THE AVALANCHE news

canadianavalancheassociation
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Photo: Kirstie Simpson

inside

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Table of Contents


Kokanee
GLACIER
BEER
Kokanee
GLACIER BEER
BC'S
GLACIER
FRESH
TASTE
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Avalanche News Volume 77 ❄ Summer 2006

canadianavalancheassociation

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

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

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

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

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

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

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Surveying the Scene

In late June, just as this issue was wrapping up, the CAA sent out an electronic member survey. As I write this, it's been less than a week since the survey went out and we've already heard from almost 15 percent of the members. Any pollster will tell you that's an impressive response rate, and we're heartened by your willingness to help us determine our focus and priorities.

It's been exciting finding out more about the members and their thoughts about the CAA, and a few things jump out at us. First off, it seems the avalanche workforce in Canada is vital and flourishing. This is good news for those who fear the majority of our members are aging. There has been some concern about the lack of "young blood" in the community, and on an anecdotal basis, there seemed to be some support for this theory. A quick scan of the crowd at the AGM reveals a distinct preponderance of grey and balding heads. However, according to the early results of our survey, this isn't the case. Almost 40 percent of the respondents are in the 25-34 age group, and 50 percent have been in the business less than ten years. Seems our community isn't stampeding to retirement after all. That's a relief.

Another piece of information we've received that's of special interest is the fact that the primary employers among this first wave of respondents are small businesses. The CAA has been working hard to bring small businesses into the technological fold, so it's good to know these efforts are focused on the right target. In fact, this issue has an article highlighting the latest initiative in this direction, called the Canadian Avalanche Data System. Take a look on page 25 to find out more.

As the editor, I was especially interested to find out what you think of this publication. I was gratified to read that 70 percent of the members surveyed said they find Avalanche News highly relevant. They read most of it and tend to keep back issues for reference purposes.

This information has added some fuel to another plan we've got cooking. This one involves sprucing up Avalanche News and making it into a more professional-looking journal. We're already pretty proud of the content. Now feels like a good time to tweak the image a bit. We're in the process of studying the business case and there are a few more steps to take before making a final decision but we'll let you know what happens.

We were surprised to find out that a significant portion of the respondents—over 30 percent of them— never use the "members only" section of our Website. We put a lot of important information in that section, and to find out that many members aren't using it or finding it helpful is a bit troubling. It's a big job to keep track of the site's contents, and we're constantly trying to streamline it and make it as efficient and intuitive as possible. We'll continue working to make it better, so please keep letting us know what you think.

So far, the survey results tell us the members are pretty happy with where we're going. Over 90 percent say they'd describe their feelings about membership as positive or very positive. The top reason for belonging to the CAA is educational and career development opportunities, which tells us our members want to keep learning and want us to keep bringing together the best new ideas and practices.

These early respondents have been a good mix of front-line workers, managers and owner/operators. It's good to know we're hearing from across the spectrum but more data is always better. If you haven't completed the member survey yet, please take a few minutes to do so. Your feedback is a crucial element in helping us plan a steady and sustainable future for the CAA. We are always looking for ways to bring value to our members, and knowing your needs is the first step in that process. Have your say, let us know what you think, and together we can realize our vision—to be a world leader in avalanche awareness, education and safety services.

View from Up Here

View from Chatter Creek Lodge, looking south to "The Table."

Photo: Isabelle Thibeault

Back to the Future

BY CLAIR ISRAELSON, CAA/CAC EXECUTIVE DIRECTOR

The CAA is now entering its 25th year of service in the Canadian avalanche community and recently I've been reflecting on our humble beginnings, and what the "the little association that could" has achieved so far. I remember attending the meeting at the Banff fire hall in the fall of 1981 where the avalanche "players" of the day agreed that forming a Canadian avalanche association was in our collective best interest.

Following that meeting Peter Schaerer and a small working group drafted a set of bylaws and the CAA was incorporated in BC as a not-for-profit society on December 30, 1981. The first formal meeting of the newly formed CAA was in Vancouver in the spring of 1982. The purposes of the CAA were formalized in the bylaws, and it's interesting to note that avalanche training and education were priorities back then, and still are.

