avalanche.ca

The journal of Canada's avalanche community

Val Visotzky

1910 DISASTER

Celebrating 25 Years of service: 1982-2007

PARK PATROL

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Avalanche.ca sends a big "Thank You" to our friends at the Canadian Avalanche Foundation for their generous support of this publication.

Canadian Avalanche Foundation

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The CAF is a registered charity providing a tax-deductible fundraising mechanism for the support of public avalanche safety initiatives. Since its inception in 1999, the CAF has raised close to $500,000 for this cause. If you are interested in finding out more about the foundation's work, go to our website at www.avalanche.ca and click on the CAF logo.

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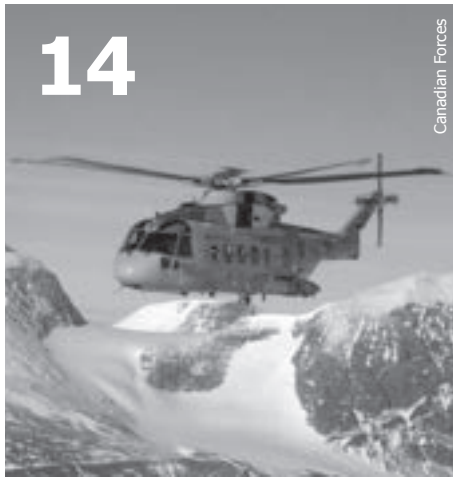
Cover Shots: A size 4 avalanche thunders down the face of Mt. Strohn in Bear Pass, near Stewart, BC, during a control mission by the BC Ministry of Transportation. Bombardier Doug Wilson triggered the slide with a 25 kg charge. The debris buried the road below six to eight metres deep. Photographer Val Visotzky.

Banff National Park



Canadian Forces

Stephane Gagnon

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failure plane

In the last issue of *Avalanche.ca* the wrong photographer was credited for this image. The credit should have gone to Brad White. We regret the error.

avalanche.ca
The journal of Canada's avalanche community
Volume 80 Spring 2007

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

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Taking in the View

Welcome to our 25th anniversary special edition. A great thing about milestones is that it's like reaching a viewpoint on your journey. Anniversaries, like viewpoints, are a great excuse to have a bit of a break, take in the surroundings, and ponder the effort it took to get to this place. It's quite a view, isn't it?

In this issue we are taking full advantage of this figurative height of land, bringing you a story from nearly a century ago. A suggestion from Rob Buchanan (our editorial cartoonist and graphic designer for Parks Canada) led us to the Revelstoke Museum & Archives. Among other treasures, they have a fantastic collection of personal and poignant memories of the Rogers Pass accident of 1910. With the help of Curator Cathy English, we've put together a snapshot of that fateful night—an accident that serves as one of our industry's first milestones.

We also have a terrific interview with Fred and Walter Schleiss, the brothers who established the avalanche control program at Rogers Pass. To call these men pioneers is no exaggeration but there is remarkably little written about them. Thanks to Sylvain Hebert for arranging and conducting the interview, offering a fascinating glimpse into the extraordinary effort and the exceptional personalities that created this world-famous control program.

Another great thing about this vantage point is that in addition to looking back from where we came, we can also look ahead to where we're going. A good example of this is the cutting-edge technology found in Ranae Kowalczuk's research on page 60. Ranae is exploring the potential in new interactive 3-dimensional technologies for avalanche education. If "augmented reality" isn't in your vocabulary already, it will be after you read her article.

Ranae's research will be playing a part in a new project the CAA is undertaking called eTraining for Mountain Operations, which will implement new computer technology for avalanche search and rescue training. The CAC also has a new project on the go—ADFAR 2. We have reports on both in this issue and it's interesting to compare the two. They have a separate focus but they share a vision—to push ahead into new territory. For its part, ADFAR 2 will be breaking new ground in the field of risk communication Exciting stuff.

It's been a lot of fun putting this issue together, and though we didn't have room for all the ideas that came our way, we'll be extending the theme throughout the year so keep those submissions coming. There are all sorts of stories about how our association got to this point—the ideas and inspiration, the mistakes and missteps. You've achieved a lot in 25 years. We hope to see you all in Penticton this spring where we'll celebrate the synergy our association is famous for. Happy Anniversary!

Mary Clayton

The view from up here

A great view of the east side of Rogers Pass, where the Trans-Canada Highway runs the gauntlet between scores of avalanche paths. Travelers are protected by snow sheds and one of the best avalanche control programs on the continent.

John Woods

Clair Israelson collection

Personal Reflections on the CAA's "Twenty Five Years of Service"

For the past month I've been thinking about our upcoming celebration of 25 years of service and what the CAA has meant to me and the organizations that employed me over the past quarter century. In the past 25 years my roles in the avalanche patch have evolved and during all stages of that career evolution the CAA has provided important support and assistance. The CAA is first and foremost an association of people who need each other to succeed and I have come to understand better why the CAA has stayed relevant and valuable to everyone involved in avalanche protection in Canada. What follows is personal observation and opinion and is offered as one individual's reasons for maintaining membership in the CAA from 1981 until now.

In 1981 I had been working for Parks Canada for 10 years and was in charge of the avalanche control program at the Lake Louise ski area, avalanche control on the Banff-Jasper highway, and year round mountain rescue services in the Lake Louise area. I worried about my abilities to fulfill the responsibilities of my job and recognized the wisdom of Willy Pfisterer's mantra—"the very best we can be in this job is barely good enough." The wisdom and experience resident in CAA's membership was a powerful resource that helped me grow professionally.

In those early years my interests were strictly operational. I was passionately driven to adopt best practices for all aspects of forecasting and controlling avalanches, and of course worker safety. We organized exchanges with other CAA members to see how they were doing things, and we talked with other operators and with regulatory agencies to develop industry-standard explosives use procedures for hand charges, Avalaunchers, helicopter blasting and other applications. Ski cutting, stability tests, worker training, signing and public information, data collection, rescue techniques, transceiver efficacy and research requirements were all issues CAA members talked about at out meetings, and in ongoing dialogue throughout the year. This collective pooling of ideas and experience helped all of us evolve together, giving us confidence that we were staying current with evolving standards for operational "best practices" for avalanche work.

I believe this operating-level cooperation and sharing within the avalanche community provided reassurance to our senior managers. Many of our senior managers had little concept of the operational realities or risks of avalanche forecasting and control operations but they were very aware of the potential for corporate liability resulting from inappropriate practices or accidents. For these managers, best practices developed through the CAA were an assurance of program quality, and increasingly they came to see the CAA as an important ally in their efforts to responsibly manage corporate risk.

In 1990 I became the regional public

“The very best we can be in this job is barely good enough.”

safety specialist for Parks Canada. My role changed from operational supervisor to program manager and once again the CAA demonstrated its value. Together, we addressed issues like adoption of the international avalanche danger scale for public bulletins, establishment of a CAA office in Revelstoke to deliver support services such as InfoEx, periodic revisions and updates of national technical standards for avalanche work, upgrades to worker training programs, and knowledge sharing and technical collaborations with colleagues in the USA and Europe.

Alan Dennis was hired to run the modest office in Revelstoke and soon industry operators, the public, and numerous government agencies began asking the CAA for expanded services. By the early 1990’s the CAA’s core value of working together was being applied on a national and international scale, and everyone benefited. The CAA had secured a reputation for being progressive, inclusive, fair and balanced, and dedicated to serving the collective best interests of the Canadian avalanche community.

The CAA provided me with a mechanism for sharing development costs of new programs and services with other organizations. By working together we all got a better product at a better price than we could have achieved by working on these issues in isolation. By the mid 1990’s the CAA was clearly in the business of providing essential support services for avalanche workers, industry operators and government agencies.

In my present role as CAA Executive Director I’ve seen more positive changes. The CAA has become recognized as a responsible organization representing the entire Canadian avalanche community. Increasingly the CAA is being approached by government agencies and industry organizations wanting this non-profit, non-government organization to assist them in achieving their avalanche-related goals.

Examples include the establishment of the Canadian Avalanche Centre to develop and deliver public avalanche safety programs from coast to coast to coast, the Canadian Avalanche Information System for comprehensive avalanche data collection, export of CAA industry training programs to other countries, and development of new technologies such as on-line eLearning programs for SAR responders and security personnel for the 2010 Winter Olympic Games. We are working with the Meteorological Service of Canada to improve the accuracy of mountain weather forecasts. The CAA provides funding for avalanche research. We routinely work with industry organizations such as HeliCat Canada, Backcountry Lodge Operators of BC, the Association of Canadian Mountain Guides, Canadian Ski Guides Association, BC SAR Association, BC Coroners Service, and numerous other provincial and federal government agencies on avalanche-related issues.

Over the past 25 years the professionalism, dedication and vision of our members has enabled the CAA to become the natural hub for avalanche safety in Canada. This is the collective success we will celebrate at the upcoming AGM this spring in Penticton, and I look forward to seeing you there to reminisce on our past successes and plan for the challenges of the next 25 years. Without this great community of Canadian avalanche professionals I could never have enjoyed a career with such profound personal and professional growth.

To each and every CAA member, past and present, I offer my sincere gratitude for the wisdom, energy and inspiration you have provided over the years. You are all truly exceptional people, I’m humbled by all that you have accomplished so far, and I’m honored to have been able to participate in such important and exciting work.

Clair Israelson

CAA Archives

Steve Blake Collection

Leaders and Legacies

I am not a history buff and I don't have a particularly good memory. But when I ponder the CAA, its history and its influence, I see very significant things. I first learned of the CAA 20 years ago when I took my first avalanche course in Lake Louise. It was apparent, not only through the instructor's words but also through his actions, that what the CAA represented in terms of observation standards, training standards and professionalism was very important to him.

I have regularly referenced the Revelstoke visioning session that took place in November 2005. One of the most interesting elements of the weekend was when the attendees created a time line of significant avalanche and political events that have influenced the evolution of the CAA. Unfortunately we didn't specify the people who were managing our responses to these events. Off the top of my head, here is the list of the past presidents and at least part of what they contributed to the CAA of today.

Each has brought a series of strengths that help inject the organization with the energy and leadership required at the time of their administration. Some brought high degrees of innovation and creativity and were able to set the wheels in motion for periods of growth; some advocated for fiscal restraint and stability. They all brought their wisdom and used the wisdom of those around them—the other board members, the committees and the membership—to bring us to where we are today.

Our founding president was **Peter Schaerer (1981-83)**. The Grandfather of avalanche safety in Canada, I'm sure he'd rather be referred to as the Godfather. Peter synergized traditional European ideas with work of early Canadian pioneers such as Noel Gardner and his own wisdom and keen observations to create a solid foundation knowledge that would form the base for the Canadian avalanche scene.

Fred Schleiss (1984-86)—The legendary forecaster at Rogers Pass, Fred contributed structure, organization, careful adherence to methodology and data management. His legacy lives on at the pass and in the CAA.

Chris Stethem (1987-91)—The longest serving president, he bridged the gap between the coast and the Rockies. Under Chris' leadership we saw the creation of a CAA office in Revelstoke with staff serving and supporting industry and training programs. Under Chris' leadership the first public avalanche bulletins for BC provincial lands became a reality.

Bruce Jamieson (1992-94)—Bruce's contribution was inclusion, ensuring the perspectives and needs of all sectors of the avalanche community were addressed. He also brought practical academia that remains evident in nearly all aspects of avalanche field work in Canada today.

Jack Benetto (1995-97) —Jack and his team ushered in the CPD program. This is a definitive move towards professionalism. He also brought the ISSW to Penticton which raised the bar for all the future ISSW's.

Niko Weiss (1998) —Niko brought energy and innovation to the position. His "outside of the box" thinking helped encourage the CAA to be a nimble responsive organization that must look beyond the immediate horizon to ensure long term success.

Bruce Allen (1999) —Bruce brought in difficult business decisions and a fiscal reality check following Niko's enthusiastic tenure. The ship's path was corrected and is still heading in the right direction.

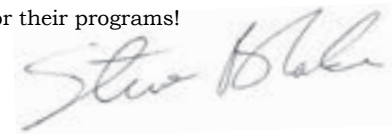
Diny Harrison (2000) —Short lived, she stepped down to avoid conflict of interest when her spouse was hired by the CAA. She then diverted her energies to the ACMG in another fine demonstration of professionalism.

Bill Mark (2000-2003) —Stepped up from the Vice-president position when Diny resigned, and ran with it. He moved the board from a hands-on operating board to a policy governance board, focussed on strategic issues and big picture direction.

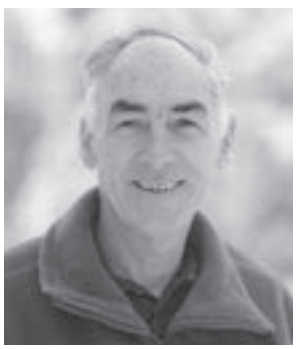
John Hetherington (2004) —John aspired for the board role of secretary treasurer but was asked to run for president. He did a great job but it wasn't the best use of his skills. The next year he stepped down as president and took the role of secretary treasurer, giving us yet another example of professionalism and service coming ahead of optics and egos.

I came on board in 2005. My legacy will likely be that I threw the best parties, and I'm good with that. It is the camaraderie that exists in the CAA ranks that is one of our biggest assets! Thank you gentlemen and ladies, I am not sure I fit in this lofty company but I am proud to be a part of the CAA. *(Editor's note: Steve is too modest to note the contributions he's made to date. Steve was at the helm during the 2005 visioning process, which led to some very real steps forward in the integration between the CAA, CAC, CAF and ISSW, as well as establishing our vision to be a world leader. Under his tenure, we've also made some major improvements in the way we showcase these organization in both our website and this publication.)*

On a final note, the BC NDP sent out a press release in February calling for more funding to the CAC so the size of forecast areas can be reduced. It is truly a favourable position to be in, when provincial political parties are advocating for funding on your behalf. It is also a testament to our success when the products and services we provide are on the minds of the public and government leaders, especially when the message is not to cut, but to actually enhance the service. It is so good now, imagine what it would be like if the CAC had more funds for their programs!



Steve Blake



Peter Schaerer (1981-83)

Fred Schleiss (1984-86)

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Bruce Jamieson (1992-94)

Jack Benetto (1995-97)

Niko Weiss (1998)

Bruce Allen (1999)

Diny Harrison (2000)

Bill Mark (2000-2003)

John Hetherington (2004)

Cumulative Impact

Acknowledging the National Search and Rescue Secretariat—SAR New Initiatives Fund Contributions to Avalanche Safety in Canada

By Clair Israelson

As we celebrate the CAA's successes of the past 25 years we gratefully acknowledge the generous financial support provided over the years by the National Search and Rescue Secretariat (NSS) and their SAR New Initiatives Fund (NIF) program.

As I travel and meet with avalanche colleagues from countries around the world I am often reminded that this program is unique in the world; a federal government program specifically designed to fund development projects to enhance search and rescue capacity, including accident prevention programs. Our international colleagues are envious of Canada's NIF program. They recognize that it takes money to develop world class avalanche safety programs, and in Canada we are extremely fortunate that the NIF program exists to serve this very real need.

Since 1991, the NIF program has provided nearly $4 million in research and development funding for CAA and CAC avalanche safety projects. NIF is by far the largest single financial contributor to development of avalanche safety programs in Canada and I believe that without this federal program Canadian avalanche programs would still be in the dark ages. NIF projects require a federal agency to support the project and oversee the work. Over the years, Parks Canada has been the primary sponsor for CAA projects. In recent years, Michel Villeneuve, National Public Safety Specialist for Parks Canada has worked closely with the CAA and we are deeply indebted to him for his unflagging assistance. More recently the RCMP has also served in this support role for CAA NIF projects, and we look forward to continuing this mutually beneficial relationship.

On behalf of the entire Canadian avalanche community and all Canadians that enjoy an active, outdoors lifestyle, I wish to publicly celebrate the significant contributions that the National Search and Rescue Secretariat, the SAR New Initiatives Fund and cooperating federal agencies have made to avalanche safety in Canada.

NIF projects administered through the National Search and Rescue Secretariat and cooperating federal agencies have produced the following outstanding results:

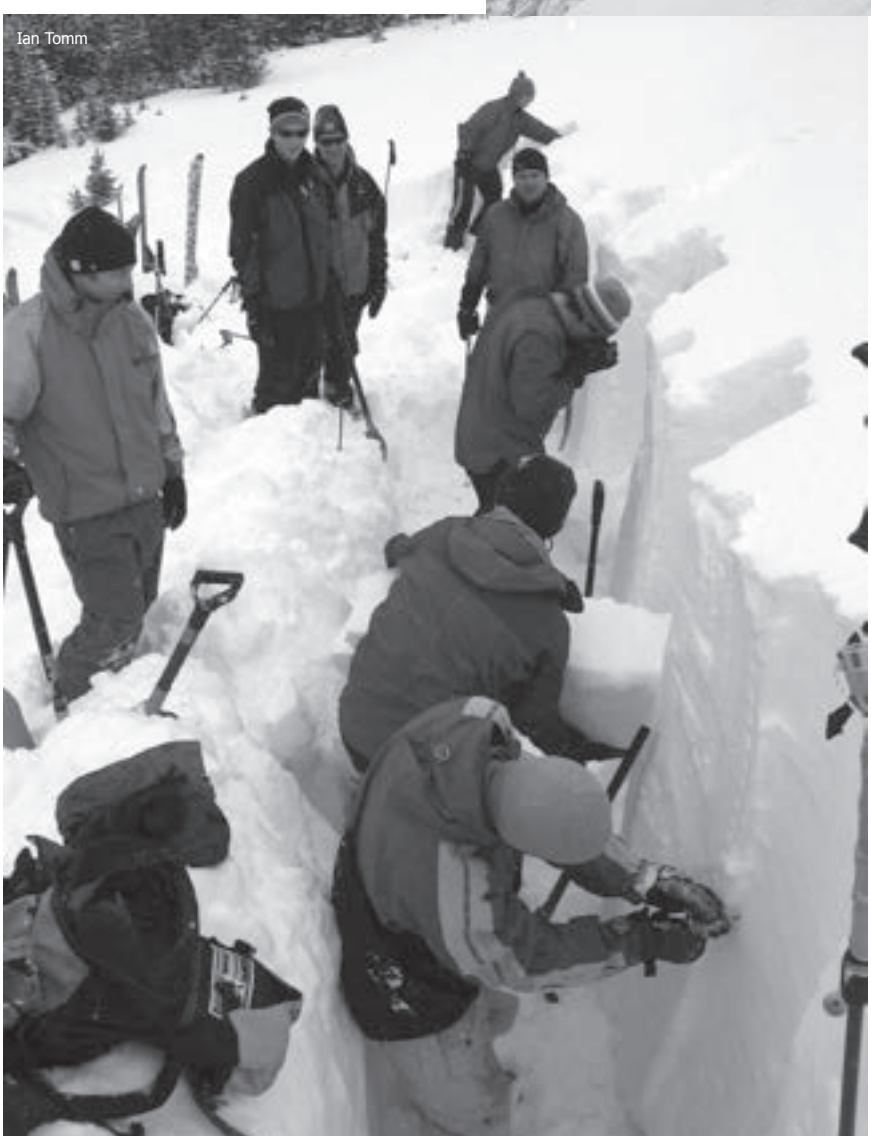
> **"I believe that without this federal program Canadian avalanche programs would still be in the dark ages."**

- Establishment of the CAA office in Revelstoke in 1991 to develop federal, provincial and industrial information exchanges (InfoEx), and to provide public avalanche information to backcountry users in western Canada.
- Development and publication of *Observation Guidelines and Recording Standards for Weather, Snowpack and Avalanches*, a national standard for data collection used by avalanche workers and researchers in Canada.
- Development and publication of *Land Managers Guide to Snow Avalanche Hazards in Canada*, a technical handbook to assist land managers to recognize and mitigate avalanche risk on Canadian public lands.
- Development and publication of *Guidelines for Snow Avalanche Risk Determination and Mapping in Canada*, a national technical standard for use by engineers, geoscientists, and other professionals to calculate avalanche risk and design avalanche defenses.
- Development of technical training courses and training materials for avalanche workers in Canada. In the past decade, approximately 4000 students have taken these courses, and these Canadian programs are now being adopted in New Zealand, Japan and Iceland.
- Development of avalanche safety training courses for non-professional recreation. These programs are available in all regions of Canada and since 1995, more than 25,000 students have taken these two- or four-day programs.
- Publication of *Avalanche Accidents in Canada, Volume 4 1984-1996*, an analysis of avalanche accidents and the factors contributing to those events. This publication serves as an invaluable learning tool for accident prevention. More than 5000 copies have been distributed.
- Production of *Beating the Odds,* a video (in 30 and 60 minute versions) for public avalanche awareness and education. Thousands of viewings to date (estimate only).
- Publication of *Backcountry Avalanche*

Awareness and *Sledding in Avalanche Terrain*. These two handbooks provide avalanche awareness and education for people involved in back country recreation. More than 38,000 copies have been circulated across Canada and around the world.

- Delivery of public avalanche awareness programs and development of professional avalanche safety capacity in Quebec and in Newfoundland and Labrador.
- Development of the ADFAR (avalanche decision framework for amateur recreationists) project to generate a scientifically valid "process" for personal avalanche safety decisions.
- Development of an internet-based avalanche accident prevention, response and rescue training program for on-site survivors. Few avalanche victims survive more than 30 minutes of burial. This program trains the victim's companions to conduct an effective rescue.
- Facilitation of inter-agency coordination and consulting services to establish the Canadian Avalanche Centre.

Bonnie Hooge



Ian Tomm

Beginning April 1, 2007 the NIF will fund two new projects:

- ADFAR 2 will further develop scientifically valid decision frameworks for amateur recreationists with advanced experience and knowledge.
- E-Learning for Avalanche SAR will develop on-line training for professional and volunteer avalanche SAR responders and SAR managers across Canada. This training program will also benefit security personnel for the 2010 Winter Olympic Games.

With NIF project funding, cooperation from federal agencies such as Parks Canada and the RCMP, and the expertise of members of the CAA, world class materials and programs for avalanche accident prevention have been developed. We look forward to continuing to work with the National Search and Rescue Secretariat and other federal agencies to improve search and rescue and avalanche accident prevention activities throughout Canada in the years to come.

>>Clair Israelson is the Executive Director of the Canadian Avalanche Association and the Canadian Avalanche Centre

eTraining for Mountain Operations

A new NSS-NIF project for the CAA

By Ian Tomm

In the spring of 2002 the CAA completed an extensive educational visioning project. Many recommendations were made, but one in particular has had a profound effect over the last five years. The second recommendation of the report stated that the CAA was "…to design, develop and/or deliver online learning modules as part of the CAA training programs…" Little did we know at the time just how important online learning would become to the CAA's educational initiatives.

The success of the CAA's first experience with online training is no secret. More than 65,000 people have taken the Avalanche First Responder Course since its launch on October 1, 2005. Of these users, 65% are Canadian, 20% from the US, and the remaining from all over the world. Use on the site continues to explode. Now that the site is managed by the CAC and actively sponsored by great organizations like RECCO, annual updates are occurring to the content and exercises. This free, public educational tool is having a much bigger impact than any of us could have anticipated.

Building on the success of this first experience, we started work this summer by talking to stakeholders in organized avalanche rescue and general SAR in Canada. All of these agencies expressed great interest in the development of best practices and the coordination of national standards for avalanche SAR. Primary among the many issues to address was the need for multi-jurisdictional and multi-agency inter-operability. This requirement, combined with the wealth of relevant expertise available within the CAA, made us the logical organization to take on such a task.

In August, the CAA was requested to develop a NSS-NIF proposal for the development of these best practices, along with a medium to train the individuals involved, both professional and volunteer. We immediately went to work and in three short weeks, a two-year, $850,000 project was submitted, with the RCMP National SAR Coordinator as sponsor. In early February 2007 we received word from the RCMP and NSS that we had been awarded the funding and that the project was to commence April 1, 2007.

In March and April there will be a series of communications sent out to the CAA membership and all stakeholders in avalanche search and rescue regarding this initiative. We will be looking for Subject Matter Experts (SME) to represent the various sectors of the avalanche SAR community, in addition to members to sit on the managers review panel. Ken Wylie has been hired as the chief content and curriculum developer. Check out page 76 of this issue for Ken's bio, showing the considerable depth of experience in avalanche work and education he brings to this important initiative.

What will this project mean in five years? We can only guess, but we believe that the development of national standards in best practices for avalanche SAR can only mean great things for our community and society as a whole. If you are interested in finding out more about the specifics of the eTraining for Mountain Operations NIF project please read on. The following are excerpts from our proposal, and if you have questions regarding this project please feel free to contact me.

Details on the eTraining Project Proposal

The CAA, working with federal, provincial, territorial and non-government avalanche search and rescue (SAR) stakeholders and avalanche rescue and

Canadian Forces

winter mountain safety experts, will develop consensus-based best practices and recommend operational protocols for safe and effective organized avalanche SAR and similar winter mountain operations. These best practices and protocols will form the content base for an on-line (eTraining) course, available in English and French language versions. This training program will have three discrete components.

1. **Safety in winter mountain operations** component will address occupational health and safety issues associated with working in mountainous terrain in winter.
2. **Best practices for avalanche SAR operations** component will describe techniques and best practice, with separate interactive exercises for avalanches involving backcountry recreation, vehicles on a highway, and a domestic residence.
3. **Best practices for avalanche SAR management** component will address best practices for alerting, command and control using jurisdiction-specific modules that reflect the ground SAR organizations of provinces and territories

This program will incorporate interactive exercises and simulations using web-based animation and possible multi-user and augmented-reality technologies. Conventional, collaborative and augmented-reality technologies developed by Dr. Nick Hedley of Simon Fraser University (SFU), a world leader in geographic visualization and spatial cognition, will be used to help develop interactive exercises that optimize learning. Research by Dr. Hedley suggests that individuals using carefully designed geospatial interface technologies appear to gain significant advantages in perception, spatial decision-making and developing mental models of spatial environments. *(Editor's note: for more on this technology, see Ranae Kowalczuk's research on page 60 of this issue.)*

Rendered 3-D graphics simulating high resolution views of a real world location (e.g. a mountain range surrounding an Olympics venue) enables students to practice emergency operations in a way that is highly effective, in any geographic location, prior to arriving at that operating site. Interface technologies such as augmented reality can produce significant safety, operational efficacy and cost savings for the numerous organizations required to ensure staff operating in potentially dangerous winter mountain environments have appropriate occupational health and safety training. This project will build on this spatial-cognitive research, applying it in the operational context of SAR.


Richard Miller

This program will incorporate or link to recently developed eTraining materials for incident command developed by the RCMP, and medical training for avalanche rescue (*Time is Life* DVD) developed by the International Commission for Alpine Rescue.

This course will benefit the Canadian SAR community and those organizations listed above by:

- Providing easy, convenient "any where, any time" internet access to high quality, specialized occupational health and safety / SAR training for personnel.
- Reducing training costs (staff time and travel) compared to conventional training methods.
- Demonstrating corporate diligence for the safety of personnel involved in winter mountain operations. This eTraining will stress awareness of and mitigations for the unique hazards inherent in winter SAR operations and similar mountain activities. A recent amendment to the Criminal Code of Canada (Bill C-45; effective March 31 2004) added Section 217.1 which states: ***"Every one who undertakes, or has the authority, to direct how another person does work or performs a task is under a legal duty to take reasonable steps to prevent bodily harm to that person, or any other person, arising from that work or task."*** Under this new legislation failure to ensure reasonable occupational health and safety training for workers

Why eTraining?

- Nationally standardized core content promoting inter-operability between organizations and jurisdictions
- Modules can be created and customized for specific applications, meeting the needs of a variety of jurisdictions and audiences
- Cost effectiveness and convenience. Students can work at their own pace and place
- Long "shelf life" with ongoing upgrades to course content over time

could result in criminal prosecution.
- Generating awareness of accepted best practices for managing avalanche rescue and similar winter emergency operations including pre-plans, command and control, on-site operations and subsequent data collection.
- Ensuring inter-operability between the numerous agencies and organizations that need to work seamlessly together during avalanche SAR responses. Jurisdiction-specific training modules will be developed congruent with the emergency response structures and capacities that may exist in BC, Alberta, Yukon, NWT, Quebec, Newfoundland and Labrador, and Nunavut.
- If it is the wish of project stakeholders, this eTraining will be configured with examinations affirming students' knowledge of content in each component. A data base registering the names of students as they pass these examinations could serve as a permanent record of training, documenting the due diligence of the organizations employing the students.

The need for avalanche SAR capacity is not restricted to Western Canada. Research by Natural Resources Canada shows that snow avalanches threaten human activities in British Columbia, Alberta, Yukon, Northwest Territories, Quebec, Newfoundland and Labrador, and Nunavut. Recent research documents 81 avalanche fatalities in Quebec, 28 between 1968 and 2006 (Dr B. Hetu, 2006). In Newfoundland and Labrador more than 60 avalanche fatalities have been documented (Dr. D. Liverman, 2006). Several more (reliable numbers unavailable) avalanche fatalities have been reported in Nunavut.

Organized avalanche rescues and similar winter mountain operations are high intensity, potentially dangerous events. Typical avalanche rescue management considerations include inclement winter weather, access to very remote locations by ground, over-snow machines or helicopter, short daylight hours, the possibility of compromised rescuer safety due to lack of knowledgeable leadership, over zealousness resulting from responders' desires to reduce suffering and save human life, safety threats from further avalanches or other natural and human hazards, medical requirements of survivors, and a host of other logistical and operational variables.

Organized avalanche rescue operations are typically complex, involving the police, emergency measures organizations, paid or volunteer SAR responders, police or volunteer search dogs, ambulance services, government or commercial helicopters, "self-appointed" rescuers, coroners, and others depending on circumstance and jurisdiction.

In Canada there are no nationally accepted protocols or best practices for avalanche SAR operations. In Eastern Canada there is little or no capacity for organized avalanche rescue response from within National SAR Program organizations. Several organizations in Western Canada have developed highly effective internal capacities for avalanche rescue response, but inter-operability is hampered by a lack of standardized, commonly accepted response protocols and field procedures. This project will address the shortcomings, and establish de facto national standards for avalanche search and rescue.

Special thanks to all the organizations that helped in the development of this project and formally supported it through letters of support.

- RCMP National SAR Coordinator
- HeliCat Canada
- Provincial Emergency Program BC
- Justice Institute of BC
- Association of Canadian Mountain Guides
- BC Ministry of Transportation: Avalanche and Weather Programs
- Government of Newfoundland and Labrador

An Update from the ISSW 08 Papers Committee

By Cam Campbell and Steve Conger

How does one interpret a return cycle when the event gets larger (Figure 1) at each occurrence? The International Snow Science Workshop was last held at Whistler in 1988 and will return after 20 years in 2008. ISSW 88 was chaired by Chris Stethem, hosted 33 presentations and had 310 participants. The most recent ISSW, held in Telluride this past fall, saw 810 attendees.

The presentations of papers and posters are often thought of as the core content of the ISSW. A second component, and just as important, is the "workshop." In his history of ISSW, John Montagne described this as the open exchange between those with theoretical interests and those with practice.

