the ATES for sledding trips and rating some popular riding areas. Figuring out how the ATES would work for sledding applications was tough at first, but once that hurdle was overcome, this portion of the project turned out to be fun.

Clearly, rating all ski and sled trips in Canada is a gargantuan task requiring more time and resources than the ADFAR project can muster at this point in its development. Our goal was to first identify general areas where skiers, boarders, and sledders can be regularly found in the backcountry. We decided on these areas based on personal and professional knowledge of the backcountry, our experience as CAC avalanche forecasters, and through dialogue with professional and experienced recreationists in various mountain communities.

We then developed short lists of popular trips commonly traveled by recreationists in these areas. This was done by soliciting opinions from local professional and recreational users. Once we had these trips listed, we looked at our timelines and budgets, and then prioritized the trips to ensure we would get a representative cross-section of trips and tours throughout the Columbia, Coast, and Rocky mountains.

At this point we were ready to begin establishing ATES ratings, thus allowing practical use of the Avaluator in BC and Alberta when it is launched in the fall. Our paths diverged somewhat at this point: Karl sub-contracted people in various areas to carry out further work on ski-touring trips while Greg went into the field to look at snowmobiling terrain and develop the database for sledding trips.

Rating snowmobile trips proved to be a different process than rating ski trips. Sledders differ from skiers due to the nature of the machine, how the users select their terrain, and how much area they cover. Many snowmobile trips also have a groomed or well-established trail in the valley bottom, leading to a cabin or common start point for the day.

These access trails to cabins or common start points were given an overall rating. Then sub-areas were identified, where sledders branch off from the main trail. These sub-areas, generally defined by major terrain features, were then given an overall rating which might differ from the rating given to the access trail. This

scheme allows people to assess risk for relatively simple trail riding separately from the risks associated with the sub-areas, which often include narrower side valleys, higher elevations, or more exposed terrain.

Developing the data for both skiing and sledding included reviewing the trip lists for each region with locals, obtaining basic geographic data (map sheet information, UTM coordinates, access points, etc.) and, of course, assessing an ATES rating for each trip. Clearly not every ski and snowmobile trip was included in this project. We attempted to get trips that are representative of the most-used areas of BC and Alberta but are very aware that much remains to be done. Over time, it is hoped that all trips everywhere will be rated and that resources, such as guide-books, will include ATES ratings for trips they describe. This way, the ATES ratings will eventually come into general use by recreational backcountry users.

The ATES ratings work done to date will make the Avaluator a useful tool for backcountry recreationists in the coming season. As the task of rating trips continues in the future, the Avaluator will become increasingly effective for more users in more places.

>>Greg Johnson and Karl Klassen are CAC Avalanche Forecasters.

Ratings Outside National Park Boundaries

Ski touring trips:

- South Coast region: 25 trips
- Nelson/Rossland/Slocan region: 19 trips
- Kootenay Pass area: 17 trips
- South Rockies/Fernie region: 54 trips
- Kimberley area: 10 trips
- North Rockies/North Cariboos area: 22 trips
- Smithers area: 32 trips
- Terrace area: 15 trips

By late fall we expect to have trips rated in:

- Kananaskis Country: 27 trips
- Revelstoke area: 15 trips
- Golden area: trips to be determined
- Coquihalla area: trips to be determined

Sledding trips:

- Valemount area
  - Clemina Creek: 10 trips
  - Allan Creek: 8 trips
- Golden area
  - Quartz Creek: 15 trips
- Revelstoke area
  - Keystone: 10 trips
  - Boulder: 7 trips

This winter we plan to rate:

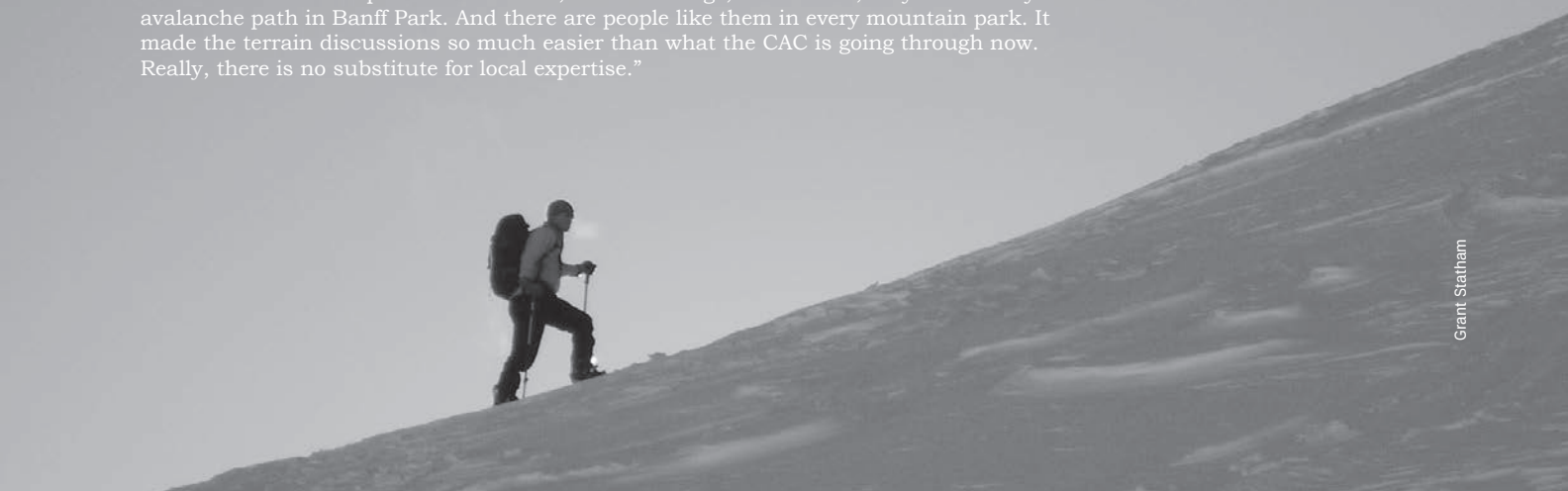
- McBride, BC
- Golden, BC
- Revelstoke, BC
- Fernie, BC
- Pemberton, BC
- Bighorn Recreation Area, Alberta

Rating Avalanche Terrain

How Did Parks Canada Do It?

The Avalanche Terrain Exposure Scale originated in Parks Canada. Grant Statham, Parks Canada's Avalanche Risk Specialist, came up with the concept and together with Bruce McMahon, Senior Avalanche Technician at Rogers Pass, they steered the project through numerous consultations. The actual process of rating terrain began in August 2004. By November of that year 275 ski touring trips in the mountain parks had been rated and the information published. The next summer waterfall climbing was tackled. By November 2005, 75 ice climbs in the national parks had been rated and published.

Grant Statham is quick to point out the obvious advantages his team had in rating terrain in the parks. "To start with," he explains, "we have an amazing base of knowledge to draw from. We have numerous mountain guides in every park, some of whom have been there for decades. People like Gord Irwin, Marc Ledwidge, Brad White, they know every avalanche path in Banff Park. And there are people like them in every mountain park. It made the terrain discussions so much easier than what the CAC is going through now. Really, there is no substitute for local expertise."



Grant Statham

The AVALUATOR™ Effect

Shifting the focus of recreational avalanche training

By John Kelly

There is a lot of buzz around the Avaluator in the CAC office. And sometimes, from the inside the bubble, it can be difficult to discern if the hum can be heard anywhere else. We are excited about the launch of this product that has absorbed so much energy and consumed many, many hours of work, but at the same time we are nervous.

We're excited because the development of the Avaluator brought together many positive elements, including world-quality research, a wide range of expert input and extensive user-group testing. As a result, the Avaluator is at once focused on helping people make good decisions on where to go during their backcountry outings, but also intuitive and easy to use.

We're nervous about, well, the same things that bring anxiety to any parent when they watch their children move out into the wide world. Will it be successful? Will it find acceptance? Will it spread its wings and fly?

At this point we don't know whether the Avaluator will have a big effect on the way people approach their backcountry trips. That will be determined by the marketplace. We have decided to include the Avaluator as an integral part of Avalanche Skills Training courses beginning this year. We feel that learning how to use the Avaluator is introductory avalanche skills training. Essentially, using the Avaluator will bring students into contact with several of the topics of the classroom component of training: gaining insights into terrain, interpreting avalanche danger, observing obvious clues related to avalanche accidents—all in a concise and compact form.

In turn this will allow instructors to maximize the time available for the all-important field sessions of avalanche skills training courses. In short, we believe the Avaluator is the best teaching tool for introductory avalanche skills training courses available anywhere, regardless of its wider applications.

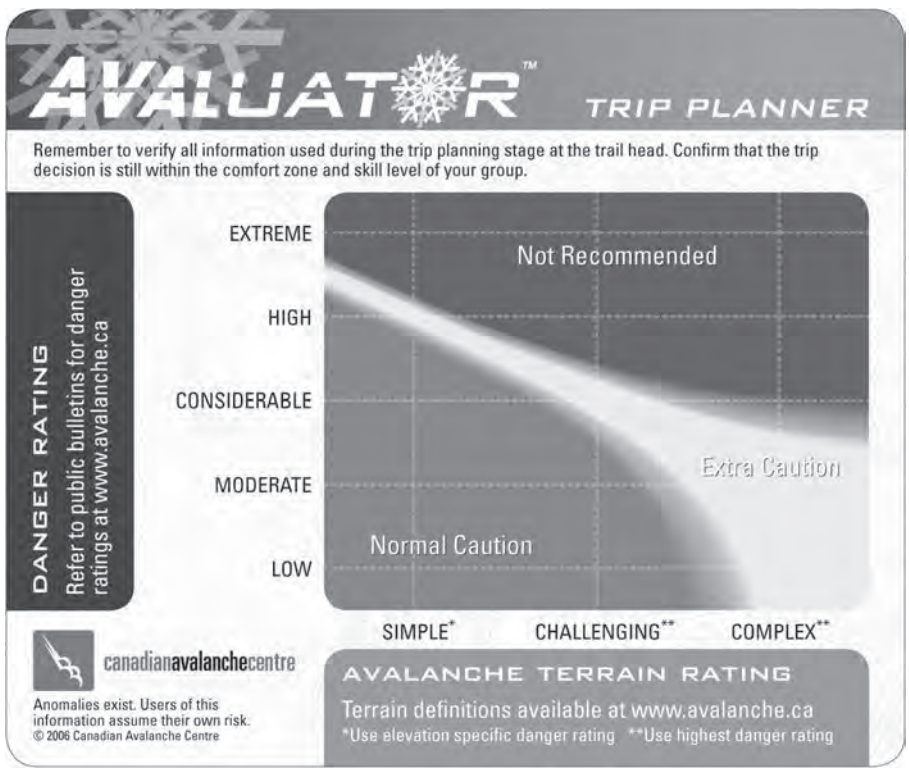
There are many very compelling reasons why the Avaluator fits into introductory avalanche education, and I won't go into detail here. If you are interested, I highly recommend reading the paper by Pascal Haegeli that appears in the "Research and Education" section of this publication. However, it is important to signal that the inclusion of the Avaluator into AST training signals a basic shift in teaching introductory-level students about avalanche risk. This shift moves introductory avalanche skills training towards the fostering of practical experience—a much more effective way to develop true expertise than traditional knowledge-focused approaches.

For some time, instructors of Avalanche Skills Training courses have requested an upgrade to the curriculum. Input from a committee drawn from AST providers has been valuable in making the decision to use the Avaluator as its central feature. We hope the curriculum changes will inspire instructors and students alike.

Calendar of events for the Avaluator as it relates to AST:

- The Avaluator is launched at the International Snow Science Workshop in early October.
- The Avaluator and its booklet will be available for examination and sale by October 15.
- In October, the AST Level 1 instructor's manual will be overhauled and lesson plans developed to include the Avaluator.
- Seminars for AST instructors, to introduce both the Avaluator and the new course content, are planned for Nelson, November 19, Whistler, November 26, and Canmore, December 2.

>>John Kelly is the CAC Operations Manager



A Letter from Quebec

This letter, signed by the Quebec Minister of Municipal Affairs Nathalie Normandeau, outlines the provincial government's commitment to provide funding for an avalanche centre in Quebec. The province has promised a total of $150,000 over two years, and is currently soliciting the federal government to commit to a similar amount. This provincial/federal funding formula follows the same model already in place in BC and Alberta. This is a big step towards our goal of a single Canadian Avalanche Centre with two offices, one in Ste. Anne des Monts and the other in Revelstoke. A few hurdles remain, but we are closer than ever to this important goal!

Québec

Gouvernement du Québec
Députée de Bonaventure
Ministre des Affaires munici
Ministre responsable de la r

Québec, le 23 août 20

Monsieur Majella Ém
Administrateur
Centre d'avalanche de la Haute-Gaspésie
464, boulevard Sainte-Anne Ouest
Sainte-Anne-des-Monts (Québec) G4V 1T5

Monsieur, Majella

J'ai le plaisir de vous informer que le gouvernement du Québec contribuera au soutien financier du Centre d'avalanche de la Haute-Gaspésie. Une somme maximale de 150 000 $ sera réservée à même le Fonds conjoncturel de développement, à raison de 75 000 $ en 2006-2007 et de 75 000 $ en 2007-2008. Je vous invite à poursuivre vos démarches, notamment auprès du gouvernement du Canada, afin d'obtenir des sources de financement complémentaires.

Les représentants du ministère des Affaires municipales et des Régions se chargeront de préparer avec vous un protocole d'entente dans lequel seront déterminées les modalités les plus appropriées du versement de l'aide financière. Cette contribution n'engage en rien le gouvernement du Québec pour les années futures.

Je souhaite ces dispositions à votre convenance et vous prie d'agréer, Monsieur, l'expression de mes sentiments les meilleurs.

La ministre,

NATHALIE NORMANDEAU

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Backcountry Avalanche Workshop 2006

Our Partnership with Columbia Brewery

By John Kelly

The backcountry avalanche workshop is just one of many community-based events supported by Columbia Brewery, our oldest presenting partner. Columbia Brewery has deep roots in the Kootenays and a brand image that highlights an active mountain lifestyle. This gives them obvious common cause with the CAC. While we both encourage people to get out in the mountains, the main thing is that everyone comes back safe and sound. The message can be summed up in two words: responsible use.

Beginning in 2003 our November workshops have been an opportunity to introduce some of the most up-to-date topics in avalanche safety to backcountry users. We brought in experts from around the world to talk about the main human factors associated with avalanche accidents, case studies from Alaska, and advances in snowpack stability tests.

In 2005 we were already feeling a change in direction coming on for the Backcountry Avalanche Workshop program. For one thing, we understood the need to take the event to core mountain communities that are the focal point of much of the winter backcountry recreation in western Canada. An exit survey conducted at the 2005 workshop also highlighted the need for more hands-on activities. Participants were most interested in talking about how to evaluate avalanche terrain and other practical exercises specifically geared to get their head in the snow.

The goal for all CAC programs is to target the recreational users most at risk from avalanche accidents on a priority basis—the more at risk you are, the more we want our programs to reach you. Research conducted by the ADFAR project concluded that the "out-of-bounds" skier, i.e., the skier or boarder who leaves the boundaries of a resort, is the fastest growing segment of backcountry user. This group is especially notable for having the highest risk propensity. In other words, a significant portions of out-of-bounds skiers accept a high risk of having an avalanche accident as a natural part of their activity. This places this segment of users at the top of our list for targeted programs.

With the move toward core mountain venues—the resort towns where these folks gravitate to in the winter—and hands-on activities teaching practical skills with obvious application to people's backcountry experience, we feel there is an opportunity to match a high-profile event with a high-priority audience. So, for 2006 we are trying a new format for the Backcountry Avalanche Workshop. Our inaugural mountain community locations will be Whistler, Nelson and Canmore. Date details haven't been confirmed at the time of printing but we will be holding the sessions in late November or early December.

The workshops will concentrate on new advances in decision tools, namely introducing the Avaluator, understanding local terrain with the help of local experts, and beacon tips and techniques. These sessions will be held in conjunction with CAA Industry Training Programs (ITP) instructor training and fall CAA Continuing Professional Development seminar.

Julian Itagaki

Depending on our Friends

The crucial role of sponsors in the CAC

By John Kelly

The community of people interested in avalanche safety includes a wide variety of members who approach the problem from different angles. Private sector sponsors are the rarest of breeds—folks who come prepared to spend money and time to help us accomplish common goals. While often the activity we do together benefits the sponsor—by giving them exposure, allowing them to interact with customers or expanding a client base—there are many instances when it doesn't. It's not uncommon for our sponsors to participate with us through of a sense of altruism, community and passion for winter mountain activities. In essence, we share the same values.

The Canadian Avalanche Centre is privileged to have a relationship with three main sponsors who each contribute products and services valued in the tens of thousands of dollars towards the interest of public avalanche safety. These three partners are Canadian Pacific Railway, Mountain Equipment Coop and Columbia Brewery. They are known as "Presenting Partners," which means they each sponsor a major event or product. CPR backs Avalanche Awareness Days, Columbia Brewery supports our Backcountry Avalanche Workshops and MEC throws its muscle behind Avalanche Skills Training courses.

With all our sponsors, our links are sometimes obvious and other times more subtle. In the case of MEC, the partnership is, in many ways, a natural. The people who venture into the backcountry in winter are their clients, and ours. Giving people the skills and training to be able to access mountain terrain in winter is a perfect fit for both of our organizations, and a clear focus for cooperation. We are also both not-for-profit organizations, an operating reality that furthers our common cause.

For a company like Columbia Brewery, our common cause may be less apparent, but it is equally compelling. One of their themes is "responsible use," a phrase that applies equally well to alcoholic beverages as the backcountry. For both of us, the message is the same—we want you to return safely! Columbia Brewery also has a highly evolved sense of community, one which is deeply connected to its mountain environment. The familiar tag line, "We're the beer out here," is always coupled with an image of Kokanee Glacier or a snowmobile slicing through virgin powder. They've made a marketing link to snow, but it's backed up by a responsible and admirable commitment to snow safety.

Snow and snow safety are integral to the corporate culture of the Canadian Pacific Railway. No other organization in Canadian history has been so deeply affected by avalanches. Forging a railway through the interior ranges of BC over 125 years ago laid the ground work for avalanche control in transportation corridors that we see today. Today, the daily challenges of operating in some of the country's most avalanche-prone terrain are a way of life for the company. Their commitment to the communities they pass through, and the employees that work in that environment, make the CPR a vital member of our team.

While our three presenting partners make certain programs viable, our daily operations, as well as many other services,

CANADIAN PACIFIC RAILWAY
Ingenuity.