During the 70s and early 80s many young Canadians were learning avalanche skills and mountain craftsmanship from program leaders who had emigrated from Europe. The avalanche gurus of the day usually had names like Hans, Willi, Peter, Fred, Toni, Walter, Rudi or Seppi. At the early CAA meetings the gurus would hold court, and the rest of us would crowd around their tables, long hair wafting out from under our ball caps, proud of our scruffy beards and sunburned faces, to learn everything we could from them.

When the gurus went to bed us younger folks would continue to talk avalanches, about what worked (or didn't) in our operations. New techniques, avalanche science, accidents involving us or the public, anything and everything about avalanches was grist for our mill. These conversations were lubricated by sometimes copious amounts of beer; sleep seemed optional, and energy levels were intense. Everything was changing. "Best practices" were being invented and shared, and we were tackling our problems together. The character and core values of the Canadian avalanche community were being formed.

"...my involvement with the avalanche training schools program was probably the most useful career development of my adult working life."

Garry Walton is one of the players from that era who is yet, in my opinion, to receive fair recognition for his contributions to the avalanche community. Avalanche training programs continue to be the core of the Canadian avalanche community, and Garry Walton is largely responsible for setting these programs on the road to success. As head of the Industry Training Programs at the British Columbia Institute of Technology (BCIT) in the late 70s and early 80s, he brought sound educational structure and professionalism to avalanche training in Canada.

I suspect Garry found the "avalanche crowd" a little weird, but fun. He came to like us, and over the years spent a lot of BCIT's money developing avalanche-related programming. He hired training-program design experts, brought practitioners from the full cross-section of avalanche operations to Burnaby, and tasked us to develop clear learning objectives and standardized lesson plans for all BCIT avalanche courses. Bert Clark was one of the experts Garry hired. Always dapper in his turtleneck sweaters, tweed jacket and military black polished shoes, Bert must have shuddered at the prospect of getting anything useful out of the T-shirts-and-jeans folk that we were, but he persevered and together we got the job done.

Next, Garry took on the daunting challenge of instructor training and development. Never one to pull his punches, Garry said "You guys are damn good at what you do, but you don't know jack s--t about instructing." That statement caught me, and I suspect many others, off guard. Later, thanks to Garry and BCIT, I came to appreciate how right he was.

For several years Garry, Bert and a hoard of hyperactive avalanche folks would descend on the Downtowner Motel in the town of Creston, BC for two intensive weeks of instructor training. Days were crammed with instructional theory and the creation of lesson plans and other teaching aids. We also practiced delivering our work in front of a video camera and the tough crowd of our fellow students. Feedback on our performances from Bert and Garry was immediate, honest and to the point.

After class we would each review our videos. How did we do; did we cover the material well; did we use the instructional aids properly; was our nervousness as obvious to the audience as it was to us? The feedback from fellow students was probably a little more consoling than that from Garry and Bert; we were all learning together, and giving our best effort. It was great fun learning useful new techniques and skills, and sharing our successes and disappointments with such a keen and motivated group.

The evenings at Creston were memorable too. There were dinners with 20 people around one table eating good Italian food and drinking bad BC red wine, and road trips to play pool in the US border town of Blackhawk. Friday afternoon tours to the Columbia Brewery (yes, the CAA-Kokanee relationship goes back a long way), organized by Paul Anhorn. Friendships were made that will last a lifetime. Those were the best of times.

To this day the CAA avalanche training courses have clearly defined learning objectives, carefully designed and standardized lesson plans and learning aids, and instructors who have undertaken skills training and development. All new courses and significant course revisions are developed by teams made up of leading practitioners and adult education experts, ensuring students learn the right things, the right way, in the shortest possible time.

In the past 25 years the CAA industry training programs have been praised as being the best in the world. Last year 32 students traveled from other countries to attend CAA courses, and CAA Industry Training Program (ITP) courses were exported, instructors and all, to Japan and Iceland. Our program has been adopted in New Zealand, and the CAA routinely receives inquiries from South America and elsewhere. In short, the CAA training schools have become internationally recognized for their excellence.