The ISSW 08 Papers Committee is responsible for the first of the two and is balancing this with strong attention to the second. We have listened closely to observations of the most recent workshops and made some of our own in an effort to ensure ISSW 08 is truly a merging of theory and practice. Along these lines, a committee has been formed that represents theorists, practitioners, theorists aspiring to be practitioners, and practitioners aspiring to be theorists. Submitted abstracts will be divided amongst and reviewed by teams of two comprised of an individual from the theoretical aspect and one from the practical.

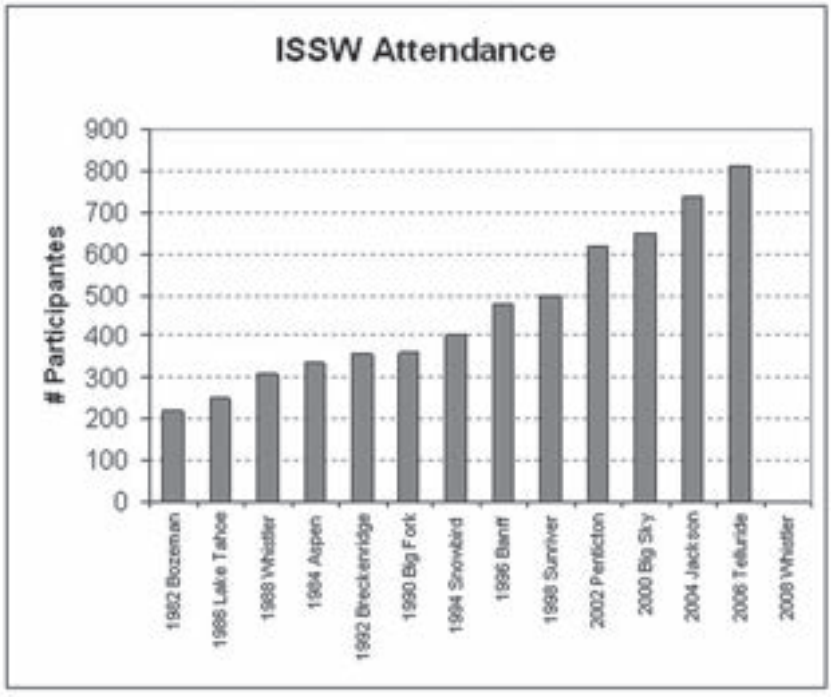


Fig. 1

Encouraging presentations from practitioners is very important and several efforts are being planned to make this easier. Virtual field trips, storm reports, or slide shows of remarkable events are the types of presentations we will be encouraging for inclusion in oral sessions. These might be about practical problems faced by an operation, or an observation that could benefit from investigation. An example might be a slide show of numerous glide cracks as seen earlier this season with the conclusion as a question: "Why do you think this happened?" An excellent presentation was made at Big Sky entitled: "The future research we'd like to see."

Other efforts are underway. We have already investigated publishing options and firms to ensure we will have the proceedings available at the conference, emulating the successes of Penticton and Telluride. Abstract deadlines and early-bird registration dates will accommodate those who need to know acceptance to ensure travel funding.

Updates, submission information and deadlines will be posted on the ISSW 08 website as they are developed. Template ideas for the virtual field trips or storm reports will also be placed there, along with links to helpful examples of previous presentations.

We'd like to publicly thank those who have volunteered their time to serve on the papers committee. Start thinking now about your submissions and let's make ISSW 08 one for the record books.

ISSW 08 Papers Committee Members.

Co-Chairs:
Cam Campbell
Steve Conger

Committee Members:

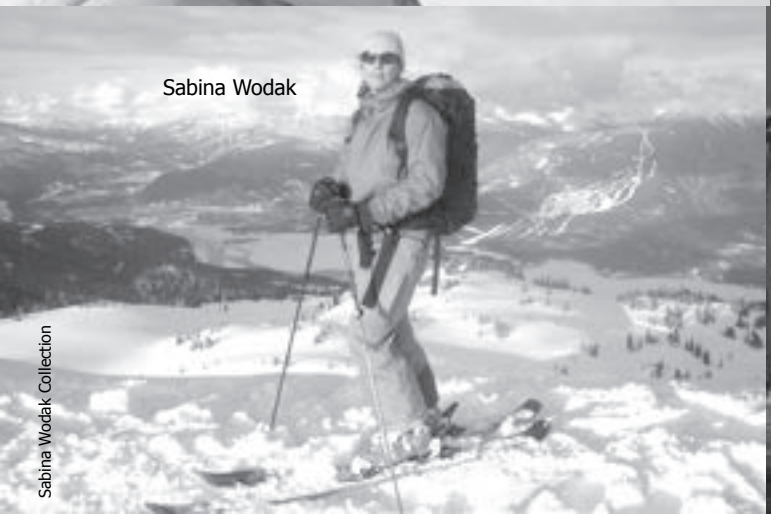
Laura Adams
Scott Aitken
Colani Bezzola
James Blench
Chris Borstad
Alison Dakin
Dave Gautier
Pascal Haegeli (poster chair)
Anton Horvath
Bruce Jamieson
Alan Jones
Dave McClung
Ian Tomm
Simon Walker


Peter Murray Collection

Pete Murray


Francois Gagnon

Francois Gagnon Collection


Sabina Wodak

Sabina Wodak Collection


Mike Sibbald

Mike Sibbald Collection

RMR Scholarship winners

Revelstoke Mountain Resort's donation goes a long way

In early January, we received word from the developers of Revelstoke Mountain Resort (RMR) that they wanted to show their support for the work done by our organizations with a very generous donation to both the CAA and CAC. You can read more about what the CAC is doing with its share of $10,000 on the facing page. For the CAA, we created four separate scholarship funds for Revelstoke residents pursuing professional avalanche training. This year's four winners are shown above—congratulations to all of them!

CAA Archives

Clair Israelson accepts a cheque for $10,000 from the developers of Revelstoke Mountain Resort. Flanking Clair on this snowy day were developers (from left to right) Robert Powadiuk, Don Simpson and Paul Skelton.

Back to School

The CAC fires up its youth education programs

By Karen Dubé

The CAC's youth avalanche safety education project received a big boost in mid-January. That's when Revelstoke Mountain Resort (RMR) announced they would fund a K-12 snow and avalanche safety project in Revelstoke. This pilot project will focus on delivering safety messages to young people revolving around winter activities such as backcountry skiing, snowmobiling and out-of-bounds riding and skiing. We will look to existing snow safety programs as a starting point and develop a school-based curriculum in partnership with School District 19 that we hope to see as a model for schools across the country.

The Revelstoke pilot project is an excellent example of community partnership driving school-based safety program development and delivery. Community groups or corporations with a vested interest in youth safety messaging—such as ski resorts, snowmobile associations or clubs, and youth outdoor programs to name a few—can partner with organizations that specialize in bringing safety messages to young people. Currently there are a number of well-established school-based projects doing good work around risk management and outdoor winter safety, including avalanche safety, that reach thousands of young people in schools across Canada. Two of the best known are AdventureSmart's Snow Safety Education Project (SSEP) and SMARTRISK's No Regrets and SNOWSMART programs.

Susan Tomecek

Natasha Tomecek, grade 6 student at Ecole Banff Trail Elementary in Calgary, proudly displays her science project on avalanches.

In just two years, SSEP has reached nearly 9000 children in grades 4-6 in BC. This program is designed for intermediate-aged elementary school children, and is an interactive multi-media presentation that teaches the essentials of winter outdoor safety. It also supports the use of proper equipment, knowledge and training to help reduce risks and prevent accidents. Developed by Monica Nissen, member of Nelson Search and Rescue and the CAA, SSEP presentations cover:

- the Alpine Responsibility Code;
- ski resort signage;
- backcountry hazards associated with going out-of-bounds;
- and avalanches, combined with the need to be prepared with additional avalanche education, training and equipment.

AdventureSmart reaches out to young students with its message to "Get informed & go outdoors!" Intermediate-aged student respond well to the SSEP teacher-led model of safety message delivery. For older youth, SMARTRISK has taken a chosen a different approach to teaching risk management.

SMARTRISK offers a multi-pronged approach reaching young people about decision making, risk management, and injury prevention. One of their biggest projects is a travelling road show called "Heroes." This one-hour presentation is dedicated to raising awareness about injuries among teenagers and giving them the tools to avoid them. "Heroes" reaches 50,000 young people across Canada each year.

Next is the "No Regrets" peer leadership program for Canadian high schools. The program has grown quickly, from 20-plus schools during 2005-2006, to over 50 schools in 2006-2007. A selected group of students design and deliver their own school-wide injury prevention programs with training and support from

A young competitor digs for a beacon during Avalanche Awareness Days at Red Mountain. The race was sponsored by Rossland Search and iescue.

Ami Haworth

SMARTRISK. While the main objective is to positively affect the attitudes and risk-taking behaviour of the students involved, it also aims to have a wider impact on the overall injury prevention culture of the schools. “No Regrets” schools act as vehicles for other important SMARTRISK safety messages catered to each school’s location, such as in Fernie, BC where the SNOWSMART curriculum is applicable.

SNOWSMART is an innovative snow risk-management program for young skiers, snowboarders and snowmobilers. Delivered through the school curriculum and available in English and French, its objective is to increase the knowledge and awareness of 12 to18-year-olds about the risks of winter recreation. Ultimately, the goal is to change the way youth see and take risks in order to reduce the number of injuries and deaths on the slopes and trails. SNOWSMART curriculum is available for grade 7 and grade 10 students in formats geared to skiers/riders and snowmobilers. SMARTRISK worked with the CAA and the Canadian Ski Patrol System to develop this school-based program.

Outside of supporting and promoting school-based programs, the CAC is involved in youth avalanche education through a number of new initiatives for the 2006/7 season including:

WEBPAGE—The CAC has creation a youth webpage for educators, parents and stakeholders to source information about and links to existing and new avalanche safety programs and services geared to youth. Through our youth webpage, the CAC acts as the hub of coordination for avalanche safety programs oriented to young people in Canada. Examples of links and resources available on the youth webpage are:

- Information about and links to school-based programs including; AdventureSmart, SMARTRISK, YouthSafe Outdoors (field trip safety in BC), and the new Revelstoke K-12 pilot project.
- Resources for educators and parents that include how to order the CAC’s avalanche safety classroom kit, information about and a link to the CAC’s Online Learning Course (recommended for grades 8-12), how to request a classroom visit from a CAC avalanche professional, a colouring sheet download (created by local Revelstoke artist Nicola McGarry) designed as a way to introduce elementary age school children to the idea of avalanche safety, and ideas for avalanche safety event activities for young people.

CLASSROOM KIT—The CAC is able to directly support educators who would like to bring avalanche safety messages to their students by providing them with an Avalanche Safety Education Kit that includes:

- Safety brochures geared to backcountry skiers, boarders and snowmobilers
- Avalanche Danger Cards—outlines the Canadian Avalanche Danger Rating Scale used in public avalanche bulletins
- Companion Rescue Cards—describes what to do when someone in your group is caught in an avalanche
- A copy of the DVD—Intro to Avalanche Awareness
- Canadian Avalanche Centre stickers
- Colouring Poster for elementary schools featuring the essential backcountry travel safety equipment—shovel, probe and beacon

Since offering these kits on our youth webpage in early January we have sent out 10 to teachers and students from Ontario, BC, and Alberta who have ordered them for special events, science fair projects and classroom-based avalanche safety lessons.

OUTREACH—Educators may wish to host an Avalanche Safety event at their school or classroom. School boards may elect to host "Train-the-Trainer" workshops to bring their teachers up to speed on the latest in avalanche safety education. The CAC is able to support these types of initiatives with outreach services. Forecaster Ilya Storm participated in a Calgary School Board teacher training workshop in November that introduced over 60 teachers to the Avaluator decision making tool. CAC Operations Manager John Kelly visited a high school classroom in Nelson, BC, in February to lead a discussion with outdoor education students on avalanche forecasting and decision making.

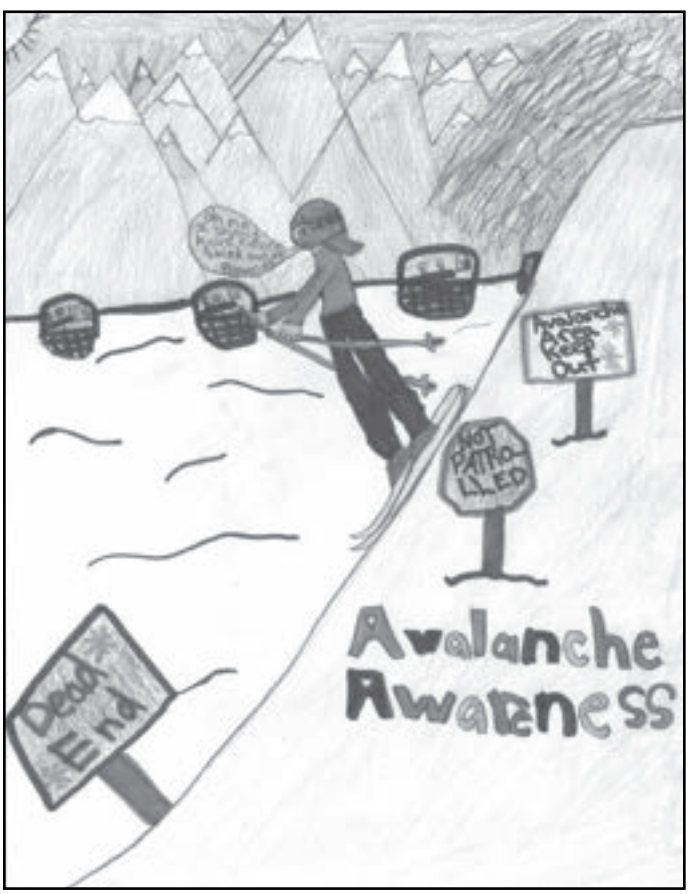
AVALANCHE AWARENESS DAYS sponsored by Canadian Pacific Railway—The CAC supported the national AAD event at Kicking Horse Mountain Resort and regional AAD events around BC, Alberta, and the Yukon with safety literature, ideas for youth-oriented activities, prizes for beacon search contests and silent auctions, and event advertising. Many of the community hosts encouraged young people to participate in avalanche safety exercises such as beacon and probe searches. We have posted AAD avalanche safety poster contest winners on the CAC youth webpage. AdventureSmart ambassadors participated in the CAC's Avalanche Awareness Days at Grouse Mountain in North Vancouver and at Sun Peaks Resort in Kamloops.

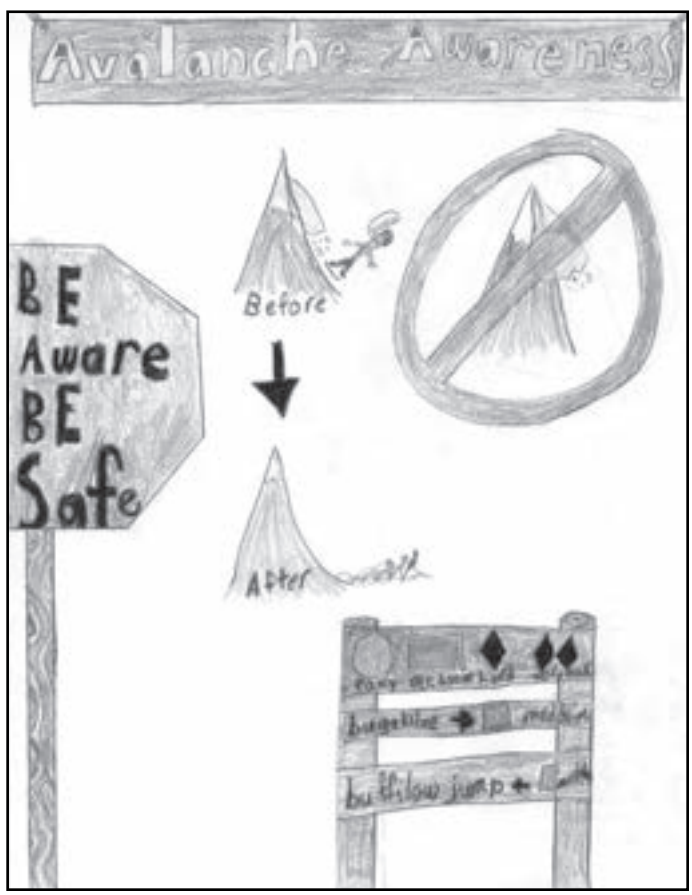
Today's youth spend more winter sports time in the backcountry than ever before and clearly the need for youth avalanche safety education has never been greater. The CAC is encouraged by the growth in school-based curriculum across the country and is keen to be directly involved in the Revelstoke K-12 project with financial support from Revelstoke Mountain Resort.

The CAC also plans to continue to support and promote existing programs on its website. Where possible, gaps in youth programming are identified and the CAC intends to work cooperatively with stakeholders to close those gaps. The introduction of the CAC youth webpage directed to educators and parents heralds a grass-roots, hands-on approach to youth avalanche safety education. We are pleased to see young people take a genuine interest in winter and avalanche safety and are excited to be able to directly support both curriculum-based programs and individual requests for safety information.

>> Karen Dubé is the CAC's Youth Coordinator

A poster contest for Avalanche Awareness Days in Golden yielded almost 40 entries. These are just two of the colourful messages we received. Morgan Foster (left) and Nathan Morris (right) are both Grade 6 students at Lady Grey Elementary School in Golden.





Avalanche Awareness Days 2007

National Event at Kicking Horse Mountain Resort

This year's national event of Avalanche Awareness Days was one of our best ever. We had unprecedented media coverage and a lot of interest in the Avaluator. The fantastic weather, gorgeous scenery and tremendous hospitality at Kicking Horse Mountain Resort played a big role in the success of this day. Thanks to all who participated!

Mary Clayton

The crowd at the silent auction waits eagerly for one of the many announcements of the evening. Thanks to our sponsors this event was a great success.

John Kelly and Pascal Haegeli each gave numerous interviews throughout the day and used the opportunity to talk about the Avaluator.


Mary Clayton


Daniel Leslie

The University of Calgary's Snow and Avalanche Research team were on hand to demonstrate snow profile and rutschblock techniques. Here Laura Bakermans instructs some onlookers about the Avaluator.

Dogmaster Mike Henderson and partner Atar demonstrate their moves during an avalanche rescue practice.


Mary Clayton

Community Events

Once again, almost 30 mountain communities participated in our annual Avalanche Awareness Days, sponsored by Canadian Pacific Railway. You can read how some of these groups held their event, and maybe get some ideas for your own community next year!

Apex Mountain Resort, Penticton
Submitted by Caley Fraser

The event went really well. We moved the majority of the activities to the top of the mountain as it was such a beautiful day out. We had the Penticton Search and Rescue team up there alongside our Pro and Volley Patrol teams. There was a tv set up to show the avalanche awareness video (it really captivated some of the kids!), a snowpit demo, and an old fashioned hot dog sale! There were also demos done outside throughout the day with the search and rescue team.

The prize box looked great, I am not sure what the public's reaction was to the prizes as I had handed them over but I am sure they went over well as everyone loves to get free gear especially when it is useful equipment. Thanks for all your help and support!

BC Parks—Brackendale
Submitted by Aaron Donohue

Last weekend went pretty well. Kendra and I helped Richard Wynn and his CARDA dog Nora with the booth setup at the bottom of Blackcomb. Members of the Blackcomb Ski Patrol also helped with the booth on Saturday. Of the people we did talk to, most were interested in the Avaluator and were happy they could take a look through it. Also this was a good opportunity to make people aware of Blackcomb's Avalanche Awareness Tours, which run five days a week and are about three hours long.

On Sunday, I set up an information table at the Diamond Head Parking Lot/Trail Head. This is a busy backcountry area in Garibaldi Provincial Park that sees a lot of first-time backcountry users from Vancouver. Again, I set up an information table with the materials provided by the CAC, along with a couple other good avalanche and guide books for the local area. I also prepared some more info on the Avaluator and printed

Probe practice at Avalanche Awareness Days in Smithers.

Rob Maurer

An Avalauncher was on display as part of the Avalanche Awareness Days activities at Fernie Alpine Resort.

Sarah Hope-Johnstone

Some 140 people attended Jasper's Avalanche Awareness Night, held at the historic Athabasca Hotel.

Darlene Skehill

out an example of the Online Trip Planning Tool for people to take a look. I also made a quick information sheet on the CAA's Online Avalanche Course by cutting and pasting off the website. Again, a lot of people had heard about the Avaluator and were happy to get to have a look through it and see an example of the online trip planning tool

Ski and Ride Smithers

Submitted by Rob Maurer

The Avalanche Awareness Days in Smithers went well. It was hosted by a member of the local Search and Rescue and our head patroller from Ski & Ride Smithers, Rob Hachey. We had a table of information in the lodge that received heavy traffic. The table was set up for the whole day and had either someone from the Search and Rescue or the ski patrol there to answer questions. As G3 was the sponsor for prizes, I borrowed a G3 banner from a local retailer to hang above the table. The whistles that the Search and Rescue brought to give out were a big hit. We also distributed most the info that was sent from the Canadian Avalanche Centre.

Once again, the Mt. Remo Backcountry Society hosted Avalanche Awareness Days at Shames Mountain in Terrace.

Duncan Stewart

In the afternoon Rob Hachey did a snow profile demonstration as well as a probe and beacon search. Roughly ten people attended both events and they were very keen. Rob used the prizes supplied by the CAC for the probe and beacon search. The group was made up of some members of our local volunteer ski patrol and some interested guests on the mountain. Thank you to everyone at the CAC for putting on this event.

A happy group at 8-Mile cabin helps celebrate Avalanche Awareness Days, hosted by the Prince George Backcountry Recreation Society.

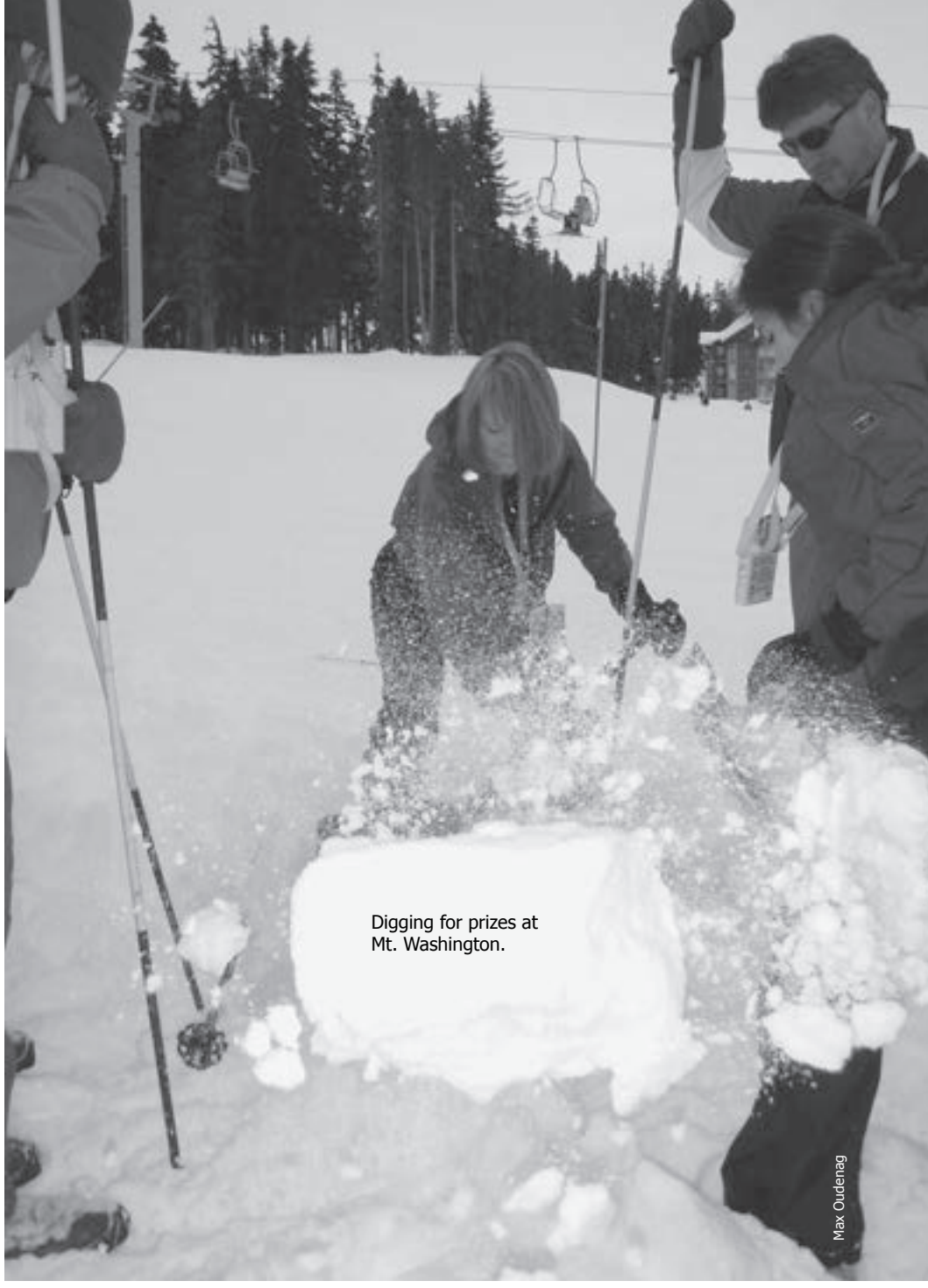
Craig Evanoff

Mt. Remo Backcountry Society, Terrace

Submitted by Duncan Stewart

The Mt. Remo Backcountry Society (MRBS) took part in Avalanche Awareness Days 2007 up at Shames Mountain this past weekend. Many people stopped into the snow-walled information tarp for information about safety gear, safe travel, the CAC and some even came to ask questions about the Avaluator. Hot chocolate and snacks helped to draw them in. Saturday started slow but the event picked up steam on Sunday with the coming of fresh snow. In the end, 57 people specifically signed up for draw prizes and took part in our basic single beacon or advanced dual lost beacon searches.

Congratulations to Andre for the quickest time on the advanced search course. Andre won four-nights accommodation in one of the MRBS-maintained backcountry cabins. Another great attraction was Kelsey the CARDA search dog with handler Shelly Jackson who put on a great show for the kids and adults who lined up to watch Kelsey dig out our lost skiers during the rescue dog search demonstrations. Thanks to all for coming out to take part and a special thanks to all who volunteered there time to make the event a success. Also a big thanks to those who gave us gear for prizes, namely the CAC, Azad Adventures, Northern Escapes Heliskiing, All Seasons Source for Sport, Ruins Board Shop and food stuffs from Safeway in Terrace.



Digging for prizes at Mt. Washington.

Max Oudenag

Sunshine Village Ski Area, Banff

Submitted by Jeremy Cox

We had a few events organized for both the Saturday and Sunday this year. After putting up banners at the parking lot, village and summit of the ski area, we had the day's itinerary on display at the base of all lifts. On tap for Saturday we had the Backcountry Access Beacon Basin in action with staff on site for instruction and prizes for top performers. In the afternoon Mike Henderson from Parks Canada did an avalanche dog demonstration and answered questions from the public. We had to postpone the explosives demo due to poor visibility.

On Sunday, we had the BCA Beacon Basin going again with staff on site and the explosives demo in the afternoon. The crowd-pleasing explosives demo was a huge success with upwards of 400 spectators witnessing a dramatic size 3 avalanche cascading off "Photo Finish"—the cliff band adjacent to the Silver City freeride zone. That evening, Sunshine snow safety and the rest of the Bow Valley avalanche community were flying the flag at Avalanche Awareness Night hosted by the Banff Centre. This was a great success as the Max Bell auditorium was overflowing with interested folks taking in the presentations and movies as well as the kiosks set up in the lobby. All in all a big success, well received by the target audience with lots of questions answered and positive attention drawn to the avalanche phenomena in the area. We look forward to participating again next year.

BC Parks—Cypress/Seymour

Submitted by Tay Hanson

We had a good time and a good turnout. There weren't thousands of people but the smaller numbers allowed us to really spend some time with those who were genuinely interested and just force a little upon those who weren't. I'd say that the personal connections were the most rewarding, and our SAR volunteers were outstanding.

Mt. Baldy, Oliver

Submitted by Matt Koenig

The weekend went well for us it was the most we have activity we have ever done. We hired Charles Wood to assist us and we had a beacon search area, a profile dug to show guests,

and we used the Avaluator video along with an old CAA video. To wrap up the day we did a bunch of prize draws. Overall, it was a fantastic day for us. We are now looking at hosting an AST course due to the interest. Thanks for your support and providing prizes!

Marmot Basin, Jasper

Submitted by Darlene Skehill

We had a very successful event and about 140 people attended. We had lots of food and we ended up going an extra half hour. As a last minute surprise, "The Pieps" wrote two snow songs and finished off the evening with a sing along. Thank you for all the prizes, they were all distributed. Jordy Shepherd from Parks Canada presented information on the Avaluator, so it was great to be able to hand some out.

Prince George Backcountry Recreation Society

Submitted by Craig Evanoff

The Prince George Backcountry Recreation Society (PGBRS) hosted an AST course the weekend of Avalanche Awareness Days, which was so popular that an overflow course was scheduled for the following weekend as well. Proceeds from the course go toward the PGBRS. A draw for prizes was held and course participants were very appreciative of the goods donated by Kelley Sports International (Voilé), G3, The North Face and the CAC.

Rossland Search and Rescue

Submitted by Ami Haworth

All day, a steady stream of people stopped by the SAR trailer where we had an information table and avalanche videos playing. We had snow profile demonstrations, a Beacon Basin, and a probe line demonstration. We also had a snow cave and quinzie-building demo and an avalanche skills relay race.

Overall it was a great day considering how cold it was. Lots of people were interested and stopped by to participate in events, gain information, or just chat about the topic. The materials that were sent to us by the CAC were very beneficial to the event. People were especially interested in knowing more about the Avaluator and how it works. Thank you for your help with this and have a great rest of the winter.

Fernie Alpine Resort

Submitted by Sarah Hope-Johnstone

The event catered to all ages and knowledge levels, as the focus was on education and safety training. Various programs and activites targeted certain demographics, such as the evening fundraiser at The Pub and auction in the Griz Bar for ages 19 plus. We had many children and ski school students as young as 11 participate in the transceiver search demos, indicating a desire to learn about backcountry safety at a young age. Unfortunately weather played a factor in our outside efforts as it was frigidly cold at points. However there was still strong interest in our demos as many people did stop by the base of the Deer Chair where our Beacon Basin was set up.

There was a snow pit demo running at the top of the Bear Chair during the day on Sat/Sun, for skiers to stop by and learn as they unloaded off the chair. Not having a specific time set to the demo meant more skiers could participate as they didn't need to stick to a schedule. Inside presentations of the "Know Before You Go" video and Patrol Safety/Avaluator Powerpoint were run in the day lodge during lunch time. This appealed to many of the guests who were escaping the cold and we had many people come up after the presentation and thank us for putting it on, as it provided a lot of great content in a short period of time.