MOUNTAIN EQUIPMENT CO-OP®

COLUMBIA BREWERY

depend on other private- and public-sector funding. Both are essential to our survival. The CAC's funding model that has been accepted by four governments in Canada (the federal government and the provinces of BC, Alberta and Quebec) defines a 40-40-20 split. Forty percent from the federal government, 40 percent from provincial governments and 20 percent self-generated funding. That means we need to raise a significant amount of money each year in order to receive government funding.

In addition to living up to our funding model, the CAC also looks to the private sector for direction and guidance. Stakeholders from a variety of backgrounds sit at the Canadian Avalanche Roundtable—a body that provides advice for our priorities and gives an annual review on our performance. Members of the roundtable are government and non-government alike. Their common thread is an interest and commitment to avalanche safety in Canada.

Our sponsors, big and small, are all members of the avalanche community, contributing to avalanche safety in one way or another. Whether through directly funding our programs, building better gear for backcountry users, supporting research or hiring professional avalanche workers, we work together to make the Canadian avalanche scene of the best in the world.


Brad Harrison

Miles for Mountains Goes the Distance

On your mark...get set...GO! Somewhere in the crowd are the "Miles for Mountains" runners, who raised close to $250,000 for the Canadian Avalanche Foundation.

Whether it's breaking the three-hour mark (or the four, or the five...), posting a personal best, or just crossing the finishing line, most people need some serious incentive to run 26 miles on pavement. This summer, 51 people participated in the Calgary Marathon motivated by something more than a finishing time. They were raising money for avalanche safety and awareness, as part of a special fund-raising project called Miles for Mountains.

Participants signed up for the project back in February. They were provided with a training program and moral support as they prepared their bodies and minds in the months preceding the big run. In return, each agreed to raise a minimum of $1,000 and donate the proceeds to the Canadian Avalanche Foundation.

By the time race day came, over 450 corporate and private donors had pledged money. The event was incredibly successful, raising some $250,000 for the CAF. "The participation, enthusiasm and financial support far exceeded my expectations," said CAF President Chris Stethem. "This was the most successful fundraising venture the CAF has been involved in to date. I'm very grateful to the Calgary community for this tremendous level of support for mountain safety."

Event organizers and half-marathon participants Linda Shaw and Susan Pattillo had their own very personal, and powerful, motives. Both had lost a son in the Connaught Creek accident of 2003, so this event was somewhat of a milestone on their paths to healing. "It was one of the most emotional experiences of my life," said Linda Shaw. "I thought of the seven children constantly and I know that my son Michael and Susan's son Alex were both very proud of their mothers on that day."

The fundraiser was "a wonderful journey" says Tania Ritchie, who spearheaded the event. "It gave a lot of people who are friends of Linda and Sue a chance to show their support and empathy and love through a commitment to training and fundraising," she explained. "It is often so difficult to help people who have had a traumatic loss like our friends did. This project just enabled us to do something without saying anything but just doing. Everyone who participated loved being part of the experience, enjoyed getting into shape, and we are all tremendously pleased with the success of it all."

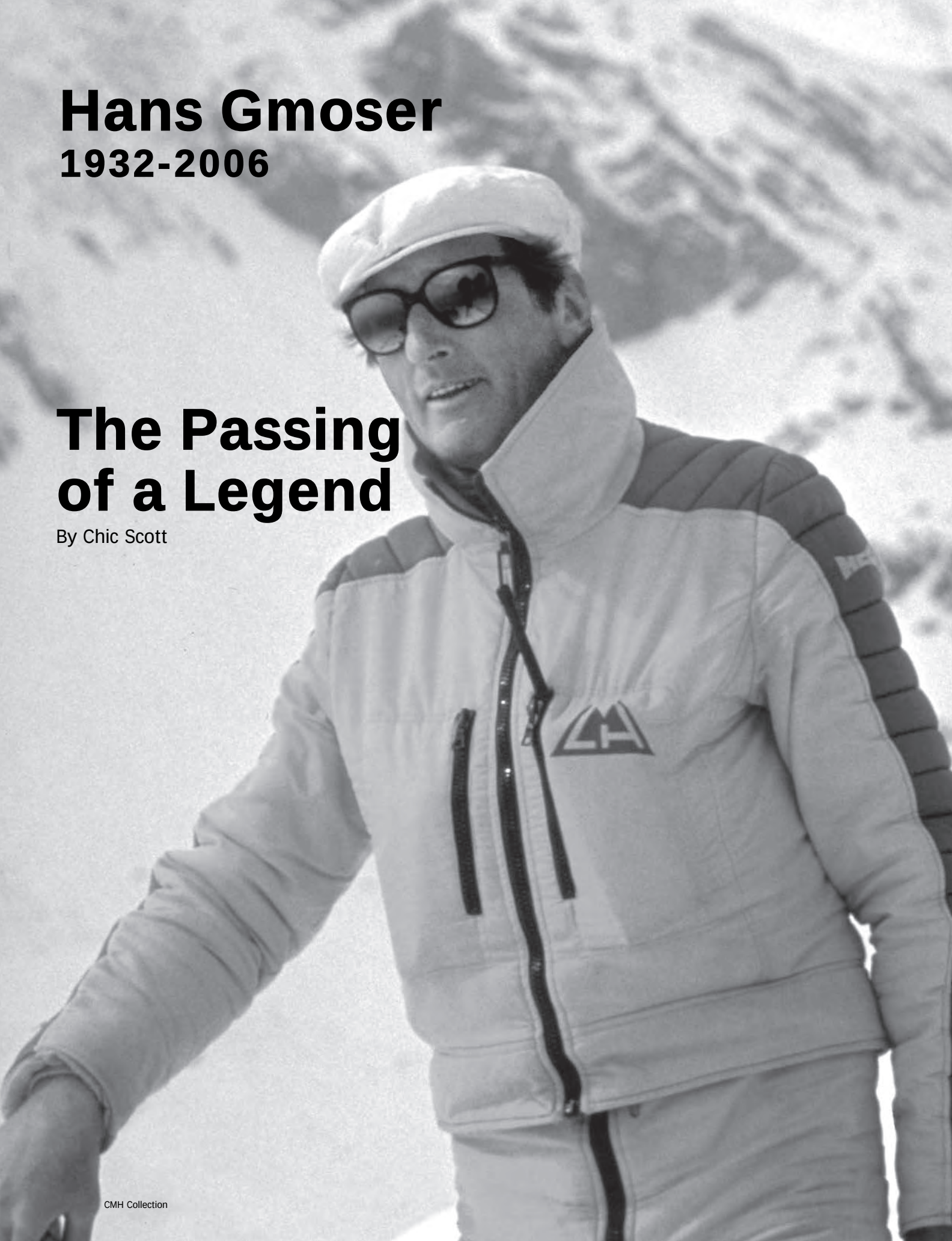
A special thanks to Tania Ritchie, Linda Shaw, Amanda Shaw and Susan Pattillo for their hard work. Of course, the event would not have been so successful without all the participants—thank you!

A classic Calgary moment. Marathon winner Jason Loutitt finishes in perfect western style.

Hans Gmoser
1932-2006

The Passing of a Legend

By Chic Scott



CMH Collection

Hans Gmoser, the eminence grise of Canadian mountaineering, died on July 5th, 2006, from injuries sustained in a fall while cycling the 1A highway near Banff. In recent years Gmoser had shunned the limelight, content to enjoy his two favourite activities—cross-country skiing in winter and cycling in summer. But during the 1950s, 60s and 70s he laid the foundation of modern mountaineering in Canada. He pioneered rock, alpine and expedition climbing, he popularized ski mountaineering and was largely responsible for creating our professional mountain guides association. Through his films and later through helicopter skiing he made the Canadian mountains world famous.

Born in Braunau, Austria, July 7, 1932, Hans grew up during the troubled war years. As a teenager he discovered the mountains and a lifelong passion was kindled. With his friend Franz Dopf he climbed and skied and developed his mountaineering skills. Then, in 1951, Hans and Leo Grillmair immigrated to Canada. Life was pretty spartan for the pair and their first job was logging near Whitecourt, Alberta. Soon they made their way to Calgary, where they were joined by Dopf. Linking up with The Alpine Club of Canada they began to discover our incredible mountain wilderness. During the summer months their passion was rock climbing, pioneering new routes on Mount Yamnuska in the front ranges of the Rockies. In the winter it was ski touring near the Stanley Mitchell Hut in the Little Yoho Valley, near Field, BC. Here they celebrated their first Canadian Christmas and learned to love their adopted country. Hans played the zither and Leo loved to sing so the wilderness cabin was full of music.

Hans' mountaineering achievements during the fifties and sixties are numerous and a brief list would include early ascents of Mount Alberta and Brussels Peak two of the hardest challenges in the Rockies, a remarkable ascent of the east ridge of Mount Logan, Canada's highest peak, the second (and possibly first) ascent of Mount Blackburn in Alaska and a new route on the north face of Denali (Mount McKinley), North America's highest summit. As a skier he pioneered new high-level ski traverses in the Purcell Mountains and along the crest of the Rockies from Kicking Horse Pass to the Columbia Icefield.

For young Canadian climbers and ski mountaineers he was an icon and inspired several generations of fledgling mountaineers. The idealistic articles he wrote in the Canadian Alpine Journal were music to young ears looking for an alternative lifestyle: "What were we trying to do? Were we trying to show off? Were we trying to kill ourselves?—No! We wanted to inhale and breathe life again. We were rebelling against an existence which human kind has forced upon itself. We were rebelling against an existence full of distorted values, against an existence where a man is judged by the size of his living-room, by the amount of chromium on his car. But here we were ourselves again: simple and pure. Friends in the mountains."

But it was as a mountain guide that he really made his mark. He began leading ski tours for Erling Strom and Lizzie Rummel near Mount Assiniboine in 1953. Lizzie became a close friend and confidant, as did Fred Pessl one of Hans' first clients. Hans never forgot the early friends he made in the mountains. They supported him when he needed help and he repaid their trust many times over. In later years Hans would host "Nostalgia Week" at his lodge in the Bugaboos and invite his early clients and supporters to join him for a week of heli-skiing.

In 1957 Hans founded Rocky Mountain Guides Ltd. He led mountain climbers during the summer but the real bread-and-butter programs were the ski weeks in the winter, at Mount Assiniboine, Rogers Pass and of course at his beloved Stanley Mitchell cabin in the Little Yoho Valley. From 1957 to 1967 Hans made 10 ski and climbing films that he toured all over North America, from Alaska to California and east to Montreal and New York. One year he had 53 lecture dates on his schedule and attracted a crowd of 2500 people in Detroit.


Whyte Meseum of the Rockies


Glenbow Museum of Archives

Hans accompanied these films with a romantic narration that thrilled and inspired audiences. A critic in a Milwaukee newspaper wrote, "In narrating the film Mr. Gmoser offered more than entertainment… there was a simple lesson in philosophy." Hans was a gifted communicator, a poet in fact, and wrote in the Canadian Alpine Journal, "In the end, to ski is to travel fast and free—free over the untouched snow covered country. To be bound to one slope, even to one mountain, by a lift may be convenient but it robs us of the greatest pleasure that skiing can give, that is, to travel through the wide wintry country; to follow the lure of the peaks which tempt on the horizon and to be alone for a few days or even a few hours in, clear, mysterious surroundings."

Although Hans loved traditional ski touring from small cabins in the wilderness, he is today known as the father of helicopter skiing. In 1965 he ran the first two commercial heli-ski weeks from an old logging camp in the Bugaboo Mountains, near Radium, BC. His timing was perfect. The requisite jet helicopter technology was just

“Beyond all these notable achievements, Hans was simply a remarkable man who inspired loyalty and in return would be your lifelong friend.”

being developed, and heli-skiing took off. By 1968 luxurious Bugaboo Lodge was open, welcoming blue- ribbon clientele from around North America and Europe. Hans’ Rocky Mountain Guides Ltd. grew to become Canadian Mountain Holidays (CMH), with 500 employees and a dozen lodges scattered throughout the interior of BC.

Hans was of course in the right place at the right time, but he was also the right man for the job. He developed a heli-ski industry with strong ties to the traditional mountain guiding and mountain climbing communities, and he always felt that heli-skiing was a wilderness experience. He wrote: “Our primary aim is to offer our guests a safe and educational mountain outdoor experience. We want our guests to be comfortable and to feel at home in our lodges. We want to keep our lodges free of the electronic noises and images that invade our lives everywhere else. We consider ourselves to be intruders into one of the few large, contiguous natural areas left in the world. Therefore, we ask our guests that they, along with us, respect the sanctity, silence and the spirit of these natural wonders we are privileged to share.”

Hans was also a founding member of the Association of Canadian Mountain Guides and its first technical chairman. Throughout his career he took a keen interest in guides’ affairs and for a number of years was the association’s honourary president. Hans’s pioneering efforts in mountain climbing, ski touring and heli-skiing created an industry that today employs hundreds of guides and thousands of support staff.

Beyond all these notable achievements, Hans was simply a remarkable man who inspired loyalty and in return would be your lifelong friend. He was a man who, in the words of the poet Rudyard Kipling, could “walk with Kings—nor lose the common touch.” Gmoser numbered among his friends and clients Prime Minister Pierre Trudeau (who he guided up Bugaboo Spire), the King of Spain and the King and Queen of Norway, but during his tenure at the helm of CMH he probably knew the name of every guest who skied at his lodges and every staff member who took care of them.

Hans met his wife, Margaret MacGougan, skiing at the Stanley Mitchell Hut and they married in 1966. They have lived all these years in the same modest house in Harvie Heights (near Canmore) and have two sons, Conrad (Lesley) and Robson (a ski guide like his father) and two grandchildren.

Hans has been greatly honoured over the years, receiving honourary memberships in The Alpine Club of Canada and the International Federation of Mountain Guides Associations and an honourary doctorate from Thompson Rivers University. He was elected to the Honour Roll of Canadian Skiing and to the U.S National Ski Hall of Fame. He is a recipient of the Banff Mountain Film Festival Summit of Excellence Award and, in 1987, was awarded the Order of Canada. Just a few weeks ago he was a founding inductee into the Canadian Tourism Hall of Fame.

Not long ago Hans commented: “Looking back, I’ve had a good interesting life. I had my time in the mountains. I had my time as a businessman. So what more can I ask for?” Hans’ passing will bring to a close a large, interesting and very creative era in the western Canadian mountains.

CMH Collection

Ron Robinson

Chic Scott is a climber, skier, guide and author. In his youth he was inspired by Hans Gmoser’s lectures and chose to follow the mountain path like Hans. His adventures have taken him from the Canadian Rockies to the Alps, Himalaya and northern Canada. This photo of him was taken on the Northern Selkirks ski traverse in 1976. Chic now lives in Banff and is currently writing a biography of Hans Gmoser.

Memories

We asked a few professional members of the CAA to share some personal memories of Hans Gmoser

Rob Rohn

This is truly the end of an era at CMH. All our lives were touched by this remarkable man. Those of us who had an opportunity to work directly with him were incredibly fortunate to have him as a mentor.

I first met Hans by chance many years ago as a young climber on my first trip to the Bugaboos. I'd heard that you could sneak a shower at the lodge if you went in when it was quiet in the afternoon. As I emerged from the communal bathroom off the lobby (this was before the renovations that added private baths to the guest rooms) I ran into an imposing, barrel-chested man with an accent and knickers. I instantly knew this was Hans Gmoser. He very graciously hid his displeasure at having me in his lodge and asked me how the climbing was going. I mumbled a response and left hastily like a kid who'd been caught stealing candy.

Several years later I was back in the Bugaboos doing an informal practicum before my assistant winter guide course. Hans was there too and I hoped he wouldn't recognize me as the shower freeloader (I never had a chance to ask him).

My memories of him since then are numerous; working beside him for three days clearing and burning brush at the site of the new Bugaboo septic field (Hans dressed in his signature coveralls); many magical days of skiing and hiking with Hans at the back of the group telling the same stories and answering the same questions with the same generous enthusiasm and sincerity as if it were the first time; guides scrambling to update the season profile and clean up the office when we heard that Hans was on his way up to the lodge; Nostalgia weeks when we eagerly anticipated the tales from the early days, each time learning new details and stories; those musical evenings with Hans and Toni playing their zithers; the occasional tongue-lashing when Hans let us know in no uncertain terms that something we'd done wasn't up to his high standards.

In more recent years Hans would show up periodically at the office (inevitably dressed in cycling gear), always concerned not to get in the way of those of us who had work to do, but also always readily offering encouragement and advice. Occasionally I'd seek out his help with a particularly troubling issue and he was always forthcoming with his wisdom. He'd been there before.

We'll have to figure it out on our own now. We're the stewards of a legacy and have to carry it forward. Thanks for everything Hans.

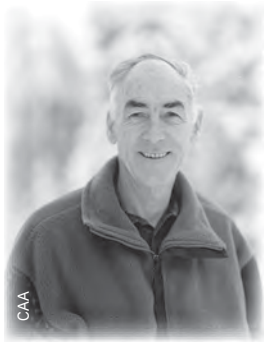

Rob Rohn Collection

Rob Rohn is an internationally-certified mountain guide. He first began working as a guide for CMH in 1984. He is now the Director of Mountain Operations.

Peter Schaerer

Among the numerous achievements of Hans Gmoser, I wish to suggest that his contribution to avalanche education of ski and mountain guides be mentioned. He had asked me to train his helicopter ski guides in making and analyzing snow pack observations at annual training weeks beginning in 1972. Hans himself was the most dedicated guide and learner of the instruction sessions. Later, he was responsible for introducing the requirement that full ski guides must have a Level 2 avalanche course.

Hans Gmoser was not a professional member of the CAA, probably because nobody suggested to him that he should be, though the senior CMH guides were and are members. But he had a strong influence on avalanche safety in the industry.


CAA

A contemporary of Hans Gmoser, Peter Schaerer spent most of his career as head of the Avalanche Research Centre for the National Research Council of Canada. He was instrumental in forming the CAA and creating professional avalanche training programs in Western Canada.

Chris Stethem

I first met Hans in the 1970's. It was in the CMH office on Banff Avenue that he occupied with Pat Lever. I had come to find out about the early days of snow avalanches in heli-skiing. Somewhat in awe, I was soon put at ease by a courteous man who had the knack of making the day about you and what the future held for you, not him. For the next three decades that never changed.

In 1999 Hans became one of the original directors of the Canadian Avalanche Foundation. He believed strongly in the value of improving the public avalanche bulletin, the goal being a daily bulletin with good local information for skiers and mountaineers to plan their day. But that came in a no-nonsense package. Hard-earned donations should be managed wisely and expensive frills were to be avoided.