In retrospect, my involvement with the avalanche training schools program was probably the most useful career development of my adult working life. Through the training schools I was exposed to how adults learn, and learned how to better communicate information in ways that will be remembered and in the right context. These are skills we use every day, in our workplace and all aspects of our lives, especially as we move into supervisory and program management positions. It was also tremendous fun working with a group of instructors that included movers and shakers from the entire spectrum of the Canadian avalanche community.

"…the next generation of leaders in the avalanche community will face escalating societal demands for safety."

So what's the connection with the CAA's 25 years of service? Looking into the crystal ball of the future, here's my two bits worth. There's a bunch of us who will all be heading off into the sunset in the next decade or so, and the next generation of leaders in the avalanche community will face escalating societal demands for safety. The profile and importance of avalanche protection in Canada will grow. The future leaders of Canadian avalanche programs will require university degrees and broad operational experience.

In many ways, 2006 reminds me of 1981, except now the avalanche gurus are Canadian, and have names like Chris, Phil, Janice, James, Colin, Bruce, Margie, Scott, Alison, Randy, Dave, Larry, and many more. These folks are also the CAA ITP course leaders. They have all worked in the avalanche patch for many years, have incredible knowledge and experience, and still have a few more years to go before they retire.

If avalanche work is your passion, working as an instructor for the CAA's Industry Training Programs is one of the best ways possible to get skills development and mentorship that can help put your career on the fast track. And we're not just looking for guides; the students gain a tremendous amount when they hear from instructors with different backgrounds and skills. If you think you've got what it takes you, contact Ian Tomm, CAA Operations Manager, and throw your hat into the ring. I can only hope that every instructor enjoys their experiences, and learns as much along the way as I have.

Fine Tuning

Another year has passed us by and summer is here. Certainly this past winter will be remembered as one with generally stable conditions and fantastic skiing. CAA and CAC independence was fully implemented and we saw a tremendous synergy due to the strong working relationship and links between the two corporations. This necessary autonomy kept our books straight, and our stakeholders very satisfied.

The board has been operating well and seems to be functioning at the desired policy governance capacity. My personal thanks to the outgoing board members; Anton Horvath, Alan Jones, Lori Zacaruk and Mike McKnight–it was a pleasure working with you. And to the new board members, we say welcome to Janice Johnson, Andrew Nelson, Mike Boissonneault and Mike Mortimer. Suffice it to say Avalanche.ca is in very good hands! And for those that missed the elections, I am very pleased to point out that there were actually elections this year. It may be the first time in our history that member votes rather than simply an acclamation process decided multiple board positions.

As I write this, our first face-to-face board members' meeting just wrapped up in Canmore. We've tried over the years to split this first meeting of the new boards into a regular meeting and a board development session. This year's development theme emphasized entrepreneurship. Simply stated: Be innovative, look forward, set clear goals, establish tangible performance measures, and meet your customers' and members' needs. One of the first orders of regular business was the RAC instructor/terrain policy and the new CAA Active Member category. Look deeper in this issue of the *Avalanche News* for more details.

A real challenge for any organization is to make timely changes to its goals and direction when things seem to be operating smoothly. The boards feel that all systems are functioning well but we continue to challeng ourselves to look for ways to maintain optimal performance.

Member satisfaction and feedback regarding the AGM is very positive. Keep your eye out for information about next year's AGM. A special 25th anniversary celebration is being planned and I expect that the next gathering in Penticton will eclipse any event we've seen to date!

The outlook for 2006-2007 is not all rosy. We have challenges to face in securing funding for the CAC. Program delivery will be the key theme for Clair and JK. Even in the face of reduced government funding, we must ensure our avalanche safety messages and products are reaching Canadians in a timely and functional fashion.

The development and marketing of new products will be heavy on Clair and Ian's plates on the CAA side of the business. We will be analyzing our products and our markets, to use business terminology, in the upcoming year to ensure the CAA's members are receiving maximum value for their membership.