Our pro patrol, volunteer patrol, and Search and Rescue volunteers were extremely helpful at ensuring everything ran as it should. The staff was keen to share their knowledge with guests, some of whom had never even held a transceiver before.

Ami Haworth

Rossland Search and Rescue put on a very creative relay race as part of their Avalanche Awareness Days. Participants had to perform a shovel shear test, find a beacon, and probe for a buried target. At the final station, the whole team had to run to the top of the hill and then toboggan down to cross the finish line.

The Avaluator

A Mid-Season Look at a New Addition to the Toolbox

By Karl Klassen

The Avaluator has been in use since the fall and feedback is starting to come in. Comments have been positive, but some people feel the Avaluator Trip Planner colour chart sometimes provides advice that appears too conservative. Several possible reasons for the cause of overly conservative advice from the Trip Planner have been cited:

- Avalanche danger ratings are too conservative.
- Avalanche Terrain Exposure Scale (ATES) ratings are too conservative.
- The colour boundaries on the trip planner chart are too conservative

Let's take a closer look at each of these points.

Avalanche Danger Ratings

A combination of large regions and long-term forecasts is common in Canada. Our vast mountain areas, sparse mountain populations, and low cultural awareness of avalanches in general make for limited resources and funding for public avalanche forecasts. This leads to challenges in providing accurate information on a local scale.

Many public avalanche forecast regions are massive. The Canadian Avalanche Centre's North Columbia forecast area, for example, encompasses as much terrain in one region as the entire Swiss Alps. This region contains a range of snow climates from near maritime to more or less continental. With four paragraphs of text and only one Alpine, Treeline, and Below Treeline rating for an entire region of this size it's impossible to provide a completely accurate local danger rating.

Public forecasts for many regions encompass three or even four days. Until weather forecasting becomes more accurate, it will always be difficult for avalanche forecasters to provide accurate information three or four days ahead, especially during times of change.

Solutions? There is no magic bullet. Smaller forecast regions and more frequent bulletins are the most obvious answer. Reducing forecast region size and increasing frequency will require significant resources and may not be practical, at least in the short-term. And, while perhaps part of the solution, such measures will not resolve all the challenges. Here are some of the other ideas that may not be particularly difficult or expensive and could play a role in helping produce more accurate and useable forecasts and danger ratings:

- Focusing forecasts and danger ratings on known high-use areas within a larger region and less emphasis on low-use or non-use areas.
- More regular and direct interaction between regional forecasters and local forecasters or local professionals within

Troy Grant


Hal Porter

larger regions.

- A common lexicon for forecasts (that is closely linked to terminology used in the Avaluator).
- A review and updating of the avalanche danger scale.
- Better graphical and textual means of communicating variations in avalanche conditions and danger ratings within a region.

A factor often overlooked is the human factors involved in producing and issuing avalanche forecasts. A forecaster's personality, experience, knowledge of the terrain and snowpack in a given region, etc., will affect how a forecast is written and danger is rated. Someone on the ground in a specific area (a local forecaster or guide, for example) may assess conditions and rate danger differently than someone who bases a forecast largely on second-party information (a regional forecaster in a central office, for example). Recognizing that human factors play a role in forecasting is important in helping to assess any inherent bias or personal outlook within the organization you work for.

ATES Ratings

ATES ratings are relatively new. To date, they have often been applied to fairly large scale terrain (an entire drainage, for example). More recently, while developing the Avaluator, we've started to rate medium to small scale features such as a particular ski run.

While the jury is still out regarding the optimal scale for applying ATES, I personally feel the current practice of rating terrain at the "run" scale for skiing and boarding is reasonable. If a run is large and has significant variation, it may be necessary or advantageous to break things down a little more and rate a couple of lines on a given run. For sledding, a somewhat larger scale may be appropriate. However, from what I hear, experience is showing that where it's possible to define "run" scale features in sledding terrain, it's not a bad idea.

For the Avaluator, I don't think a scale finer than a run will be particularly useful. Unless we slice and dice the terrain to an extremely fine (and I'd venture impractical) level, it'll never be possible to encompass all the nuances in the terrain we ride. Even if we could realistically rate on a feature-by-feature scale, the amount of information and the difficulty specifying which feature is which would probably make things worse for Avaluator users rather than better.

There might be some things worth looking at to see if ATES can be used more effectively in the context of the Avaluator Trip Planner:

- Develop standards for scale when applying ATES in various contexts.
- Review terrain that has already been rated by various organizations and revise ratings where necessary to meet an agreed upon common scale.
- The CAA and CAC have come a long way in defining qualifications and procedures for those who rate terrain. The next step might be to get a number of qualified people from various regions in the same room to work on developing uniformity in rating from one region, one organization, and one person to the next.
- Review terrain ratings that were made before CAC/CAA qualifications and procedures were in place and ensure those ratings hold under current standards.

Trip Planner Colour Boundaries

I personally see the Avaluator less as a decision making tool and more as a counseling tool. It increases a user's situational awareness and provides advice during the decision-making process. Yes, yes, it has that very cool Trip Planner with all the colours that seem to tell you when to stay home and when to ride. And yes, it has the very neat and tidy seven questions in the Obvious Clues checklist that appear to say go or no-go. But in fact, the Avaluator never actually says "Go skiing" or "Don't go sledding".

What the Avaluator does say is: "Here's how many people would have avoided having an accident if they had decided to stay home under the conditions that match the profile of your trip or the slope you are about to ski. Think about that and decide if you are comfortable taking that risk."

Taken in this context, the colours on the chart simply are what they are: advice to a decision-maker based on statistical analysis of recreational accidents and expert advice. The decision-maker can take that advice or not. An untrained and inexperienced user might make a go/no-go decision based purely on the colours on the chart. A user with more training and experience might be able to press on and travel safely in the yellow zone. When questioned closely the most experienced travellers can usually give detailed reasoning for their choice to travel in the yellow or red zone. Most often the reasoning has little to do with an increased acceptance for risk and everything to do with understanding intimately why they are safe to go there.

There is no doubt that it's possible to travel safely in the red zone. Professionals, for example, regularly travel in places and at times when the Avaluator's Trip Planner indicates yellow or red conditions. They can do this because they are extremely proficient at making on-the-spot analyses of snow stability and avalanche hazard and highly adept at utilizing terrain.

Professional stability and hazard analyses are not snap decisions, are not made by rote, nor are they (in my opinion) as subject to heuristics as some would have us believe. These local, small-scale analyses are based on a solid foundation of baseline knowledge, current data, and local information. They are synthesized using a standard, formal process on a twice-daily basis. And, most importantly, there is the extensive training and considerable (often vast) experience base of the analyst.

Professionals (in particular, guides) are the masters of terrain. In home areas, their terrain familiarity makes it possible to routefind on a scale that appears mystical to the uninitiated. In areas where they are not familiar with the terrain, professionals dig into their significant (often huge) internal database, compare what they know to what they see in front of them, then quickly and efficiently deal with terrain they may never have seen before.

> **"I see the Avaluator less as a decision-making tool and more as a counseling tool."**

Let's be very careful not to put the Avaluator to the test at this level. The Avaluator is not designed to act as your replacement when you are not right there, in the field, with your students or guests. It's designed to help people assess potential risks and consequences when there is no on-site professional guidance and all they have to go on is general, broad-stroke information.

We must be completely honest and ask ourselves what a student is truly capable of after an AST 1 or even AST 2 course without the benefit of a guide or instructor with them, right there, on-site. What advice you would give that person if you were not on-site to help them assess terrain and local conditions first-hand? Be honest. If the Avaluator still appears too conservative under this scenario, then perhaps there's further work to be done—if not on the Avaluator itself, then in how we ourselves want to teach people about decision-making in general and about the Avaluator specifically.

The Avaluator is not (and clearly says it is not) a substitute for avalanche training. It encourages people to take a course to learn more. That said, it's clear not everyone will get training. Currently, about 25% of all Avaluators produced to date are in the hands of people who have bought it "off the shelf" and will use the Avaluator as their primary decision-making aid without professional instruction, guidance, or support. If it becomes broadly accepted, this percentage will rise and I wouldn't be surprised if the Avaluator eventually reaches a far larger audience than even AST Level 1 courses can or will reach.

In this context, the Avaluator gives a perfectly reasonable message to the untrained and inexperienced. It simply reiterates what professionals and instructors have always said to this group of people: without experience and training, conservative trips and conservative decision-making are the best defense against accidents. No matter if it's coming from a human or a card, it remains the user's decision whether they heed that advice or not.

Part of our challenge as educators is that we are frequently called upon to teach avalanche skills to people who are incredibly skilled at their sport of choice but at a completely novice level of awareness about avalanches. They can ride the slopes with finesse, so advising them to stick to simple terrain under certain conditions because of avalanche danger is not particularly appealing. It takes skill as an educator to separate the message that we are not commenting on their ability to ride, but advising them to leave a margin of safety for avalanches.

I do think it is appropriate to let people know that they will be seeing evidence of people disregarding the advice of the Avaluator all around them as they take their backcountry trips. There are many reasons for this, and only one of them is that people are making inappropriate choices. There will also be people using information, their experience and

training to good advantage. If you, as a local, know that avalanches have already released on a given slope and solved the danger problem then why wouldn't you ride it, regardless of what the Avaluator said? But if you didn't have this piece of information, the advice of the Avaluator would be valid.

For users with basic training, like an AST Level 1 course, I think the message can and should be very similar to that given to untrained and inexperienced users. In one weekend, we can't expect people to gain the experience required to question the validity of a danger rating or a terrain rating. However, it may be possible to help them look for very specific and simple keys that help them use the Avaluator effectively. The lesson plans developed last fall for teaching the Avaluator on the AST Level 1 course are a pilot project that explores some ways this might be done.

I hope and expect there will be extensive discussion and review in the spring, which will lead to revisions and improvements to how the Avaluator is taught at this level. If I have one suggestion for those who will be looking at the AST Level 1 curriculum in the future, it is to consider making the AST 1 course largely a human factors and Avaluator program. That is,

a) develop people's ability to examine their own goals, inherent motivations, and risk propensity

and

b) help them become adept at using the Avaluator to make decisions that fit their personal risk profile.

The training curriculum devised for the AST Level 1 course this fall was not intended for use on higher level (for example, AST Level 2) courses. I'm not saying the Avaluator is of no use to those who have experience and higher training—I think it does. At this point, however, I'm of the opinion that the Trip Planner colour chart and the Obvious Clues checklist should not be adjusted for users with higher training or even those with more experience.

I do think that the literature that goes with the Avaluator and the lesson plans for decision-making at a higher level may need further development so the Avaluator can play an integral and realistic role in the decision-making process of more advanced users. This will be a different role than the one it plays for the untrained or the AST 1 student, but no less important. I'm not yet sure how the Avaluator should fit into the curriculum of the AST 2 course, but some ideas come to mind:

- The Avaluator should remain a primary tool for helping people with situation awareness and recognizing potential risk.
- The Trip Planner colour chart might become more of a "first filter" for a trip which, if in the yellow (or maybe even low red?) zone, may trigger much more in-depth and detailed examination of the trip itself, the danger ratings/avalanche forecast, the terrain, as well as one's motivations, training, experience, and knowledge.
- Maybe the advanced course deepens students' concept of trip planning to include terrain management and interpretation of the avalanche forecast beyond just a one-word rating
- I wonder if the AST 2 course should become primarily an Avaluator and terrain course. I don't think it's possible for casual recreationists to ever get to the point where they can do their own stability or hazard analyses but I do think they can learn a lot about terrain. And we all know that when we are uncertain about the snow, we turn to the terrain to keep us safe.

It's been very interesting to play a small role in the development of the Avaluator and see how different people react to it. The debate that has been sparked about ATES ratings, avalanche forecasts and danger ratings, and the Avaluator itself is a good thing and will lead to improvements all around. We are just starting to learn how to instruct students in the use of the Avaluator so there's lots of room for refinement. And clearly, the Avaluator should play different roles for different people based on their training, knowledge, and experience. It's just the beginning of a very exciting time in avalanche education and decision-making for recreational riders in Canada. Stay tuned!

Arno Baty

>>Karl Klassen is a CAC Public Avalanche Forecaster.

ADFAR 2
Taking the Avaluator Further
By Mary Clayton

Earlier this spring, the CAC received word from the National Search and Rescue Secretariat that the funding for ADFAR 2 had been approved. This project has the same aim as the original ADFAR project—to reduce avalanche accidents. Building on the findings of the first ADFAR project, the new project will develop new methods to provide advanced training for recreational backcountry users.

Teaching the intricacies of avalanche hazard analysis has always involved an essential conundrum—how to impart enough usable information to the students so that they can get out and gain some experience without getting in trouble. For years the accepted approach has been to distill the best practices and evolving knowledge of successful professional operations. The trouble with that method is that beginners lack the necessary practical experience to use this knowledge-based approach effectively. The ADFAR project focused on this disconnect and produced the Avaluator, a decision-making tool that gives novices rules to guide their decisions.

Now, the ADFAR 2 project will focus on the next stage of decision aids that will not only raise the awareness, but also the understanding of avalanche hazards, slowly moving the users towards the knowledge-based process used by professionals. Led by Dr. Pascal Haegeli and administered by Susan Hairsine, the project has two years—from April 1, 2007 to March 31, 2009—to accomplish its goals.

There are five primary objectives in this project. The first is to have a closer look at the current avalanche danger rating system, which doesn't quantify the probability or consequence of an avalanche. Revisions will aim to make the system less ambiguous and more explicit, allowing amateurs to access the "reading between the lines" interpretation that professionals already employ. Grant Statham of Parks Canada will lead this part of the project and a team of experts will be assembled to guide the revisions.

The second objective is to develop a better assessment of the risk behaviour of out-of-bounds skiers and boarders. Initial research into this group, done during the first stage of the ADFAR project, showed that this group is the fastest growing and the most risk-inclined of all user groups. Drs. Pascal Haegeli and Ian McCammon will lead this initiative to improve understanding of these recreationists. This research will provide the necessary background for the development of more effective avalanche hazard communication tools specifically tailored to this user group.

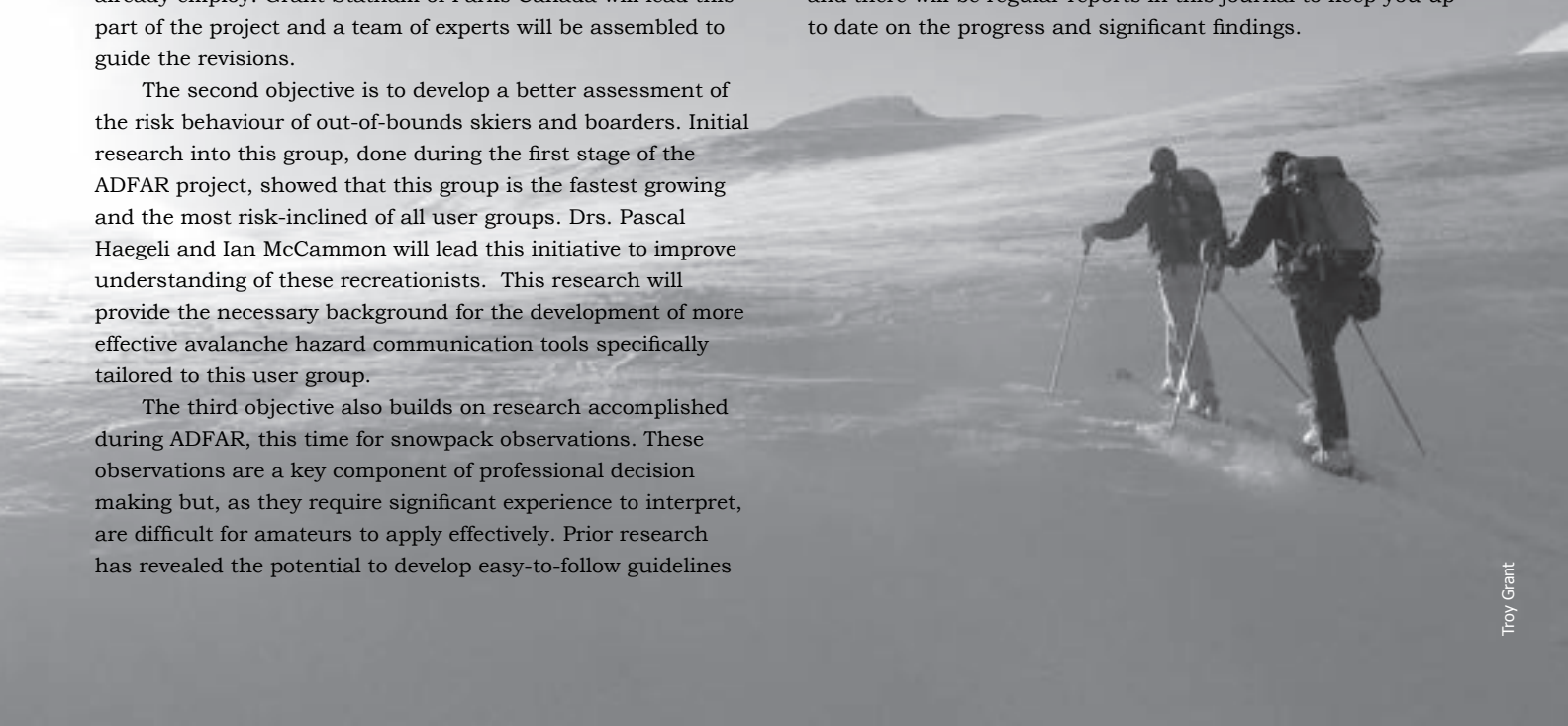
The third objective also builds on research accomplished during ADFAR, this time for snowpack observations. These observations are a key component of professional decision making but, as they require significant experience to interpret, are difficult for amateurs to apply effectively. Prior research has revealed the potential to develop easy-to-follow guidelines for using snowpack observations to locally verify the public avalanche danger ratings. Dr. Bruce Jamieson will lead this component of the project. Building on his previous work, he and his team will develop methods for integrating local snowpack observations in a decision framework for more advanced users.

Fourth, the project will take the Avaluator itself to its next logical progression, creating guidelines for advanced users to make more nuanced decisions in avalanche terrain. The Avaluator 2 will incorporate more complex avalanche concepts, improving and refining avalanche risk communication for amateur recreationists with some experience and training. Achieving this objective will require the combined research of both ADFAR projects to bridge the conceptual gap between rule-based and knowledge-based approaches to decision making.

Finally, the fifth objective is to assess the performance of the Avaluator that was developed in the first ADFAR project. This is no easy task. The wide variety of factors that determine avalanche conditions and the dispersed nature of backcountry users make the assessment of decision-making methods in avalanche terrain a challenge. The goal of this objective, which is lead by Dr. Pascal Haegeli, is to develop methods for real-time and retrospective assessment of the decision strategies created in the two ADFAR projects.

The goal of reducing avalanche accidents is an ambitious one. Based on the success of the Avaluator, we are convinced the methods developed in ADFAR 2 will significantly improve the effectiveness of avalanche education. With better education, backcountry users will make better decisions.

The proposed research is breaking new ground in the field of risk communication for recreation and we are all excited to see where this project will take us. Dr. Pascal Haegeli will be making a presentation about this project at the AGM in May, and there will be regular reports in this journal to keep you up to date on the progress and significant findings.



Troy Grant

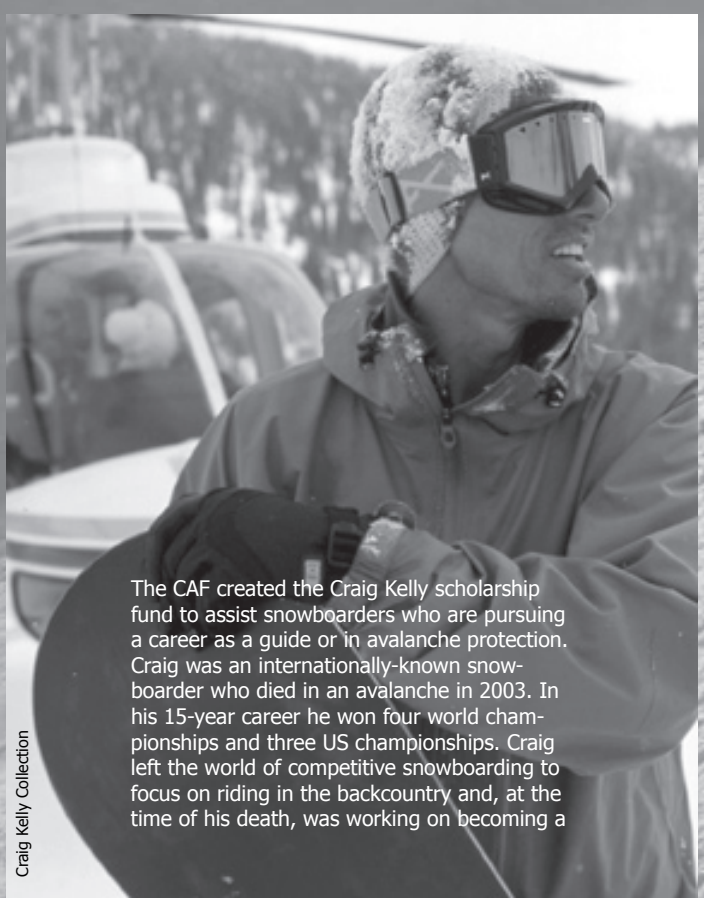
The CAF Craig Kelly Scholarship Winner: Daniel Morton

Daniel Morton Collection

"I can't explain in words how stoked I am to receive this scholarship," says Daniel Morton. "I've been a snowboarder since I was 12 years old and Craig has been an idol of mine since the beginning of snowboarding, since before they allowed boards at ski hills. I remember seeing footage of him and it was absolutely beautiful what I was watching him do in the mountains. Just the way he rode out there you could see he was at peace with the mountain. He'd be riding these big dramatic lines and it would look like he was at home with a great song in his head."

Winning this scholarship has allowed Daniel to take all three modules of the CAA Level 2 this winter. "It would have been very difficult without the help of the scholarship," says Daniel. "It's very expensive but totally worth every cent. It's a phenomenal training program. The amount of resources they give us is amazing, and the instructors are amazing too. They really put a lot of energy into making this top-notch and it shows."

Daniel wants to become a mountain guide and plans to begin his ACMG (Association of Canadian Mountain Guides) training next winter. He has recently begun gaining experience in the field by working as a tail guide for cat-skiing and ski touring operations, but his heart is with the non-mechanized approach. "I really enjoy the touring, where you earn your turns," he explains. "I think there's more appreciation of the experience and that's the direction I'm heading in my career." By all accounts, it's a direction Craig Kelly would have approved of.



Craig Kelly Collection

The CAF created the Craig Kelly scholarship fund to assist snowboarders who are pursuing a career as a guide or in avalanche protection. Craig was an internationally-known snowboarder who died in an avalanche in 2003. In his 15-year career he won four world championships and three US championships. Craig left the world of competitive snowboarding to focus on riding in the backcountry and, at the time of his death, was working on becoming a

John Kelly, Lisa Ochowycz and Pascal Haegeli smile for the camera at the CAF's gala fundraiser in Whistler.

Snap Whistler

CAF Gala Fundraisers

Calgary / Whistler
February 23 & 24

Keynote speaker Dr. Joe MacInnis is flanked by two CAF supporters at the Calgary dinner.

Donna Broshko

A table full of patrons at the Calgary gala, held at the Hyatt Regency. Over 600 people attended the evening.

Donna Broshko

Nic and Sheilagh Seaton with CAF President Chris Stethem in Whistler.

Snap Whistler

Courtesy of MoT

Data Sharing

MoT Allows Access to its Extensive Weather Network Data

By Simon Walker

In the fall of 2005, the BC Ministry of Transportation (MoT) began to post current data (the last 24 hours' worth) to the InfoEx from its network of electronic weather stations around the province. In the near future, current data from a large part of MoT's network will also be available to the general public via the province's travel information web site—DriveBC—as well as the Weather Network. The avalanche community may be interested to read a bit more about how this came to pass, the history of the network including its roots in avalanche forecasting, and who the various stakeholders with respect to this data are.

This process of gradually opening up access to publicly-funded weather data is in step with a global trend among the agencies responsible for environmental monitoring in its many forms. Following the severe avalanche winter of 2003, governments took a close look at the ways in which they contribute to avalanche safety, whether it be financial support, in-kind resources, or the sharing of data. This assessment of how avalanche safety programs were delivered set the stage for an evolution in philosophy, recognizing that the public have a right to access this data, since taxpayers funded the development of the network in the first place.

MoT's Avalanche and Weather Programs arose from the recommendations of the Minister of Transportation's Avalanche Task Force in 1974. Before that time, a few stations were monitored by highway road crews, notably at Alison Pass in Manning Park, and at the summit of Kootenay Pass. Following the Task Force's report, manual weather stations specifically located and instrumented to provide data relevant to avalanche forecasting appeared in the Fraser Canyon, Kootenay Pass, and the Terrace-Tyee area along the Skeena River west of Terrace.

The first electronic weather stations in MoT's network were installed in 1977 in the Fraser Canyon and at Kootenay Pass. Throughout the 1980's, this network expanded to cover all of the active Highways Avalanche Programs, with stations installed at the roadside, mid-mountain, and ridge-top elevations. This network currently consists of 53 stations.

During the mid-1990's, MoT began experimenting with electronic "Road Weather Stations" that incorporated sensors embedded in the pavement surface to measure temperature and freezing point (salinity) of the road surface. After a couple of unsatisfactory experiences with off-the-shelf systems, the Ministry worked towards integrating pavement sensing into their standard, in-house designed and built remote weather station.

Since that time, this parallel network of stations has grown to provide valuable data and forecasts that assist in operational decision making for winter highway maintenance personnel. This part of the network currently consists of 57 stations. About one third of these are sited to serve both purposes, providing data for both avalanche operations and highway maintenance. The remainder are sited in locations where the only concerns are winter highway maintenance issues.

As the network of stations has expanded, the philosophical approach to the sharing and dissemination of the data has also evolved. In the early 1990's Environment Canada's Atmospheric Environment Service (now

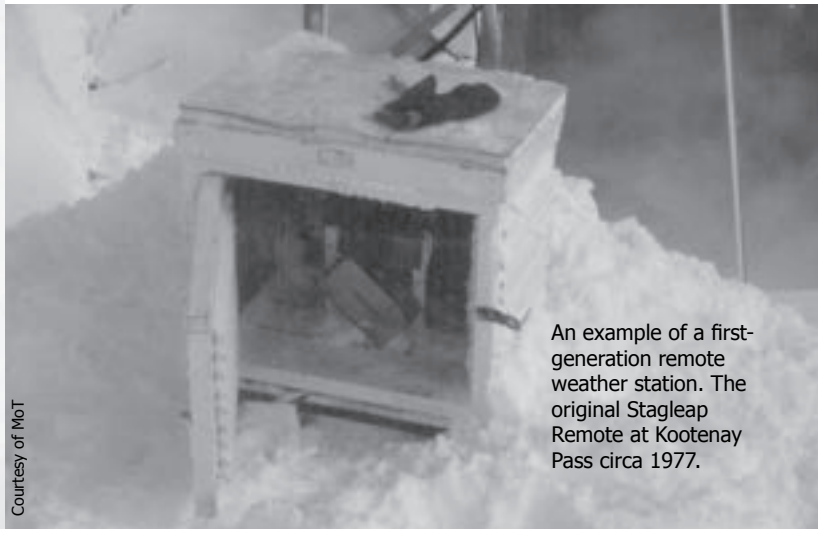
Mike Zylich tuning up the Kiwi Squirt de-icing system at an early Highways Remote Station.

Courtesy of MoT

the Meteorological Service of Canada) was evolving into "cost recovery" approaches to service delivery. Most provincial agencies with weather data networks adopted a similar strategy in the hope that data-sharing agreements would return a tangible cost recovery to the agency collecting the data. The result was to reduce the amount of freely available weather data from all levels of government.

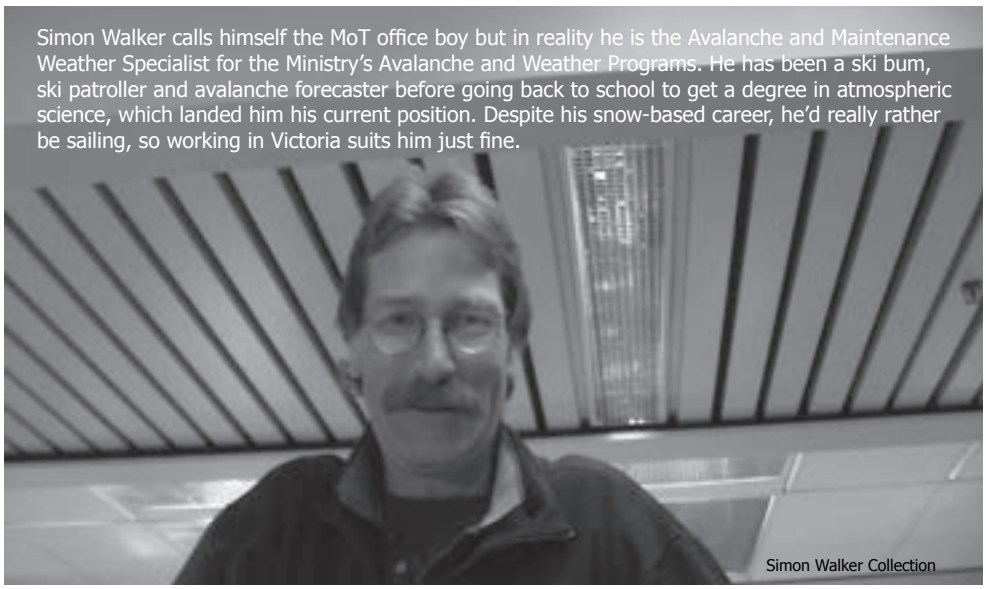
In the case of MoT, the resulting data-sharing agreements were costly to maintain and provided small returns when compared to the large capital costs and ongoing operating costs. After the winter of 2003, this approach became even less relevant as fundamental assumptions about data ownership were questioned. The end result of this examination has created a new guiding principle—that data should be freely shared in the interest of the public good.

Sharing MoT's electronic weather data with the InfoEx community was a significant step in this direction, as will be the availability of that data to the public via website and the Weather Network. In the future, MoT will be working toward a 511 system of travel and weather information providing access to current data and forecasts via phone, web, and PDA. It's a new age of data sharing, and MoT is pleased to be playing a lead role.



Courtesy of MoT

An example of a first-generation remote weather station. The original Stagleap Remote at Kootenay Pass circa 1977.



Simon Walker calls himself the MoT office boy but in reality he is the Avalanche and Maintenance Weather Specialist for the Ministry's Avalanche and Weather Programs. He has been a ski bum, ski patroller and avalanche forecaster before going back to school to get a degree in atmospheric science, which landed him his current position. Despite his snow-based career, he'd really rather be sailing, so working in Victoria suits him just fine.

Simon Walker Collection

SFU's Centre for Natural Hazard Research

By John Clague / Photos courtesy of Centre for Natural Hazard Research

Economic damage and personal loss due to natural disasters are increasing rapidly. Losses in the 1990s were 17 times larger than those in the 1960s. In the past 50 years alone, losses due to natural disasters in Canada have exceeded $25 billion, and even greater losses can be expected in the future unless action is taken. Although infrequent, events that have such a high economic and social toll should concern all Canadians.