In February 2004 Hans was the keynote speaker at the Calgary CAF dinner, where he recounted the 'History of Backcountry Skiing in the Canadian Rockies." He had spent a great deal of time putting the presentation together and, as expected, the audience was wrapped in the story. He was learned, entertaining, with a humble mastery of his world.

I still have a set of maps Hans gave me for planning a road biking trip in the Czech Republic. I look forward to putting that trip together and will remember Hans' smile along the way.


Chris Stethem Collection

Chris Stethem has been a professional avalanche consultant since 1979. He is the President of the Canadian Avalanche Foundation

Finding the Sunshine Again

By Beth Stewart

I felt the cool air as I stepped out on my porch, chilling yet thrilling me as I felt the promise of the coming snow in the air. It's always like that come the fall. I put on my first ski boots at Silver Star, going on to work at Grouse Mountain where my three sons all became great skiers too. The youngest, Trevor Petersen, achieved the status of the most well-known Canadian ski mountaineer in 1996, appearing in many videos, films and on the cover of countless international ski magazines. He was much beloved by the ski community.

That dreaded phone call that all parents fear came from France to my house on February 28th, telling me my boy had died in an avalanche which swept him down the Aiguille du Midi in Chamonix. Strangely enough, my revered grandmother clock stopped working at the exact time of his death—and I stopped living for a little while.

One of the questions I asked for a long time was, "What can I do to make some sense out of losing him?" Then one day the idea for POLS (Parents of Lost Skiers) appeared and went on to become a reality.

POLS is a Canadian non-profit organization established to help those parents and family who are left behind when a son or daughter dies as a result of a skiing, snowboarding, mountain climbing or snowmobiling accident in the mountains. Its intent is to give the kind of help that can only be given by those who have been through it, those who speak the same language of this kind of loss. Its second objective is to support mountain safety and education.

We support people by e-mail, telephone, in person, in whatever way they are most comfortable. We also offer a Companion Journal for the asking as well as contacts for other help. We are mothers and fathers who have been there and can walk with others through the most painful part of their journey. Currently our group is talking to people from Quebec to Texas. Some join us for a while, others just for a short time. All have a need for affirmation that they are not going mad with their grief.

POLS is not sparkly and invigorating like the ski industry, no, but it shines in its own way, lighting the dark side of mountaineering, bringing sunshine and hope. Visit the POLS website at polsonline.ca or POLS can be reached at: pols@shaw.ca or Beth by phone 250-245-8487 and Marilyn at 250-861-7067.

>>Beth Stewart is the founder of POLS

Avalanche Update for Newfoundland

By Keith Nicol

There are several avalanche-related projects ongoing in Newfoundland. Currently I am working on a video/dvd featuring interviews with skiers and snowmobilers who have had close calls with avalanches or cornice drops. This project is being produced in conjunction with the Environmental Studies Program at Sir Wilfred Grenfell College. There is still the thinking among many backcountry users that avalanches don't occur in Newfoundland, even though more than 60 people have been killed by avalanches in this province. This project has had funding from the Canadian Avalanche Foundation and it will be used in AST courses and other school programs. I am also investigating the link between recent avalanches and cornice drops and preceding weather conditions.

I have written a proposal to the Centre of Environmental Excellence in Corner Brook to produce basic avalanche hazard maps for the four main mountain regions of Western Newfoundland. The proposal also includes money to help subsidize guide training. The avalanche terrain hazard maps will be posted on my avalanche information Website as well as at warm-up shelters located near these mountain areas. They will also be used for AST courses and other school programs. If you're looking for more information, please e-mail me at knicol@swgc.mun.ca, or click "Avalanche Information" on my Web page at www.swgc.mun.ca/~knicol.

Keith Nicol is an Associate Professor of Environmental Studies and Geography at Sir Wilfred Grenfell College in the Memorial University of Newfoundland. In addition to teaching, Keith also runs the Winter Outdoor Pursuits Program at Sir Wilfred Grenfell College. He holds the highest overall CANSI (Canadian Association of Nordic Ski Instructors) certification in Canada, and has been on four Canadian Interski Nordic Skiing demonstration teams.

Keith Nicol Collection

David Liverman Collection

Avalanche debris in the Blomidon Mountains in Western Newfoundland.

THE AVALANCHE DETECTIVE

Tracking Down the Details of a Long-Ago Tragedy

Earlier this year, we received an e-mail from our friend Susan Hairsine who was vacationing in Newfoundland. She wrote:

> From: Susan Hairsine
> To: canav@avalanche.ca
> Subject: Newfoundland Avalanche
>
> I met a guy in L'Anse Aux Meadows who told me a story about moving his grandfather's house from a place called Ireland Bight, and that the house had an "avalanche hatch" for escaping. His grandmother had told him of two kids who had died there in an avalanche when she was a girl, and he wondered if we had record of that. I told him I'd check it out.

We forwarded Susan's e-mail to David Liverman, who is currently researching the history of avalanches in Newfoundland. He replied:

> From: David Liverman
> To: canav@avalanche.ca
> Subject: Newfoundland Avalanche
>
> We had heard rumours about the Ireland's Bight avalanche for some time but only pinned it down last year. Good to see that oral history is alive and well, and the 'avalanche hatch' is a new one for me! That avalanche occurred in 1891, and this is what the newspaper reported:

Source: Royal Gazette, March 31, 1891

Shocking Catastrophe Three persons killed

Mr. Joseph Moore, of St. Anthony, writing to his father in St. John's gives particulars of a terrible accident which happened at Ireland's Eye, Hare Bay on the 20th January. On that date, he says "an avalanche of snow swept down from a high cliff and buried under its enormous weight, the house of Levi Andrews, distant about 60 or 70 feet from the foot of the cliff. Nine persons were in the house at the time of the accident - five on the loft and four in the kitchen.
Mrs. Andrews was going out in the porch at the time, and six days after her lifeless body was found under fourteen feet of snow. The head was smashed in and her neck and arms broken. The eldest daughter was found lying across the stove rigid in death, and the stove was smashed in atoms. Five days after being rescued, one of the sons died from his injuries. At the time of the terrible affair, George Reid was upon the loft fixing a trap, and at the time of present writing is unable to lift his arms to his head, but he is getting better. One of the girls rescued had one of her legs broken, and suffered considerable pain. It was an awful site to behold the disfigured bodies and the house broken up like so much tinder wood. I was up all one day shoveling snow, there were forty others at the same work. The three bodies were laid out together on a board and were buried on the 28th. It was one of the saddest spectacles ever witnessed in this vicinity and threw a gloom over the community. There was never as much snow as there is this winter but very little frost."

David added this background to the story:

The best-known community of Ireland's Eye lies in Bonavista Bay. The community described here is in fact that of Ireland's Bight (variously known as Ireland Bight, Ireland's Bite, and Ireland's Eye), which lay on the northern side of Hare Bay on the Northern Peninsula, and was abandoned during resettlement in the 1960s. Levi Andrews married Susanna Canning in 1865 (it appears his previous wife Elizabeth died in childbirth in 1863). We know of the birth of Charlotte Andrews in 1867, James in 1870, and William in 1872. It's thus likely that Charlotte was killed in the 1891 avalanche.

Levi Andrews died in 1892, aged 57, a year and four days after his wife was killed. William is the head of household in the only Andrews family living in Ireland Bight in 1898, and died in 1915. Thus the likely fatalities in the 1891 avalanche were Susanna Andrews, James Andrews, and Charlotte Andrews, unless there were children of Levi and Susanna who were not recorded in the registry of births.

The community of Ireland's Bight lay at the mouth of Ireland's Brook in northern Hare Bay. Maps from 1970 show the remnants of the re-settled community with 12 buildings on steep ground northwest of the brook. Most of the community lies under modest slopes but a single building at the western extremity is overhung by steep cliffs, rising to 75 m. This is the most probable site of the Andrews house. Snow would build up in the lee of such cliffs in northern to northwesterly winds, making it vulnerable to avalanches.

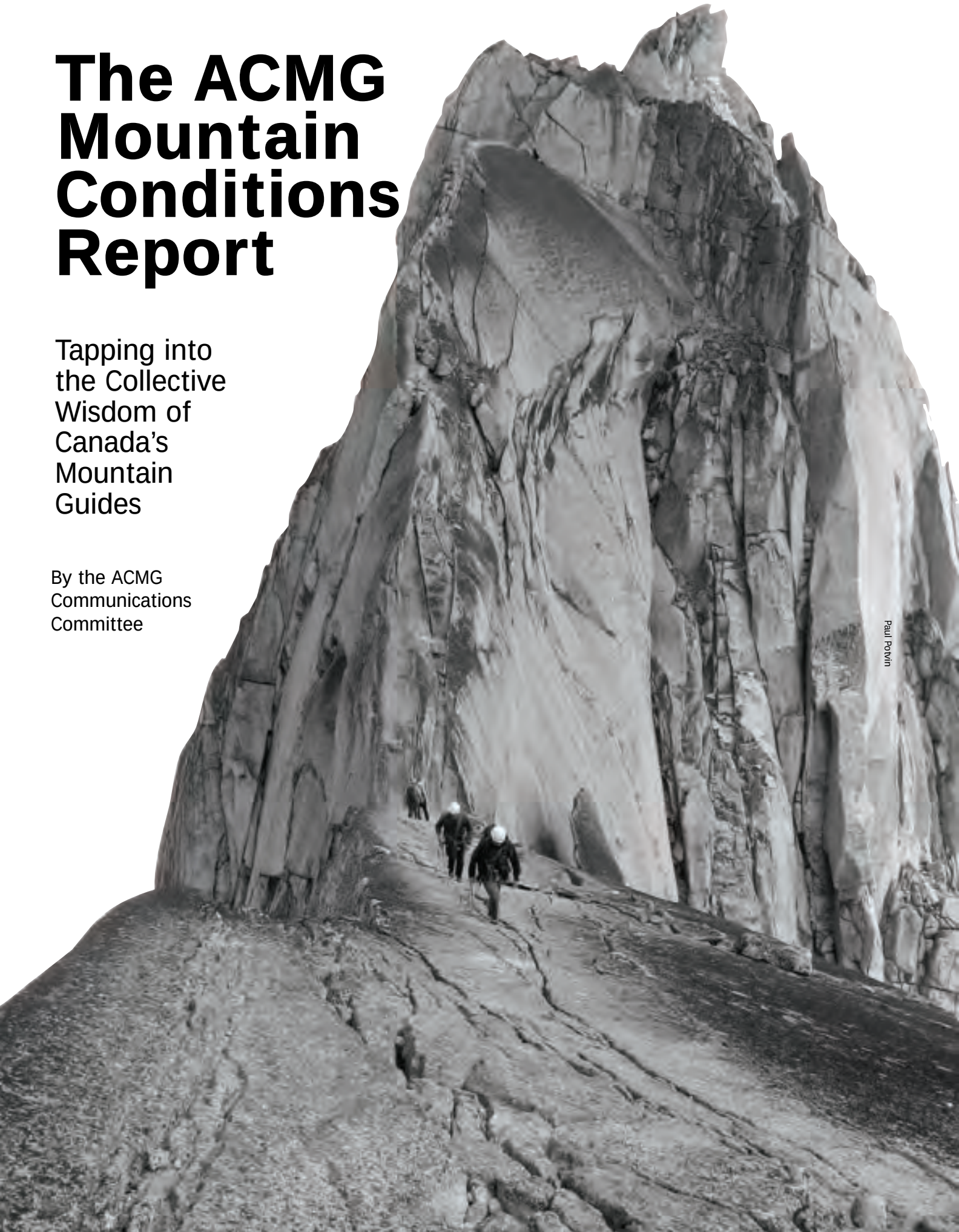
David Liverman is a senior geologist with the Geological Survey of Newfoundland and Labrador. He is currently working on a book about the history of avalanches in Newfoundland. Published by Flanker Press, it will be released in the spring of 2007

David Liverman provided us with this photo from his research. An avalanche in 1912 destroyed these houses in Tilt Cove, Newfoundland.

The ACMG Mountain Conditions Report

Tapping into the Collective Wisdom of Canada's Mountain Guides

By the ACMG Communications Committee



Paul Potvin


Rob Owens

Avalanche bulletins provide critical information regarding snow and avalanche conditions throughout the winter and spring months. Indeed, it has become standard practice to check the bulletin before heading into the mountains. But what about in the summer? People still go out in the mountains, and the conditions still matter. Wouldn't all alpine climbers appreciate access to information on current mountain conditions? Guides certified by the Association of Canadian Mountain Guides (ACMG) are working to share their knowledge, and provide this important information to the public.

In 1996, members of the ACMG began regularly exchanging observations of mountain conditions. We used e-mail at first, but when the list of recipients became bigger than the actual message, we evolved the discussion into a web-based forum. This exchange of information between guides is called the Informalex and has grown to include over 150 individual ACMG guides, each of whom regularly exchange time-sensitive information about topics such as: avalanches, snow conditions, hazards, weather, climbing conditions and specific route information. During the winter season the ACMG provides its Informalex reports to the Canadian Avalanche Centre to assist in the production of public avalanche bulletins.

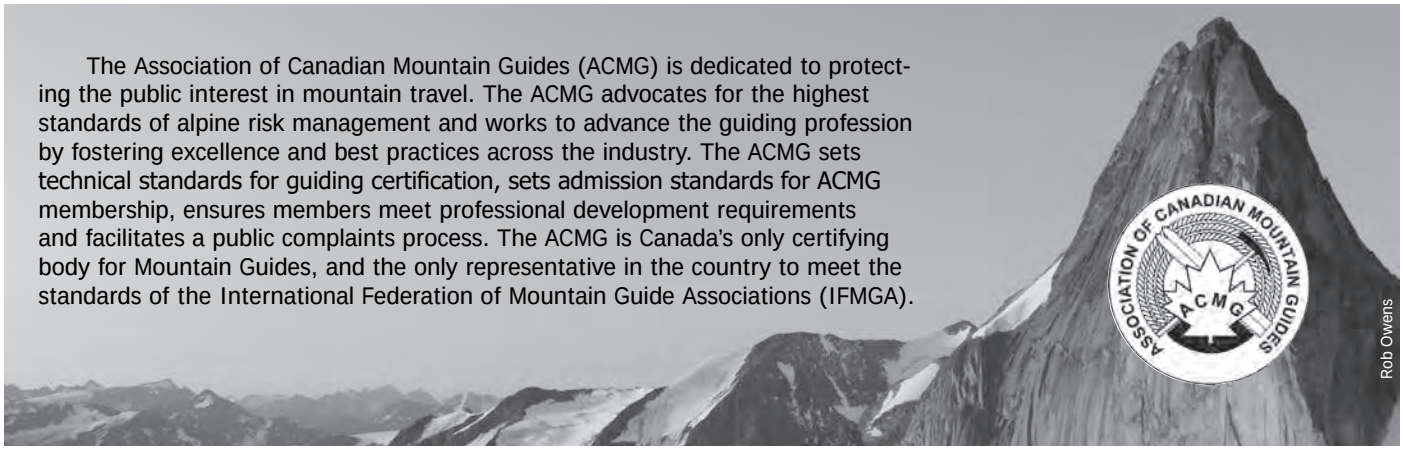
The summer of 2005 delivered a unique set of mountain conditions, due to an unusual instability in the alpine snowpack. Slab avalanches were common and guides were managing the situation by regularly exchanging their observations. **In early July of that year, two serious avalanche accidents occurred on Mt. Athabasca and Mt. Robson, both involving members of the public. The guiding community immediately asked itself, 'Would those climbers have made different decisions if they had access to the information we were exchanging amongst ourselves?'** It seemed clear to many ACMG members that the information exchanged on the Informalex would be a valuable public safety offering. What followed was a determined effort to make these professional observations available to anyone who was interested. In just a few weeks—in late July 2005—the Mountain Conditions Report (MCR) was launched.

The main goal of the MCR is to improve public safety by making real-time observations from ACMG-certified guides available to anyone. Guides post their observations in a short paragraph, which is then automatically e-mailed to a subscriber list and posted to the ACMG web site. Guidelines help to ensure that the information provided is objective and presented in a manner that is both non-technical and easy to understand. During the summer months, a weekly summary is issued on Thursday evenings, presenting a synopsis of regional conditions and an outlook for the weekend. Anyone can sign up to receive e-mailed reports, or just check the website at their convenience.

MCR weekly summaries aim to dovetail with the CAC's public avalanche bulletins, providing the summer equivalent and filling the gap when avalanche bulletins cease for the year. MCR postings occur on most days during the height of summer, and discussion typically revolves around snow, avalanches, rockfall, crevasse problems, and general climbing conditions throughout the Coast, Interior and Rockies ranges.

The ACMG supports the CAC vision to "enhance and promote public avalanche safety programs," and is committed to achieving this through feeding real-time information to avalanche forecasters and the general public. Please check out the MCR on the ACMG website (www.acmg.ca), and send your comments to the Executive Director (ed@acmg.ca) to help the ACMG continue to develop this important new product.

The Association of Canadian Mountain Guides (ACMG) is dedicated to protecting the public interest in mountain travel. The ACMG advocates for the highest standards of alpine risk management and works to advance the guiding profession by fostering excellence and best practices across the industry. The ACMG sets technical standards for guiding certification, sets admission standards for ACMG membership, ensures members meet professional development requirements and facilitates a public complaints process. The ACMG is Canada's only certifying body for Mountain Guides, and the only representative in the country to meet the standards of the International Federation of Mountain Guide Associations (IFMGA).



Rob Owens

AdventureSmart

Winter Teams Encourage Educated Activity

By Cyndie Jones

Get informed & go outdoors!

Every year, there are more search and rescue incidents in British Columbia than the rest of Canada combined. A large number of these incidents occur in BC's mountain backcountry every winter. AdventureSmart is a provincial initiative designed to combat this statistic by reducing the number and severity of these incidents through public education. As a component of this program, two two-person teams travel the province promoting AdventureSmart's "Three T's" for a safe trip:

1. Training: Know the risks, check current conditions, gain skills and practice
2. Trip Planning: Fill out a trip plan and leave it with a friend or family member before you go
3. Ten Essentials: Always carry the "Ten Essentials" plus the required safety gear for your trip

This winter, the AdventureSmart teams will be traveling to ski hills, community festivals and schools to spread these positive messages at their interactive booth. The team will distribute free outdoor safety kits and FOX 40 whistles as they talk to skiers, snowboarders, snowmobilers and other outdoor enthusiasts about the importance of properly preparing for their adventures. In addition to promoting basic outdoor safety preparation, the team will be focusing on the Canadian Avalanche Centre as the first step in planning any backcountry outing during the winter.