We wrestle with the issues of advocacy and to what degree the CAA should foster an advocacy role. Dealing with government agencies on avalanche-related issues on behalf of the avalanche community continues to be a benefit to us all, but the expense in staff time cannot be linked back to a funding stream.

I am quite jazzed about the way things have been going in the last year and look forward to the opportunities and challenges that face us all.

Have a great summer!

Laptop wars at the Canmore BOD Plenary Meetings.

Photo courtesy Mike Mortimer

Heli-Skiing Icon Hans Gmoser Honoured By Canadian Ambassador in Washington

BY CONNIE MACDONALD, COMMUNICATIONS MANAGER, CMH

Founder of Canadian Mountain Holidays (CMH) and Bow Valley resident, Hans Gmoser was honoured for his contribution to Canada's mountain heritage at the Canadian Embassy in Washington on April 5 of this year. The ceremony was led by the Honourable Michael Wilson, Ambassador of Canada to the United States, and Murray Smith, Minister Counsellor for Alberta.

Hans' accomplishments are impressive and include founding director of the Association of Canadian Mountain Guides (ACMG) and the British Columbia Helicopter and Snowcat Skiing Operators Association (now HeliCat Canada), prolific climber, feature filmmaker, inventor of heli-skiing, and tourism innovator, to name only a few.

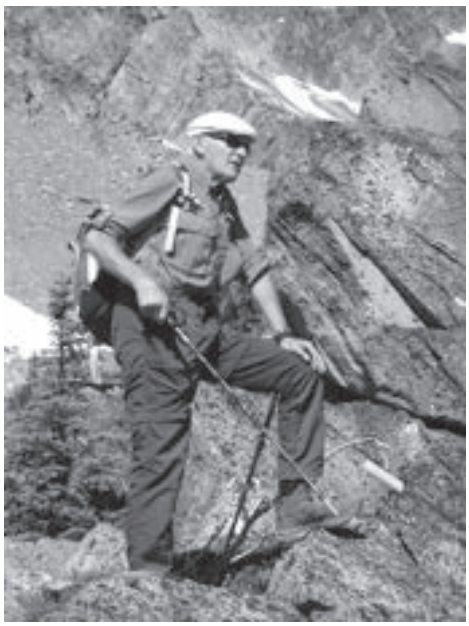
While in Washington, Hans presented a retrospective featuring slides, film clips and stories from his early days of climbing, guiding, heli-skiing and heli-hiking in the mountains of Western Canada. The presentation was part of National Geographic's Quest for Adventure series and took place at the Grosvenor Auditorium in the National Geographic Society Headquarters.

"It is hard to succinctly convey the impact Hans has made on Canada's mountain heritage because his contributions are so diverse and significant," said Marty von Neudegg, director of Corporate Services and Legal Counsel for CMH.

"Hans is a true pioneer. He made many first ascents in the Rockies; he invented heli-skiing and heli-hiking, which are two of Canada's greatest tourism products; he was instrumental in setting up the ACMG; he made over 10 feature-length films promoting skiing and hiking; and in 1965 he started CMH. But despite all of Hans's business related achievements, what really makes him stand out is his incredibly gracious and down-to-earth approach to people, life and himself. Hans is very deserving of this great honour."

Hans in Washington DC this spring, flanked by the Honourable Michael Wilson, Ambassador of Canada to the United States, and Murray Smith, Minister Counsellor for Alberta.

Photo courtesy of Connie MacDonald



Hans Gmoser, enjoying the mountains.

Photo courtesy of Connie MacDonald

Just as this issue was going to press, we received the tragic news of Hans Gmoser's death. We will pay tribute to Hans' life and celebrate the tremendous influence he's had on our industry in the next issue of *Avalanche News*.

AdventureSmart Program Report

CYNTHIA JONES, ADVENTURESMART PROJECT MANAGER

British Columbia offers an extraordinary environment and opportunity for pursuing numerous outdoor recreational activities that appeal to a wide variety of age groups. Regrettably, the province also has the highest rate of search and rescue incidents in Canada, and each year many people are injured or die. The cost of these rescue efforts to various levels of government is substantial and continues to rise annually.