For example, potentially catastrophic earthquakes of magnitude 7 occur, on average, once every 30 years in the coastal Pacific Northwest. The most recent of these quakes, in February 2001, caused about US $1 billion damage in Washington State. This damage, however, pales in comparison to that of the earthquakes at Northridge, California (January 1994, magnitude 6.4), and Kobe, Japan (January 1995, magnitude 7.1), which amounted to US $20 billion and US $147 billion, respectively.

Earthquakes larger than those at Northridge and Kobe can occur in populated areas of British Columbia. Damage from a large, shallow, crustal earthquake near Vancouver or Victoria could reach several tens of billions of dollars, perhaps more. A reduction in damage and loss of life from a large earthquake or another natural disaster will be achieved through sustained innovative scientific research on natural hazards, training of graduate and senior undergraduate students for professional careers in earth science, and transfer of information to the people who need it. The direct benefits to Canada, in addition to a reduction in losses from disasters, are improved public safety, a better-informed public, and wiser land-use decisions.

Natural disasters are complex phenomena; as such, approaches to risk reduction that rely on single disciplines and linear thinking address only one aspect of the problem and tend to fail. Success requires a broad-based, innovative approach. Such an approach is central to Simon Fraser University's (SFU) new Centre for Natural Hazard Research (CNHR). Established in 2005, CNHR is the first scientifically based, natural hazard research facility in western Canada. It conducts innovative research on geophysical processes that are a threat to the inhabitants and the economic infrastructure of the region.

CNHR researchers and students carry out research required to better understand how hazardous natural processes operate, to quantify risk associated with hazardous processes, and to predict the consequences of future natural disasters. The Centre enables a program of inter- and multi-disciplinary natural hazard research involving geologists, geomorphologists, remote sensing and geographic information system (GIS) specialists, geophysicists, biologists, and social geographers. This program is aimed at better understanding earthquakes, tsunamis, volcanic eruptions, snow avalanches, floods, and landslides, and at quantifying risks associated with these processes.

Research is also conducted on related environmental issues such as the impacts of climate change on natural processes and the landscape. Geophysical processes are the main focus of the Centre's activities because CNHR's research partners at universities in western Canada, the Geological Survey of Canada (GSC), private sector companies, and other organizations have much expertise in these phenomena.

A key element of CNHR is the inclusion of public policy research on how to effectively transfer results of scientific research to the people who need and can use it. The Centre strives to integrate scientific research on natural hazards with research on public and policy issues, which to date is rarely achieved by the earth science community in Canada. One of the Centre's underlying premises is that the integration of physical science with social and policy research is necessary if Canada is to achieve a society that is more resilient to natural disasters, and where planning and investment result in more sustainable communities.

1994 Kobe earthquake damage

CNHR research aims to contribute not only to a fundamental knowledge base but also to improvements in engineering design, better land-use decisions, and a more informed public. Sooner or later, Canada will experience a disaster far more devastating than any in the past. CNHR's goal is to reduce the human, economic, and environmental costs of such disasters.

CNHR's principal researchers are world-class scientists who are leaders in their respective fields. The research team includes faculty members in several departments at SFU, faculty at other universities in western Canada, and Geological Survey of Canada scientists. Students trained at SFU receive a broad-based science education that prepares

them for jobs involving hazard assessment and mitigation. They benefit from cooperative education programs, work placements, and collaborative research projects with companies and agencies that support CNHR.

CNHR, together with its affiliated departments at SFU, trains students by imparting an exceptional set of skills and expertise of critical importance to Canada. The unique environment of the Centre creates a stimulating training environment by exposing students to geology, physical and social geography, economics, biology, geophysics, physics, chemistry, mathematics, and computing science. SFU has a world-class school of computing science and strong programs in remote sensing, environmental earth sciences, resource management, and communications. The training equips students with the full range of skills required to meet the challenges of natural hazard evaluation and risk reduction in Canada in the twenty-first century. Without such training, Canada will have a shortage of highly qualified personnel able to provide informed advice on land-use decisions, hazard mitigation, and emergency preparedness.

A CNHR-supported project that will be of interest to readers of this journal is the research of M.Sc. student Ms. Ranae Kowalczuk. Ranae is jointly supervised by Dr. Nick Hedley, Director of the SFU Spatial Interface Research Laboratory, and me. She is working with the support of the Canadian Avalanche Association to develop and test new two-dimensional and three-dimensional route-finding exercises for winter recreationists.

Her project is unique in blending natural hazard science, education, and new, state-of-the-art, geographic visualization technologies. Ranae is exploring how new geovisualization tools can be used to make avalanche education more effective. Specifically, she is (1) evaluating the effectiveness of the Canadian Avalanche Association's online interactive route-finding exercise, (2) developing new 2D, 3D, and augmented reality exercises, (3) conducting online user testing of the current and new route-finding exercises, and (4) providing avalanche educators with new teaching tools. Details are provided in a companion article in this issue of Avalanche.ca.

CNHR was also a sponsor and co-organizer of the successful International Workshop on Snow Avalanches, held in Vancouver in late October and early November 2006. The workshop brought together Canadian avalanche and weather researchers, educators, and field practitioners, and leading international avalanche researchers to discuss avalanche science, modelling, and education. The workshop laid the groundwork for a follow-up workshop that is being planned for the fall of 2007 or the spring of 2008.

John J. Clague is Shrum Professor of Science at Simon Fraser University and Director of SFU's Centre for Natural Hazard Research. He has published widely on a range of earth science disciplines, including glacial geology, geomorphology, stratigraphy, sedimentology, and natural hazards. John and his graduate students are currently conducting research on natural hazards and late Holocene climate change in western Canada. His other principle professional interest is improving public awareness of earth science by making relevant geoscience information available to students, teachers, and the general public.

CNHR's Principal Areas of Research

Earthquake and Tsunamis
A large earthquake located close to a Canadian city could cause tens of billions of dollars damage. Some earthquakes with sources beneath the Pacific Ocean generate large tsunamis that are a threat to coastal residents and infrastructure.

Landslides
Landslides threaten people and property in many parts of Canada, from the St. Lawrence Valley to the mountains of the Cordillera. Population growth is pushing development into formerly remote areas that are prone to landslides.

Snow Avalanches
Snow avalanches, on average, kill about 15 people in Canada each year. This number is growing due to the rapid increase in winter backcountry recreation.

Volcanism
Several young volcanoes in western North America are active or dormant and could erupt explosively, producing ash falls, pyroclastic flows, landslides, lahars and floods that damage property and threaten life far from the source.

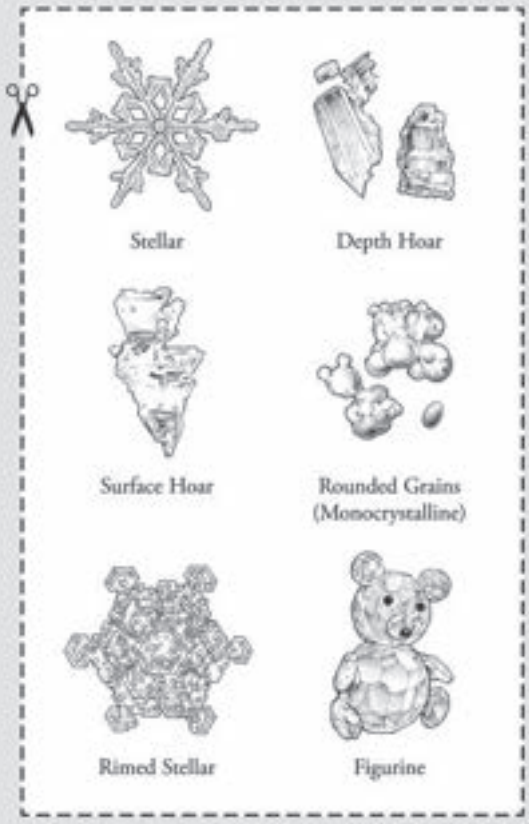
Floods
One of the greatest hazards in Canada is flooding. The 1948 Fraser River flood caused about $200 million in damage and displaced 16,000 people from their homes. Today, about $10 billion in property lies on the Fraser River floodplain behind protective river dykes.

Climate Change
Rapid climate change affects physical and biological processes and the landscape. Hazards associated with anticipated future climate warming caused by deforestation and burning of fossil fuels include glacial outburst floods, melting of permafrost, and sea-level rise.

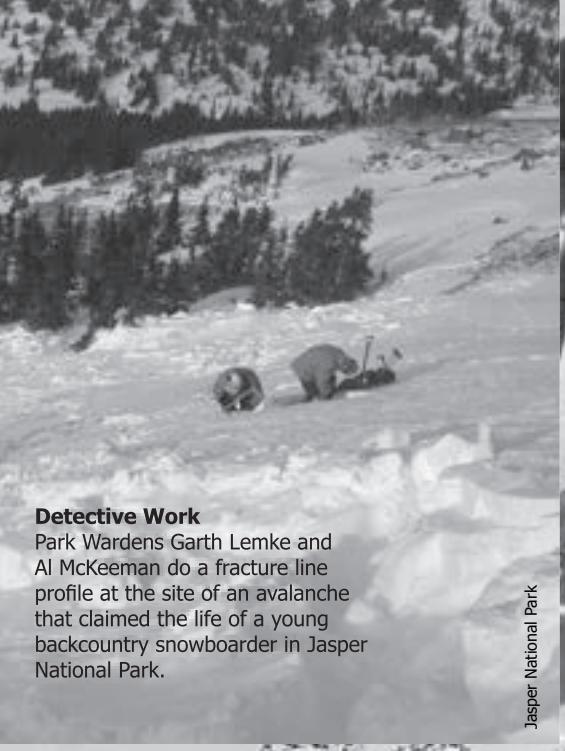
Remote Sensing
Surface imaging from satellites or aircraft is used to identify potentially hazardous processes and assess their likely impacts.

Geographic Information Science
Understanding and responding to natural disasters requires large amounts of geospatial data from many sources. GIS technology allows scientists and governments to access integrated datasets in order to effectively plan disaster responses.

Public Policy and Communication
Public policy research is required to inform how scientists can effectively influence land-use decisions and resource management. Rapid and effective communication of hazard information to the public is required to reduce the human and economic tolls of natural disasters.



crystal ID card



Detective Work
Park Wardens Garth Lemke and Al McKeeman do a fracture line profile at the site of an avalanche that claimed the life of a young backcountry snowboarder in Jasper National Park.

Jasper National Park

Parks Canada Collection

Lake Louise Avalanche Team, circa 1977
For many years Park Wardens did the avalanche control work for the ski areas inside the National Parks. In the early '90's this responsibility was transferred to the ski areas. Left to right: Bill Moffat, Traf Taylor, Scott Ward, Cliff White, Eric Langshaw, Doug Ohrn, Jim Murphy, Clair Israelson.

High-Tech Control
These two slide paths on Mt Bourgeau are regular performers and often closed a busy road below. In 2003 these Gaz Ex systems were installed, which have significantly lessening the amount of closure time.

Parks Patrol

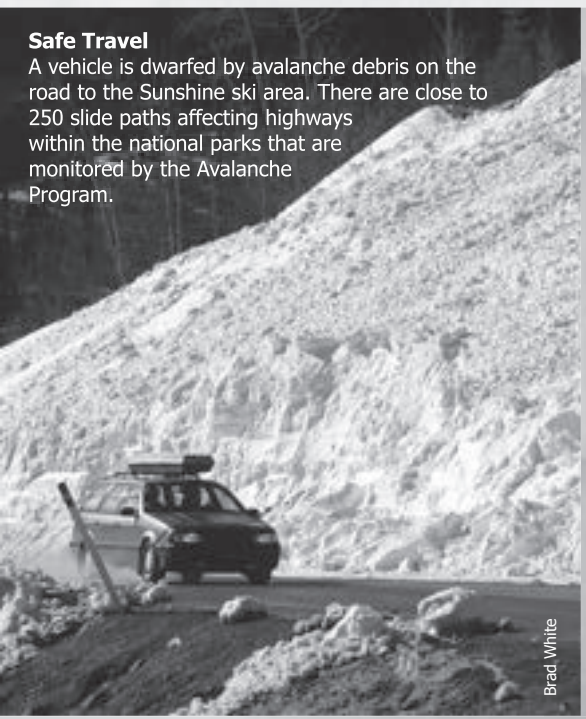
Images from the Avalanche Program of Parks Canada

Photos courtesy of Banff Yoho Kootenay, Jasper, Glacier and Waterton National Parks

Brad White

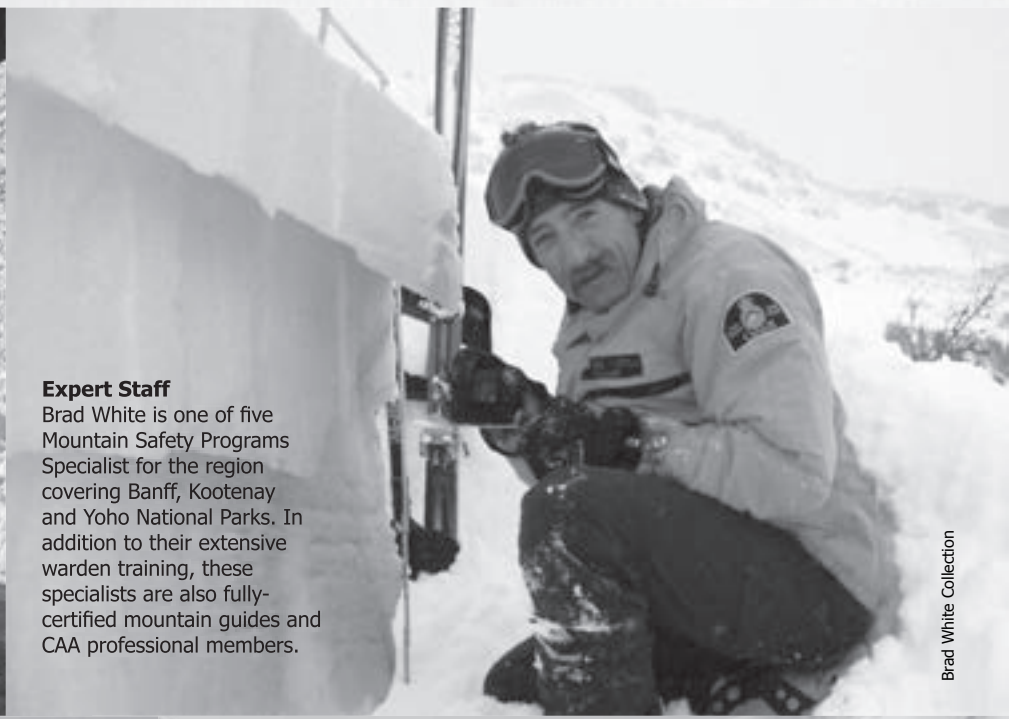
The Big Gun
The Avalanche Control Section at Rogers Pass is the only Parks program to use the 105 mm Howitzer, allowing control work to proceed at any time and in all weather conditions. The gun is operated by soldiers from the Canadian Armed Forces, who come to the pass in six-week shifts to be trained with this artillery.

Bruce McMahon



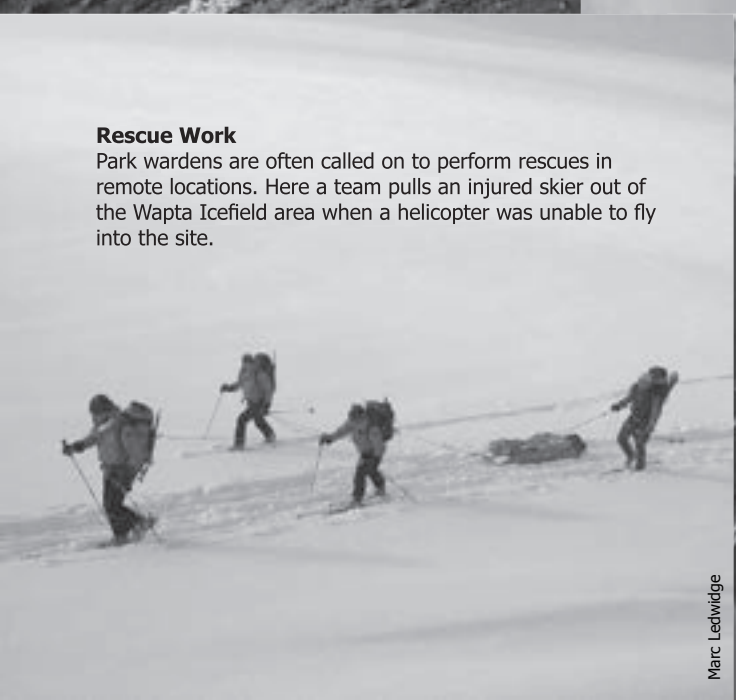
Safe Travel
A vehicle is dwarfed by avalanche debris on the road to the Sunshine ski area. There are close to 250 slide paths affecting highways within the national parks that are monitored by the Avalanche Program.

Brad White



Expert Staff
Brad White is one of five Mountain Safety Programs Specialist for the region covering Banff, Kootenay and Yoho National Parks. In addition to their extensive warden training, these specialists are also fully-certified mountain guides and CAA professional members.

Brad White Collection



Rescue Work
Park wardens are often called on to perform rescues in remote locations. Here a team pulls an injured skier out of the Wapta Icefield area when a helicopter was unable to fly into the site.

Marc Ledwidge

Big Country
The Icefields Highway is one of the most spectacular roadways in Western Canada, winding through the heart of the Rocky Mountains between Banff and Jasper. Here, a small avalanche falls from Mt. Wilson, close to Saskatchewan River Crossing. The avalanche control program is often busy in this section, where a number of paths affect the highway.

Rupert Wedgwood

Perks of the Job
A team of wardens work on a snow profile in Waterton National Park's Cameron Lake valley. Gathering information for the parks' avalanche bulletin is one of the many duties of the avalanche program staff, along with highway avalanche protection and search and rescue response.

Parks Canada

Canine Rescue Teams
Dogmasters Darian Sillence with Japo and Mike Henderson with Atilla (now retired) take a break at the foot of Mt. Deltaform after a search for two fallen climbers. These avalanche rescue dogs are certified by the RCMP in a training process that takes years of dedication.

Marc Ledwidge

By The Numbers

Parks Canada's Avalanche Control Program

7	Number of national parks with avalanche control programs
26,000	Square kilometers of avalanche zones affecting highways
3,980,000	Number of park visitors annually
5500	Number of public avalanche bulletins issued per year
4800	Kilograms of explosives delivered annually
4	Number of ski areas inside the park boundaries
550	Number of public avalanche bulletins issued per year
12	Number of ACMG-certified guides on staff
17	Number of CAA professional member on staff
115	Number of staff with CAA professional avalanche training
188	Number of search and rescue incidents annually
22	Number of remote weather telemetry stations
2.4	Average annual number of avalanche fatalities inside national parks (10-year moving average)

The Brothers Schleiss

By Sylvain Herbert

Rob Buchanan

Rogers Pass—the epicentre of Canada's avalanche industry. The first avalanche professionals in the country were sent to work here, and the program that evolved to protect this corridor set national standards that are still in effect today. Fred and Walter Schleiss are brothers whose names are synonymous with this avalanche control program, and it was their exacting standards that have set the foundation for Canada's avalanche professional guidelines.

The Schleiss brothers were pioneers and innovators. Countless numbers of wardens, guides and avalanche technicians worked at Rogers Pass and honed their skills under their unrelenting supervision. Our association was created 25 years ago but its roots go back to the days when two brothers traveled by ski and train to figure out a way to keep travelers safe on the new Trans-Canada Highway.

In early March, Sylvain Hebert sat down with Fred and Walter and Fred's son Johann, who currently carries on the family tradition as an avalanche technician at Rpgers Pass. Here is their conversation.

Sylvain Hebert: You come from a beautiful part of the world, the Corinthian mountains of Austria. Why did you want to come to Canada?

Fred Schleiss: I came to Canada in 1955 because I wanted to see the Canadian outdoors. My sister and brother lived in the States. I ended up in Prince George to teach the army grunts how to ski. They were training to work on the DEW line and once they got good enough we went ski racing around Jasper and Banff.

In the spring of 1956, the people at Jasper Park were looking for an alpine specialist in the summer months and a ski patrol in the winter and I worked there until 1959. I was then hired to work at Rogers Pass in 1959 to be the second avalanche forecaster under Noel Gardner. *(Editor's note: Noel Gardner retired from the Warden Service in 1954 to work for the National Research Council at Rogers Pass in preparation for the construction of the Trans-Canada Highway).*

SH: Walter, when did you arrive?

Walter Schleiss: I worked for Parks in Jasper from 1956 to 1959.

FS: Between 59 and 63, I worked at Rogers pass, occasionally returning to Jasper as a "mountain expert/guide" in the summer and as an avalanche forecaster in the winter. We taught climbing and skiing to the wardens with Walter Perren.

SH: Tell me about the artillery methods.

FS: In 1958, two types of mortar explosives were investigated. It didn't work.

WS: It didn't work because the angle of impact was such that we were getting a lot of duds. In 1959, the 105mm howitzer was introduced. A team of soldiers who had fought in Korea came in from Shilo, Manitoba. They were the best. We would give them the distance to a target, say 6000ft, and they would figure out the angle required. We would aim for cornices and they would hit them. When we got started, they would only require two shots to hit the targets. At the beginning, we moved the Howitzer on a stone sled.

SH: Stone sled?

WS: The gun sat on a platform on top of a few logs pulled by a cat. It's called a stone sled becasue farmers would use this sort of thing to carry stones out of their fields. Remember, there wasn't a road to drive on yet.

Rob Buchanan

WS: Right from the beginning, we needed to find a gun set-up that would allow us to centre the gun over each position quickly and accurately. Some winters we shot over 4000 rounds so the positions had to be solid, and the gun needs to be in exactly the same place every time. But finding the best way to do that took a lot of work. After about ten years of trial and error we came up with the set-up that's still in use today. We have a circular concrete platform with a centering cup in the middle and a spade ring around the outer edge. The gun is mounted with a jack, and that allows it to be centred quickly and accurately.

SH: At what point did you come up with the gun positions?

WS: Establishing the gun positions was one of the early priorities and they are still the positions we use now. We knew the gun could shoot accurately to 11000 yards on the flats, but in the mountains the wind and temperatures affect the trajectory so it's more like 6000 yards. We looked for gun positions that would encompass as many targets as possible within that distance.

SH: How about the early days at Fidelity? You stayed in tents?

WS: In 1959, we built an A-frame in which we put the tent so that it could survive the snow load. I even spent my honeymoon up there with my wife. It took us six hours to get up there from the highway. She wasn't really a skier… (They are still together).

FS: We stayed for a week or two weeks at a time, sometimes three weeks.

WS: Fred and I used to go to Abbot for two or three days at a time for observations. Peter Schaerer built the hut in 1957. We also had an observation station at Balu Pass. But we gave up on it, as the winds were channeled and not representative, and it was tough to access and dangerous due to avalanches. That's when we decided that MacDonald west shoulder would be a better location.

SH: What did you think when you first saw Rogers Pass?

FS: When I came to Revelstoke and went to Rogers Pass, I thought: "That's it, that's where I will be."

SH: How did you get up to Rogers Pass?

FS: By train.

WS: We stayed in a camp below the pass on the west side, where teh Illecillewaet campsite is now, in section houses still in existence from when the railroad used to go across on top, before the tunnel was built.

SH: When you lived up there in the winter, would you stay there all winter?

WS: At first, we worked 60 hours a weeks, six days a week, with one day off. It was useless, because we couldn't go out. So later we worked 18 days on and three days off. The only train that we could board, the Dominion, came at noon. It would stop anywhere, you'd put up your hand and it would stop. So we'd get three days out.

SH: What do you feel are your major accomplishments at the Rogers Pass?

Fred: I would say that it was to keep the highway open for 30 years without any accidents. Except for 1966, on January 6th, a storm came on. Walter was on duty and he called me in, I was in my trailer sleeping. The storm blew in like hell from the South.

We had a warning out and the operators went out, but we had difficulty working with those people together. You know, they wanted to do their thing and they didn't think the snow research people knew anything.

I ran out, trying to get people off the slide that had already

ran off MacDonald west shoulder.

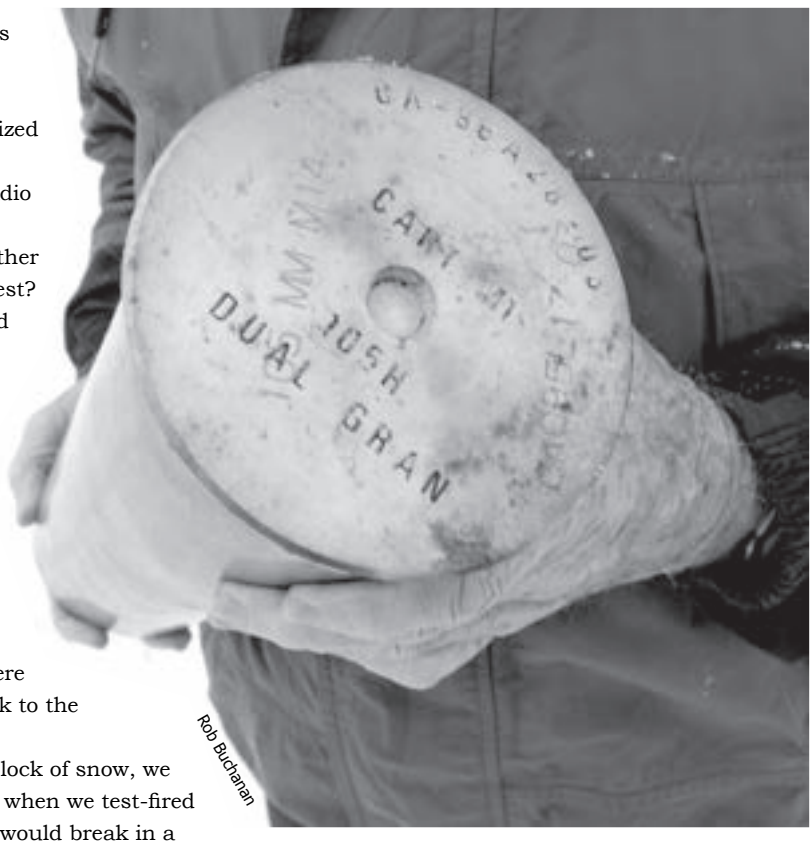
So I drove out where they were working on the small avalanche, and said "get the hell out of there!" And the guy said, "I don't have to listen to you, my foreman will tell me when to go." So I said ok, I went on the radio, right there and radioed the wardens and everybody, and I said I want everybody off these areas here because there's already a slide down, a small one. Then I took off, and by the time I arrived at the hotel the big slide hit, and she went right across the highway.

WS: It moved the loader 150 feet off the road and it moved the cat another 150 feet. The winter cab of the cat was about 500 feet up on the Cheops 2 side. The loader was upside down, and the loader operator was still at the control. The peculiar thing was that the cat was upright, but the winter cab was blown off by the original air blast and there was no protection for the operator when the snow hit him so he was killed by the impact.

FS: That was the only accident that we had as far as people caught in avalanches for over 30 years. But it was avoidable and everybody realized it, they shouldn't have been there, I called them on the radio you know.

SH: How about the weather observations and the shear test?

FS: It was sort of started under Noel Gardner. We started the shear test, but we would also shine a light through a block of snow, at night actually, but sometimes the prominent layers didn't turn out to be the ones which were the weakest. In other words they looked to be the weakest but it didn't necessarily shear there and that's when we went back to the shear tests.



Rob Buchanan

When we looked at the block of snow, we wanted to find the layers but when we test-fired to investigate, the avalanche would break in a different layer. There was no reason for it, and that is why we developed the shear test.

WS: Originally, in the field, we'd put our ski poles behind the block, and tehn pull the pole through and see if the basket would cause a shear. We never wrote it up, it was just something we used for our own safety in the field. But we started like that and then started using the shovel to cut the block.

FS: The governor of the state of Nevada invited me to teach avalanche control from Taos to Reno. We went out there, flew around in helicopters, nobody knew anything about those things. They had to come to Rogers Pass to find out how we did things.

WS: But we were the only system at the time that responded to conditions in existence. In other words, if it was in the middle of the night and conditions became critical, we would shoot at that time. From 1959 to 1965-67 we were the only outfit that did that in North America. In Europe, they'd come over and be so impressed with this system. They have so many restrictions over there--private property issues, authorization issues--they could never do what we could do here.

SH: So you were basically at the cutting edge

WS: I think that for avalanche control, we were.

FS: We were at the time. Other people learned from us. For example, Kootenay Pass, they started controlling avalanches, with different things, but it's all the result of us doing it first.

WS: In 1962, the highway opened. In January, the Lanark came down, blocked the two portals and caught two cars in there. It came down on the west side first. A government plow truc was able to get out before the east side got blocked and reported the cars stuck in there. There were six people trapped in total, including a woman and her baby. We found a small hole in the snow at the top of the shed that we could talk to them, but it was eight hous before we could get in.

SH: Weren't you afraid that something else would come down?

WS: It was so big that we had trouble finding the shed, so we knew there was only a minimal chance that anything else could come down.

FS: We couldn't find the shed. That one hole was the only place we could find.

WS: Another thing we used to do was to go on avalanche patrols prior to the highway opening. We would ski from Glacier to Albert Canyon and catch the train back up. After a storm had moved through, we would record downed avalanches. The idea was to understand how big they were and to control them before they got too big. Actually, the western part of the road from Glacier to Revelstoke was opened to the crew in 1961.

SH: I would like to include Johann in this discussion too. What are the main differences between now and then?

Johann Schleiss: The big difference is that the time pressures have all increased. The original system is still what we do but it has been refined. The pass is a very confined space, there aren't many places where avalanches don't hit the road and the

safe zones fill up very quickly. It used to be four hours, now it's two, even one hour on holidays. So you have to let traffic go, and then shoot again. We have faster methods, but we use the same artillery, the same gun positions.

A key development has been to find the targets that will clean up the starting zones in small increments so as not to bury the road too deeply. We still do a lot of full-snow profiles to know what's there. With the rapid snow build-up that we get, we can get loading that affects deeper layers, so we have to keep an eye on these deeper layers.

SH: Speaking of deeper layers, Fred and Walter, did you have these deeper layer problems such as the November crusts that we have seen in the last few years?

WS: Oh sure, we had these problems to deal with. We even had depth hoar problems. I remember in 1967 going in the Mounds slide path in the # 1 target where it was nothing but depth hoar in the bottom 150cm of the pack.

SH: Johann, what are the future challenges at the Pass?

JS: We have to continue to refine the system. We have to add forecasters, for shoots anyway, and we might have to shoot both ends at once as well as adding more guns. Our staff turnover has diminished and this has created higher proficiency with our crew. I don't see another delivery method replacing the howitzer yet.

SH: How about the increase in ski tourers?

WS: At the beginning, we gave permissions for ski tourers to go skiing. Hans Gmoser was one of them. He would register out and go to MacDonald West Shoulder. But conditions would deteriorate, and we couldn't reach him if we wanted to go shooting. So we changed the system.