The teams will also be visiting schools and outdoor clubs all winter to deliver free educational presentations. AdventureSmart has adopted an hour and a half long presentation called the Snow Safety Education Program (SSEP). This fantastic, interactive program teaches children in grades 4-6 about the Alpine Responsibility Code, ski resort signage, and the hazards of going out of bounds. The last portion of the presentation focuses on avalanche awareness and emphasizes the need for more training and equipment knowledge when heading into the backcountry under winter conditions.

In addition to the SSEP presentation, the team will also be delivering their Survive Outside Program (SOP) to people 12 and over. This program outlines the BC Search and Rescue Code of Responsibility and the necessity of packing the "Ten Essentials" and filling out a trip plan before heading into the backcountry.

If you are interested in any of AdventureSmart's free programs, please contact Sandra Ferguson, AdventureSmart Team Coordinator by phone at 604.299.5450 or by email at teamcoordinator@adventuresmart.ca to book your presentation. For more information on AdventureSmart, please visit www.adventuresmart.ca.

>>Cyndie Jones is the Program Manager of AdventureSmart

In Memoriam Norman Arthur Wilson

By Robie Litchfield

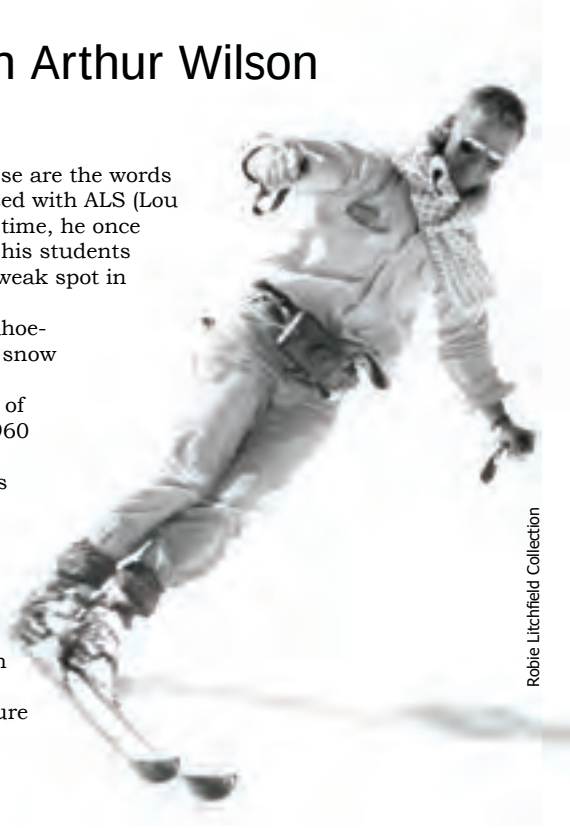
"I had more fun at my work than most people have on their vacations!" These are the words of Norman A. Wilson, aka "Stormin' Norman," shortly after he was diagnosed with ALS (Lou Gehrig's disease), in April of 2005. Given two to nine months to live at the time, he once again showed those who loved him his will—the type often experienced by his students during wild sideways snowstorms on Sierra ridgelines in search of that perfect weak spot in the snow—by staying with us 14 months instead.

An expert, a professional, an educator, and fifty-five year resident of the Tahoe-Truckee Region, Norm was known, loved and respected throughout the ski and snow industry. He began his life on snow in the early fifties at Sugar Bowl, moving to Squaw Valley a few years later to begin his avalanche career under the tutelage of Monty Atwater, highlighted by his position on the avalanche crew during the 1960 Olympics. He later took the position of mountain manager at Alpine Meadows and in 1971 became a full-time snow consultant, conducting studies for various clients including mines, highways and ski areas, and teaching numerous courses.

It is in the area of education that Norm leaves his strongest legacy. In his own home-grown classes on Donner Summit and many other venues, Norm shared his passion and respect for snow in his characteristically informative and sometimes humorous ways, but always with dignity and grace.

Norm maintained that dignity and grace right up to his last peaceful breath on the morning of Wednesday June 28, surrounded by his family. In honour of his life and work, the NAW Avalanche Education Fund has been created to ensure that avalanche education is available and affordable to anyone who wants it.

>>Robie Litchfield is Norm Wilson"s daughter



Robie Litchfield Collection

International Workshop on Snow Avalanches

Environment Canada, the National Search and Rescue Secretariat and the Centre for Natural Hazard Research at Simon Fraser University are sponsoring a workshop on avalanche research and the communication of avalanche risk to the general public. The purpose of this workshop is to build a better understanding of avalanche processes and to examine Canadian and international approaches to avalanche forecasting and public awareness of avalanche risks.

The workshop will bring together researchers and public avalanche practitioners from North America, Europe and Asia. It will be held in Vancouver at the downtown campus of Simon Fraser University from October 30 to November 2, 2006. It is anticipated that there will be over 150 attendees at the workshop who will take advantage of a unique opportunity to hear about the latest advances in avalanche research and avalanche risk communications.

This workshop presents an excellent opportunity to learn about the latest in avalanche research and modeling from experts around the world. In many ways this workshop can be thought of as a mini ISSW in a location that is closer to home. Highlights of the workshop include:

- Presentations by leading researchers and practitioners from around the world.
- An all-day field trip on Tuesday, October 31 will allow attendees to visit the BC Ministry of Transportation's avalanche control operations on the Coquihalla Highway east of Vancouver.
- A panel discussion on Wednesday afternoon will allow you to share your views with leading experts from around the world.
- A free public lecture will be held at UBC Robson Square at 7:00 PM Wednesday, November 1. This lecture will feature keynote addresses from Swiss and Canadian experts on how avalanche risk is communicated in their respective countries.

Further information can be found at www.sfu.ca/cnhr/avalanche/index.html

Schedule of Coming Events

Oct 9-15, 2006
UIAA General Assembly
The International Mountaineering and Climbing Federation (UIAA) has been meeting since 1932 to encourage mountaineering for the young, develop international standards, raise awareness about safety, and protect the environment. This year's assembly is hosted by the Alpine Club of Canada, as part of their centennial celebrations.
Where: Banff, Alberta
Info: www.uiaa.ch

October 14, 2006
Alpine Club of Canada's Centennial Dinner
Come join John Wheeler—grandson of the club's founder A.O. Wheeler—who, as patron of the of the Centennial Dinner, will extend his greeting to some of the 60-80 foreign alpine federation presidents from around the world who will be attending the UIAA General Assembly..
Where: Banff Park Lodge, Banff
Info: www.alpineclubofcanada.ca/centennial

Oct 11-15, 2006
58th ICAR Congress
The International Commission for Alpine Rescue is once again hosting an open forum to discuss ideas and share information on mountain rescue. ICAR represents 30 mountain-rescue organizations from Europe and North America. The focus for this year's forum will be on trends and developments.
Where: Kranjska Gora, Slovenia
Info: www.ikar-cisa.org

Oct 27 - 29, 2006
2006 Wilderness Risk Management Conference
This annual event is focused on educating wilderness practitioners on risk management and practical safety skills. The conference is sponsored by the Wilderness Risk Managers Committee, a national consortium of outdoor schools, guide services, organizations and land managers, who are working towards better clarification, understanding and management of risks in the wilderness. Early registration deadline is August 15, 2006.
Where: Killington, Vermont
Info: www.nols.edu/wrmc
Contact: Call 1-800-710-NOLS x 3 or e-mail wrmc@nols.edu

Oct 30 - Nov 2, 2006
International Workshop on Snow Avalanches
The Coastal and Mountain Meteorology Laboratory of the Meteorological Service of Canada and the Centre for Natural Hazard Research at Simon Fraser University invite practitioners and researchers to attend an international workshop to bring together the avalanche research, forecast and rescue communities to discuss strategies for overcoming knowledge gaps in snow avalanche processes, forecasting and information dissemination.
Where: Vancouver, BC
Info: www.sfu.ca/cnhr/events.htm
Contact: Call Desiree Dallas at 604-664-9060 or e-mail Desiree.Dallas@ec.gc.ca

November 11-12, 18-19, 25-26, 2006
Backcountry Avalanche Workshops
This year we're shaking it up a bit and taking the BAW on the road. We'll be in three different mountain communities over three consecutive weekends, bringing hands-on, practical avalanche safety training. These workshops will also highlight a local professional sharing the best of local knowledge, as well as an Avaluator workshop to get you up to date with the latest addition to the avalanche safety essentials.
Where: Nelson, Whistler, Canmore/Banff
Info: www.avalanche.ca
Contact: Call Karen Dubé (250) 837-2435 or e-mail kdube@avalanche.ca

January 12-14, 2007
Avalanche Awareness Days
The CAC's annual event just keeps getting bigger and better. This year, the national media event will be held Jan 12 at Kicking Horse Mountain Resort in Golden, BC. Over the Jan 13-14 weekend, some 30 communities and ski areas across Western Canada and the US will take part by hosting a variety of activities aimed at avalanche awareness and education. Remember, there's always room for more volunteers!
Where: Kicking Horse Mountain Resort, and at a ski or sledding area near you.
Info: www.avalanche.ca
Contact: Call Karen Dubé (250) 837-2435 or e-mail kdube@avalanche.ca

Chris Christie

CAA INDUSTRY TRAINING PROGRAMS

Avalanche Operations Level 1 - SKI

This course is the first professional-level training course for people seeking employment with avalanche safety operations. Participants must be advanced skiers or snowboarders and should have considerable backcountry travel experience commensurate with industry standards. The Level 1 course is a prerequisite course to many other industry training programs.

This intensive seven- to eight-day professional training course will provide students with a solid understanding of the avalanche phenomenon including mountain snow pack formation and characteristics, terrain identification and classification, weather data collection and basic interpretation, essential companion and organized rescue skills, snow profile data collection, basic snow stability analysis including InfoExTM interpretation and a look at risk management principles in avalanche operations.

The program underwent a significant rewrite during the summer of 2005.

Prerequisites:

- A minimum of Avalanche Skills Training Level 2 or equivalent training. Participation in the AST course before your level 1 is acceptable for those that don't have this prerequisite at time of application.
- Advanced backcountry travel skills in either skiing or snowboarding.
- Proficient and consistent multiple burial transceiver skills.
- Must be 19 years of age or older.

Tuition: $1250..

Avalanche Operations Level 1 – SNOWMOBILE

Same as Level 1 but for snowmobilers

LEVEL 1 PROGRAM SCHEDULE

Avalanche Control Blasting
REVELSTOKE
Nov 18-19 (2 days)

Avalanche Operations Level 1 - SKI
WHISTLER
Dec 3-9 (7 days)
BLUE RIVER
Dec 3-9 (7 days)
KOKANEE GLACIER
Dec 8–16 (8 days)
BURNIE GLACIER
Jan 7–14 (8 days)
FERNIE
Jan 7–13 (7 days)
PTARMIGAN
Jan 21–Jan 28 (8 days)
PTARMIGAN
Jan 28–Feb 4 (8 days)
ROGERS PASS – TRU
Feb 11–17 (7 days)
ROGERS PASS
Feb 18–24 (7 days)
LAKE LOUISE
March 11–17 (7 days)
LAKE LOUISE
March 18–24 (7 days)

Avalanche Operations Level 1 – SNOWMOBILE
MONASHEE POWDER
Nov 23-30 (8 days)

Resource & Transportation Industry Avalanche Management
NELSON
Dec 4–8 (5 days)

Avalanche Control Blasting

This two-day course day provides training in the safe application of explosives in avalanche control operations. Explosives and avalanche industry experts have designed this course with the generous assistance of the BC Workers' Compensation Board. This course covers material common to all avalanche control blasting programs, including federal and provincial government regulations followed by industry- endorsed procedures for hand charge, cornice, helicopter and Avalauncher missions. Prerequisites: CAA Avalanche Operations Level 1 or equivalent. Tuition: $275.

Resource & Transportation Industry Avalanche Management (RTAM)

This course is an introduction for supervisors and technicians who are concerned with the construction, maintenance and safety of transportation facilities, routes and utilities. They may be involved in the collection of weather, snowpack and avalanche activity data. In general, these people do not use skis in the course of their duties. Workers and supervisors from transportation, utility and resource sectors such as forestry will find this course very beneficial to their winter operations and avalanche hazard management programs.

David Bryan

CAA INDUSTRY TRAINING PROGRAMS

Avalanche Operations Level 2 Module 1,2,3

The CAA Avalanche Operations Level 2 Program is an advanced program for personnel who work full time with avalanche safety and control operations. Participants must have at least 100 days of operational field experience, making and collecting weather, snowpack, and avalanche activity observations before applying. This generally requires at least two years of active operational field work and experience under the mentorship of CAA Professional Members.

The CAA Avalanche Operations Level 2 Program is divided into three modules. Module 1 focuses on decision making, advanced snow-science concepts and operational risk management principles in a four-day theory-based classroom environment. Module 2 and 3 are both field-based programs that involve the application of Module 1 principles into real-life operational decision making and risk management. Module 2 is a three and a half-day day field course in an evaluation-free setting to provide a relaxed and open environment to maximize learning. Module 3 is a seven-day evaluation based course where students' knowledge, skills and competency in both technical knowledge and practical application of Level 2 concepts is evaluated. Successful completion of Module 3 results in Level 2 certification by the Canadian Avalanche Association.

Prerequisites:

Prerequisites.

. CAA Avalanche Operations Level 1 certification or equivalent.
. Thorough working knowledge of the CAA Observation Guidelines & Recording Standards (OGRS 2002).
. At least 100 days of operational field experience in weather, snowpack and avalanche occurrence observations and analysis.
. Advanced backcountry skiing, boarding or snowmobiling skills.
. A minimum of two letters of reference from CAA professional members.
. Be physically fit.
. Participation on at least two operational avalanche rescue scenarios.

Tuition: Module 1: $900, Module 2: $700, Module 3: $1500

LEVEL 2 PROGRAM SCHEDULE

Avalanche Operations Level 2 Module 1
KAMLOOPS
Oct 24-27 (4 days)
CANMORE
Nov 7-10 (4 days)

Avalanche Operations Level 2 Module 2 – SKI
WHISTLER
Dec 10 – 13 (3.5 days)
ROGERS PASS
Jan 30 - Feb 2 (3.5 days)
ROGERS PASS
Feb 3 - 6 (3.5 days)
ROGERS PASS
Feb 7 - 10 (3.5 days)

Avalanche Operations Level 2 Module 3
WHISTLER
Dec 15–21 (7 days)
GOLDEN
Feb 11 – Feb 17 (7 days)
GOLDEN
Feb 18 – 24 (7 days)
GOLDEN
Feb 25 – March 3 (7 days)

AVALANCHE SAFETY JUST GOT EASIER

AVALUATOR™

Helping you make some of the most important decisions of your life

What is the Avaluator?

- A new tool for backcountry users that will help identify the conditions that have led to fatal accidents in the past.
- Whether on skis, snowboards or sleds, the Avaluator will help anyone build a systematic method of assessing avalanche conditions.
- A simple system we anticipate will have a positive impact on the rate of avalanche accidents in Canada.

Flip the page to read the research paper Dr. Pascal Haegeli presented at the International Snow Science Workshop in Telluride Colorado this fall. As project manager for the Avaluator, he describes the origins of this project and the research that went into its development.

THE AVALUATOR – DEVELOPING A CANADIAN RULE-BASED AVALANCHE DECISION SUPPORT TOOL FOR AMATEUR RECREATIONISTS

Pascal Haegeli[1]*, Ian McCammon[2], Bruce Jamieson[3], Clair Israelson[4] and Grant Statham[5]

[1]Avisualanche Consulting, Vancouver BC
[2]Snowpit Technologies, Salt Lake City, UT
[3]University of Calgary, Calgary AB
[4]Canadian Avalanche Association, Revelstoke BC
[5]Parks Canada, Banff AB

ABSTRACT: An exceptionally high number of avalanche fatalities during the winter of 2003 forced the Canadian avalanche community to question the effectiveness of existing public avalanche safety programs in Canada. In response to the recommendations of several avalanche safety reviews, the Canadian Avalanche Association launched the ADFAR (Avalanche Decision Framework for Amateur Recreationists) Project for the development of a practical, science-based decision framework for amateur recreationists when planning for, or traveling in avalanche terrain. The goal of the project was to reduce recreational avalanche fatalities by improving risk communication and risk awareness among the fast growing number of winter backcountry enthusiasts in Canada.
The Avaluator is a new rule-based decision support tool for amateur recreationists, including backcountry skiers and snowboarders, snowmobile riders and out-of-bounds skiers and snowboarders. A key part of the Avaluator is a pocket card that assists with planning backcountry trips and facilitates field decisions. The paper provides an overview of the ADFAR project, describes the usage of the Avaluator and discusses the underlying design principles.

KEYWORDS: Avalanche Education, Risk Management, Decision-Making, Decision Support Tool

1. INTRODUCTION

The winter of 2003 is remembered as one of the deadliest winters for recreationists in Western Canada. The avalanche conditions of that winter were dominated by a persistent instability that developed in November and remained a serious concern for the entire winter. By the end of the season, 29 people had died in avalanches in Western Canada, which was almost twice the long-term average of 15 avalanche fatalities per winter. The tragic events of the winter suddenly made avalanche safety a topic of public interest in Canada and forced the Canadian avalanche community to question the effectiveness of the existing public avalanche safety programs. In response to the events, Parks Canada (O'Gorman et al., 2003) and the provincial government of British Columbia (Bhudak, 2003) commissioned major reviews to identify possible improvements to avalanche safety on federal and provincial lands in Western Canada.

At that time, the avalanche awareness curriculum in Canada was primarily based on the premise that amateurs could use a simplified version of the knowledge-based approach that professionals use when assessing travel conditions in avalanche terrain. However, amateurs often lack the necessary practical experience to properly apply the theoretical avalanche knowledge. In order to address this issue, the Parks Canada review (O'Gorman et al., 2003) suggested the development of a practical, science-based decision framework for amateur winter recreationists as a major component for future avalanche safety improvements in Canada.

Over the previous decade, a number of rule-based decision methods had been developed for backcountry recreationists. They included the Reduction Method (Munter, 1992; 1997; 2003), the Stop-or-Go Method (Larcher, 1999; 2000), the SnowCard (Engler and Mersch, 2000; Engler, 2001), the NivoTest (Bolognesi, 2000), and the Obvious Clues Method (McCammon, 2000; 2002). With the exception of the Obvious Clues Method, all of these methods were developed in Europe, where they have been widely promoted. While the impact of these methods on avalanche accident prevention remains unclear, the new approaches had clearly provided a new perspective and significant impetus for improved avalanche safety education.