To address this growing concern, the BC Provincial Emergency Program (PEP) has created AdventureSmart. The focus of the program is to educate the public on understanding the potential risks and effective risk management strategies for individuals to employ when participating in outdoor activities.

The AdventureSmart team giving a safety presentation to the school at Big White Ski Village.

Photo:Cynthia Jones

The AdventureSmart Teams are one component of the AdventureSmart program. Two two-person teams traveled throughout BC attending community events, sporting events, as well as visited schools and camps, educating people of all ages on how to enjoy the outdoors safely. In the winter of 2006, AdventureSmart Teams encouraged outdoor enthusiasts to follow the "Three Steps for a Safe Trip":

1. Training: Know the risks, check current conditions, gain skills and practice.
2. Trip Plan: Complete a trip plan before you go and leave it with a friend or family member.
3. Ten Essentials: Always carry the "10 Essentials" plus the required safety equipment for your chosen activity

With the support of search and rescue volunteers, the AdventureSmart Teams also promoted and delivered the Snow Safety Education Program to elementary schools, camps and community centres throughout the province. The 90-minute interactive presentation is geared towards children aged 10–12, and was developed by Monica Nissen.

More than 7000 children received the presentation this season and were educated on backcountry hazards, avalanche awareness, and the importance of the Alpine Responsibility Code. In addition to these presentations, AdventureSmart Teams attended a number of public events and gave many print, radio and television interviews. Throughout all these outreach efforts, the team members did a great job of promoting the Canadian Avalanche Centre as the first step in any backcountry outing.

AdventureSmart is managed by PEP and is funded by the National Search and Rescue Secretariat's New Initiatives Fund, the BC Search and Rescue Association, ActNow BC, and supported by a number of public and private sector organizations. You can find out more about this program by visiting our website at www.adventuresmart.ca.

Trying out transceivers.

Photo:Cynthia Jones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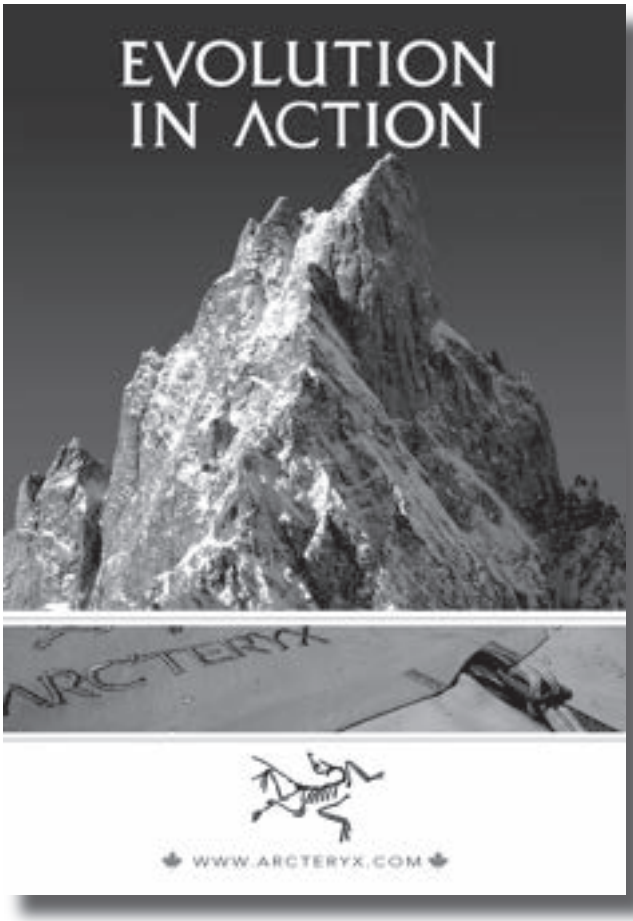
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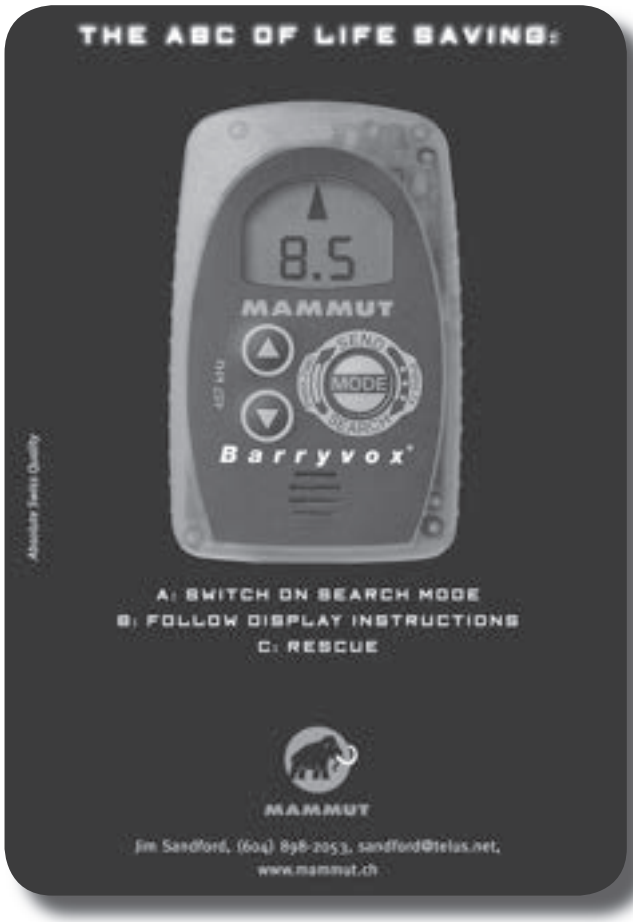
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Editor's note: *Bruce Tremper was invited to the Bulletin Writers Workshop at this year's AGM, to speak about Utah's new icon-based system for avalanche advisories. This article, describing the evolution of those icons, first appeared in* The Avalanche Review*, Vol 24, April 2006.*