JS: We have problems with poaching. And I'd like to get the message out that closures are necessary for being able to control slides that affect the highway and that we want to protect the backcountry users from being threatened by explosives.

SH: Did you have time to go ski touring and enjoy the powder?

FS: Every so often, we took the helicopter to investigate. We'd come down the Bonney Glacier or the Illicellewaet but it was always connected to work.

WS: For the first three years, before the highway opened, we would go every second day to Abbot.

SH: Where was your favourite place to ski?

FS: I always liked Abbot and the Fidelity South run. In the spring in May, we'd ski the Illicellewaet.

FS: The most popular ski day for skiing was on the May long weekend, we'd sometimes see 600 people in the area.

SH: Who was the most colourful character?

WS: Fred was for sure.

FS: I have to say Gordie Peyto *(Editor's note: Gordie was a park warden and dogmaster who worked up at Rogers Pass from 1970-1998).* We could always count on him to be there, whether it was on the highway or to get to Fidelity on a snowmobile.

Grocery shopping in Chamonix, during Nutella's 40th birthday celebrations.

Sylvain Hebert is a ski guide who's lived in Revelstoke since 1988. He worked as an avalanche technician at Rogers Pass in the late 1980s. He and then-colleague Niccy Code had an ongoing badminton and ping-pong challenge against Fred and Walter. Throughout Sylvain's time at the pass, the Schleiss brothers remained undefeated.

Parks Canada

News from the American Avalanche Association

By Mark Mueller

Last fall, the AAA celebrated its 20th Anniversary. We had a nice celebration at the Peaks Hotel in Telluride during ISSW. We looked at how far we had come, but I couldn't help but be more interested in where we are going.

The membership of AAA has increased by about 5% per year over the last five years with nearly 500 Professional and Affiliate members and close to 250 additional subscriptions to *The Avalanche Review* (TAR). The current level of dues has been maintained for over ten years despite rising costs. We try to keep costs reasonable, as affordability is an issue for many who choose to pursue a life in the mountains. For as many members as we gain, we seem to have an equal amount lose interest for whatever reason and leave the organization.

The founders of AAA envisioned it as an organization that would foster communication between snow and avalanche professionals in the United States and abroad. Our publication, *The Avalanche Review* is the vehicle facilitating that communication and remains our primary focus. In recent years we have begun to print TAR in color and expanded its content. We are very lucky to have a dedicated editor in Lynne Wolfe and an enthusiastic designer in Karen Russell. One can now subscribe to TAR as well as renew one's membership online at our website, www.americanavalancheassociation.org. This should help international members in particular with the hassle of currency exchange now eliminated.

Recent projects have included the publication of *Snow, Weather, and Avalanches: Observational Guidelines for Avalanche Programs in the United States* (commonly known as SWAG) and the development of the AAA Professional Avalanche Worker School (PAWS), a weeklong advanced avalanche training program aimed at professionals and aspiring snow workers.

About 2200 copies of SWAG are in use across the U.S. and worldwide and the proceeds from sales have strengthened our financial situation. SWAG is a part of an increasing number of US avalanche schools and is used as a text at several universities.

Now in its second year, PAWS is seeking recognition among US avalanche programs. It shouldn't take long given the top-flight instructor team we've assembled. This winter's course is being held at Bridger Bowl, Montana, and we hope to expand from one course offering per winter to up to three in different locations in the western US in the near future.

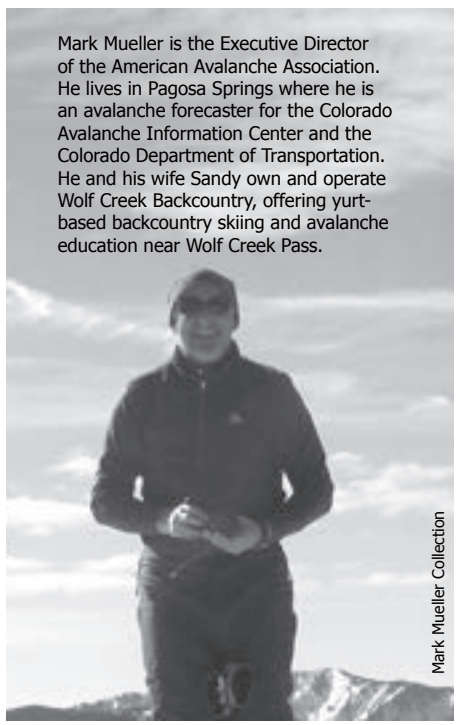
> The American Avalanche Association has its own very interesting and informative publication called *The Avalanche Review*. A subscription to TAR is an easy way to keep up with what's going on in the professional avalanche industry south of the border.
>
> To find out how you can subscribe, go to www.americanavalancheassociation.org

Our instructor certification program that began in 2003 has certified 31 instructors to date. AAA instructor certification enjoys the support of Rod Newcomb's American Avalanche Institute and the American Institute of Avalanche Research and Education (AIARE). AAA is currently reviewing our Avalanche Course Guidelines for the first time in nearly eight years. Education Committee members will present a draft at our spring Governing Board meeting then a period of member review will the follow.

Financially, AAA is in a very strong position due in large part to SWAG sales and generous donations made by members in addition to their annual dues. AAA looks for groups and individuals that we can partner with to advance our mutual goals; promoting high standards of professional competence and advancing the pursuit of avalanche safety through both professional development and recreational user education (and maybe drink a beer or two along the way). We continue to provide grants for both academic and practitioner research. Interested persons can get additional information about grants on our website, www.americanavalancheassociation.org.

The AAA Governing Board consists of 24 professional members representing all aspects of the avalanche field; forecasters, researchers, educators, guides, a government snow ranger, and ski area operators, snow safety directors and technicians. Many are engaged in multiple activities in the snow and avalanche field. Newly elected board members began their two-year stint on January 1, led by our new President Janet Kellam, Director of the Sawtooth National Forest Avalanche Center.

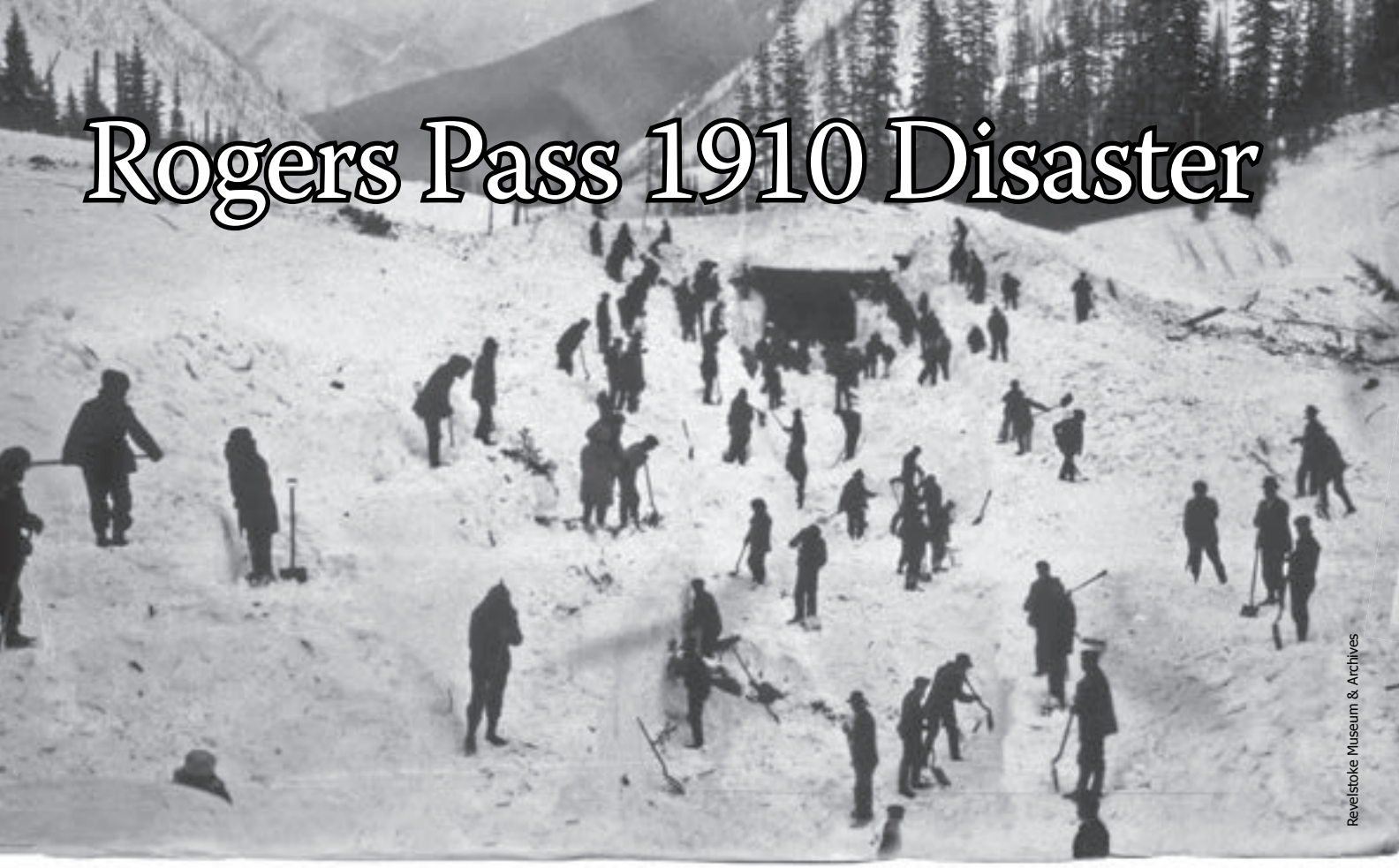
Entering my sixth year as Executive Director, I believe the main challenge that AAA faces is continuing to create and maintain value in AAA membership. We are geographically far-flung and basically have only myself as a part-time paid staff person. Winters can be hectic forecasting on Colorado highways and keeping the wheels at AAA rolling. I look to the Internet to streamline some of our operation and help keep AAA in touch with our membership and the membership in touch with one another. I wish all CAA members a safe and successful winter and look forward to a continuing relationship that furthers our shared objectives.



Mark Mueller is the Executive Director of the American Avalanche Association. He lives in Pagosa Springs where he is an avalanche forecaster for the Colorado Avalanche Information Center and the Colorado Department of Transportation. He and his wife Sandy own and operate Wolf Creek Backcountry, offering yurt-based backcountry skiing and avalanche education near Wolf Creek Pass.

Mark Mueller Collection

Rogers Pass 1910 Disaster



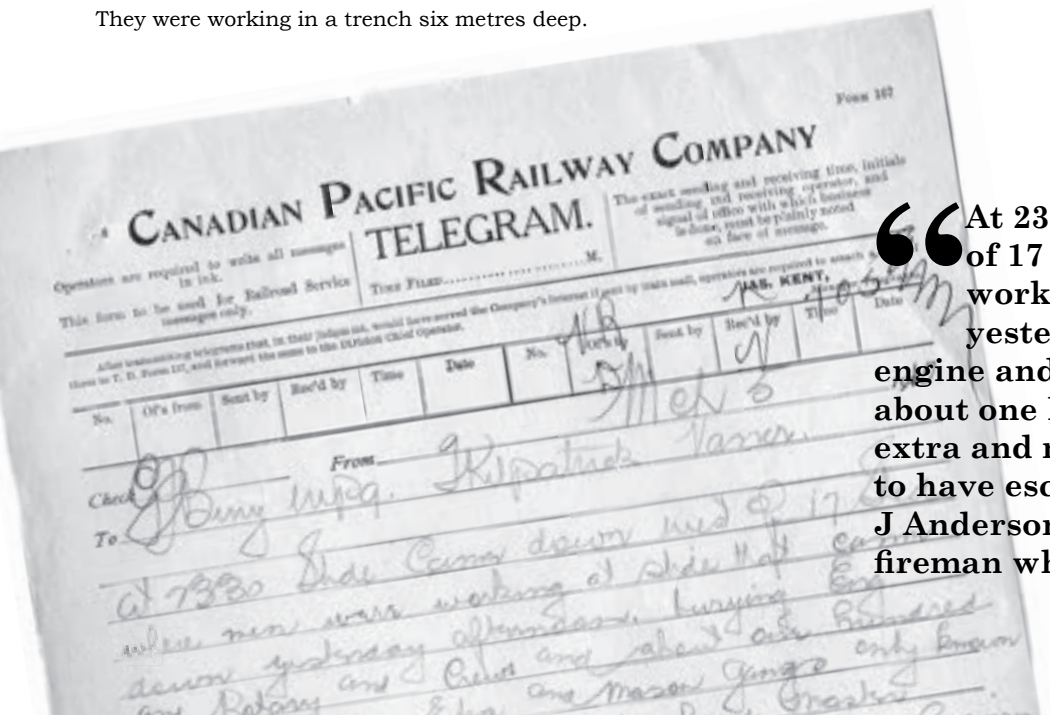
Revelstoke Museum & Archives

On March 4th, 1910, after 10 straight days of snow, a massive slide came down Mount Cheops in Rogers Pass and blocked the main line of the CPR under six metres of snow. Road Master John Anderson and his crew of 63 men were given the task of clearing the tracks. Conductor Richard Buckley was in charge of the rotary snowplow, while Fireman Bill LaChance stoked the furnace of the locomotive pushing the plow.

There was so much broken timber in the avalanche debris, the rotary plow couldn't function properly. The men had to shovel snow into the plow by hand, which then blew it clear. They were working in a trench six metres deep.

Just before midnight, John Anderson walked to a watchman's cabin to report that the snow removal would be completed within two hours. When he returned to the work-site, everything was gone. No sounds, no lights, just utter darkness and desolation. The men had disappeared, and the trench was now a tomb.

A second slide had thundered down the opposite side of the valley, from the flanks of Avalanche Mountain. John heard a voice calling for help and was able to rescue Bill LaChance, who suffered two broken legs. Richard Buckley was also pulled out, but died later. The final death toll was 58 men.


Form 107

CANADIAN PACIFIC RAILWAY COMPANY

TELEGRAM.

Operators are required to write all messages in ink.

This form to be used for Railroad Service messages only.

Time Filed ..... M.

The exact sending and receiving time, initials of sending and receiving operator, and signal of office with which business is done, must be plainly noted on face of message.

After transmitting telegrams that, in their judgment, would have served the Company's interest if sent by train mail, operators are required to attach them to T. D. Form 127, and forward the same to the DIVISION Chief Operator.

JAS. KENT,

No.	Of'e from	Sent by	Rec'd by	Time	Date	No.	Of'e to	Sent by	Rec'd by	Time	Date

Check

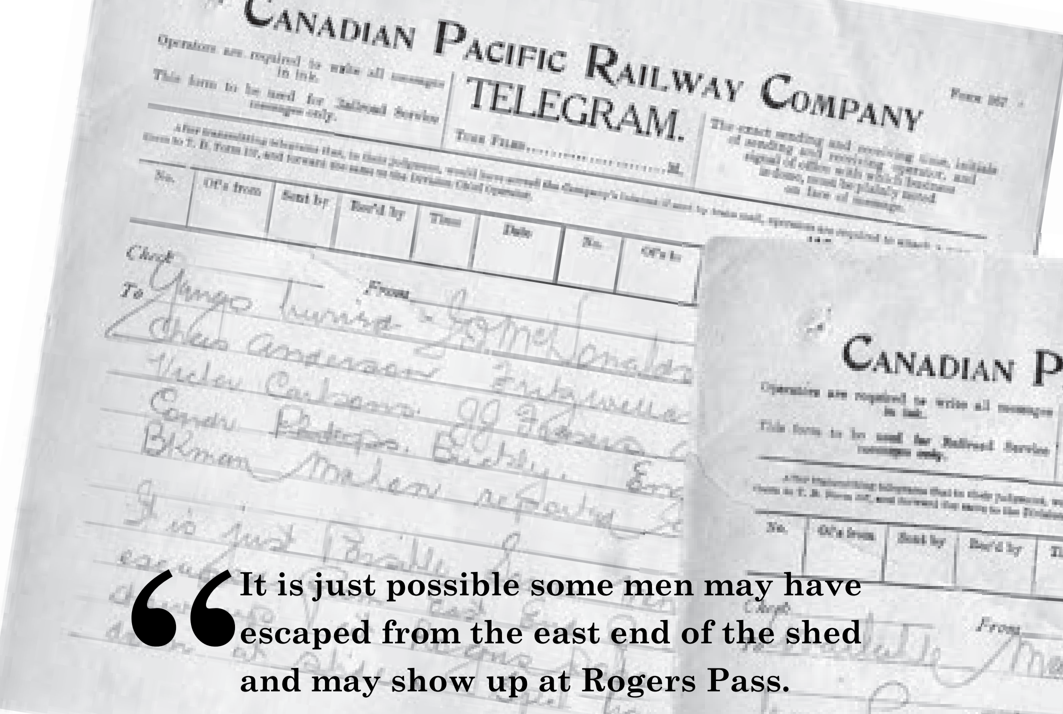
To

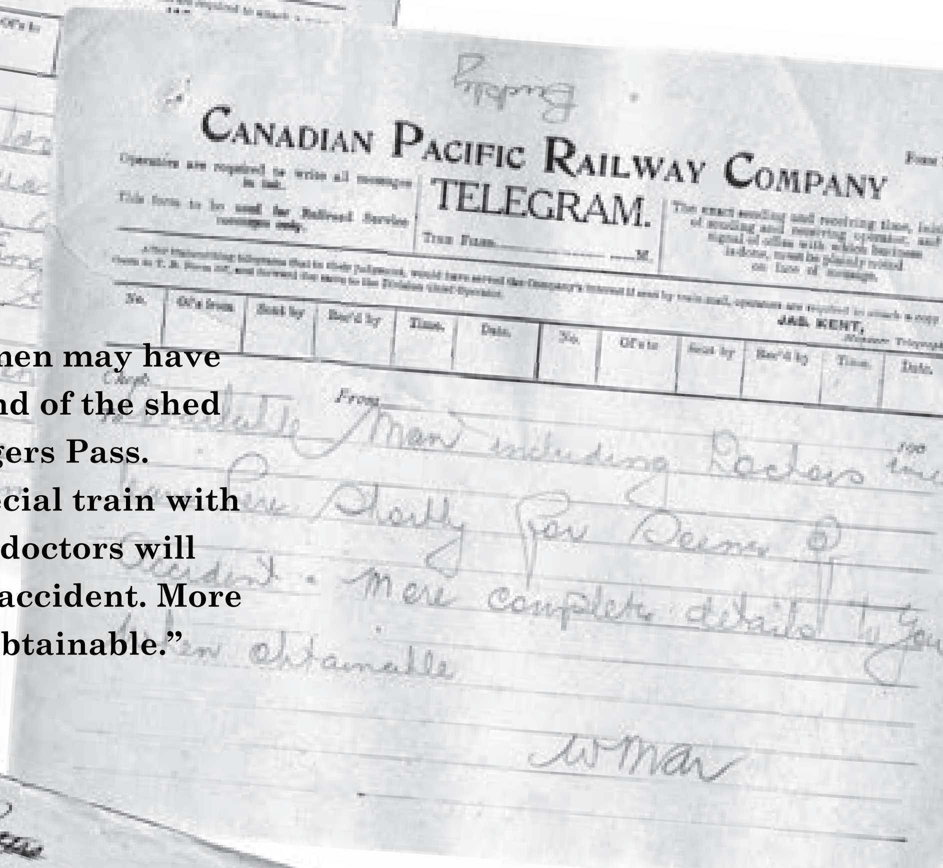
From

At 2330 Slide Came down west of 17 shed where men were working at slide that came down yesterday afternoon. Burying engine and rotary and crews and about one hundred men in bridges, extra and mason gangs. Only known to have escaped so far is road master J Anderson and four men including a fireman who has both legs broken...

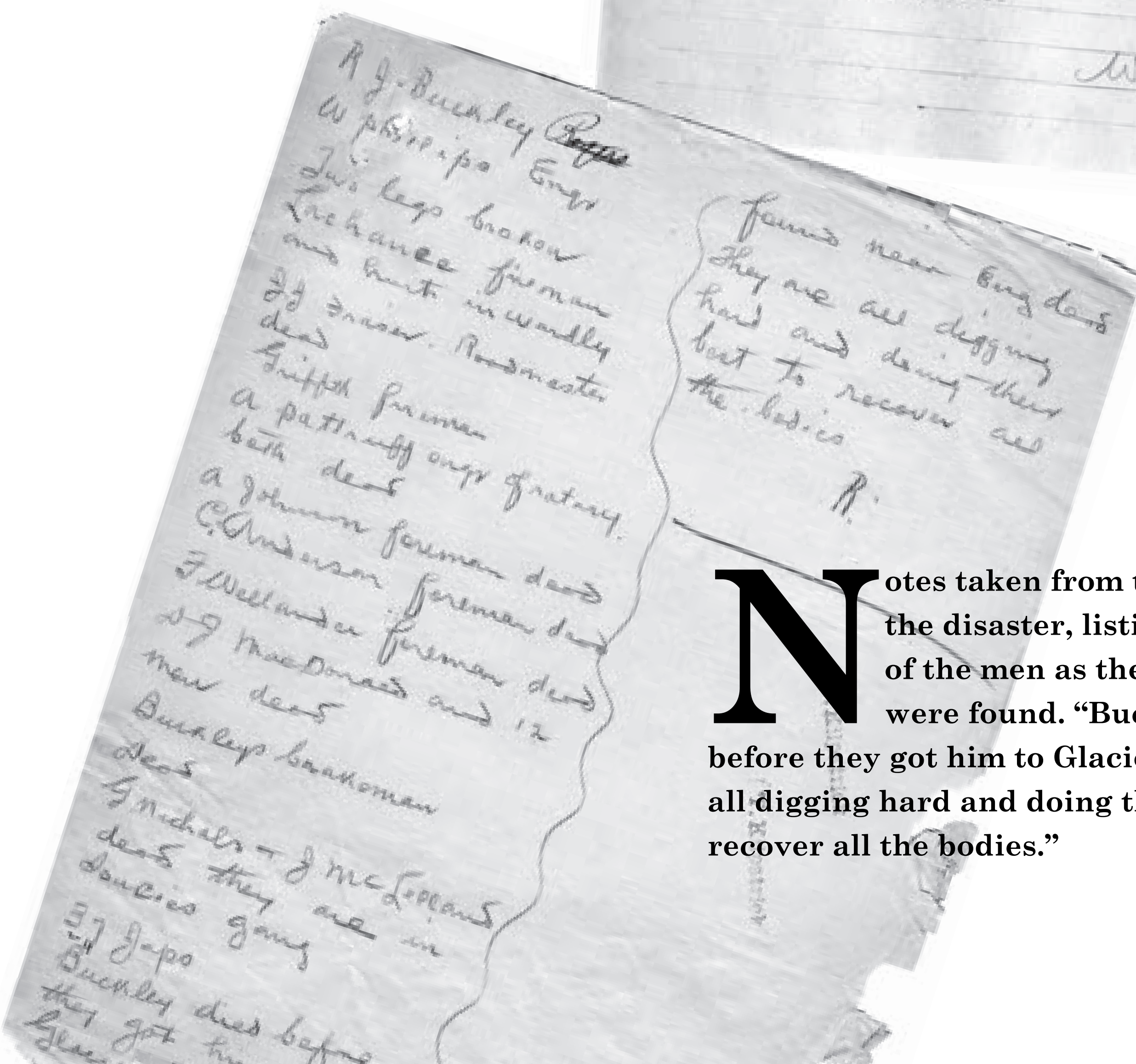
"At 2330 slide came down west of 17 shed where men were working at slide that came down yesterday afternoon. Burying engine and rotary and crews and about one hundred men in bridges, extra and mason gangs. Only known to have escaped so far is road master J Anderson and four men including a fireman who has both legs broken..."

All images courtesy of
Revelstoke Museum & Archives





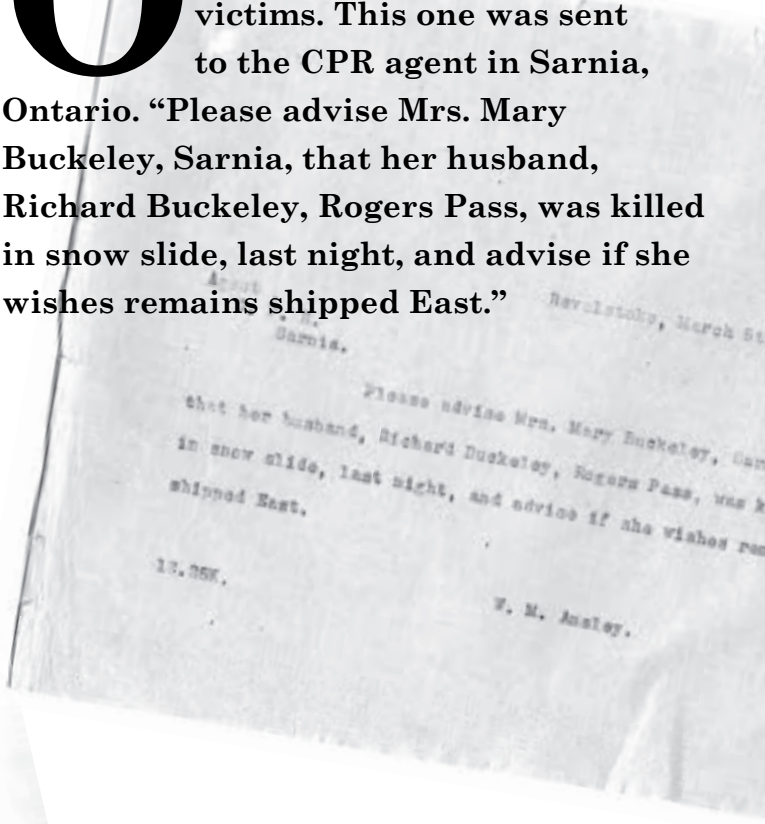
"It is just possible some men may have escaped from the east end of the shed and may show up at Rogers Pass. Wires down at slide. Special train with every available man including doctors will leave here shortly for scene of accident. More complete details to you when obtainable."



Notes taken from the scene of the disaster, listing the names of the men as their bodies were found. "Buckley died before they got him to Glacier…they are all digging hard and doing their best to recover all the bodies."

A more complete list of the men involved as searchers slowly recovered the bodies, check marks identifying the ones found. Handwritten notes to the side record information such as, "wife here," "friends advised," and "shipped east."

One of the many death notices sent to the families of the victims. This one was sent to the CPR agent in Sarnia, Ontario. "Please advise Mrs. Mary Buckeley, Sarnia, that her husband, Richard Buckeley, Rogers Pass, was killed in snow slide, last night, and advise if she wishes remains shipped East."



Accident report for Bill LaChance, the fireman who escaped with just two broken legs. Known afterwards as "the lucky one," LaChance went back to railroading in the mountains. Eventually two more rail accidents, one ending with his train in a river, convinced him to take a safer job as a barber.

"Where do you lads think you're going?"

Coming of Age During Canada's Worst Avalanche Disaster

By Cathy English

Around midnight on March 4, 1910, sixteen-year-old schoolmates Donald Scott Calder and Charles Procunier had just left a house party on Revelstoke's main street and were walking home together. The night was balmy and neither boy was wearing an overcoat. Suddenly, they heard the heart-stopping call of the steam whistles in the CPR shops and roundhouses sounding simultaneously, along with the alarm in the fire hall. Growing up in a railway town, the boys knew this meant one thing: a disaster had occurred.

Calder and Procunier hurried down to the fire hall. "Here we learned that several snowslide clearing crews, locomotives, and snow plows had been caught in a huge slide off Avalanche Mountain in the Rogers pass area," wrote Calder. "Volunteers were being recruited to help dig out the entrapped men and, like about 150 others, mostly CPR personnel, we accepted shovels and walked with the rest of the rescue team down to the station where a special train awaited to take us up to the slide. No thought was given by either Charles or myself of the fact that we were dressed in light party clothes. We were out on our first adventure mingling with adults. Not a few of the other volunteers were as lightly clad as we were ourselves…."

Revelstoke Museum & Archives

"It did not take long to assemble and shortly after one a.m. the rescue train moved out of Revelstoke…. We had only gone a few miles up Albert Canyon when Mr. Cotterell, at that time the CPR Chief Dispatcher and Acting Superintendent…came through the coaches."

Mr. Cotterell stopped to look at two schoolboys lightly clad and each holding a short handled shovel. "His first question was: 'Where do you lads think you are going?' and the answer from both of us, 'To help dig the men out of the slide.' His next question: 'Do you realize what you are in for?' Our answer: 'No.' 'Lads,' said Mr. Cotterell, 'the slide is at least a mile deep and there is a blizzard blowing in the area of Rogers Pass where it is at least 30 below zero and possibly colder.' Charles and I were crestfallen, clad as we were in party clothes. We would be forced to remain on the train. Mr. Cotterell. However, gave us some encouragement by stating that he would see what could be done when the train reached Rogers Pass Station."

"When we arrived there the entire rescue mission personnel, CPR employees, volunteers, etc. were given a hearty breakfast of porridge, bacon and eggs. To our surprise and delight and conforming with Mr. Cotterell's promise we were issued heavy woollen caps and mitts, heavily lined snow boots, heavy winter trousers, splendid wool-lined jackets which we promptly put on over our party clothes. Proud in the fact that we were now part of the rescue gang we trudged with the rest of the volunteers through loose snow until we reached the slide area. Here we met a devastating sight—the snow mixed with pieces of timber, shredded like matchwood, was packed almost as hard as solid ice. Heavy picks rather than shovels would be needed and we were quickly supplied."

"The whole side of the mountain had been swept clear of timber, no signs of snowsheds anywhere. The snow from high above had formed a huge mass at which our railway guides and supervisors told us that they hoped to find the bodies of their comrades. It would be a miracle if any of them were alive. Charles and I, looking into the stern faces of these men trained in the hazardous work in the mountain sections of the railway, prepared for what we knew was to be perhaps our first brush with death. There would be no further slides in this area for the mountain granite stood out crystal clear."

"Well and thoughtfully supervised the volunteers started what seemed to be almost a hopeless task locating the various buried work crews. Although the snowplows, locomotives and work trains had been pushed far from their original locations, they were in part quickly located. The unfortunate locomotive engineers and firemen were brought out partially scalded and partially frozen solid. They were known to us but in a few short

hours Charles and I had forgotten about boyhood and there were no tears. At this juncture in the operations several of the members of the train crews were found but the bodies of the work crews had still to be located. For Charles and me this was to be a time in our lives never to be forgotten."

"I had played basketball on the Railway YMCA Gymnasium floor with several of the victims and for the first time in my life had come face to face with violent death. The volunteers working diligently did exactly what they were told to do and working in various places in small clusters we forgot all about the howling storm still going on through Rogers Pass. After several hours digging, we were well fed in shifts back at Rogers Pass Station. As the work continued we were extremely proud of the various CPR officials in charge of the work. Many of these men were highly skilled and experienced in dealing with snowslides. We were told that never before had they dealt with a snowslide of such magnitude."