However, there are considerable differences in backcountry activities and public avalanche warning systems between Canada and Europe. Canada has much larger forecast areas for public avalanche bulletins, a full range of snow and avalanche climates and greater popularity of snowmobile riding. All these differences precluded the direct application of an existing rules-based decision method. In order to address these issues, the Canadian Avalanche Association launched the ADFAR (Avalanche Decision Framework for Amateur Recreationists) project in the spring of 2004 with funding from the National Search and Rescue Secretariat. The goal of this three-year project was to comprehensively examine avalanche accident patterns in Canada and develop effective risk communication strategies for the recreational backcountry user groups most at risk based on best practices and vigorous science.

Table 1: ADFAR related research project

i) Review of best practices
- Review of existing rule-based decision methods (McCammon and Haegeli, 2005; 2006a)

ii) Understanding of target audiences
- Study on the motivations, perceptions and current decision preference of the three ADFAR target audiences (Longland et al., 2005; Haegeli et al., in prep.)
- Estimation of non-commercial backcountry use trends in Western Canada (Haegeli, 2005)
- Estimation of average exposure of amateur backcountry skiers and snowboarders to various types of avalanche terrain in Western Canada (Haegeli, in prep.)

iii) Analysis of accident patterns
- Analysis of non-commercial recreational avalanche accident data from Canada and the United States for the development of the Avaluator (McCammon and Haegeli, 2006b)

iv) Snow science related projects
- Verification of danger ratings of some Canadian avalanche bulletins (Jamieson et al., 2006a)
- Assessment of predictive merit of snowpack observations on amateur decision-making (Jamieson et al. 2006b)

The goal of this paper is to give a brief overview of the ADFAR project and to introduce the Avaluator, the Canadian rule-based avalanche decision support tool. While the paper contains a detailed description of how to use the Avaluator, the primary focus is to explain the underlying design principles.

2. ADFAR PROJECT OVERVIEW

To produce the background material necessary for the design of a Canadian rule-based avalanche decision support tool, the ADFAR project included a number of research efforts. While historic avalanche awareness initiatives primarily focused on snow science, the ADFAR project intended to address avalanche accident prevention more comprehensively. The related projects can be grouped into the four objectives (i) review of best practices, (ii) understanding of target audiences, (iii) analysis of accident patterns, and (iv) snow science related projects. It is beyond the scope of this paper to discuss each of the research projects in detail, but Table 1 provides an overview and reference for the interested reader.

3. FUNDAMENTAL DESIGN PRINCIPLES

In this section we will describe some of the fundamental principles that were used for the design of the Avaluator. These concepts provide the theoretical context for the decision support tool and explain how it interfaces with other avalanche awareness approaches.

3.1 Target audiences

The primary target audiences of the ADFAR project are (i) backcountry skiers and snowboarders, (ii) snowmobile riders, (iii) and out-of-bounds skiers and snowboarders. Even though research has shown that there are considerable differences among the decision processes of these three activities (Haegeli et al., in prep.), it is important for the credibility and acceptance of the Avaluator to design to a tool that can be used by all three target audiences. Multiple tools could create confusion since many users partake in several of the targeted activities.

A successful, all-inclusive decision tool should therefore be adaptable and fit into the decision procedures of the various activities. To do so, it cannot require any skills that are completely foreign or unreasonable for one of the activities. As an example, Haegeli at al. (in prep.) show that while the use of maps is very common in backcountry skiing (75% of all parties interviewed had maps), it is not possible to generalize this assumption as only 8%of snowmobile and 10% of out-of-bounds groups were carrying maps when interviewed.

3.2 Decision-making focus

While traditional avalanche awareness education primarily focused on teaching facts and skills about individual aspects of avalanche risk mitigation (e.g., snow science, terrain, rescue), the goal of the Avaluator is to provide a framework that brings these components together and produce well-defined decision situations. Decision-making in avalanche terrain has been described as a sequential process where the travel decision is constantly re-evaluated as new information becomes available at smaller scales (McClung, 2002a). It is important that a decision support system raises the awareness of scale issues in avalanche hazard assessment (Haegeli and McClung, 2004) and promotes the iterative decision process.

3.3 Levels of Mastery

Blake (2004) suggested that backcountry users can be grouped into four classes according to their awareness, knowledge and experience with respect to avalanche hazard. The groups have been labeled ‘Unaware,’ ’Untrained Recreationists,’ ‘Trained Recreationists’ and ‘Professionals.’ This classification loosely follows the concept of stages of mastery from novice to expert proposed by Dreyfus and Dreyfus (1986). As individuals advance through the different stages, their decision methods become more refined. Research in decision support has shown that while knowledge-based methods work well for experienced decision-makers, rule-based

methods are more appropriate for novice users (see, e.g., Gonzalez, 2004). This model suggests that effective avalanche awareness programs should follow a tiered approach with different decision tools for users of different experience levels. However, a continuum between these tools is desirable to encourage a natural progression through the stages of mastery.

In 2005, the backcountry avalanche advisory (BAA; Statham and Jones, 2006) was introduced as a simple communication tool to raise the awareness of the general public about avalanche conditions. This initiative represents the first layer of a tiered approach to avalanche education. The BBA uses basic recommendations, such as 'Normal Caution', 'Extra Caution' and 'Not Recommended' to provide its generally unaware audience with very specific behavioral guidance about backcountry travel.

The ADFAR project and the Avaluator are primarily aimed at the next level of comprehension, which includes 'Untrained Recreationists' and 'Trained Recreationists' with only limited experience. Recreationists within these categories are generally aware of avalanche hazards and more advanced users might have a basic understanding of avalanches. Important concepts to introduce at this level are (i) What are right questions to ask? (ii) What are important pieces of information? and (iii) How do they fit together? This guidance will allow users to become familiar with basic risk management concepts and to gain practical experience in the field more easily. Klein (1998) points out that practical experience is a much more effective way to foster true expertise than traditional know-ledge-focused approaches. As users improve their understanding through practical experience, the rule-based decision method can slowly be replaced by a richer knowledge-based system that allows for more subtle decision-making. It is therefore crucially important that a rule-based decision tool is integrated in an overall avalanche awareness curriculum that continuously encourages users to develop their skills further and strive for expertise. This is a significant departure from the approach promoted by Munter (1997), where the Reduction Method is suggested as a method for double-checking knowledge-based decisions.

3.4 Decision metric

Providing a well-defined decision situation includes a decision metric, which allows users to compare alternatives and make choices based on personal criteria. The most intuitive decision metric for decisions related to traveling in avalanche terrain is the risk of triggering an avalanche, getting seriously injured or killed in an accident. However, since it has proven to be difficult to collect reasonably accurate exposure data for backcountry travel (Haegeli, in prep.), it is very challenging to calculate meaningful risk related metrics for backcountry travel.

In place of risk, historic prevention value (McCammon and Haegeli, 2006b) has been adopted as the decision metric for the Avaluator. It represents the percentage of past accidents that could have been prevented if the accident parties had followed a specific decision guideline. To produce the most meaningful prevention value, the analysis of McCammon and Haegeli (2006b) focused only on incidents with potentially serious outcomes, i.e., accidentally or remotely triggered avalanches of size 2 or larger (CAA, 1995) or involvements that resulted in injuries or fatalities.

The move to prevention value as the decision metric has important consequences for the interpretation of the resulting recommendations. While risk-based decision tools can be used as predictive tools, decision tools based on prevention values do not have any predictive capabilities. In other words, users cannot reliably use these tools to predict if a specific slope will likely avalanche or if an accident will occur. Instead, the decision tools provide the user with a measure of how often the current conditions have been observed in past accidents. This means that the Avaluator is primarily an awareness tool rather than a predictive tool. This is an important distinction from existing tools, which have often been falsely promoted as having predictive capabilities.

3.5 Decision responsibility

The Reduction Method provides the user with a definite decision by requiring the residual risk ratio (danger potential divided by reduction factors) to be equal to or less than 1 (Munter, 2003). However, such decision thresholds are highly personal and depend on various factors including current conditions, personal skills and personality traits such as risk propensity. Longland et al. (2005) have shown that there are significant differences in risk propensities among the target groups of the ADFAR project. Preset decision thresholds would most likely result in low acceptance of the Avaluator in backcountry user groups with high risk propensities. This would unnecessarily undermine the other benefits of the promoted decision approach in target audiences, where guidance is particularly needed.

Instead of presenting the user with a decision, the Avaluator aims at providing the user with a framework to make a well-informed decision based on relevant information. The prevention value is used as the objective decision metric and users have to decide for themselves what level of prevention value they feel comfortable with. The responsibility for making the decision is therefore fully in the hands of the user. However, this does not preclude the possibility for avalanche experts to include recommendations for reasonable decisions in the decision tool. This is particularly important for users with

very limited experience.

McClung (2002b) proposes that the decision outcomes in applied avalanche forecasting generally to fall into one of three categories: (i) 'Go,' (ii) seek more relevant information to resolve uncertainty, and (iii) 'No go.' The equivalent decision recommendations for an awareness tool are: (i) Proceed with 'Normal Caution;' (ii) use 'Extra Caution' as additional knowledge and experience is required to manage the present avalanche hazard; and (iii) backcountry travel 'Not Recommended.' This reference to knowledge and experience should encourage users to continuously seek further training.

3.6 External limitations

There are also a number of external constraints for the design of a Canadian decision tool, which are particularly important when comparing to European decision frameworks.

In Western Canada, forecast regions of public bulletins vary widely in area ranging from approximately 100 km^2 to about 30,000 km^2 and bulletins are published between three and seven times a week. Bulletin regions in Europe are significantly smaller and bulletins are generally posted daily. For Canada, Jamieson et al. (2006a) showed that locally verified danger ratings agreed with the regional danger ratings posted in the bulletin in approximately 57 to 64 percent. This percentage was generally higher for smaller forecast areas and large-scale regional danger ratings tended to be more conservative. With the exception of the NivoTest (Bolognesi, 2000), all European decision frameworks use danger ratings as one of the primary input parameters for the decision process. The observations of Jamieson et al. (2006) show that in Canada, danger ratings should primarily be used for large-scale assessments. Any decision support system for slope assessments needs to have a mechanism to locally verify the bulletin danger rating.

An additional limitation that primarily affects the decision process at the trip planning stage is that the quality of Canadian maps does not compare to European map standards. While maps at the 1:25,000 scale are standard in Europe, the official topographic maps in Canada are published at a 1:50,000 scale. The larger map scale makes it more challenging to plan routes, identify key decision points and characterize them in detail.

4. AVALUATOR

The Avaluator (Haegeli and McCammon, 2006) is the new Canadian decision support tool for amateur recreationists who travel in avalanche terrain. It was developed based on the results of ADFAR research projects and the design principles described above. It consists of a decision card that is printed on waterproof synthetic paper and a 30 page companion booklet. The name 'Avaluator' is a combination of the words 'Avalanche' and 'Evaluator' to stress the importance of the continuous evaluation of avalanche conditions during backcountry travel.

While the Avaluator card (Fig. 1 and 2) is the central part of the Avaluator, the companion booklet provides the user with important context and background material on decision-making and risk management. The Avaluator is intended to supplement existing avalanche aware-

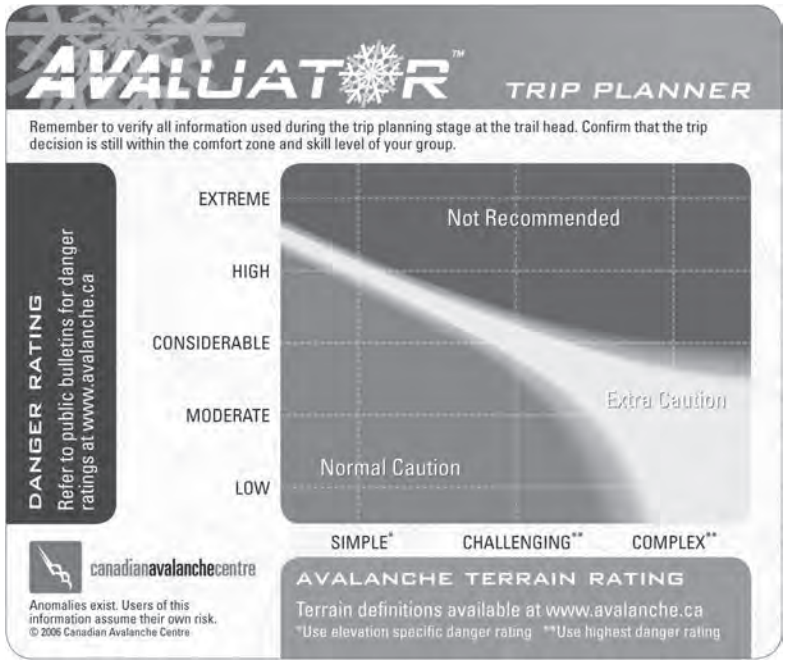


Figure 1: Grey-scale rendering of Avaluator trip planning tool.

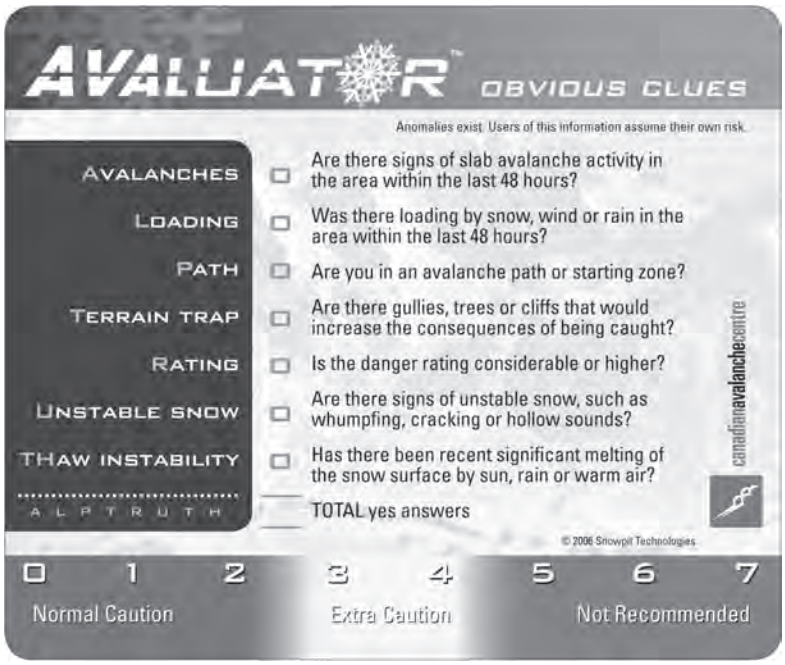


Figure 2: Grey-scale rendering of Avaluator slope evaluation tool: Obvious clues.

ness literature as it does not contain any snow science information.

Risk management on a backcountry trip is broken up into a sequence of four distinct steps: (i) trip planning at home, (ii) recognizing avalanche terrain, (iii) slope evaluation, and (iv) good travel habits. This structure is used to demonstrate the importance of progressive and iterative risk management in avalanche terrain. The sequence loosely follows the well-established 3x3 formula (Munter, 1992; 1997; 2003), which has proven to be an excellent conceptual teaching and planning tool. However, direct application of such sequential strategies in decision-making requires considerable experience as it does not contain any additional decision guidance, such as rules about prioritizing observations or decision criteria (McCammon, 2005). While the Avaluator Card only provides specific decision guidelines for trip planning and slope evaluation, the booklet also contains basic recommendations on the other two decision steps. In addition, the booklet contains background material on avalanche rescue, avalanche danger rating scale, avalanche terrain exposure scale, gear checklists and refers to important information resources on mountain conditions.

The following paragraphs explain the various steps of the Avaluator avalanche risk management approach in detail.

4.1 Trip planning

Trip planning is an important first step in avalanche risk management. The goal of this step is to select a backcountry trip that is appropriate for the current snow and avalanche conditions. The most common information sources used in this step are the avalanche bulletin, a weather forecast and terrain information from maps, guide books, brochures or personal knowledge.

A study on recreational decision-making (Longland et al., 2005; Haegeli et al., in prep.) showed that recreationists primarily use the bulletin danger rating to decide whether they go out or stay at home. However, once they have made their go decision, it is the type of trip that is the main factor for choosing among trip options. In other words, amateur recreationists do not seem to use terrain to gauge their exposure to avalanche hazard in a similar way that professionals do.

The chart on the front of the Avaluator card (Fig. 1) provides guidance for trip planning by combining snow and avalanche conditions (vertical axis) with the terrain of the intended backcountry trip (horizontal axis). The current snow and avalanche conditions are characterized with an avalanche danger rating and an Avalanche Terrain Exposure Scale (ATES; Statham et al., 2006) rating is used to comprehensively describe the terrain characteristics of the intended backcountry trip. Since it is standard in Canada to rate avalanche danger for all three elevation zones separately (alpine, treeline and below treeline), an auxiliary rule was designed to select the relevant danger rating. While it is sufficient to use the elevation specific danger rating in simple terrain, the highest danger rating has to be used for planning a trip in challenging or complex terrain. This rule is based on the idea that exposure to avalanche hazard is mostly confined to isolated slopes in simple terrain. Challenging

and complex terrain are much more open and can be threatened by avalanches from multiple elevation zones.

While avalanche danger ratings have been used in avalanche risk communication for a long time, ATES trip ratings are a much more recent development and are less common. While most backcountry trips in the mountain national parks have been rated by Parks Canada (Parks Canada, 2005), the ADFAR project is currently rating the most popular trip destinations for all three target audiences outside the national parks in Western Canada. These ratings will be available on the website of the Canadian Avalanche Centre for the beginning of the winter season 2006/07. While this list will initially be limited, it is expected that ATES ratings will be adopted more widely in guidebooks and other reference materials in the near future (Statham et al., 2006).

The colors on the chart represent a consensus on travel recommendations for amateur recreationists from more than thirty avalanche experts in Canada. These professionals were asked to delineate the areas that correspond to the recommendations of 'Normal Caution,' 'Extra Caution' and 'Not Recommended'. The detailed definitions of these recommendations (Table 2) focus on the level of knowledge, skill and experience required to travel under these combinations of terrain and avalanche conditions. While backcountry travel under green conditions is regarded as generally safe for recreationists with limited experience, safe travel in the yellow area requires managing avalanche hazard at smaller scales and therefore considerably more training and experience. Backcountry travel in the red area is not recommended without professional guidance.

In essence, the chart represents a generalized 'run list', a tool commonly used in mechanized ski guiding for discussing the 'guide-ability' of specific terrain under given conditions. The graph shows the expert opinion that exposure to avalanche hazard can be lessened by choosing simpler terrain. A continuous representation was chosen to convey the continuous character of both rating scales. As the terrain becomes more complex, the need for managing the avalanche hazard at smaller scales increases. Color transitions are fuzzy to represent the probabilistic nature of avalanche hazard. However, intersection points between danger and terrain ratings (dashed lines) provide non-ambiguous guidance for users with limited experience.