"We had our sleeping quarters in the rescue train, warm and comfortable. We had our meals in the same hall during the operation…The days slipped by rapidly and soon the CPR relieved the volunteers bringing in their own crews specially trained for this kind of work. Later we received letters of thanks from the railway and substantial cheques in appreciation of the work we had done. In spite of the time away from our school classes we had no trouble catching up with our work…."

"Charles and I returned to the mundane affairs of life as schoolboys in Revelstoke's two-roomed high school opposite St. Peter's Anglican Church. As the lone volunteers from our school we felt that having worked with men under trying circumstances we had in some measure reached manhood status. In a few short years both of us were to see and take part in events in some respects similar in character for we both found ourselves part of the Canadian Expeditionary Forces on Active Service in France, Flanders and Belgium."

>>Cathy English is the Curator for the Revelstoke Museum & Archives.

The official records and correspondence relating to the Rogers Pass avalanche are housed in Revelstoke Museum and Archives, providing personal and poignant views of this tragic accident. The next time you're in Revelstoke, take some time to visit this display, or take a walk down the "Abandoned Rails" self-guided interpretive trail at Rogers Pass in Glacier Park. Both the museum and the trail are compelling monuments to the lives lost in the quest to unite this country from coast to coast. And for members of today's avalanche industry, it's an important piece of our history that deserves to be remembered.

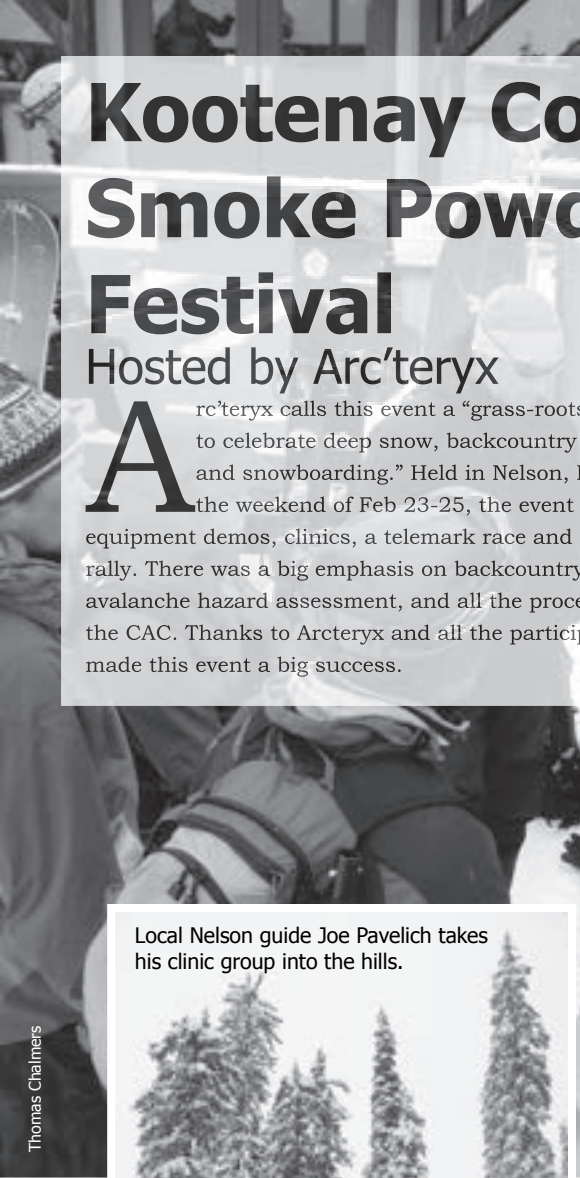
Kootenay Cold Smoke Powder Festival

Hosted by Arc'teryx

Arc'teryx calls this event a "grass-roots gathering to celebrate deep snow, backcountry skiing and snowboarding." Held in Nelson, BC, over the weekend of Feb 23-25, the event featured equipment demos, clinics, a telemark race and a randonee rally. There was a big emphasis on backcountry safety and avalanche hazard assessment, and all the proceeds went to the CAC. Thanks to Arcteryx and all the participants that made this event a big success.

Nelson Rocha prepares for the Telemark Race in a very special racing suit.

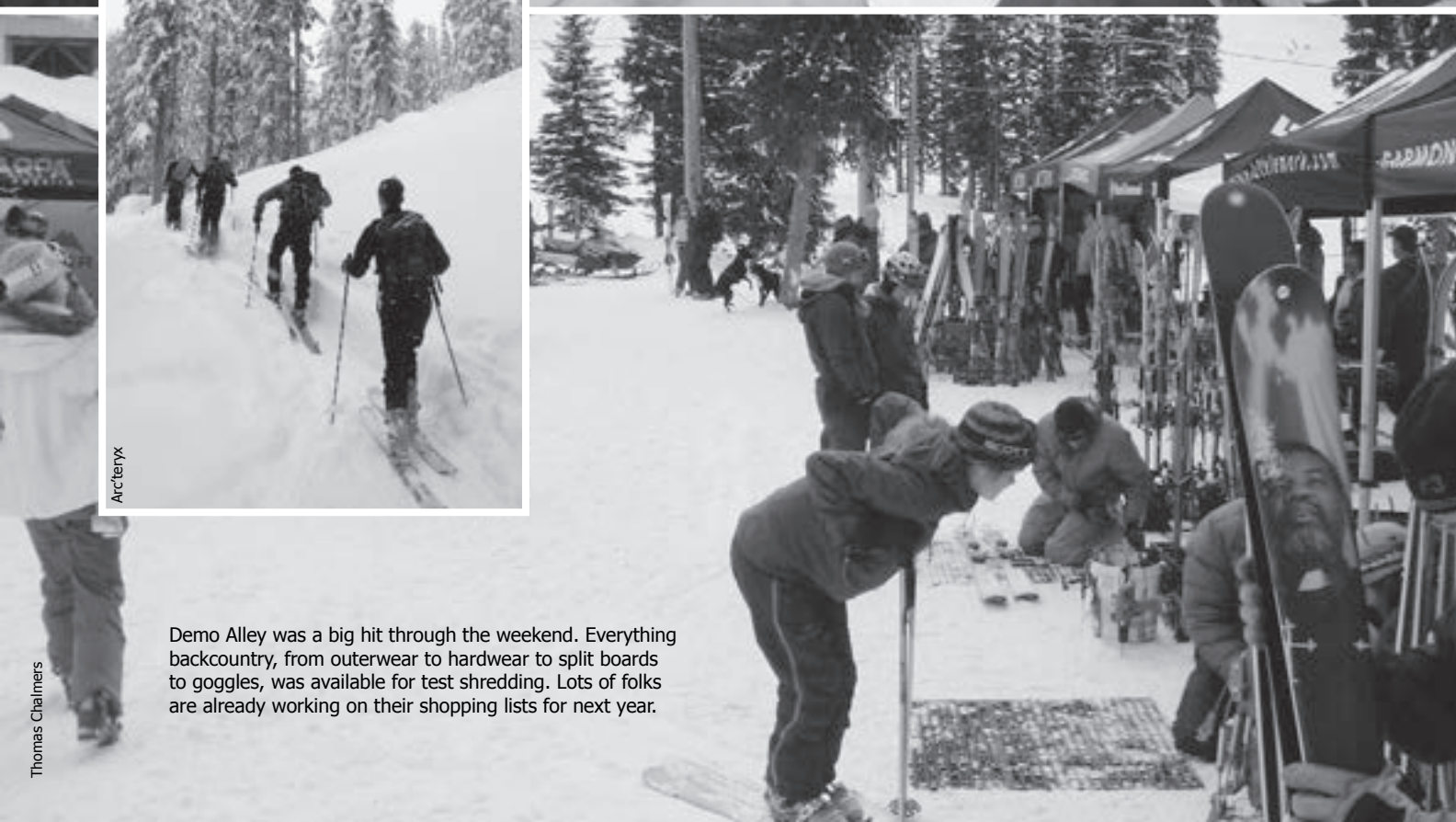
Arc'teryx



Thomas Chalmers

Local Nelson guide Joe Pavelich takes his clinic group into the hills.

Arc'teryx



Thomas Chalmers

Demo Alley was a big hit through the weekend. Everything backcountry, from outerwear to hardwear to split boards to goggles, was available for test shredding. Lots of folks are already working on their shopping lists for next year.

Who Is The CSGA?

By Bob Sayer

Julian Itagaki

I am always being asked questions about the Canadian Ski Guides Association: What is the CSGA? What are the courses like? Who hires the CSGA? Probably the most telling question is: Who is the CSGA?

History

The CSGA was formed in 1989 when a group of heli-ski and cat-ski operators, unable to find enough suitable guides for their companies, decided to form a school specifically to train guides for mechanized skiing. The idea was to start a five-year apprenticeship program where courses and on-the-job training would develop the guides from within the industry. Mike Wiegele incorporated the school and a board of directors was appointed from six different companies.

Ken France and I taught the first course in April of 1990. Over the next few years I attended guide training courses in Canada, Germany, Austria and France to see what was working best in each of those programs and how they could be incorporated into mechanized ski guiding. I wanted to be sure that CSGA guides would be as capable as any other guides out there at the skills involved in mechanized ski guiding.

The program that developed was a series of three ten-day courses each separated by two seasons of work in the industry. At the end of five years a successful student has, in addition to the CSGA Level 3 certification, a minimum of: CAA Level 2, Level III CSIA or CASI, Advanced First Aid, and at least five seasons of heli-ski or cat-ski guiding experience.

The courses in the early and mid 90's were taught by operators like Ken France of Kootenay Heliski, Wayne Bingham of Great Canadian, Reto Keller of Island Lake, Helene Steiner of Whistler Heliski and Herb Bleuer (at the time working for Monashee Powder Adventures). Today the courses are taught mainly by CSGA graduates who are now owners and operators themselves.

Governance

Due to strong differences of opinion, the original board of directors was dissolved in 2003 and the CSGA took on a new organizational direction. The CSGA is now a member-driven organization with a board elected by its membership. Current board members are: President Bob Sayer, Vice-president Jason Remple, and Directors Heidi Steckle, Vlad Lamoureux, Erin Heintzman and Matt Pinto.

Recognition of CSGA in the Mechanized Ski Industry

A founding principle and driver of the CSGA is to produce the finest quality guides for the industry. Unfortunately politics and personality within HeliCat Canada, and not quality of the guide training, has resulted in the CSGA being "recognized," "not recognized," "partially recognized" and even an ambiguous "not sure." The present board is committed to getting this issue resolved so that our members are sure of where they stand in relation to the significant training and skill development they have undertaken.

The CSGA is recognized by the provincial government, the coroner's office, the insurance industry, and has been officially and positively reviewed by both the French and Austrian guiding associations.

Who IS The CSGA?

Now to the question "Who is the CSGA?" Of the 500 students who have taken courses over the years, more than 100 are working in the industry, many as operators and owners. Here is a short list: Jason Remple—owner/operator Stellar Heliski, Don Schwartz—owner Powder Mountain Cat Skiing, Ron Greenlaw—owner Highland Powder, Heidi Steckle—lead guide Selkirk Wilderness Skiing, Matt Pinto—operations manager Northern Escape Heliski, Patrick Maloney—owner SnowWater Heliskiiing, Vlad Lamoureux—lead guide Whistler Heliski, Bill Mark—lead guide Mike Wiegele Heliski, Dennis Ross—lead guide Retallack Cat Skiing, Victor Mascheretti—owner Helivision, Alex Brunet—lead guide Great Canadian Heliski, Tom Cadwallader—lead guide Cat Powder Skiing, John Birrell—former president Island Lake Lodge, Leo Steiner—owner Klondike Heliski, Don Steadman—Chatter Creek Cat Skiing, Heath Lockhurst—Baldface Lodge.

The list goes on but you get the idea. From owner to tail guide, heli-ski or cat-ski, CSGA guides are everywhere in this industry. They are participating beside you at CAA meetings, having a beer with their guests, or searching alongside you at the rescue site. We're here, working for a living and doing a great job for our guests and our operations, and contributing to the mechanized ski industry.

What's Next?

The annual general meeting of the CSGA will be held in conjunction with the CAA spring meetings. If you have taken courses with the CSGA or you are an operator looking for quality guides and a say in their training, come and see what's going on. I hope to see you there.

>>Bob Sayer is the President of the Canadian Ski Guides Association

CANADIAN SKI GUIDE ASSOCIATION

Schedule of Coming Events

April 15-20, 2007
European Geosciences Union General Assembly 2007
This year there will be two sessions on snow avalanches. "Avalanche Dynamics and Risk Assessment" will examine the movement and effect of avalanches, and present recent developments in hazard/risk assessment and mitigation. "Snow Cover Properties and Processes, and Snow Avalanche Formation" is devoted to the latest results and views on snow avalanche formation from field, laboratory and numerical studies.
Where: Vienna, Austria
Info: meetings.copernicus.org/egu2007
Contact: Dave McClung at mcclung@geog.ubc.ca or Juerg Schweizer at schweizer@slf.ch

April 16-20, 2007
Western Snow Conference 2007
2007 brings the 75th anniversary—the diamond jubilee—of the Western Snow Conference. This year, organizers are going all out to mark this celebration of all things snow, ice and water.
Where: Kona, Hawaii
Info: www.westernsnowconference.org
Contact: e-mail conference chair Randall Julander: randy.julander@ut.usda.gov

May 5-6, 2007
HeliCat Canada Annual General Meeting
Where: The Grand Okanagan Lakefront Conference Centre, Kelowna BC
Contact: Call (250) 542-9020 or e-mail info@helicatcanada.com

May 7-11, 2007
Canada West Ski Areas Association Spring Conference
Where: The Grand Okanagan Lakefront Conference Centre, Kelowna BC
Info: Call (250) 542-9020 or e-mail office@cwsaa.org

May 7 – 11, 2007
CAA Annual General Meeting and Spring Meetings
Don't miss the CAA's 25th Anniversary AGM! See the ad on page 74 for more details on what we have planned so far, and a more detailed itinerary of the week is available on our website.
Where: Penticton, BC
Contact: Call Ian Tomm at (250) 837-2435 or email itomm@avalanche.ca

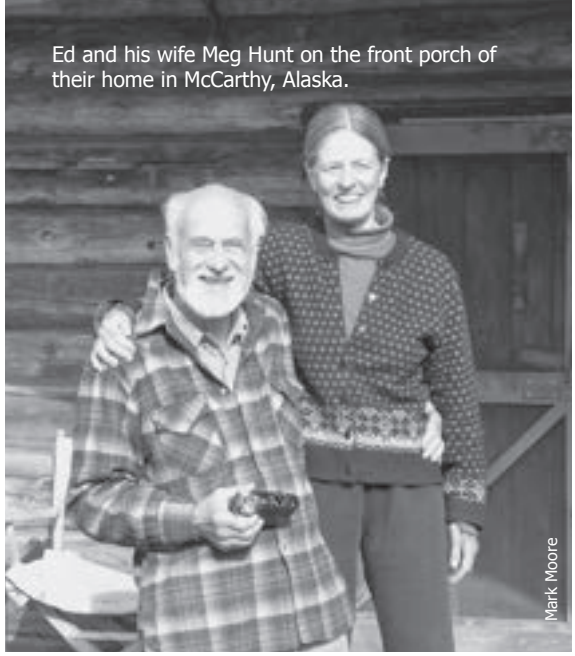
July 9-13, 2007
IUGG General Assembly
The International Union of Geodesy and Geophysics meets every four years. This year, a session on snow avalanches will be held, focusing on field observations and modelling. Emphasis will be on the integration of observations and the verification and improvement of models.
Where: Perugia, Italy
Info: www.iugg2007perugia.it

October 17-20, 2007
SARSCENE 2007
The sixteenth annual search and rescue conference will be held in Victoria, BC. As Canada's leading national forum on search and rescue, SARSCENE is a unique opportunity for members of the SAR community to come together and share their expertise. Highlighted this year will be demonstrations on search and rescue in Western Canada.
Where: Victoria, BC
Info: www.nss.gc.ca or call 1-800-727-9414.

October 24-26, 2007
Wilderness Risk Manager's Conference
This annual conference focuses on risk management and practical skills for the wilderness adventure and education industry. Attendees share field and administrative techniques in risk management, while building valuable networks with other leaders in the outdoor field.
Where: Banff, Alberta
Info: www.nols.edu/srmc

Dave Smith

In Memoriam
EDWARD R. LaCHAPELLE
By Peter Schaerer


Ed and his wife Meg Hunt on the front porch of their home in McCarthy, Alaska.
Mark Moore

The avalanche community has lost a skilled educator, scientist, pioneer and friend. Snow, avalanches, and glaciers formed Ed LaChapelle's lifelong career. After graduating in physics, he spent a year at the Institute of Snow and Avalanche Research at Davos in Switzerland. In 1952, he joined the avalanche research station of the US Forest Service at Alta, Utah, where he introduced the formal techniques of snow observations, developed instruments for weather and snow observations, and forecasted avalanches.

In 1969, he became a professor of atmospheric sciences at the University of Washington in Seattle. He took early retirement from the academic world and spent the past 25 years on outdoor activities, in the summer in McCarthy, Alaska, and in the winter in mountains and in ski areas of the Western USA. He carried out professional work occasionally only after his retirement and we were fortunate to hear him as the keynote speaker at the ISSW in 2006.

Ed's remarkable and memorable skills were developing instruments, photographing, teaching, and writing books. He searched for and tested continuously equipment and methods that would assist snow observations and avalanche control. Examples are snow settlement gauges, large shear frames, applying chemicals with the objective of preventing the formation of depth hoar, and releasing avalanches by inflating bags buried in the snow.

As a photographer, Ed developed techniques for photographing snow crystals. The resulting excellent pictures were published in his book *Field Guide to Snow Crystals*. Another book *Secrets of the Snow* contains photos of surface features of snow with guidelines for visual conclusions about avalanche and ski conditions. Even without reading the text, the photographs alone make the books a pleasure to browse. Other publications include scientific papers, the pocket book *ABC of Avalanche Safety*, which is a guide for avalanche safety in the backcountry, and the co-authorship of the first *Avalanche Handbook* of the US Forest Service.

Ed LaChapelle was a frequent speaker at meetings of avalanche professionals. His talks always covered new topics ensuring that even experienced avalanche technicians could learn something new every time. Ed interacted with people in a modest and informal way, and was able to catch his audience by explaining a subject matter in simple and convincing terms.

I remember the two-day long professional snow seminar in Seattle that Ed organized in 1971. Ed made the administration simple by drafting a stimulating program of presentations about current research, avalanche control, safety measures, rescue, public education, and training of operational staff. He did not request formal papers, but instead assigned the topics to seminar registrants. Under Ed's convincing leadership, the speakers came prepared and the seminar was a success.

Ed often came to Canada, and he was a frequent guest and adviser at the guide training seminars of CMH Heliskiing. He also liked to visit avalanche control operations all over the west.

Ed LaChapelle had a distinguished career. Those of us who enjoyed the opportunities to work with him and to discuss with him avalanche terrain and the snowpack, will miss him. His books, however, will be with us a long time and will remind us of an affable colleague

Skiing Community Loses a Pillar
By Bob Berwyn

This article first appeared in the Summit Daily News of Summit County, Colorado, on February 2, 2007.

The avalanche and snow science community lost one of its founding fathers this week, when Ed LaChapelle died of a heart attack while skiing powder at Monarch Mountain on Thursday. LaChapelle, who was 80, was skiing with a group that included his wife, Meg Hunt, Paula Mears, former Colorado Avalanche Information Center director Knox Williams and Art Mears, another Colorado-based avalanche expert.

LaChapelle was known for his groundbreaking research on basic snow safety and avalanche control work, as well as for his writing and his involvement in the development of the first practical avalanche rescue beacon. Speaking from his home in Buena Vista, Williams said the group was enjoying 17 inches of fluffy powder that had fallen at Monarch the previous two days.

"Ed said, 'Let's go ski some powder.' So we got some skiing in before things went bad," Williams said, explaining that LaChapelle appeared to succumb to a heart attack that came on gradually over the course of about an hour. LaChapelle was transported toward medical care via ambulance but died later that day.

"It was a great day, but a sad ending," Williams said. "Like

his wife, Meg, said, here's a guy who lived for skiing and the mountains, and he was skiing some pretty good powder on his last day on the planet," Williams said.

LaChapelle died just a week after his ex-wife, Dolores LaChapelle, died of a stroke in Durango. Dolores LaChapelle was another legendary figure in the world of powder skiing. She pioneered groundbreaking routes and powder skiing techniques in Alta, Utah, while her husband was based there as part of a seminal U.S. Forest Service team of snow rangers.

"He contributed so much to basic avalanche research and forecasting," Williams said, explaining that everyone today involved in the field has been touched by LaChapelle either directly or indirectly. "Almost everyone knows him or knows of him," Williams said, explaining how LaChapelle's expertise and mentoring spanned three generations of snow safety experts.

"He was the experimenter. He had this huge base of knowledge and an inquisitive mind, always asking how we can look at the snowpack and understand it better," Williams said.

"He was a mentor to us," said Don Bachman, a retired avalanche professional now living in Montana who worked with LaChapelle in Silverton during the 1970s. "He taught us with an enthusiasm that was contagious," said Bachman, who also served a very short stint as ski patrol director at Arapahoe Basin. "We're walking in Ed's sizable footsteps, or ski tracks, rather, since he would rarely walk if he could ski."

Bachman recalled LaChapelle's distinctive, sonorous voice, "always speaking with purpose, always with a twinkle and a wry sense of humor." Out of the work that Bachman and LaChapelle (along with others) did in Silverton during the 1970s grew the current Center for Snow and Avalanche Studies, now headed by Chris Landry.

LaChapelle was born in 1926 in Tacoma, Washington, and started his snow science career at the renowned Swiss Avalanche Institute as a guest worker in 1950 and 1951. He served as a US Forest Service snow ranger at Alta from 1952 to 1972, with breaks to do glacier research in Greenland, Alaska and Mt. Olympus. He was appointed to the faculty of the University of Washington in 1967, and retired as Professor Emeritus of Geophysics and Atmospheric Sciences in 1982.

LaChapelle was part of the pioneering crew of Forest Service snow rangers at Alta who laid the basic groundwork for avalanche control programs at ski areas and for highway departments. As well, he authored *The ABCs of Avalanche Safety*, a slender, pocket-sized how-to manual that has for decades been a mandatory text for winter back country travelers. Another book he authored that graces the shelves of many snow enthusiasts is the *Field Guide to Snow Crystals*, beautifully illustrated with spectacular photos of different types of snowflakes.

The Alta snow rangers were dubbed the Avalanche Hunters in Monte Atwater's book on the Forest Service research program. They refined the use of explosives for avalanche control work with some dicey and exciting field experiments, well-described in Atwater's book. While Atwater wrote the first Forest Service avalanche manual, LaChapelle refined the work and published the agency's first official avalanche handbook in 1961. *The ABCs of Avalanche Safety* was a direct outgrowth of that work, according to a telephone interview with LaChapelle, taped by Lowell Skoog in 2001.

He was also involved with another ground-breaking innovation that has become a standard piece of equipment for back country powder skiers—the avalanche transceiver. LaChapelle began experimenting with the use of radio transmitters as a locator for buried avalanche victims in 1968. Working with John Lawton, an electrical engineer who skied regularly at Alta, LaChapelle refined the device, which gradually evolved as the "Skadi," which remained the primary avalanche search beacon for many years.

Ed LaChapelle was a well-loved and respected member in the brotherhood of avalanche experts, and his passing leaves a big void. Comments on several online ski forums reflect the respect he engendered, as other avy pros recalled their last meetings with him at the International Snow Science Workshop in Telluride this past fall.

Ed and Charlie Rubin on the Red Mountain Pass field trip at ISSW in Telluride, 2006.

Charlie Rubin

In Memoriam
MARCEL de QUERVAIN
By Peter Schaerer

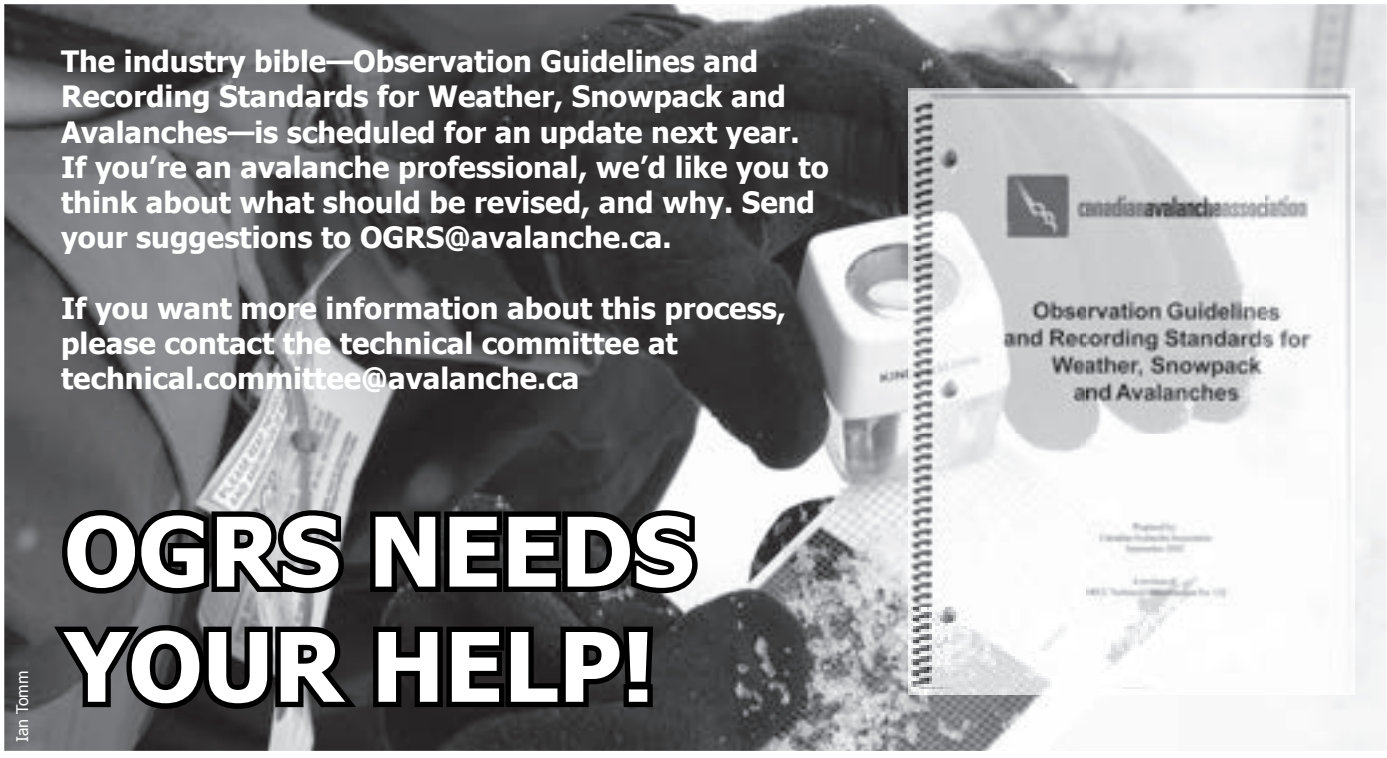
Marcel de Quervain died on February 16, 2007, at the age of 91. A name that may not be so familiar to today's avalanche professionals, he nonetheless had a lasting impact on Canada's avalanche industry.

After graduating with a doctor degree in physics, Marcel de Quervain joined the Federal Institute for Snow and Avalanche Research at Davos, Switzerland as a senior scientist. His topics of research were snow physics and crystallography. In 1950, he became the director of the institute, a position he held until his retirement in1980. He was also a professor at the Federal Institute of Technology at Zurich, where he taught courses on snow physics and avalanche control. Under de Quervain's leadership, the institute gained a world-wide reputation by developing the classification and observation techniques of snow, issuing a daily public avalanche bulletin, and carrying out research on snow properties and avalanche control.

In addition to his achievements in Switzerland and his international reputation, Marcel de Quervain contributed to snow and avalanche research in Canada. In 1948, the National Research Council of Canada invited him to spend a year in Canada and make recommendations about the snow and ice research that should be carried out in this country. He visited Glacier National Park in February 1949 where he observed and recorded the first ever snow profile in the Rogers Pass area. With his final report, Marcel recommended that Canada should establish a snow and avalanche research facility. In response, the Division of Building Research of the National Research Council created the Snow and Ice Section, which later initiated and carried out the Canadian avalanche studies.

Marcel de Quervain returned to Canada in 1955, 1957, and 1973 to advise the Aluminum Company of Canada on the avalanche protection of the electric transmission line between Kemano and Kitimat. In 1959, he visited Rogers Pass where the highway was under construction. He observed the avalanche paths, made comments about the planned avalanche control and advised the Canada Department of Public Works about the snow loads on the planned snow sheds.

Marcel de Quervain had an organized mind, asked many questions when he studied a problem and gave careful consideration to solutions. We are grateful for his contributions to the knowledge of snow and avalanches.



IN ORDER TO WIN ONE OF THESE...

Marmot
Sawtooth
Sleeping Bag

Eider
Volano
Jacket

AND OTHER GREAT BOOTY!

YOU HAVE TO SEND US ONE OF THESE.

Didn't you say you had some great photos? Well then why not enter? Check out avalanche.ca for more info.

caa/cac fourth annual photo competition

categories

History: Images from the CAA's first decade - 1982-1992.

Members at Work: People working in the avalanche patch.

Avalanches:The white dragon itself!

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

prizes

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

1st Place: Marmot Sawtooth Sleeping Bag

total prize value $250

2nd Place: Eider Volano Jacket

total prize value $130

Special Mention: Great Booty TBA

rules

Entries: Contest is open to all members of the CAA and the CAC.

Entry Deadline: Entries must be received by April 27, 2007.

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

Specifications for Accepted Formats: 35mm slides (transparencies), unmounted prints up to 8 x 10 inches and high resolution digital (300dpi or 1200x900 pixels minimum). No digitally altered images will be accepted. Images must be JPEG, TIFF or RAW format only; all other formats will not be accepted. Digital images may be received on CD, DVD and e-mail.

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

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

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

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

New Tools for Avalanche Education

By Ranae Kowalczuk

More and more people are discovering the incredible beauty of Canada's backcountry in winter. Unfortunately, some of these recreationists become avalanche victims. Key factors in avoiding avalanches are learning to identify clues of increased hazard and how to plot a safe route (McCammon and Haegeli, 2006). It takes practice and experience to learn these skills and amateur recreationists may get themselves into trouble in avalanche terrain before they adequately develop the necessary skills. Amateur backcountry recreationists need exercises that let them practice finding safe routes and making good decisions in an engaging, realistic environment where mistakes are not potentially fatal.

At the Spatial Interface Research Lab (SIRL), our focus is on developing new geovisualizations and geospatial interfaces that improve and maximize the value of spatial information in research, education and public life. Since 2005, I have been working with Dr. Nick Hedley (Director, SIRL), Dr. John Clague (Director, Centre for Natural Hazards Research) and with the CAA on a project to develop and build learning tools that help avalanche educators more effectively teach route finding skills and terrain identification.