It is rather surprising that historic frequencies of non-commercial avalanche accidents do not show any correlation between avalanche danger and terrain ratings (McCammon and Haegeli, 2006b). In other words, the peak of avalanche accidents occurs under considerable avalanche danger ratings regardless of the terrain rating of the trip. Most likely, this result is due to the coarseness of the danger and terrain ratings at the trip scale. Since accident frequencies are dominated by backcountry use, it can also be argued that this result confirms that recreationists do not use terrain to lessen their exposure to avalanche hazard as presented by Longland et al. (2005).

We argue that there is significant educational value in the trip planning chart despite the lack of correlation with historic accident data. Prevention values for the expert guidelines can still be calculated and provide useful background information for the user. The analysis of McCammon and Haegeli (2006b) shows that approximately 75% and 36% of all reported accidents could have been prevented if accident parties had limited their backcountry travels to the green or green and yellow areas combined respectively. The fact that the exact prevention value for the green and yellow area combined depends on snow climate and elevation zone further emphasizes the need for additional skill and experience to safely travel under these conditions.

4.2 Recognizing avalanche terrain

Recognizing avalanche terrain in the field is a crucial component of avalanche risk management. When backcountry travelers encounter avalanche terrain, they are faced with the critical decision whether to enter the terrain, go around it, or even go back. It is important

Table 2: Travel recommendations for Avaluator trip planning chart

Recommendation	Description
Normal Caution (Green)	Accidents are generally infrequent. These conditions are appropriate for informed backcountry travel in avalanche terrain. Use NORMAL CAUTION. You should, however, always look out for isolated slabs and be especially careful if the avalanche bulletin mentions deep instabilities. Basic avalanche rescue skills are always appropriate when you travel in avalanche terrain.
Extra Caution (Yellow)	Accidents are more frequent and are likely to occur with human or natural triggers. Traveling under these conditions requires EXTRA CAUTION and advanced avalanche skills, including detailed trip planning, route-finding and navigation, stability evaluation, group management, rescue skills and wilderness first aid. You can learn these skills in avalanche and other courses, but practice and humility are essential.
Not Recommended (Red)	Conditions are primed for avalanche accidents. Even careful decisions can result in serious accidents. Since the margin of error is very small under red conditions, safe backcountry travel requires extremely careful planning and extensive experience. Backcountry travel under these conditions is NOT RECOMMENDED without professional-level safety systems and guidance.

that users of the Avaluator are made aware of these key decision points on their trips. If they decide to enter an avalanche path or its run-out, they must consciously accept the inherent risk and know that additional methods are needed for managing it. The Avaluator booklet provides a few simple guidelines for recognizing avalanche terrain.

4.3 Slope evaluation tool

If people decide to enter avalanche terrain, they need a method to assess whether specific slopes are safe enough to cross. While slope evaluation requires years of training and experience, the Obvious Clue Method can help recreationists avoid situations that have lead to accidents in the past.

The back side of the Avaluator card (Fig. 2) presents a list of obvious clues to facilitate slope decisions. Detailed discussions on the origins of this method can be found in McCammon (2000, 2004) and McCammon and Haegeli (2005). The checklist can be used to keep track of danger signs during a backcountry trip. The number of clues that apply to a specific slope is a measure of how similar the conditions are to situations that have lead to accidents in the past.

The Obvious Clue Methods was chosen for the slope assessment method on the Avaluator for several reasons: (i) the method does not require any advanced skills; (ii) its performance has proven to be mostly independent of activity and snow climate; (iii) it is not highly dependent on an avalanche danger rating; and (iv) it performs well under low and moderate danger ratings (McCammon and Haegeli, 2006a; 2006b).

While the seven clues have been derived from historic accident data, they also provide a process-oriented view of avalanche hazard to the user. Following the pattern of the trip planning tool, the clues can be grouped into indicators for snow and avalanche conditions and terrain variables. The clues 'Avalanches,' 'Loading,' 'Unstable snow' and 'Thaw instability' provide indications about the local snow and avalanche conditions and can be used to locally verify the bulletin danger rating. The clues 'Path' and 'Terrain trap' describe the seriousness of the local terrain.

The decision-making study of Haegeli et al. (in prep.) shows that differences in snow quality seem to be much more important to amateur recreationists for the slope choice than differences in terrain variables and local observations. Raising the general awareness of these variables and their interactions will further facilitate the development of risk management expertise.

Similar to the chart on the front of the card, the back side of the Avaluator card shows a scale that presents travel recommendations in relation to the number of clues observed. In this case the thresholds for the recommendations are purely based on avalanche accident records from Canada and the United States (McCammon and Haegeli, 2006b). 'Normal Caution' is recommended for slopes with two or fewer clues, and would have prevented 90% of past accidents. Three and four clues ('Extra Caution' and prevention value of 47%) should alert users to consider their next steps carefully. Backcountry travel is 'Not Recommended' on slopes with five or more clues. These recommendations are more conservative than in case of the trip planner, since the margin of error is much smaller when making the final decision to enter a slope. To allow users to have full control and choose their own decision thresholds, prevention values are provided for all numbers of observed clues in the booklet. It is important to point out that while the prevention values for three or less clues have proven to be applicable most generally, the prevention value for higher numbers of clues becomes sensitive to snow climate, elevation and danger rating (McCammon and Haegeli, 2006b).

4.4 Good travel habits

The booklet provides the user with useful tips on route-finding (e.g., traveling on ridge crests, thinking of escape routes) and group management (e.g., only exposing one person if crossing a suspect slope, including everybody in the decision process). While the Avaluator does not address human factors explicitly, it is the intent that a well-structured decision process will make users less vulnerable to these influences. However, a more detailed discussion of human factors, such as heuristic traps (McCammon, 2004), should be part of any more advanced avalanche awareness training.

4.5 Overall performance of Avaluator

Used together, the methods of the Avaluator would have prevented the vast majority of reported accidents. Based on Canadian records, the most conservative configuration of the Avaluator (green-yellow boundaries for trip planning and slope evaluation) would have prevented up to 98% of historical avalanche accidents (McCammon and Haegeli, 2006b). The most permissive configuration (yellow-red boundaries) would have prevented approximately as many accidents as the German SnowCard (Engler and Mersch, 2000), which is the highest-performing European decision aid in the comparison of McCammon and Haegeli (2006a). Above this level, actual prevention values vary with snow climate and elevation zone.

In order to use the Avaluator to its fullest potential, it is important to closely examine the characteristics of accidents that would not have been prevented by the decision recommendations. McCammon and Haegeli (2006b) show that these accidents primarily fall into the category of small isolated slabs. A much smaller,

but often fatal, group of accidents that go undetected are related to deep persistent instabilities at moderate danger ratings. Alerting users to the characteristics of these accidents will not only improve the effectiveness of the Avaluator, but will also increase its educational value.

5. NEAR FUTURE

In today's world, marketing is a crucial component of a successful product. A marketing team is currently working on different strategies for the various target audiences.

Special attention is given to the out-of-bounds skier and snowboarder group. It is most likely the fastest growing backcountry user group in Canada (Haegeli, 2005) and has shown a notably higher risk propensity than the other user groups (Longland et al., 2005). A poster campaign focusing on the Obvious Clues might work best for their often spontaneous decision habits (Haegeli et al., in prep.).

The focus for the remainder of the project is on developing Avaluator teaching materials for introductory avalanche awareness courses. The Avaluator will also be included in the online avalanche course for first responders of the Canadian Avalanche Association (CAA, 2005).

6. CONCLUSIONS

This paper presented the Avaluator, a new Canadian decision support tool for amateur backcountry enthusiasts. The Avaluator is based on Canadian and U.S. avalanche accident data, social science including the risk propensity of target audiences in Canada, an element of expert opinion, and other research and background information specific to Canada that has been developed over the past two and a half years at a cost exceeding $600,000 by project end in March 2007.

The focus of the Avaluator is the decision-making process when planning for or traveling in the backcountry. After the backcountry avalanche advisory system (Statham, 2006), the Avaluator represents the second layer of a tiered approach to avalanche awareness education in Canada. The primary target groups are backcountry skiers, snowmobile riders and out-of-bounds skiers and snowboarders with limited experience in avalanche terrain. The simple decision tools aim at starting users towards the development of comprehensive avalanche risk management expertise.

The Avaluator is an awareness tool and does not have any predictive capabilities. In other words, it cannot be used to predict the likelihood of an avalanche accident happening. Instead it provides the user with a measure of how often the current conditions were observed in past accidents. While the Avaluator is aimed at users with limited experience, this new perspective might also provide more advanced backcountry travelers with new impulses for their risk management in avalanche terrain.

The Avaluator shows promise to considerably help reducing avalanche accidents in Canada. The big question mark is how wholeheartedly the outdoor community will adopt the Avaluator and apply its methods in the backcountry. It will take a few years to understand the full implications of the Avaluator on avalanche awareness education and see whether it has a direct effect on avalanche accident patterns in Canada.

7. ACKNOWLEDGMENTS

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This project has truly been a community effort. It has been a tremendous help to have input and suggestions from such a wide spectrum of backgrounds and experiences. The list of people who have contributed to this project is long and would go beyond the page limit of this paper. We would like to thank everybody for their valuable input in this project. Last but not least, we would like to thank Susan Hairsine for her tremendous help to keep this project on target.

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Brad White

Avalanche control above the Sunshine ski area parking lot.

Avalanche Control in the 21st Century

By Rob Hemming

Live fire site 1

Typical fracture line from target 4. Site 1 and 2 visible at the top of the ridge

All photos courtesy of BC Ministry of Transportation

Around the turn of the century there was a small cluster of natural snow avalanches from a north-facing slide path affecting the Trans-Canada Highway at the west boundary of Glacier National Park. The last event, in March 2003, triggered a review within the BC Ministry of Transportation. The review determined that a means of artificially triggering avalanches, other than helicopter bombing, was required to ensure the safety of highway users and minimise closure times in this area.

The staff at the Avalanche and Weather Programs headquarters located in Victoria immediately began the process of determining what was required and finding the money to make it happen. After a careful analysis of the problem, a business case was developed that led to the formation of a framework for a bidding process. The Provincial Purchasing Commission then issued a request for proposals and the Avalanche Guard system was selected on the merits of the proposal made by CIL/Orion in July 2004.

> "The crew was pleased to get another tool to deal with the problem. This slide path is a ***beauty.***"

The Avalanche Guard, produced in Switzerland for Outdoor Engineers, Inc., of Golden, Colorado, launches a 4 kg charge of high explosive into the start zone of an avalanche path, from a safe location, day or night, in any weather. While this device was already in use to protect facilities in Europe and in the US, this one would be the first installation in Canada.

The ministry avalanche crew in Revelstoke was pleased to get another tool to deal with this problem. This slide path, named Laurie for the old mining town that used to be located nearby, is a beauty. Located 50 km east of Revelstoke, it shares a narrow winding portion of the transportation corridor with a number of other large slide paths. Many avalanche events are recorded in the vicinity of Laurie every winter.

The Canadian Pacific Railway right-of-way is protected by concrete snow sheds and tunnels in this area. The Laurie tunnel, originally constructed more than a hundred years ago, traverses the Laurie slide path near the bottom of its track. Three snowsheds do a good job of protecting the highway from the large south-facing slide paths. The valley bottom acts like a massive ditch that contains all but the largest avalanches produced by Laurie before they reach the highway. The estimated return period for one of these larger avalanches reaching the highway is about once every three to four years.

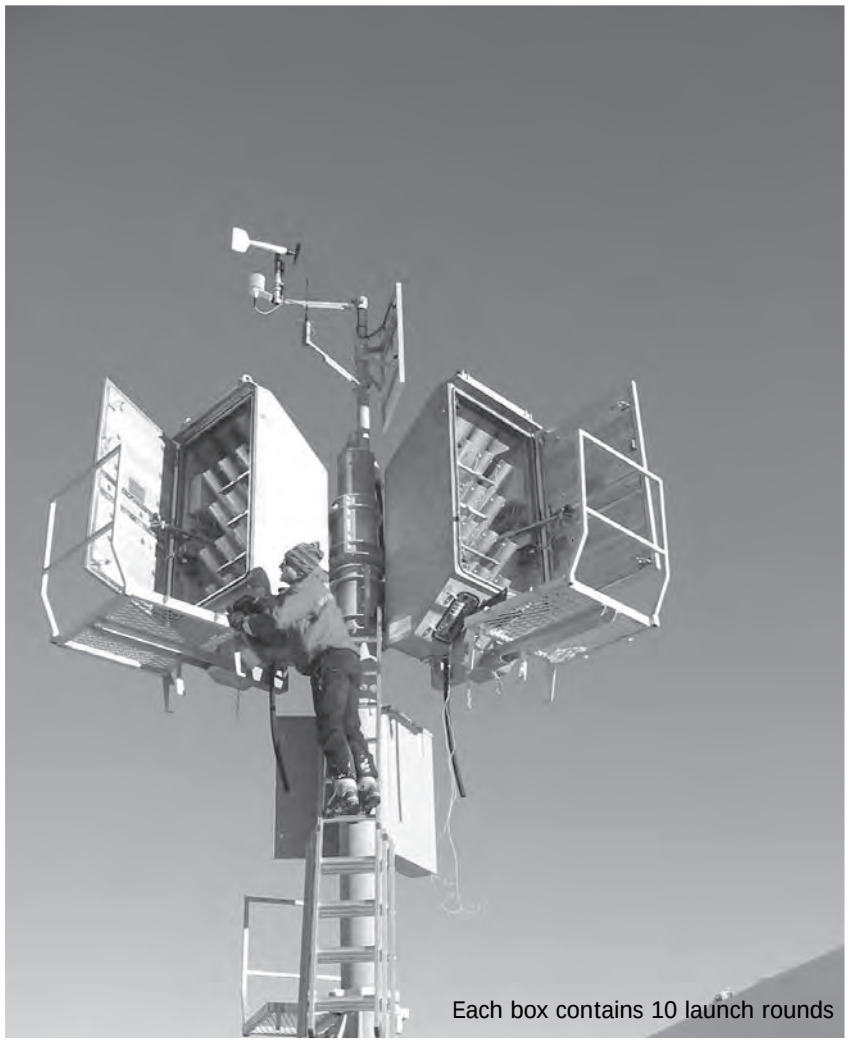
The start zone is large and complex, with many trigger areas and an average slope angle of 40 degrees. Shaped like a catcher's mitt and lee to prevailing winds, it has a propensity for rapid snow loading. Snow supply is abundant. In mid-winter, I would expect to find at least three and a half metres of snow at our profile site, on the west side of the path at 2100 metres. Four separate trigger areas within this start zones can, independently, produce a snow avalanche large enough to affect the highway, given the correct conditions.

Below the start zone, deep gullies, with an average slope of 35 degrees, converge just above the CPR right-of-way. The runout zone begins at the Illecillewaet river bed at 900 metres and ends above

> "Geo-phones detect the detonation and the entire mission is recorded on the hard drive. ***Very slick.***"

the highway, on the other side of the valley. Deposits sometimes contain mature trees, river ice and water-saturated snow. Some of these deposits have temporarily dammed large amounts of water. If you hike around this area in the summer, you'll find extensive tree damage and on the uphill side of the highway, river rock that has been scooped up out of the river, 100 metres below.

The Laurie path is the only north-aspect slide path on the east end of our program area. It's hard to justify lengthy road closures during periods of high uncertainty and/or elevated hazard levels, when historically most snow avalanches produced by this path do not affect the highway. Before this device was installed, the only way to eliminate the hazard in a timely manner was by artificially triggering


Each box contains 10 launch rounds


Fire control computer

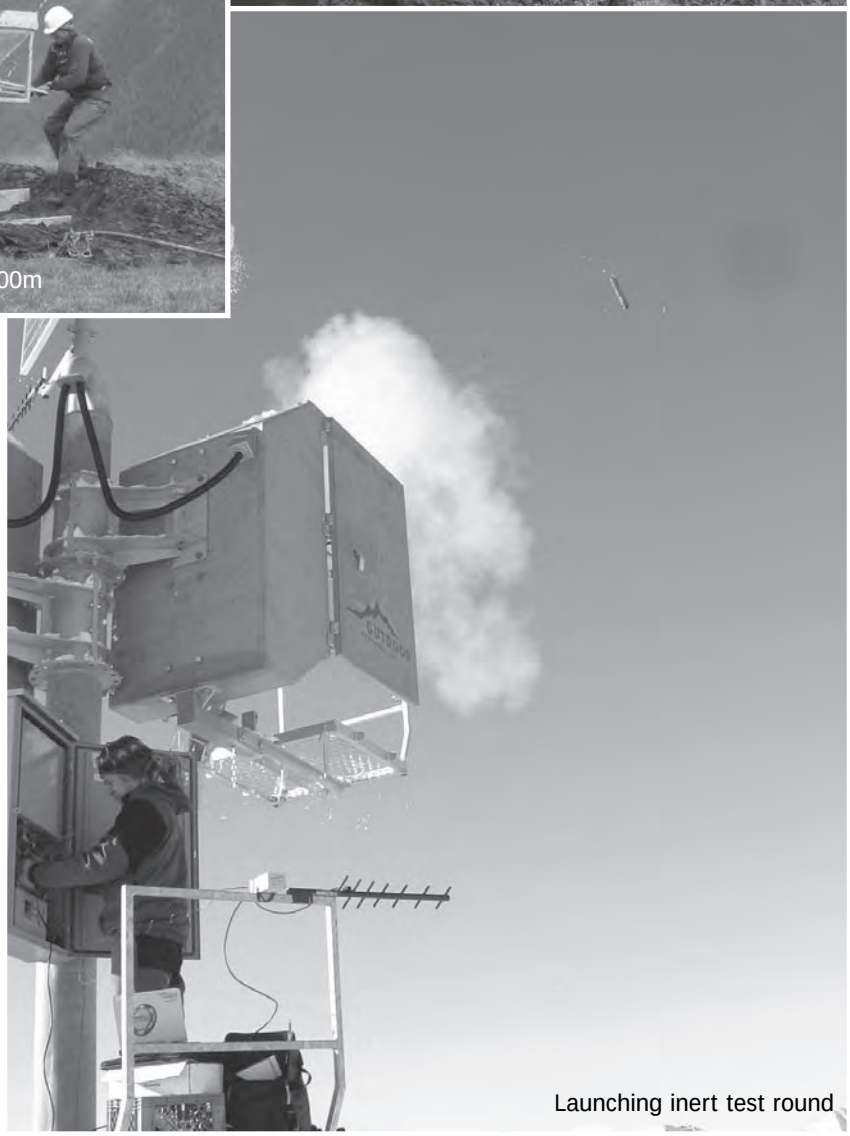
avalanches by helicopter, which was not always an option. Even when a window of opportunity is open, flying conditions are challenging. Downdrafts, flat light and poor reference by themselves or in combination have resulted in scrubbed or incomplete missions, despite having access to some of the best mountain pilots in the world. Now, it's a relatively simple matter to set up a highway closure, shoot up to six targets high in the start zone of Laurie and get the highway reopened, all in less than half an hour if there is no cleanup.