The CAA and CAC have developed an interactive online route-finding exercise that allows users to practice drawing safe routes on 2D terrain photos (Fig. 1). The exercise uses Flash animation and has become a popular component of the CAC's new online course. Although the exercise is popular, no data exist on how much users learn. My project focuses on developing new geovisualization tools for teaching route finding and determining their effectiveness in facilitating learning.

Do people learn most effectively from traditional 2D photographs, interactive 3D models on a computer, or virtual models in a classroom setting, or from other tools? New 3D technologies look cool, but do they teach people any better? I am not only designing and building new 2D and 3D exercises, but also testing them on learners to see what specific aspects help or hinder students as they learn about and practice route finding. Testing of both traditional exercises and those using innovative technologies allow us to build a knowledge base for developing new avalanche education tools, ensuring that limited resources are spent wisely. The avalanche community cannot afford to waste time, resources, or lives on tools that do not effectively teach the concepts recreationists need to help them make sound decisions in the backcountry.

Personal computers and internet access have become nearly universal, allowing new technologies to be applied in avalanche education. The avalanche community has embraced Flash animations, movie clips, and interactive exercises, but there are a host of other geovisualization tools that can be used.

Geovisualization

"Geovisualization" is an abbreviation for geographic, or spatial, visualization (Hedley 2005; Slocum et al., 2005). People use geovisualizations everyday without knowing them as such. Online photographs, illustrations, animations, QuickTime panoramas, ArcGIS maps, Google Earth, and Google Maps are common types of geovisualization. Less widely known and newer ones include 3D terrain models, virtual and augmented reality environments, GeoWalls, and QuickTime Virtual Reality models. All of these newer types of geovisualization can be applied to avalanche education. For example, dynamic 3D models can allow learners to explore terrain and investigate whether a slope is as steep as it looks, something that is not possible with a static 2D photograph. Augmented reality environments allow several learners to gather around a virtual terrain and discuss routes interactively as a group. However, we must tread carefully and not assume all new tools will work better than traditional ones.

Every geovisualization tool has strengths and weaknesses when it comes to communicating concepts and information. Different combinations of content (maps, images, 3D models), interface controls (navigation buttons, slider bars, zoom buttons), and feedback (icons, text, colour schemes, sounds, animations) may reinforce or undermine the message the geovisualization is trying to convey (Hedley 2005; Slocum et al., 2001). For example, a new learning tool that teaches about topographic maps could use Flash animations and sound. However, if it relies on the user moving sliders up and down and repeatedly clicking magnifying glass icons to zoom in and out, it is possible that the user may spend more time trying to figure out how to use the tool instead of learning from it.

A unique component of my research is an evaluation of how different ways of organizing tasks, different kinds of feedback to the learner, and varying ways of interacting with the exercise affects comprehension. Failure to do such an evaluation can render a new educational tool ineffective (Hedley, 2005). Each of my new exercises differ slightly in how the user interacts with the content, the way they get information, and how they can manipulate the information in order to test which combinations are most effective for learning.

The Avaluator tool and my research

The CAC recently launched a new educational tool, the Avaluator decision-making card, which helps recreationists identify obvious clues to increased avalanche hazards when they plan a trip and are in the mountains. My research supports the new Avaluator tool by incorporating it into an interactive, online route-finding exercise where amateur recreationists can practice using it before they head out into the snow.

The online Avaluator exercise provides users a scenario and asks them to plot a safe route from point A to B on a 2D photograph (Fig. 1). If the user approaches a terrain hazard, a red polygon pops up, together with text that identifies and explains the hazard. This exercise is an excellent first step in interactive learning, but the interface design may limit the effectiveness of the exercise. If a user moves the cursor over point B, all safe routes are displayed, providing the answer without any thinking having been done. I am testing a revised version of this exercise to determine how well it helps users identify hazards and safe routes.

The main focus of my project is the application of geovisualization principles, educational theory, and interface design to develop a new exercise (based on the current one) that uses more interactive 2D terrain photographs. The new design allows users to explore, hypothesize, test, and review their understanding of terrain hazards and route finding. Participants progress through a series of activities that mimic the actual process of route finding in the outdoors.

First, they review a bulletin and use their Avaluator card to identify any obvious hazard clues. They then hypothesize and draw a route that they think will safely get them from point A to B on a 2D photograph. As they move the cursor around the photograph, they see a zoomed-in view of their location in a separate box (Fig. 2). There is no need to scroll, click buttons, or take their attention away from plotting the route. A toolbar allows them to start over and re-draw their route if a mistake is made. By clicking on a button, they can re-read the bulletin, view a topographic map, or look over two additional terrain photographs for a different view of the area.

After proposing a route, users practice identifying hazards using the Avaluator card. They must review the photograph and circle any visible avalanches, avalanche paths, loaded areas (or expected ones), and terrain traps. After identifying potential hazards, users re-examine their route, modifying it as necessary.

The next step is to begin the interactive route-finding activity (Fig. 2). As users plot a route from A to B, they receive feedback about the hazards and risk level along their route. This exercise provides a variety of ways of receiving feedback about hazards. Some people are visual learners, whereas others learn more from reading. Some are inductive learners,

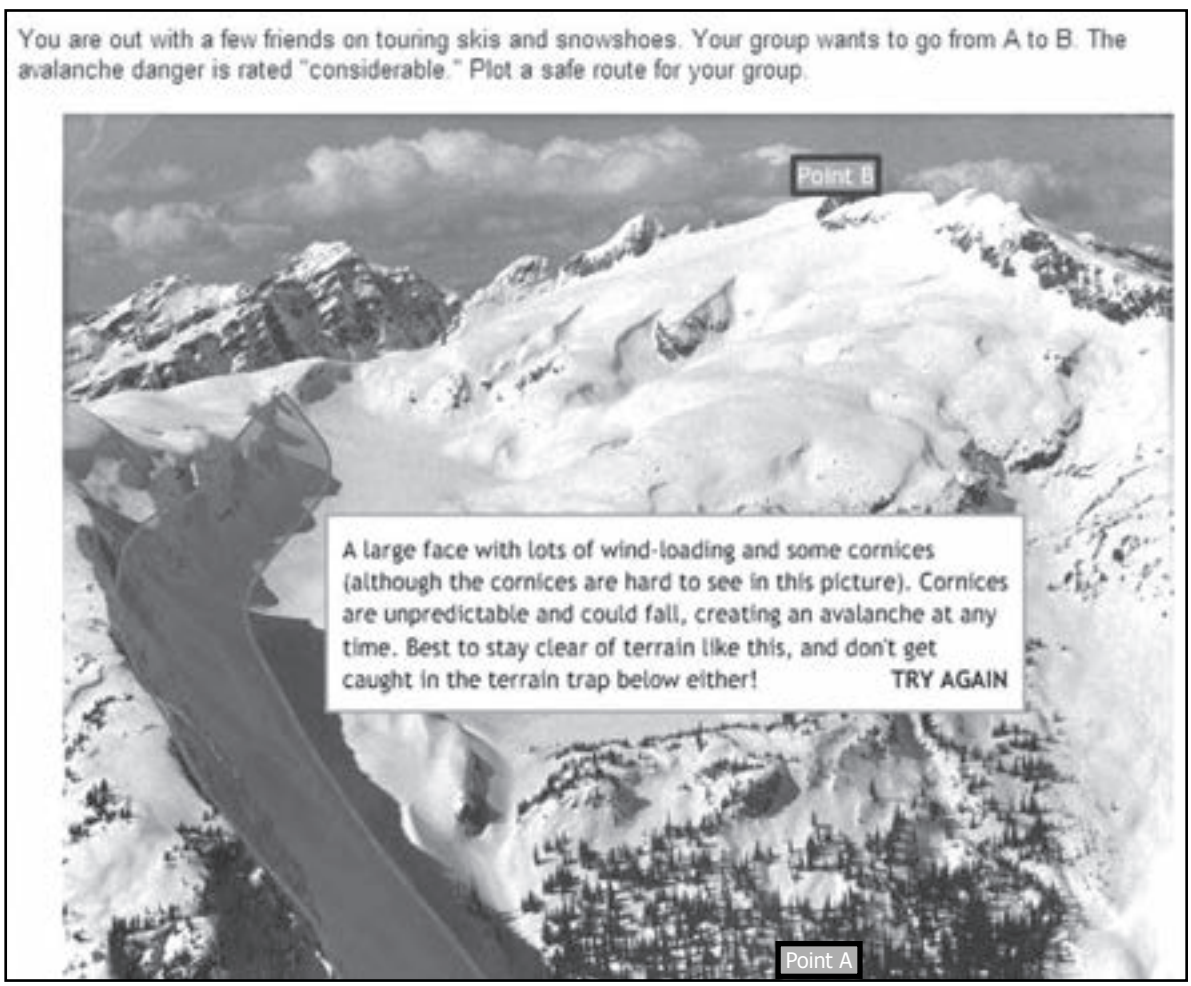


Fig. 1 Screenshot of the CAA route finding exercise. Red polygons are used to identify dangerous terrain areas under 'considerable' conditions. Users 'plot' a route by moving a mouse cursor over the photograph and receive visual feedback on dangerous areas. A 'safe' route is identified if the cursor is positioned over 'Point B'.

Fig. 2 Screenshot of the new 2D route finding exercise. Users progress through a series of activities where they practice using their Avaluator card to identify terrain hazards and a safe route. Users can view multiple terrain photos, a topographic map, and review a bulletin throughout each activity. During the interactive route-finding activity, the seven obvious clues are listed along the side and light up if a user encounters one on the terrain. A zoomed-in view of the photo automatically appears in the zoom box (lower right corner) as they plot their route.

and others learn by deductive reasoning. Successful learning exercises must be flexible and provide information in both forms and through multiple avenues. In this activity, red polygons and text appear identifying hazard locations, the type of hazard is highlighted from a list of Avaluator clues along the margin of the screen, and an interactive scale bar adds up the number of clues present at any given site. The user must start at point A, and hazard information appears only as they draw a route. Thus the user can't "cheat" and find a safe route without doing the work.

Most tools would stop here, but it is important for users to know how well they did. If they took an avalanche course, they would receive feedback from the instructor. The final component of the exercise mimics this process. After they successfully reach their destination, users click buttons that display the locations of all the hazards present on the slope. An expert's route also appears, that they can compare against their route. Doing so gives them an opportunity to see how many hazards they may have been close to even though they successfully made it to their destination.

One of my goals is to determine how different geovisualization tools affect learning. To do this, I will build a different version of the new exercise, in which the user manipulates and views the terrain differently. In the current exercise a user cannot zoom into or move the 2D photograph. The new exercise provides users a zoomed-in portion of the photograph in a small window left of the terrain photo. As the user moves the cursor across the photo, their location is enlarged in the zoom box.

Another version of the exercise replaces the zoom box with a 3D terrain model (Fig. 3). Users can pan around, zoom in and out, and rotate the model to explore the terrain. Each of the three versions of this exercise permits different types of interactions and manipulation, all of which can be tested. One of these exercises may promote learning better than the others; however, formal testing is needed to find out for sure.

Initially each of the exercises will be available, for testing purposes only, on a website linked to the CAA/CAC website. From this link, users progress through a series of pre-test questions before they read a digital version of the Avaluator booklet and complete one of the three testing exercises. This procedure will allow me to determine the user's ability to find routes and identify terrain hazards before they do the exercise. After finishing, they complete a series of post-test questions, and their answers are compared the pre-test responses to determine if using the exercise had an effect on their ability to identify terrain hazards and plot a safe route. Assessing pre- and post-test observations is crucial to collecting valid test results.

Exploring the future of Avalanche visualization

The last component of my project, although the smallest, is the most exciting. I will investigate the use of new virtual technologies, such as augmented reality, (Fig. 4) in avalanche education. Augmented reality (AR) environments are overlays of 3D virtual images on real-world views or objects (Hedley et al., 2001; Slocum et al., 2005).

Augmented reality uses virtual markers to register 3D digital representations on an object or a view. When one of the virtual markers is recognized by the AR program, it generates a 3D representation onto the chosen display device. People can view AR content on a desktop computer screen, through

Fig. 3 New experimental exercise that uses a 3D QuickTime virtual reality object model instead of a 2D zoom box. Users can investigate the terrain by moving their cursor over the image to zoom in and out and rotate. In the activity shown, the user is identifying visible terrain traps.

special virtual-reality goggles, or on a projection screen. For example, a science museum could use AR to interactively show what dinosaurs looked like when alive. With an AR-equipped cell phone or hand-held computing device, you could see a virtual representation of a live dinosaur when you pointed the device at the bones. If you picked up a bone in front of the screen, you would see your hand picking up and moving the live dinosaur. In AR, the real view of the skeleton is augmented with additional, virtual information.

Virtual markers can be attached to any object, making this type of interface highly flexible and potentially more natural for users (Dede et al., 1998; Hedley et al., 2001; Winn, 2002). Virtual content is overlaid onto a real object, allowing users to pick up and manipulate it much like a real object. It is possible that users learn more with AR because they spend less time learning an interface composed of buttons and icons, and more time interacting with facts or concepts, using familiar methods of natural interaction.

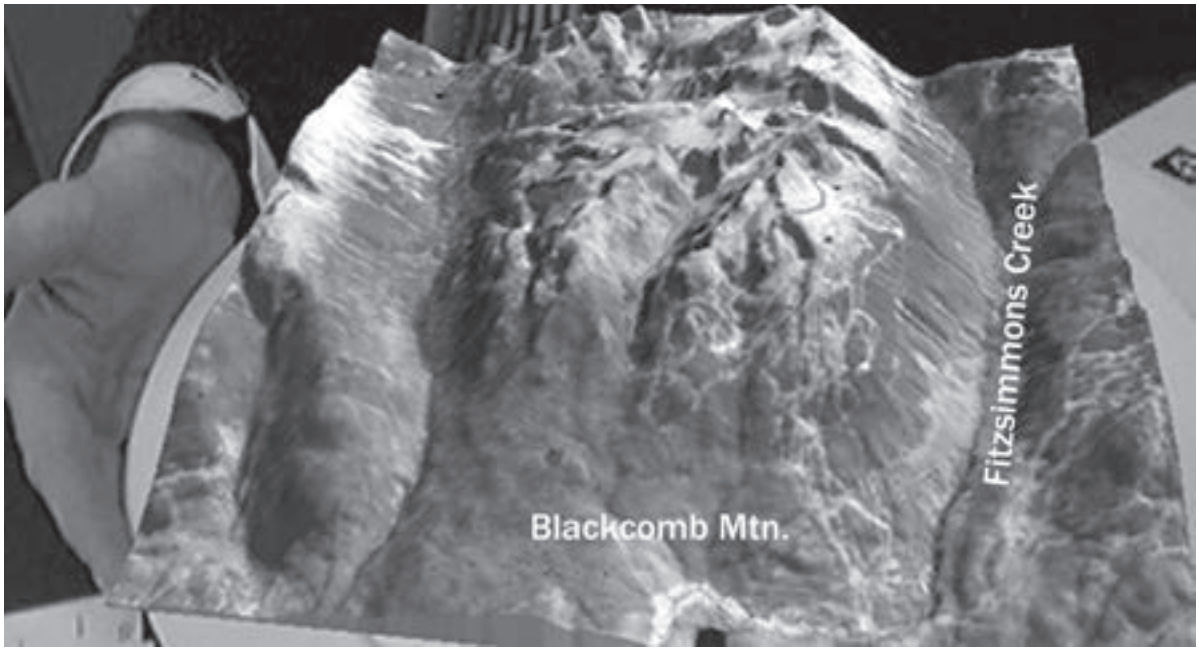


Fig. 4 Screenshot of the Blackcomb ski area in an AR environment. The red line symbolizes a potential route through the terrain. In this environment, users view the virtual terrain in a desktop computer display and can zoom in/out or rotate the content by physically moving a hand-held circular disk that has a virtual marker attached to it.

Augmented reality is still a developing technology, but it has been used in research in the medical, manufacturing, museum, and educational fields. Dr. Nick Hedley and other researchers associated with the Human Interface Research Laboratory have explored the potential for AR to teach complex and abstract science concepts (Hedley et al., 2001; Winn, 2002) and initial research indicates that AR is highly effective. It is possible that AR could help learners understand abstract avalanche science concepts easier and more fully. However there is no guarantee that this type of technology will teach students any better than more conventional 2D or 3D visualizations.

As a researcher at SIRL, I am initiating the development of a 3D augmented reality prototype (Fig. 4). This prototype uses the same terrain as the new 2D and 3D exercises and represents a first step toward using AR in avalanche education. Planned and future testing will focus on exploring the ability of AR to better represent terrain features than traditional and interactive zoomable 2D photographs and 3D terrain models. Previous research suggests that 2D forms are limited in their ability to represent complex, spatially dynamic phenomena and processes (Shelton and Hedley, 2002); yet new web-based interactive tools continue to rely on 2D videos, animations, and photographs. It is possible that recreationists' misperceptions of risk may partially stem from the limitations of current avalanche education methods and tools.

Conclusion

Effective education is the key to reducing avalanche accidents. My research is a pilot study aimed at evaluating and improving existing avalanche education tools and exploring the potential of new interactive 3D technologies. Most amateur recreationists lack the time and resources necessary to conduct well-informed terrain and risk assessments (McCammon and Haegeli, 2006). Hopefully, these new exercises will provide a safe way to practice route finding and hazard identification before amateur recreationists enter the backcountry. Formal testing of these tools makes this research the first of its kind in avalanche education. I hope this project will aid educators teaching avalanche safety and save time, money, and most importantly, lives.

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Strategic Shoveling:
The Next Frontier in Companion Rescue

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Background

In the past eight years, great attention has been focused on avalanche transceivers and their use. Not only are more avalanche transceivers being sold now than ever before, but more avalanche courses are being taught and more opportunities are being created for beacon practice.

In the past six years mean rescue times with a transceiver for recreationists have dropped by a third. These times include both searching and excavating. Based on U.S. accident data collected by the Colorado Avalanche Information Center (CAIC), the average search time was 29 minutes from 1977 to 2000, then dropped to 18 minutes based on data from 2000 to 2006.

During this time, transceivers have become significantly easier to use, due mainly to digital technology. However, there have been no corresponding advancements made over the last decade in excavation technique or education.

Anecdotal evidence suggests that the majority of time in avalanche rescue is consumed in excavation, after the victim has been located. Therefore, the greatest potential for decreasing overall rescue times is in this phase. If excavation times can be decreased at the same rate that beacon search times have, then we can expect an even greater improvement in survivability.

As important as excavation time is excavation quality. In at least two US avalanche rescues the victim's air pocket has been severely compromised as rescuers dug down to the victim. In other cases, excavation progress or treatment of the victim has been severely compromised by lack of maneuverability within the excavation area, for example, stepping on or knocking substantial amounts of snow onto the victim.

A search of international literature revealed very little published research on the subject of avalanche victim excavation. Most books don't mention how to dig, and the few that do limit their comments to starting the excavation downhill of the probe, and chopping the snow into blocks for removal.

Field research performed over 20 years ago by Willi Pfisterer of Parks Canada offers the most detailed advice for avalanche excavations. His research supports the creation of terraces extending away from the probe strike to enable snow to be removed more efficiently. Likewise, the Association of Canadian Mountain Guides (ACMG) teaches a method based on Pfisterer's research.

In order to verify Pfisterer's recommendations and the comments of individuals involved in rescues, we hosted three field tests in the Colorado Front Range to determine what shoveling techniques were most effective.

At all three sites, the tests were performed on slope angles ranging from 0 to 15 degrees. This is typical of avalanche runout zones, although depositions from small avalanches are sometimes found on steeper slope angles. The "victims" were either life-sized dummies or large canvas duffel bags filled with snow. The dummies or duffels were buried in varying orientations with respect to the fall line. All were buried parallel to the snow surface, as this is the most common orientation in which avalanche victims are found.

Burials were between 1 and 1.5 meters deep. This depth was chosen because the average burial depth in the US is 1.16 meters (according to CAIC data). Below two meters, the chances of survival are extremely low: only 11 of 126 people (9%) have survived burials deeper than 2 meters. All rescuers were equipped with the same-sized shovel (BCA Traverse EXT aluminum shovel with an extendable, oval shaft). The "victim" was first located with a probe by the test organizers. Rescuers were advised to leave it in place.

The test results were all qualitative, despite repeated efforts to generate quantitative data. At all three sites, excavation times were recorded for each individual or team and the final excavation areas were measured. However, the excavation times were variable enough so they were statistically insignificant. It became obvious that changing snow conditions, motivation, and the conditioning of the shovelers played an even more important role in excavation times than shoveling technique. However, in a real companion rescue, motivation, conditioning and snow conditions are not variables; technique becomes a critical factor in rescue time.

The Importance of Strategy

We started our experiments at Loveland Basin with nearly two dozen volunteers. All excavations were performed in a "dual" format and the excavations were timed to stimulate competition and urgency. Rescuers were first advised to dig with no particular strategy.

In the next round of tests, volunteers were given instructions on how large to make the initial hole and how to organize the excavation team. For large excavations (involving three or four rescuers), they were briefed on the methods developed by Pfisterer.

Digging with no strategy created a hole in which it was nearly impossible to roll or treat the victim. Often the rescuers were standing directly on top of the victim, compromising the air pocket. Rescuers would invariably excavate in a cone shape down to the victim. Once deeper than their waists, rescuers were no longer able to throw snow clear of the hole,

Figure 1. Proper terracing allows better snow removal and maneuverability for the rescuer. Sitting or kneeling is more ergonomic than standing.

but had to lift it above the sides and deposit it. This creates high walls around the hole and exacerbates the problem of removing snow from the excavation area.

To prevent the problem of digging straight down to the victim and creating a non-workable hole, we determined that it was essential to clearly define the excavation area before digging. This area, called the "starter hole," should be excavated first, preferably starting on one's knees. Once this hole is up to the rescuers' waists, then the next level can be excavated. Without this starter hole, rescuers tend to get "tunnel vision" and lose the opportunity to create a hole that will be workable when the victim is reached.

In burials deeper than the rescuer's waist—approximately one meter—the hole will need to be deepened further to reach the victim. This next level can be excavated closer to the victim, creating a "terrace" effect up to the surface, as suggested by Pfisterer. The starter hole, already excavated, enables shovelers to throw snow clear of the hole instead of lifting and depositing it on the sides (Figure 1).

Pfisterer suggests that the excavation starter hole should always begin at the probe strike and the terracing should extend down the fall line (if the deposition area is sloped). This decreases the probability of rescuers standing on top of the victim and trampling the air space. The ACMG suggests that the starter hole should surround the probe and the terracing should proceed on multiple sides. This increases the probability of locating the victim's head so an airway can be established.

Our finding was that it is more efficient and faster—at least with limited manpower—to build the terrace system on one side (downhill) rather than multiple sides. This enables the rescuer to excavate deeper and faster, thereby reaching the victim earlier. When revealing the victim, the snow can be removed relatively easily by "flaking" it from the wall rather than lifting. One shoveler can do this while the other removes the snow from the hole.

Manpower Considerations

It should be noted that in our research we drew a clear distinction between companion rescue and organized rescue. In a companion rescue, it is necessary to allocate limited manpower efficiently. In an organized rescue or mechanized operation with greater resources, it indeed might make more sense to excavate the starter hole around the probe and extend the terracing in more than one direction.

In the multiple-rescuer scenarios, it became clear that it is not always efficient to have all four shovelers excavating. When the starter hole is shallow (below the waist), all shovelers can throw snow to the sides, creating minimal interference with each other. But when it becomes necessary to jettison snow out the terraced side, both downhill (or "secondary") shovelers should leave the hole to enable the uphill ("primary") shovelers to throw their snow aggressively clear of the area. This provides the opportunity for one shoveler to rest while the other prepares the area for first aid and evacuation. In longer excavations, this opportunity for rest becomes very important.

Key Dimensions: Length

After experimenting with various hole sizes, we determined that the optimal y-axis—or downhill—length of the initial starter hole is approximately 1.5 times the burial depth (Figure 2). Hole sizes shorter than this tended to become too steep and high on the sides and therefore difficult for snow removal. A starter hole longer than this would delay locating the victim's head. A starter hole length of two times the burial depth felt excessive to the shoveler, who would often resist starting this far away from the probe strike.

While it seemed counter-intuitive to the test subjects at first not to dig their starter hole directly at the probe strike, eventually they would determine that a hole that large would need to be excavated anyway to adequately be able to remove

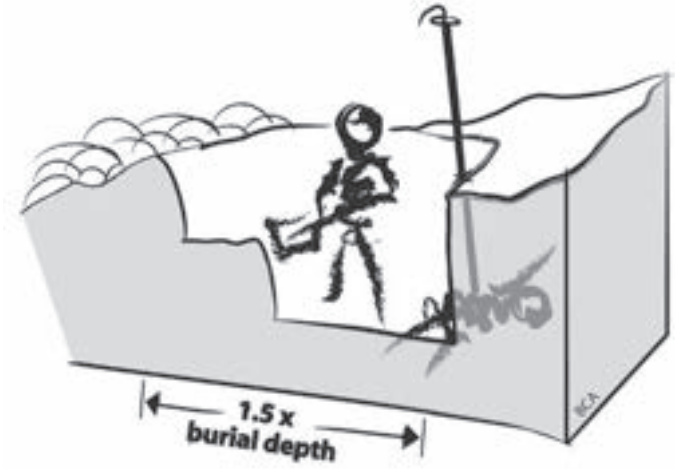

Figure 2. The optimal length of the hole should be 1.5 times the burial depth. Width should be 1.25 to 2 meters, depending on the number of shovelers.

snow when the hole got deeper. Our experience was that if the entire starter hole is not dug immediately, then it will not be dug at all. Once the excavation is underway, shovelers tended to get "tunnel vision" and keep digging straight down until the victim is reached.

One alternative is to initially dig the portion of the starter hole nearest the probe first, and then extend it once the shoveler is up to his or her waist. This increases the probability of revealing a body part closer to the surface than the probe strike. This is the best option if the deposition area is flat and the shovelers are disciplined and well-trained. On a steeper slope, however, it is more ergonomic and efficient to start downhill and work into the probe.

On a separate day, at Pass Lake, near Loveland Pass, we confirmed that a hole length of 1.5 times the burial depth was optimal even in hardened avalanche debris and at varying slope angles. Shorter hole lengths resulted in final holes with steep sides and lack of maneuverability.

Key Dimensions: Width

Since we knew that the optimal downhill length of the starter hole is about 1.5 times the burial depth, our objective here was to determine the optimal width.

We began by excavating what we determined to be "ideal" holes for rolling and treatment of the victim, using ourselves instead of dummies as the victims. This was extremely time consuming and most likely, extremely conservative. According to the CAIC data, only half the time will it be necessary to roll the victim to create an airway. In 235 US accidents where the victim's body position was recorded, 13 percent of avalanche victims were oriented on their side, 16 percent were vertical (sitting or standing), 26 percent were supine (face up) and 45 percent were prone (face down).

Since the victim's orientation is not known, we determined this dimension is more a function of the number of shovelers available at the site. Field-testing at Berthoud Pass convinced us that if two shovelers are working side by side, then a two-meter width is most efficient to prevent interference with each other. If only one shoveler is available, then a 1.25-meter width—or about one "wingspan"—is optimal to prevent interference with the sidewalls.

Rescuer Positioning

Tests with more than one rescuer confirmed that side-by-side shoveling was more efficient than shoveling in-line. Rescuers using the in-line technique would always shovel more cautiously to avoid striking the secondary shoveler with snow or their shovel blade. Invariably the secondary shoveler would be waiting for shovelfuls of snow from the primary shoveler so he could then move that snow from the area (Figure 3). While this provided needed rest for the secondary shoveler, it was inefficient compared to the side-by-side method.

Conventional wisdom says that it's best to position shovelers in-line so the second shoveler can move the excavated snow further downhill. But this is unnecessary if the snow is initially thrown to the sides and then thrown properly out the back. The second shoveler is best positioned side-by-side so he can help make the hole wider near the victim, increasing the probability of locating the head.

Figure 3. Shoveling side-by-side (background) was more efficient than shoveling in line (foreground). In the latter technique, the primary rescuer shoveled tentatively and the secondary shoveler was often idle.

Summary

Based on the preliminary research, interviews and field testing, we established the following guidelines for excavating avalanche victims in a companion rescue:

a) Leave the probe in place to confirm the exact depth and location of the victim. This also creates an imaginary line past which rescuers should not operate, so that they will not stand over the victim and trample the air space. Using a probe with depth markings is extremely valuable in determining the optimal size of the starter hole.

b) Clearly mark the area to be excavated. By marking this rectangular area and establishing a starter hole of that size, the shoveler will avoid excavating a restrictive tunnel or cone to the victim. This excavated area also enables snow to be thrown clear of the area once the snow surface is above the rescuer's waist.

c) The initial starter hole should be 1.25 meters or one "wingspan" wide for a single shoveler. With more than one shoveler, it should be two meters wide to ensure adequate working space and to increase the probability of locating the victim's head. This is a fixed dimension unrelated to burial depth.

d) The starter hole should extend downhill 1.5 times the burial depth. In a flat area, it should extend in the direction where snow can most easily be thrown. This dimension ensures that snow can be thrown rather than lifted and deposited on the sides, and that it will clear the area and not have to be shoveled twice.

e) Begin the excavation process on the knees, removing

snow to the sides of the excavation area, where it won't have to be moved again. Excavate by chopping the snow into blocks, then removing it from the hole. Stand up when the sides of the hole are up to the waist. Continue throwing snow to the sides.

f) On a slope, it is most ergonomic to start downhill and to move uphill while excavating, digging two blade depths down before moving forward. In a flat area, it is best to start at the probe, to increase the probability of reaching a part of the victim that is closer to the surface than the probe strike.

g) Once the sides of the entire starter hole are up to the shoveler's waist when standing, then the starter hole is complete. From this point, all snow should be removed to the downhill side, clear of the hole, rather than to the sides.

h) Once the starter hole is complete, excavate the next level. This should start approximately half the distance to the probe. By starting downhill of the probe rather than at the probe, the shoveler can create a bench on which to sit while excavating into the probe. From the sitting position, snow can very ergonomically be thrown from the hole at waist level.

i) Special attention should be paid to keep the downhill side of the probe exposed, particularly if the probe is perpendicular to the snow surface (as is normally recommended in a transceiver rescue) instead of plumb. If the probe is perpendicular to the snow surface and the uphill wall of the hole is excavated plumb from the surface down, then it is possible to excavate below the level of the victim without revealing the victim (see Figure 4).

j) Once the victim has been revealed, determine the location of the head and concentrate on revealing the victim's face. Establish an airway as quickly as possible.

If two shovelers are available, they should operate side-by-side, moving snow to their respective sides of the hole. Operating in-line is inefficient, for the reasons explained above.

Once the victim is revealed, the primary shoveler should remove adequate snow to provide an airway or roll the victim to provide an airway. This snow can be moved within the hole and then removed by the secondary shoveler, who is responsible for enlarging the hole to treat the victim.