The avalanche guard magazines are located along the top and side of the Laurie slide path. Six magazines are mounted on four towers at three different sites. Pointed at a specific target, a magazine can hold 10 rounds of fused explosives, each in its own launch tube. At the base of the tube is a launch cup filled with a precise amount of propellant powder. The device is fired from a ministry pickup truck, using a dedicated laptop computer called the "fire control computer." Using special encrypted software, communication is established by radio with the site. If everything is correct, the firing sequence is initiated. When the firing signal is sent, the propellant powder is ignited and shoots the round out of the launch tube at the target. As the round leaves the magazine, special pull-wire lighters are pulled by lanyards connected to the launch tube and two safety-fuse assemblies attached to the charge are lit. Geo-phones located beside the towers detect the detonation and the entire mission is recorded on the computer's hard drive. Very slick.

Construction of the facility began in the summer of 2004. Scott Aitken was the construction manager for the ministry, while Randy Gliege and his crew from Summit Lifts Ltd. out of Fernie, BC did the installation. Concrete foundations were poured in late summer and the steel arrived in the fall. It was assembled on the valley floor and then flown onto the foundations above the target areas using a Bell 214 from East West helicopters. Before the end of November 2004, the first test shots had been fired into the start zone. Dave Sly from Maple Leaf Powder


Beginning construction


Pouring concrete at 2300m

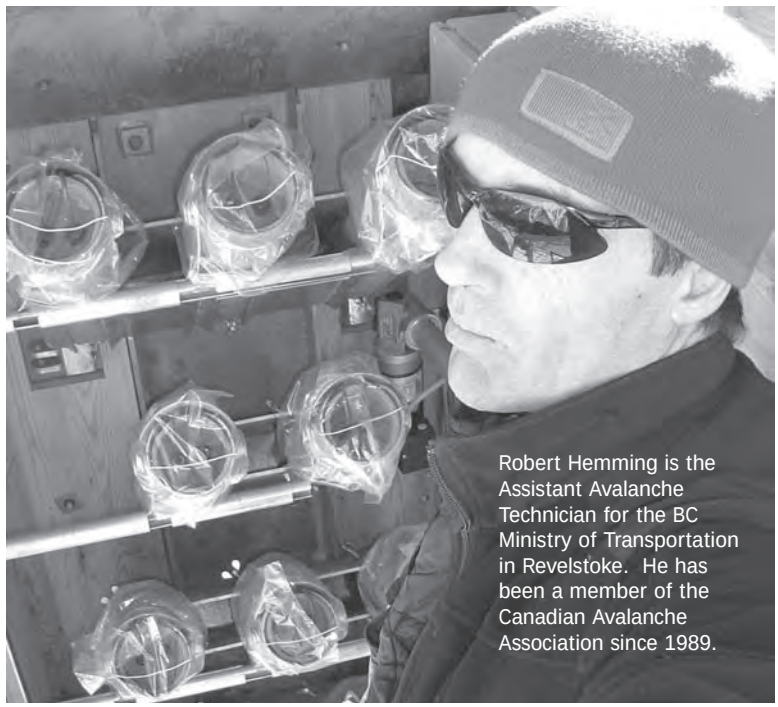

Launching inert test round

Co. and Everett Clausen of CIL/Orion provided the technical explosive expertise. Oswald Graber of Outdoor Engineer, Inc. ensured quality testing and trouble shooting for the software, hardware and communications.

Prior to and during this period, a squall of activity was taking place in Victoria. Permits had to be secured. Agreements were formalized with the stakeholders, including Parks Canada (part of the start zone is in Glacier National Park) and the Federal Explosives Regulatory Division. Some of the explosive components are manufactured in the US and had to be shipped across the border. New procedures had to be produced and submitted to WCB for approval. Can you imagine? Much acclaim has to be heaped on Mike Boissonneault and his team for making it happen. Niko Weis and especially Doug Wilson were instrumental in the process. Bruce Allen, his crew and Brant Benum from Revelstoke did a lot of work to ensure the success of this project as well.

The avalanche guard was fully operationally last season and performance was good. The solar panels kept the batteries powered up through the dark and cold months of mid-winter despite the inevitable rime events. Communication with the site was never a problem. The explosives components worked well. Accuracy is not and will never be as good as using artillery but it is better than any other kind of launcher technology available today. This distributor definitely has a product that will satisfy the needs of some customers in North America.

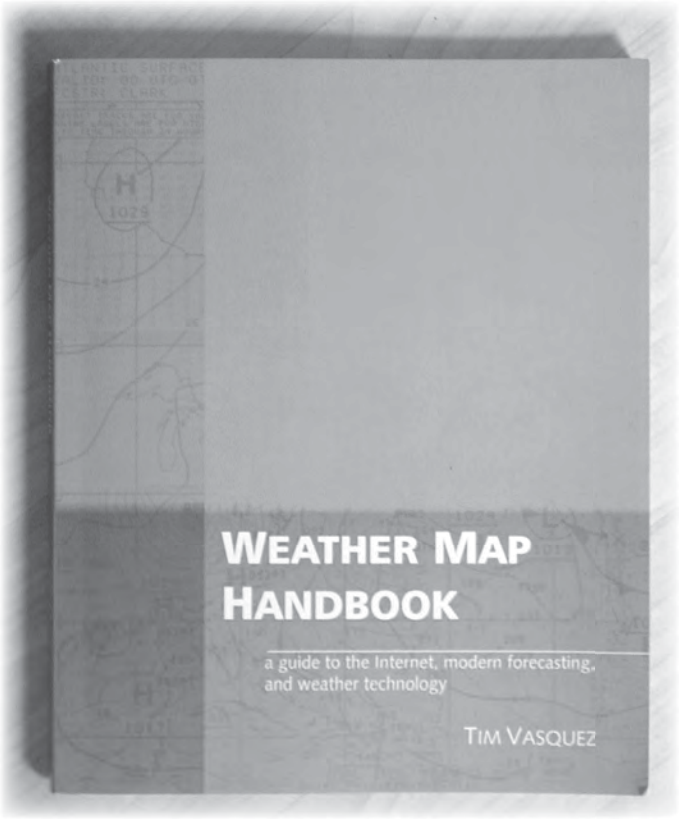
I believe that our community needs to look for and test new technologies. I'm proud that my employer has been a leader in this regard for the last 30 years. I think it's great that companies like CIL/Orion and Avalanche Guard Inc. are developing innovative and practical methods to artificially trigger avalanches. I call upon our universities and progressive companies to research and develop new ways to artificially trigger snow avalanches that will complement our existing technologies.

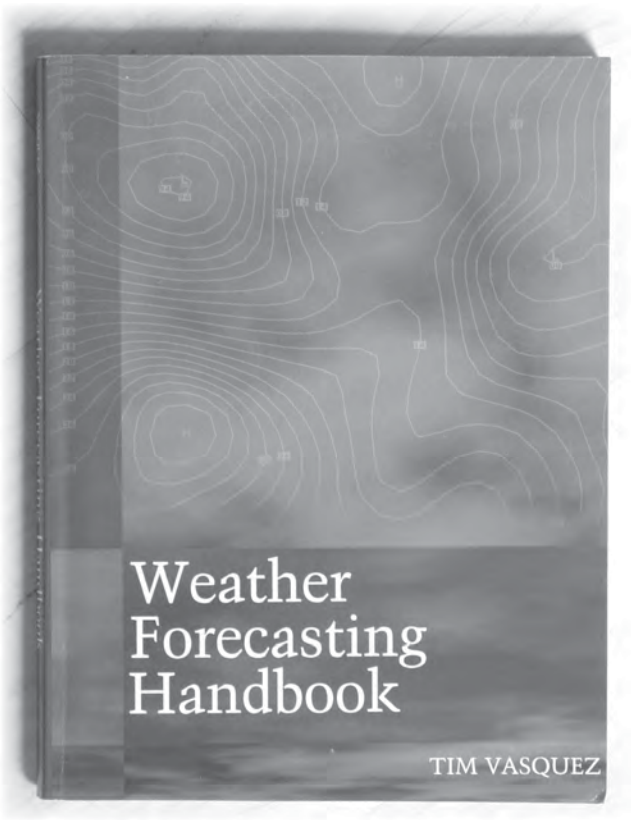


Robert Hemming is the Assistant Avalanche Technician for the BC Ministry of Transportation in Revelstoke. He has been a member of the Canadian Avalanche Association since 1989.

Weather Books for Weather Junkies

Book Review by Greg Johnson





Weather Forecasting Handbook

by Tim Vasquez 198 pp. 24.95 USD

Weather Map Handbook: A guide to the Internet, modern forecasting, and weather technology

by Tim Vasquesz 167 pp. 24.95 USD

Very early one summer morning when I was a Boy Scout, a group of us were camped out next to a small lake in central Wisconsin when a thunderstorm struck. It was just getting light as the wind picked up and what seemed like out of nowhere a very strong down draft hit us. After a minute or so the wind subsided leaving our canvas tents ripped apart and gear blown everywhere. The storm wasn't over, yet all of us boys had our eyes fixed on the funnel cloud descending almost directly above us.

My fascination with powerful weather began when I was a kid, and never subsided. In fact, now I love it. Does this sound like you? If so, and you want to learn how storms work and how to forecast them, I'd recommend reading the Weather Forecasting Handbook and the Weather Map Handbook..

Author Tim Vasquez does an excellent job of laying out the basics of hands-on forecasting to those of us who are seriously keen. Vasquez describes the underlying premise of both books like this: "A meteorology degree and an understanding of advanced math will go a long way towards the mastery of forecasting, however what is most essential are three things: 1) a strong foundation in analysis; 2) frequent practice of analysis; and 3) the willingness to learn."

In the Weather Map Handbook Vasquez provides good navigation through the plethora of Internet products and how they are used. He includes very relevant information on observational charts, satellite imagery, radar and weather models. The Weather Forecast Handbook provides more in-depth explanations on the forecast process and the physics of the atmosphere. This book is a little technical but all of it is practical, if you are willing to put time in to figure it out. Both have excellent illustrations and examples to follow.

These two books are unlike any other weather-related books that I've come across and I found them both very helpful in understanding and forecasting the weather. I highly recommend adding both to your quiver. They are available at www.weathergraphics.com

Product Review:
Backcountry Access Companion Shovel

Reviewer: Sylvain Hebert

Shovels and probes are standard, must-have gear for winter backcountry enthusiasts. Only the unaware and uneducated dare go without. Therefore, it may be useful to look at the shovel/probe combo offered by Backcountry Access (BCA). The particular model that we will look at is called the Companion shovel.

But first, what is out there right now? We have D-shaped or T-grip handles. Fixed or telescopic handle systems, burly 6000-Series aluminum blades, some with magnesium alloy, others with polycarbonate plastic. There are "ovalized" ferrules, welded high-strength shaft sockets, even dry stash compartments (possibly coming in handy while building kickers and love caves.)

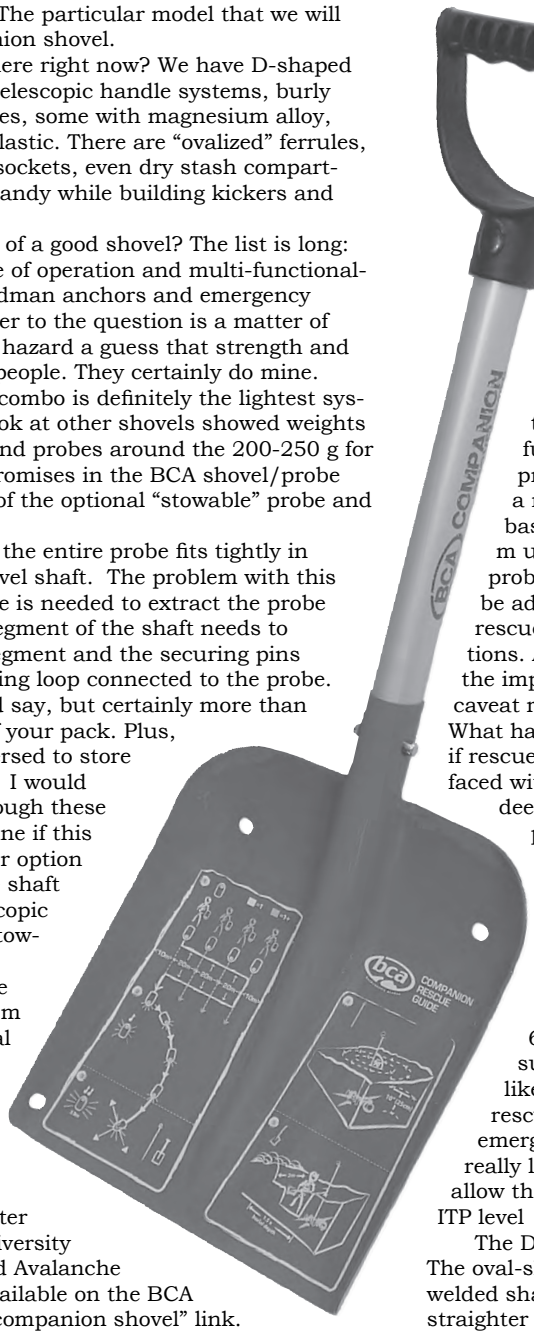
What do we really want of a good shovel? The list is long: sturdiness, lightweight, ease of operation and multi-functionality (some can double as deadman anchors and emergency evacuation sleds.) The answer to the question is a matter of personal choice but I would hazard a guess that strength and weight top the list for most people. They certainly do mine.

The BCA shovel/probe combo is definitely the lightest system right now at 865 g. A look at other shovels showed weights ranging from 660 to 850 g and probes around the 200-250 g for the 2.3 m length. The compromises in the BCA shovel/probe combo are the accessibility of the optional "stowable" probe and its length at 1.8 m.

By "stowable" we mean the entire probe fits tightly in the upper section of the shovel shaft. The problem with this concept is that precious time is needed to extract the probe from the shaft. The upper segment of the shaft needs to be pulled out of the lower segment and the securing pins removed to access the webbing loop connected to the probe. Not a lot of time some would say, but certainly more than just pulling the probe out of your pack. Plus, the process needs to be reversed to store the probe back in the shaft. I would recommend that you go through these steps in the store to determine if this is acceptable to you. Another option is to leave one section of the shaft at home, foregoing the telescopic option, while keeping the "stowable" probe option.

A few people may puzzle over the usefulness of a 1.8 m probe. To answer this crucial question, I refer readers to a paper titled "Avalanche Probing Re-visited" written by Tim Auger and Bruce Jamieson. The article can be found at www.avalanche.ca under the knowledge center > research and articles> University of Calgary Applied Snow and Avalanche Research Group. It's also available on the BCA website by clicking on the "companion shovel" link.

To sum up the conclusions regarding the depth of useful probing, the authors wrote: "The proportion of victims found alive decreases with depth of burial and decreases markedly around 1.5 m." Therefore, practical research supports the idea of limiting probe length. I suspect that the folks at BCA followed this line of thought and found it reasonable to offer a narrow-diameter, 1.8 m probe.



The issue I have with the short probe length is the fact that you have to bend down to drive the probe to the hilt to get to the maximum depth range. For those who have been involved in probe searches, whether in rescue simulations or for real, the thought of bending over and reaching all the way down to the snow surface repeatedly cannot be too appealing. Let's not forget that probing is also very useful while traveling on glaciated terrain when crevasses are hidden. Although the short length of the probe makes it more manageable and will allow the user to find thin bridges, a longer probe would give the weary traveler the opportunity to recognize somewhat thicker bridges that could still be considered marginal in certain situations.

Also, I like to use my probe as a ruler in my snow profiles so that I can leave the traditional ruler (100 g) at home. My graduated probe then becomes a multi-purpose tool. But for those who do not have to dig full snow profiles on a regular basis, the 1.8 m unmarked probe should be adequate in rescue situations. Although the important caveat remains: What happens if rescuers are faced with a burial deeper than 2 m and everybody is carrying the 1.8 m probe? We could debate the question, but the fact remains that more time will be required to pinpoint the victim if the probe doesn't reach all the way down to make contact.

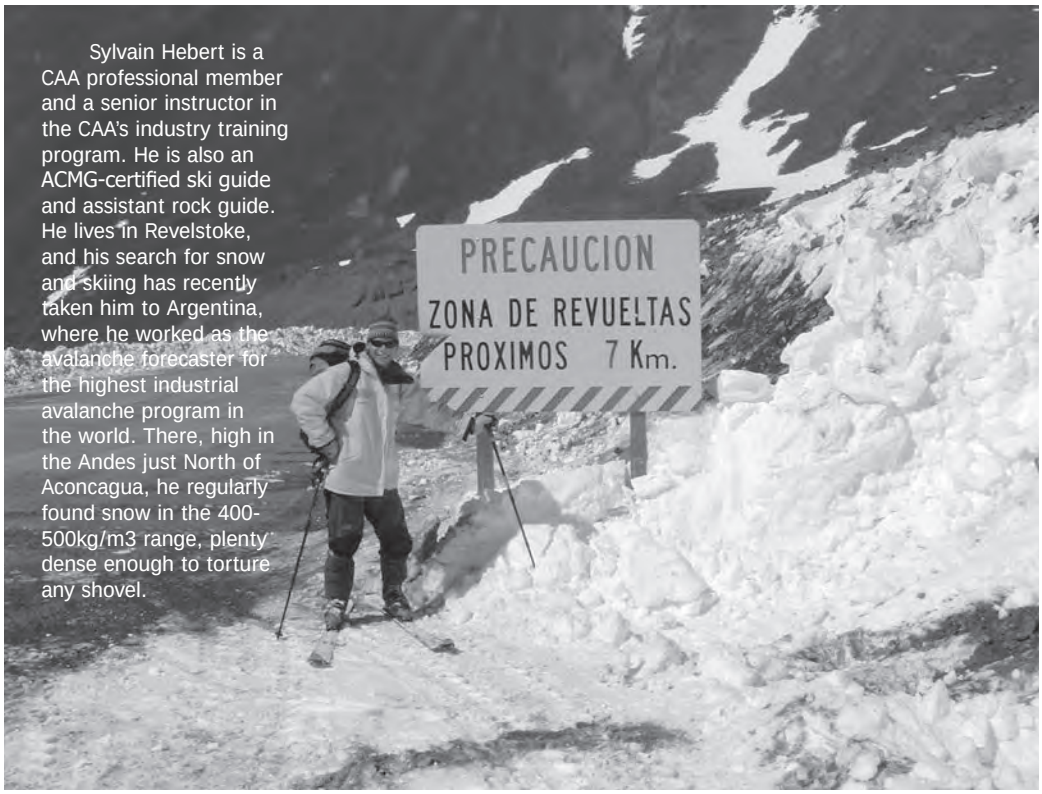
> I really liked the shape of the blade, which is very flat and will allow the perfectionists out there (and all you potential CAA ITP level 1 students) to dig perfectly flat and plumb pit walls.