If more than two shovelers are available, the two primary shovelers should begin the starter hole at the probe and the third and fourth (secondary) shovelers can begin the starter hole downhill, at 1.5 times the burial depth. All shovelers should clear snow to the sides. Once the primary shovelers are up to their waists in the hole and it becomes necessary for them to clear the snow downhill, then the secondary shovelers should exit the excavation area to rest and prepare for administering first aid and evacuation. For maximum efficiency, rescuers should rotate shoveling and resting approximately once every minute.

Deep burials of two meters or more may require an intermediate step in removing snow from the excavation area. At this depth it can be difficult to throw snow clear of the hole even with a terraced design. In this case, the primary shovelers should lift their snow to the level of the secondary shoveler(s). The secondary shoveler(s) can then clear it from the hole. One secondary shoveler may need to exit the hole to create room for this intermediate step.

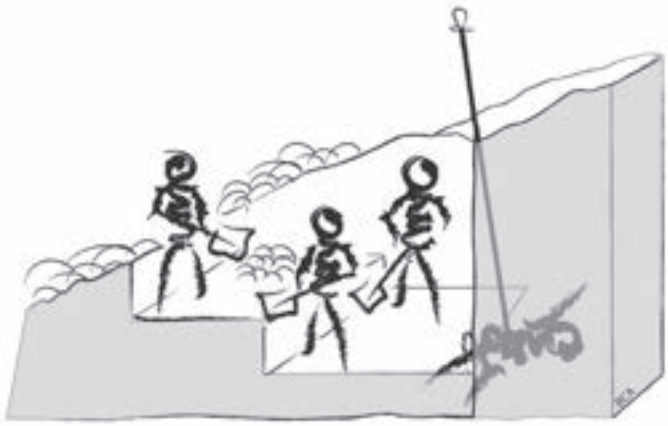

Figure 4. In burials deeper than two meters, it can be difficult to clear snow from the hole. Instead, it should be lifted to the next terrace, where it is removed by a secondary shoveler.

Conclusion

Strategic shoveling techniques show promise for decreasing excavation time and improving workspace during victim recovery. The excavation phase is the most time consuming portion of most companion avalanche rescues. Now that transceiver search times are on the decrease, the excavation phase holds the most promise for improving the chances of live recovery. We believe avalanche educators should include these strategic shoveling techniques in their curriculums and that further research should be performed to better quantify the most efficient methods for excavation.

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

Avalanche Explosives Control Update

By David Sly

My latest swing through the industry was primarily to introduce our new Avalauncher bullet we call the "Stubby Snowlauncher System." The evolution and development of the Avalauncher has been well documented in previous articles. Its value to the snow control industry is unprecedented. The "classic" style Avalauncher has remained unchanged for about 30 years or so. Changing it has been a difficult but rewarding task.

Quality control of the classic system was a challenge because of the number of participants involved in manufacturing all the required parts. The system control was spread through corporations from California, Utah, Ohio, Quebec and BC. Well known problems included broken nose cones, crooked nose cones that ruined flight, loose adapter molds, extremely tight adapter molds, an intermittently poor tail fin connection causing separations in flight, poor flight characteristics, supply interruptions and delays, and little or no field technical service. Last but certainly not least was the issue of determining which company was responsible for what problem.


David Sly and Mike Rubenstein of Kicking Horse Mountain Resort working their Avalauncher gun.

Daniel Leslie

We believe our new Stubby Snowlauncher System addresses all these deficiencies. CIL/Orion uses experienced field technical support as well as extensive staff support in R&D at our head office and plant levels. This is a large part of our commitment to the avalanche industry, ensuring our continued unmatched track record.

Collectively Everett Clausen, Andre Gagnon and I have contributed 100 years to the explosives industry. We analyze our product performance in the field, providing feedback to the scientists, chemists and engineers we work with at Austin Powder Company. It is this collaborative culture that ensures our products are kept at the level the industry is accustomed to. As a result, you can be assured they are not homemade charges, but are meticulously designed and backed by a network of companies with depth and bench strength. This is an important liability-plus only CIL/Orion offers.

Our products must be safe, reliable and affordable. It is incumbent upon CIL/Orion to ensure this is the case. Therefore all our products must be properly introduced to the site and our clients with a field visit and follow-up visits. We set the procedures and guidelines for all our products and systems to ensure safety. This is an essential part of our customer service commitment and one that our valued customers have learned to depend on.

Our products are designed specifically for use in the avalanche industry and we have full liability assurance partners who understand and support our Snow Control Division. We don't fear our customers and issue forbidding warnings that our products are not to be used by avalanche practitioners. We support and encourage the use of our products for avalanche control. That is why we designed and manufactured them—for you.

All parts and design for the Stubby are made in-house by CIL/Orion and the Austin Powder Company. This gives us the quality control that was lacking in the past. The primer is made in Ohio with the patented Austin Powder Enviroprime COMP-B blend. This blend contains 5% microbial inoculants for self destruction.

I was delighted to find real evidence of the advantages of this feature when I visited Rob Hemming at BC Highways in Revelstoke. His team had recovered a 4kg COMP-B Avalanche Guard primer dud containing the Enviroprime blend. This dud was found on the Laurie slide path and originated from a target registry for the Avalanche Guard in October 2005. The rugged cardboard wrapper was soggy but intact, while the COMP-B inside was almost completely decomposed. With this new field evidence, we can safely assume that all our COMP-B products will decompose in the field but not in your magazines.


The new Stubby Snowlauncher System.

CIL Orion

As well, Rob reported that our Avalanche Guard system is definitely doing its job in this large avalanche field. Avalanche Guard is artificially triggering class 4 avalanches when forecasted to do so. This buys everyone some much-needed stress relief. News like this just can't be matched in any lab setting.

As I made my way through the industry many small discoveries were made. At several sites, I found three different gun barrels that the Stubby would not fit into. One barrel actually fit the Stubby on one end and did not fit the barrel on the other end. Fluctuations in temperature play a large role in the diameter of an aluminum barrel, and our Stubby procedures address these barrel issues. CIL/Orion has specially designed barrels for sale if your gun should require one, whether it is a breach or tray loader.

A few accounts like Telluride, Mount Hood Meadows and Fernie Alpine Resort have some very difficult, high pressure targets to hit. The difficulty comes from long distance and indirect targets. One target at Telluride has to fly over a large shoulder and drop down into a start zone. High pressure lobs are needed to hit this important target.

At two of these locations we test-fired the Delta K round along side our Stubby. The Delta K round has some desirable features and flies straight and accurately. The patented Delta K arming system is very reliable and provides a very fast detonation linkage, enabling the charge to explode closer to the surface. The tail fin connection has been a topic of much discussion but this feature is dealt with through precise and detailed procedures. Many thanks to Daniel Howlett (Howie) at Alta for his assistance with this.

The avalanche control team at Stevens Pass is now using our new low-temperature emulsion with cap wells. This enhanced energy charge is working very well. The rugged wrapper over a 2" x 12" payload provides reliable high energy at an affordable price. The cap well enables charges to be disassembled without contamination to the detonator.

I also visited Aspen Highlands to introduce our Avalanche Guard system. The Highland bowl is a great spot for this large 4 kg COMP-B primer. We lobbed one charge on each side of the bowl from a mobile Avalanche Guard Pipe. The pipe was mounted on a snowcat and launched from above the bowl, in a safe area well back from the lip. As it happened, we were there the day after the largest snowfall of the season and the large explosions soon emptied the bowl of any dangerous deposits.

This season we are really seeing an increase in sales of our factory made Mildet Fuse Assembly. The Mildet has been exclusively used in Canada for the past six years. The entire USA market appears ready to switch from homemade fuse assemblies to a reliable factory-made fuse assembly. Our Mildets are made in the USA at our plant in Tennessee. This year has been one of our best years ever for reliability. We can boast a performance rating of less than 0.01% failures. At Lake Louise Dave Isles told me, "We have never had a dud with Mildets in the six seasons we have used them." Mildets are the backbone of our business and this is great news indeed.

Now, with these new Avalauncher bullets available, I am sure you will see a renewed interest in the Avalauncher system. At CIL/Orion we are committed to this industry. We have an answer for your avalanche explosives needs on both sides of the border. We have quality equipment, a quality product and quality people! Our field support never stops. That's a wrap for this trip, and I hope see you all on the mountains soon.

David has been in the powder business since 1977 when he worked as a delivery person for his uncle's company, Killeen Explosives Ltd out of Nelson, BC. After his uncle's death, David ran the business with his aunt, marketing explosives for mining and avalanche control in the Kootenays. In 1989 he reformed the family business as Maple Leaf Powder Company, a government-approved technical blast designer and blasting consultant. Though he is now based in Victoria, he continues to get to all the nooks and crannies of the province, working with just about everyone involved in the avalanche control industry today. His son, Adam Sly, is also in the powder business, carrying on the family tradition

Daniel Leslie

Thank you to all our clients I worked with on this trip. Your input is crucial to the development of our systems and products.

Mount Hood Meadows, Telluride Ski and Golf, Colorado DOT, Emrick and Hill Inc., Dyno-Nobel Inc., Aspen Highlands, Breckenridge, Copper Mountain, Stevens Pass, Mount Norquay, Lake Louise, Marmot Basin, Jasper Parks Canada, Kicking Horse Mountain Resort, Mustang Powder Ranch, Whistler, Blackcomb, Fernie Alpine Resort, BC Highways Revelstoke and Victoria, Craig Sterbenz (Sterby), Anton Horvath, Tony Sittlinger, Jon Andrews, Asa Mueller, Tim Ricci, John Thornton, Mike Rubenstein, Daniel Leslie, Dave Isles, Richard Miller (Rocket), Garth Lemke, Mike Eider, Rob Hemming, Doug Wilson, Daniel Howlett (Howie), Brian Johnson, Mark Vesley, Garret Boyd, Mike Wilson, Ray Munford, Jack Steiber, Peter Carvelli, John Adams, Mike Clark, Rob Tierny, Kevin Ahern, Stu Schaefer, Roger Peart, Stephen Kintingh

Product Review

Backcountry Access SR3 Avalanche Rescue Probe

By Ken Wylie

What's in a name? Names of things have the ability to expand or limit our perception of a tool. The SR3 Avalanche Rescue Probe is a case in point. This probe is perhaps one of the finest rescue probes on the market for that express purpose. It has the fastest assembly of any probe out there and the "quickie" tensioning system is the most creative system I have ever seen in any probe anywhere.

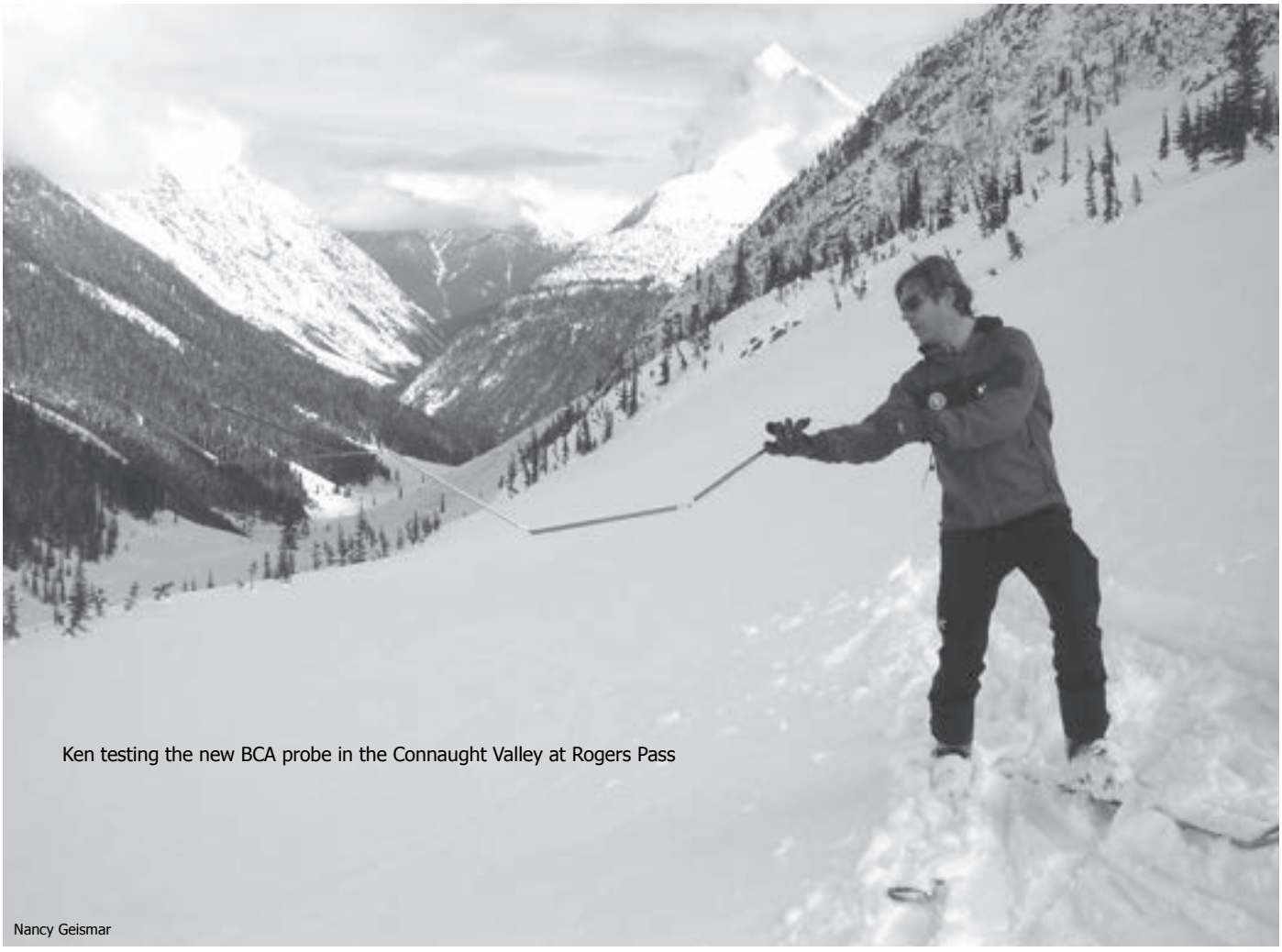
It has pointed guides so that each probe section slides together without binding during assembly. It has a length of three meters, which is adequate for deeper snowpacks and has laser-etched depth markings in 1cm increments to measure burial depth. It also comes with a companion rescue guide, which is invaluable information for the intended use as a rescue tool.

Careful thought has gone into making the tool fast and easy for use under duress. Overall, it has the look and feel of durability and for the person who is only going to use it for avalanche rescue, it is indeed perfect.

However, I believe that Backcountry Access can work to expand their definition of what a probe does in the backcountry winter environment. If they do so they will easily reach the goal of making the perfect probe for winter mountain use and not just avalanche rescue.

As a guide I use my probe extensively to assist my decision making process, a use which far outweighs the amount of time I would use it for locating an avalanche victim. Instead of thinking of this tool as an "avalanche rescue probe," I would call it a "winter mountain probe." It is with this notion in mind that that I will base my review.

This shift in thinking might begin with the card that comes with the probe. It is good, but it only deals with rescue. This is a lost opportunity to give more information on what a probe is used for in the winter mountain environment. Knowing what a thing is used for gives the user more power with the tool. Most users love to know all of the uses of a tool, and knowing all the applications that a probe can be used for will improve their decision making and overall safety.



Ken testing the new BCA probe in the Connaught Valley at Rogers Pass

Nancy Geismar

As a guide and instructor I use my probe for:

1) Checking snowpack depth across the terrain. This gives me a better sense of snowpack coverage and consistency. This is information that may prevent an accident because we know that avalanches are, at times, triggered from thin spots in the snowpack. Simply knowing if the snowpack is evenly distributed or not is often very helpful in assessing stability.
2) Snow profiles. I use the probe to determine a suitable profile site and as a ruler in my snow pit to measure the depth of layers and features in the snowpack. Snow profiles are an important tool for decision making while in avalanche terrain, and my probe plays an important role in this step.
3) Glacier travel. My probe gets used for finding crevasses while on glaciers and making sure I am on hard ice for route finding, re-grouping and setting up camp. In fact on Denali one year I witnessed an entire camp set up on top of a sagging snow bridge. I also estimate bridge thickness with my probe and general coverage over the glacier, which aids in my rope-on/rope-off decision process on the glacier.
4) Snow shelter construction. My probe is invaluable for giving me information on snow depth and ground features before I build a snow shelter.
5) Managing cornice hazard. The simple assumption that the ridge extends underfoot in winter can have dire consequences. There have been many deaths over the years of people trodding on cornices. I use my probe to ensure I and my party remain on terra firma and not on some cornice large or small. Surprisingly this happens to even the most experienced among us.

Expanding the definition of what a probe is used for in the winter mountain environment changes the design. When one looks at all of these uses, the SR3 probe needs polishing on a couple of points.

First, the depth markings need to encircle the whole probe. Since I am constantly using it for measuring I need the convenience of having the "ruler" on all sides. This would also speed up assessing the burial depths of avalanche victims in the event triage is needed during events with multiple burials.

Secondly, the draw cable the tensioning system relies on is plastic coated. Since I use my probe routinely, and for much more than rescue purposes, I have found that this component wears out and negatively affects the "quickie" tensioning system. I would suggest replacing the plastic with a more durable material.

All in all I would highly recommend the Backcountry Access SR3 probe. It is a highly functioning probe, with a speed of assembly that allows me to make quick assessments and measurements with a minimum of fuss. To me, my probe is much more than an avalanche rescue probe. It helps me make decisions by giving me more information, which may, in fact, keep me from using it as an avalanche rescue probe—something we all want to avoid.

Bruno Engler

Banff National Park

Celebrating 25 Years of service: 1982-2007

Wednesday May 9th

25th Anniversary CPD Seminar - Celebrating 25 years of Professionalism in Canada
1:30pm to 5:00pm
A Retrospective of Avalanche Safety—milestones and landmarks in the avalanche patch
Outstanding Achievement Awards
Silver Anniversary BBQ & Celebration
5:00pm till late
Silent Auction
25th Anniversary Photo Contest
BBQ for CAA members, family and invited guests
$60/person – includes BBQ, refreshments and 25 year memorabilia

Banff National Park

Clair Israelson

Don Bauer

Transitions:

Lead Content and Curriculum Developer
Ken Wylie


Nancy Geisman

The CAA is pleased to announce that Ken Wylie is coming on board to head up the next phase of our on-line education project *(Editor: you can read more about that project on page 14.)* Ken comes to us from Thompson Rivers University (TRU) where he's recently been an instructor in the mountain section of the Adventure Diploma Program. Ken is a fully-certified mountain guide with a tremendous amount of experience in outdoor education. In addition to TRU, Ken has taught at Yamnuska Mountain School, in the Outdoor Pursuits Program for both the University of Calgary and Mount Royal College, and with Outward Bound.

Ken brings with him a passion for both teaching and the mountains. "In my work as a mountain guide I have typically gravitated to educational programs," he explains. "It is through empowering others that I have found the most rewarding experiences of my professional life." Ken has also done a lot of work in producing individually-targeted programs and he's looking forward to the challenge of this next project. "I expect this to be a very rewarding experience because I will be working with two dynamic elements—avalanches and people," he says. "Through the interaction of people and snow we have great potential to grow in our understanding of both. I can think of nothing more worthwhile."

Youth Avalanche Education Coordinator
Verena Blasy


Verena Blasy Collection

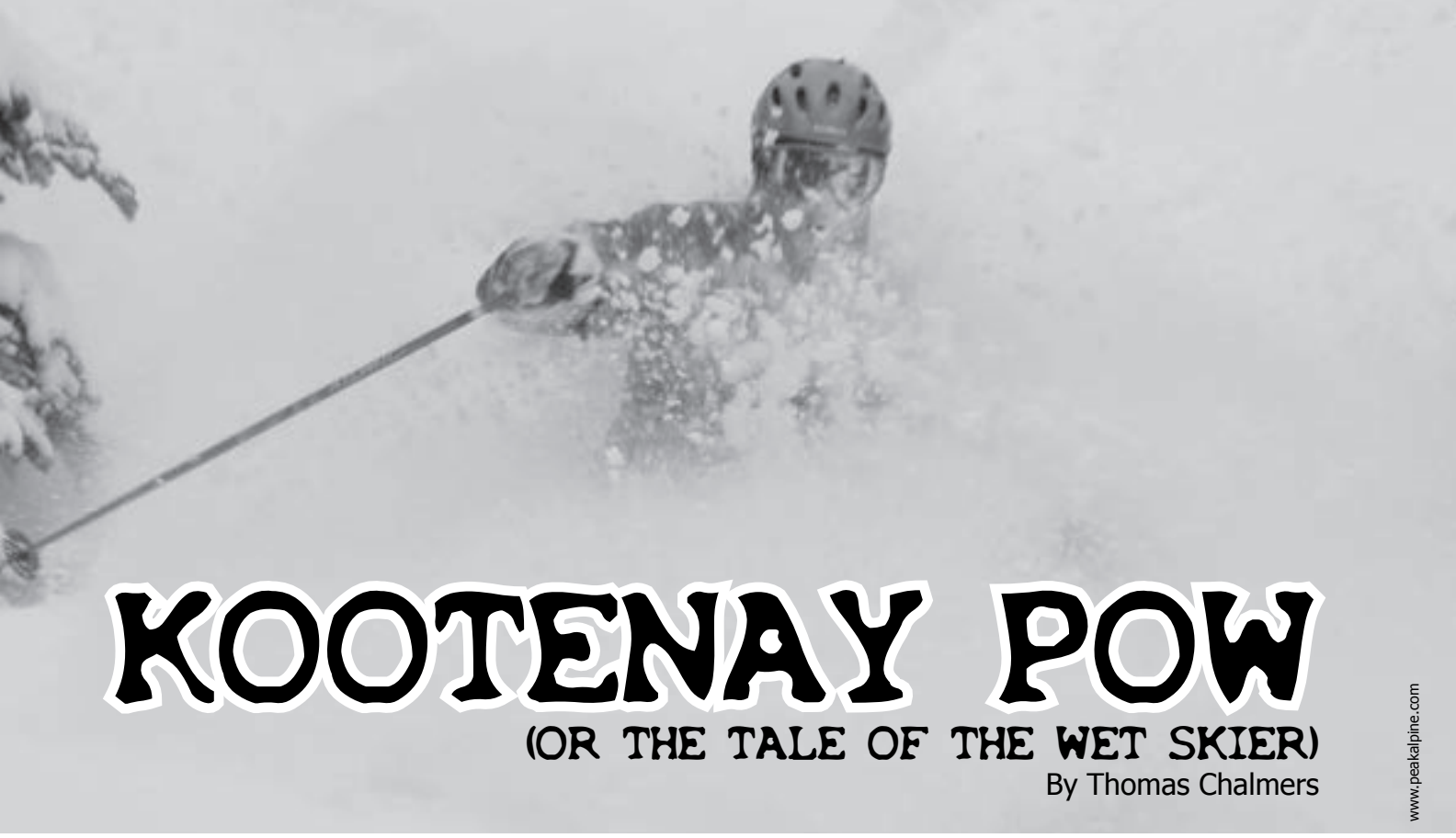
Verena Blasy is a substitute teacher in Revelstoke who has taught all grades—from kindergarten to grade 12. In addition to her work with the public school system, Verena also helps run the Mountain Caribou Education Program, which travels to schools throughout the Columbia River Basin teaching students about our local mountain caribou. Combined with her outdoor experience and skill in curriculum development, she's a great choice to coordinate our new youth avalanche education program.

"I love teaching people about anything to do with the outdoors," says Verena. "I think avalanche and winter recreation education is really needed in Revelstoke schools and other mountain towns. I've talked to several students at the high school who go out into the backcountry with no safety gear or knowledge of the risks. This is a great opportunity to prevent some accidents that could very well happen."

In addition to backcountry skiing, climbing and hiking, Verena is interested in knitting and Celtic fiddling. She also confesses to being a "nature nerd" and says she's "particularly fond of plants." Verena is looking forward to working at our office because "the CAC is a pretty happening place and they have good coffee here to boot."

“Prevention…is one of those things there is not much glory in. I mean you can’t prove how many people you saved by telling them this and that and giving them lectures.”

Willi Pfisterer as told to the CAA’s Oral History Project



KOOTENAY POW

(OR THE TALE OF THE WET SKIER)

By Thomas Chalmers

www.peakalpine.com

1. A CHAIRLIFT ENCOUNTER

Another Sunday in March, two thousand and seven,
The rain kept on coming, pounding and numbing.
Friends headed for drinking like angels for heaven.
But the lift was still spinning and I was still grinning,
Soaked to the skin, and barely alive.

I sat down on the seat, with much sloshing of feet,
And at first paid no attention to the man I now mention
(My awareness was trapped in my body, sans heat).
He had bombed the last pitch, ducked the rope with a twitch,
And plopped on my chair, bearded and duct-taped and not very neat.

The fellow did rouse me, with a voice clear and bright,
"I don't like the rain, so much moisture in vain,
And temps above zero all through the night.
No snow, only woe, from this damned southwest flow!
A big cursed soaking instead of pow, nice and light."

2. THE MOUNTAIN CLIMATE OF WESTERN CANADA

I was struck dumb by his wagging tongue.
"You look lost," he said, sagely nodding his head.
"Let's start in the Pacific, with a storm, strong and young.
It grows up and moves east, then the Coast Range does feast
On snow warm and wet, and plenty is wrung."

"For mountains are glad when storms come to play!
A system comes from the ocean with moisture and motion,
Then mountains stand up and get in the way,
Forcing clouds to go up, pouring wet from their cup,
The storm moves on smaller, with a little delay."

"Then it will rest, and sooner is best.
Behind a tall peak the storm is quite weak,
And keeps much of the moisture close to its chest.
Just ask your Dad-O about the rainshadow,
Or hang out in Osoyoos, be dry and feel blessed."

"Past Whistler it flows, the land of do-as-you-please.
The pow there is dense, and rain sometimes intense.
Our storm then heads on. Drier and colder, it flees.
Over the plateau, past Kamloops it will go,
Into the Columbias, and the steep-ass deep trees.

"Now the storm is no miser, just older and wiser,
So again the snow falls (but with slightly less balls).
Colder air and less violence becomes an enticer.
Thus the pow is more fluffy on Rogers than Duffy,
The amount may be less, but it feels that much nicer."

"Then the storm heads up the big Rockies past Golden.
Some moisture remains in its grey cloudy trains;
The Great Divide will soon see what they're holdin'!
At the height of our land lies the last great demand,
Where the storm spends it all, and its hand is now foldin'!"

"Our storm is well-travelled, tired and old.
At Sunshine and the Lake, the hills get what they take,
They grab it with fences, from wind and cold.
And if you dare look, there might be a Chinook,
A last blast of warm air from a warrior bold!"

3. THE WINTER WEATHER SYSTEMS OF WESTERN CANADA
"Storms move west to east, it all seems so plain,
And mountain ranges three set the clouds' water free.
Yet to find the best snow there is more to explain!
It all comes to pass from prevailing air mass,
Just give me a light and I'll still entertain!"

With that he laughed and pulled out a smoke,
And lit up a butt, that silly old nut
(Though it smelled sort of funny and he started to choke).
"So the Coast gets the most and the Rockies the least,
With Columbias between, under winter's snow cloak."

"An ocean storm from northwest, when seen from the sky,
Is a gargantuan swirl, a big cloudy whirl,
Called Aleutian Low Pressure, oh me oh my!
It then spanks the land, with a cool wet hand,
And brings snow to the people, unless there be a High!"

"A High is a curse and a blessing of sorts,
It has air that is colder and drier and bolder,
So blue skies and no snow are its major imports.
The trouble arrives when a High comes to stay,
For sweet Lows may bounce off it with a few whiny snorts."

"Now of this High Pressure, there are two major kinds,
The first is born in Pacific, west or south is specific.
When it comes to Vancouver, nobody minds,
For they need winter sun; if this High is not done,
Even out in the Koots they may open the blinds!"

"Pacific High does not last in a nice stormy blast,
Unlike its bad twin with the cold Arctic grin!
When Arctic High comes, put the flags at half mast.
Cold air from the Pole drops into Alberta,
When it spills out to the west, the snowfall stops fast!"

"There is one more sort of air mass to discuss,
Born near Hawaii, it is mighty, but gross!
The Pineapple Express is a warm winter bus,
To the ridges it rains, causing great pains,
Smashing the shredding with a big sloppy fuss!"

4. WHY THE INTERIOR RULES
"And so, by-and-by, through blown mind and blown knee,
There are no two winters the same in this great chaos game!
But the snow always covers every rock, every tree.
And our thighs will yet burn, and we'll get good turns,
For the best pow to be had is yours to go ski!"

"In middle BC, we see nature's cahoots,
Compared to the Coast, our dry pow is the most,
Cold on the face, but not wet in the boots.
Next to the Rockies, our temps are less shocky,
And we get way more snow (hence the hollers and hoots)!"

5. WHY YOU SHOULD SKI IN THE RAIN ANYWAY
"That's why," he said, "I'll ski here 'till I'm dead."
And so he spoke, and finished his smoke,
Then pulled out spare goggles, which he placed on his head.
"But that does not explain, here in the rain,
Why YOU are still riding, when all others have fled."

"That's simple," said I, "and you may get my notion.
For I could be lurking in an office and working,
Way up in Cowtown, or down by the ocean.
But I'd rather be skiing, be it pow or clouds peeing,
Because that's what I got, growing up Nova Scotian!"

Brad Harrison

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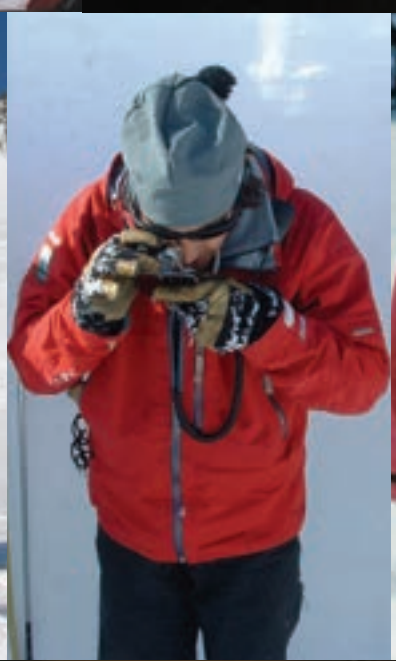
Flakes


...happy birthday dear C.A.A.,
happy birthday to - RUN!!
CLOSED FOR AVALANCHE CONTROL
Yellow Snow hole
©r.buchanan

Lyle Grisedale

Facing page clockwise from top left: Bruce Jamieson, Clair Israelson testing slope angles. The first five presidents of the CAA: Fred Schleiss, Peter Schaerer, Chris Stethem, Bruce Jamieson, Jack Bennetto. In the field with Peter Schaerer, Paul Anhorn, Art Twomey and Mike Zylich. National Park Wardens Lisa Paulson and Sylvia Forest. John Tweedy, Evan Manners and Bruce Allen laugh it up at last years' AGM. The French connection of Dominic Boucher, Stephane Gagnon and Marc Deschênes. Forecaster time with John Kelly, Scott Back (guest forecaster from the North Shore) Greg Johnson and Ilya Storm. Centre: Craig Ellis in the pit. All photos CAA archives.



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