How about the shovel itself? The blade is a bright, fire-engine red and comes in at 25 cm by 30 cm, which is a good size to move snow and perform compression or shovel tests. It is made of 6061-Series aluminum, a material that BCA calls "far superior to plastic." Aluminum shovels are indeed less likely to break; that fact has been confirmed in recent rescues. It has four pre-drilled holes to configure it as an emergency toboggan component or a deadman anchor. I really liked the shape of the blade, which is very flat and will allow the perfectionists out there (and all you potential CAA ITP level 1 students) to dig perfectly flat and plumb pit walls.

The D-shaped handle comes with a reversible offset grip. The oval-shaped shaft is sturdy and inserts snugly into the welded shaft socket. The socket's connection to the blade is straighter than the usual "open fold" and may be the weak link of the unit. The retracted shaft measures 56 cm and extends to almost 80 cm. It feels comfortable to use, although in the retracted position, the protruding pins on the shaft can be felt with the gloved hand. I have been using a short 45 cm shaft for many years and I found the 56 cm shaft a bit long to fit my pack.

The blade features graphics illustrating the basic steps of a companion rescue. It is an excellent idea, as the bigger scale of the diagram is much easier to read than on the back of a beacon (for my baby boomer's eyes). I would have gone one step further and put in a small screen insert (in place of the BCA logo) for snow crystal observation. Surely I am not the only one who has used a shovel blade to look at snow crystals. And you'll have to excuse my cheekiness, but I cannot help but picture a nervous rescuer looking at the graphics on his beacon and then perhaps at his shovel, after having failed to heed the warnings offered by the three-steps terrain scale and the five-level avalanche hazard rating and the seven obvious clues of the new Avaluator. I guess one can never be too informed. But I digress.

All in all, the BCA Companion shovel system is strong, sturdy, with an attractive design, look, shape and weight. The short probe just fits in the handle and I cannot see how the manufacturer would have been able to add a section or two to make it longer to remedy the concerns previously mentioned. We have to give credit to the folks at BCA who are not afraid to innovate and push the design envelope of avalanche rescue tools. Their shovel/probe system is a great addition to the available products on the market. Finally, the BCA website (www.bcaccess.com) is well worth a look, with a wealth of relevant information that's easily accessible.



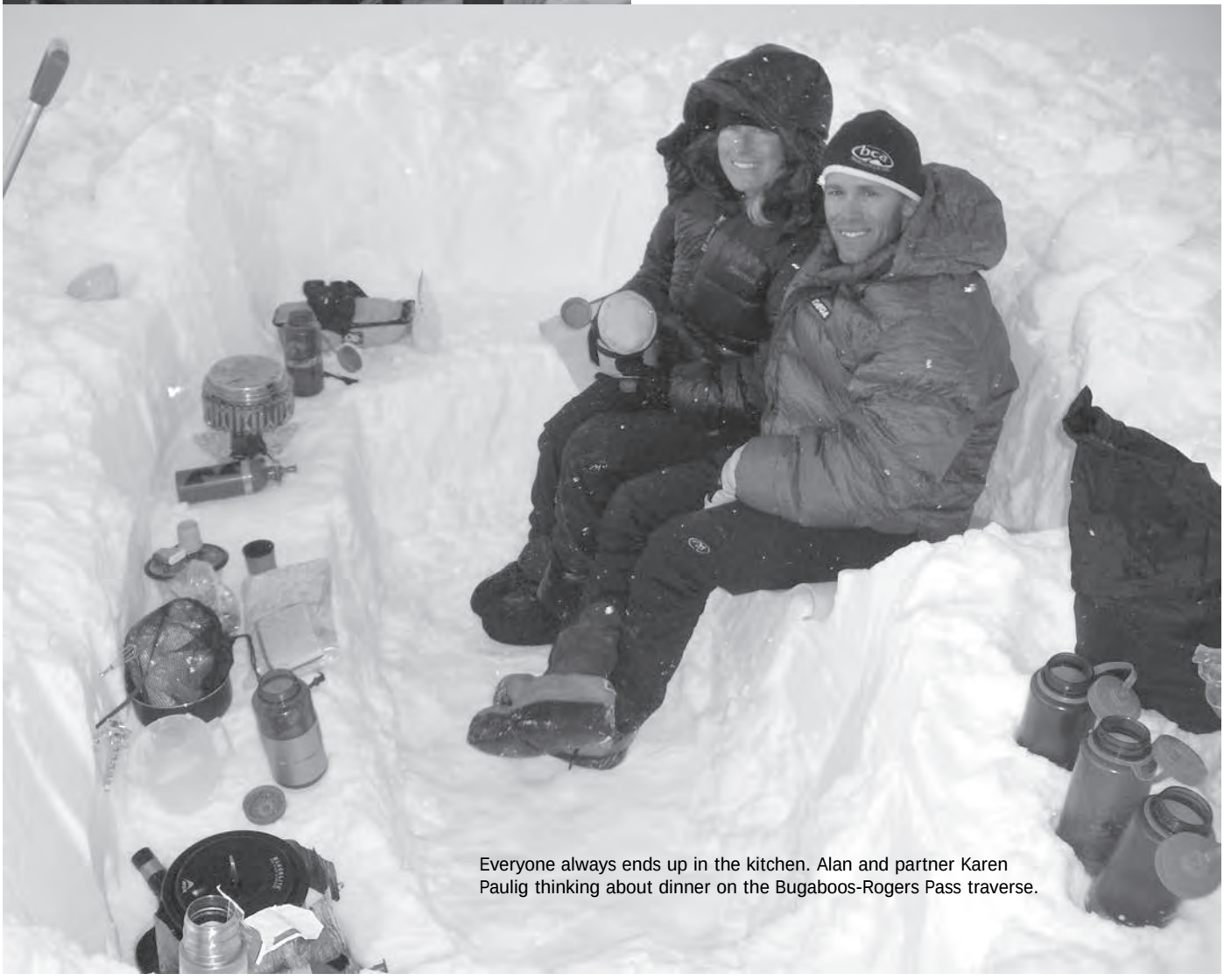
Sylvain Hebert is a CAA professional member and a senior instructor in the CAA's industry training program. He is also an ACMG-certified ski guide and assistant rock guide. He lives in Revelstoke, and his search for snow and skiing has recently taken him to Argentina, where he worked as the avalanche forecaster for the highest industrial avalanche program in the world. There, high in the Andes just North of Aconcagua, he regularly found snow in the 400-500kg/m3 range, plenty dense enough to torture any shovel.

Alan and Karen grinning through some grim weather on the Chilkoot Trail in the Yukon.

Transitions: **Alan Jones**

After three years as a public forecaster with the CAC, Alan Jones is going to be taking on a new role this fall. He has decided to the season off from the CAC in order to be able to fully devote himself to his new duties as a dad. He and his partner Karen Paulig are expecting their first child shortly after the ISSW in Telluride. In addition to fatherhood, Alan will also be developing his business as a consultant in avalanche safety engineering services.

We will miss Alan's participation in CAC programs in a number of ways: the ability to seamlessly synthesize large amounts of data into a coherent avalanche forecast, his skills as an educator, the quick turn of phrase that makes an otherwise dry avalanche bulletin readable, to mention just a few. He has however, guaranteed to continue submitting a regular article to the "Runout Zone" so look for him there. We're all looking forward to his return next season.



Everyone always ends up in the kitchen. Alan and partner Karen Paulig thinking about dinner on the Bugaboos-Rogers Pass traverse.

Karen and her six-year-old daughter Caitlyn

Transitions: **Karen Dubé**

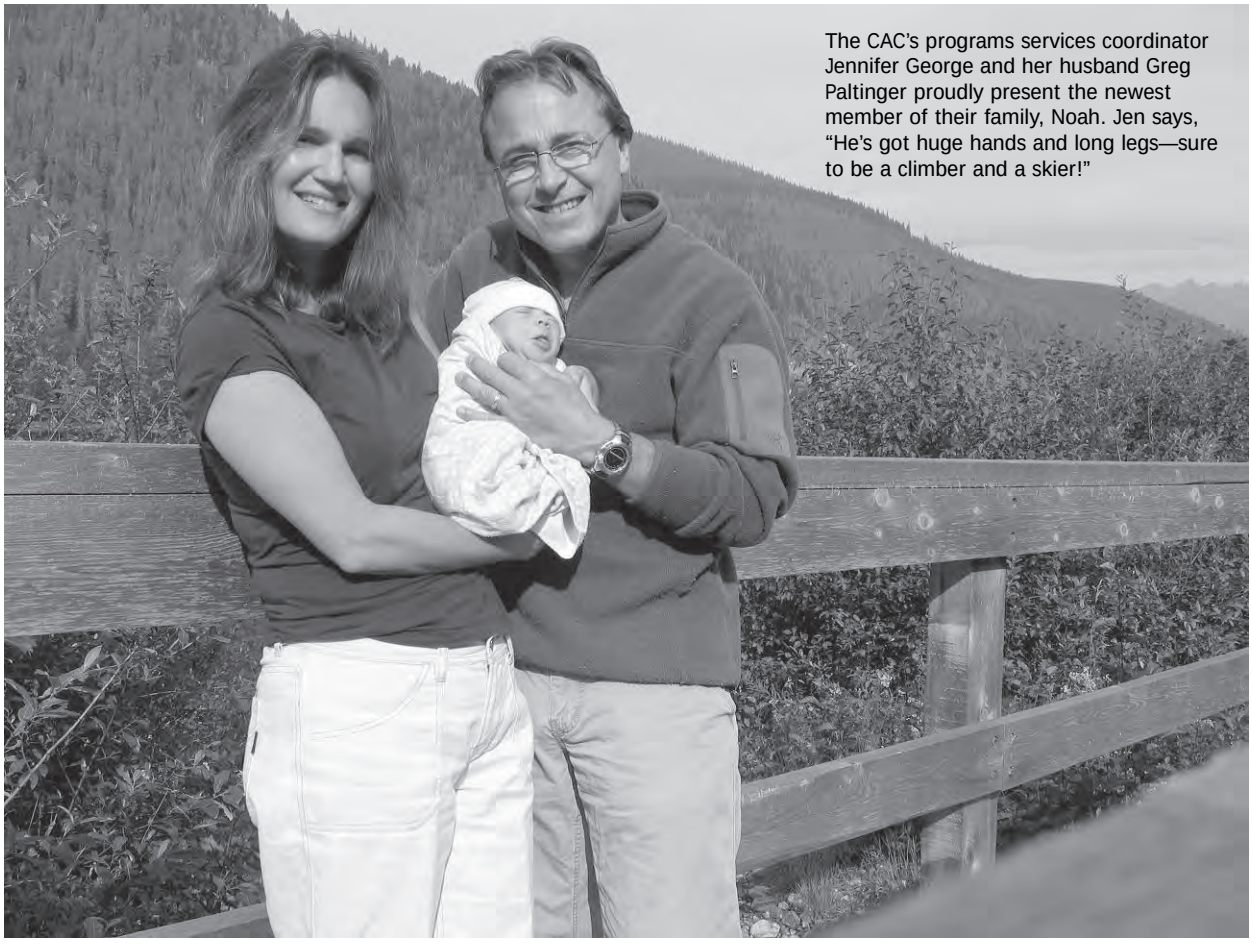
Karen Dubé was brought on this summer to help fill the programs services role during Jennifer George's maternity leave. She has a wide range of experience that will surely be helpful for the coming year. Born in Prince George, BC, and raised in Comox on Vancouver Island, Karen has a degree in Political Science from the University of BC. "I thought I wanted to work at the United Nations," she says, "but I recovered from that."

After university, she lived in Japan for a year and a half where she taught English. She then spent six months travelling from Japan to Europe "by boat and train, even a donkey cart."

In 1995, and living in Vancouver, she became the registrar for Outward Bound Western Canada. She kept that position through the school's transition to a national organization. With Outward Bound Canada, Karen was keeping track of all the students who took courses in the west—over five hundred a year. After the birth of her daughter Caitlyn, Karen went part-time and made the job mobile. She and her partner Lance Steinhauer moved to Squamish where they lived at the base of the Grand Wall "in that nice little house" in the Stawamus Chief parking lot while Lance ran the climber's campground there.

After a year in Squamish, they moved to Revelstoke "to take advantage of the cheap homes, lots of snow, smaller town and quieter lifestyle." In 2006 Outward Bound decided they needed their registrar to be in Vancouver. "I said no thanks to that," Karen explains. She had planned to take some time off to assess and look around but it was only a month later when the opportunity at the CAC arose. Her exceptional administrative skills have made her a natural fit in the position, and her professional and friendly manner make her a welcome addition to our team.

Transitions: **Jennifer George**



The CAC's programs services coordinator Jennifer George and her husband Greg Paltinger proudly present the newest member of their family, Noah. Jen says, "He's got huge hands and long legs—sure to be a climber and a skier!"

Flakes


Finally – a stability test that solves the mysteries of the deeper snowpack...
"THE RORSCHACH REUTSCHBLOT"
–interpreting the sitzmark–
Dude, is it safe to ski?
I don't know but it looks like a dream I had about Wendy telling Peter Pan to sell his van and get a real job 'cause she wanted to get married, have two kids and join the P.T.A.
©r.buchanan

Field Notes

Excelsior!

By Alan Jones

As the long days of summer become shorter and winter looms around the corner, it's only natural to wax poetic about our summer exploits. For some, that may have included long alpine climbing routes with bloody hands and scraped up knees, and sunsets viewed from a narrow bivy ledge. For others, that may have been a day spent gliding up thermals, soaring with the birds. Or perhaps your style is more attune to carving waves at Tofino, swinging your clubs or catching up on a novel by a lake. If you're like me, as winter approaches, thoughts of summer adventures turn to thoughts of snow-covered mountains, strapping new skis on my feet and moving upwards through avalanche terrain.

Talking about waxing poetic, you might recall from your school days a poem written by Henry Wadsworth Longfellow called "Excelsior." This poem describes a young man passing through a Swiss town bearing a banner inscribed with "Excelsior" and intending to climb a mountain pass in the dead of winter. Excelsior can be translated from Latin as "ever higher," or loosely as "onward and upward" or, in modern terms, "giv'er dude." Despite warnings from the town locals on the dangers of climbing the mountain pass, including an offer from a local maiden to "rest thy weary head upon this breast," the young man ignores all warnings and climbs higher until inevitably, he lies "lifeless, but beautiful" half-buried in the snow.

Obviously the locals were aware of the avalanche hazards up in the pass, noting the "pine-tree's withered branch." In the end, the traveller is found by the "faithful hound," a predecessor of the modern day CARDA dog. More than likely this was a Saint Bernard dog, rescue dogs made famous as loyal companions to the monks at the Great St. Bernard Pass linking Switzerland with Italy. Goes to show, it's always worth listening to the locals.

Anyway, enough of my waxing poetic. Below we present the poem Excelsior in its entirety. Hopefully this will help inspire you to go "onwards and upwards" this winter, while heeding the signs on the trees and listening to the locals. Have a great winter!

Excelsior

By Henry Wadsworth Longfellow (1807-1882)

The shades of night were falling fast,
As through an Alpine village passed
A youth, who bore, 'mid snow and ice,
A banner with the strange device,
Excelsior!

His brow was sad; his eye beneath,
Flashed like a falchion from its sheath,
And like a silver clarion rung
The accents of that unknown tongue,
Excelsior!

In happy homes he saw the light
Of household fires gleam warm and bright;
Above, the spectral glaciers shone,
And from his lips escaped a groan,
Excelsior!

"Try not the Pass!" the old man said:
"Dark lowers the tempest overhead,
The roaring torrent is deep and wide!
And loud that clarion voice replied,
Excelsior!

"Oh stay," the maiden said, "and rest
Thy weary head upon this breast!"
A tear stood in his bright blue eye,
But still he answered, with a sigh,
Excelsior!

"Beware the pine-tree's withered branch!
Beware the awful avalanche!"
This was the peasant's last Good-night,
A voice replied, far up the height,
Excelsior!

At break of day, as heavenward
The pious monks of Saint Bernard
Uttered the oft-repeated prayer,
A voice cried through the startled air,
Excelsior!

A traveller, by the faithful hound,
Half-buried in the snow was found,
Still grasping in his hand of ice
That banner with the strange device,
Excelsior!

There in the twilight cold and gray,
Lifeless, but beautiful, he lay,
And from the sky, serene and far,
A voice fell, like a falling star,
Excelsior!

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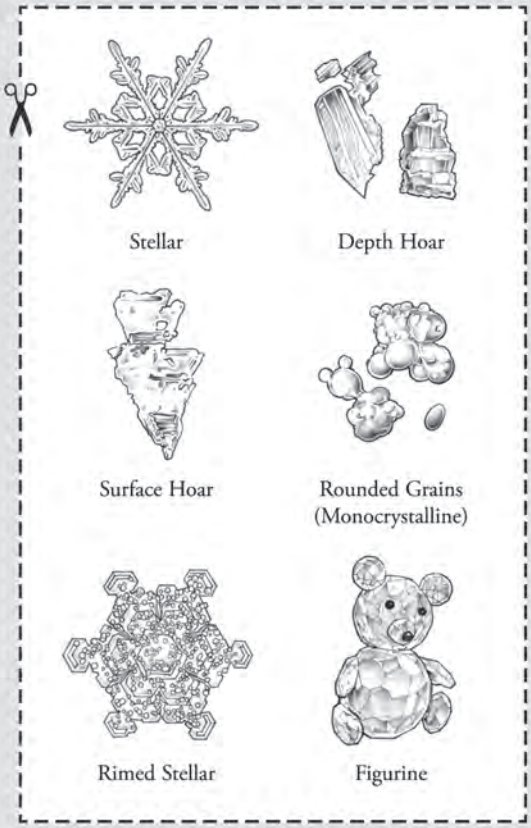

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