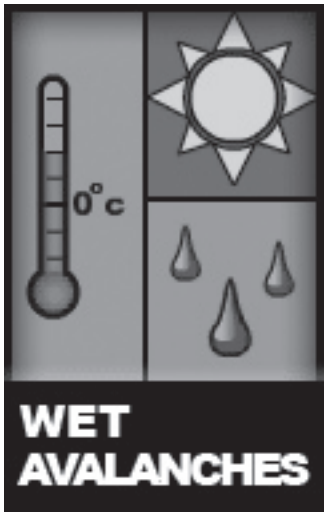
Utah's New Graphic Avalanche Advisories

BY BRUCE TREMPER, DIRECTOR, UTAH AVALANCHE CENTER

I've always known that it's hard to communicate complex avalanche information to the public. But it hit me between the eyes several years ago when I was backcountry skiing with three of my best friends and most regular backcountry skiing partners. It was one of those days with a complicated avalanche pattern—considerable danger on upper elevation north-facing slopes, low danger on south-facing slopes and moderate on the other slopes.

My friend took his turn breaking trail and I had to veto the plan when he started to head up a steep, north-facing slope. He called the forecast that morning. He heard the words. Yet he still started breaking trail up something that could have killed us all. In the ensuing discussion, I polled the others in our group to see what they remembered from the morning forecast and no one could remember exactly which slopes were rated considerable, moderate or low.

I know what you're thinking—that if they are friends of mine they probably "don't have all their huskies barking," as the Alaska expression goes. But this is not the case. One is a successful lawyer and the veteran of several big-mountain expeditions to Nepal and Alaska. The other is a high-level computer programmer and a mountaineering partner of mine from trips to Nepal and Peru. And then there's the smartest one of all, my wife Susi, who has skied with me at least 500 days in the backcountry and has gone virtually everywhere with me in the outdoors for the past 13 years. None of them could tell me which slopes were rated considerable, moderate or low. Clearly, we had a problem—a big problem.



For the next few months, I conducted my own informal backcountry survey and similarly found that few people could recall the details of the forecast. And it wasn't just us. In more recent years, the Swiss surveyed backcountry users and had similar results. As avalanche forecasters and educators, we tend to fall into what Ian McCammon calls the "fire hose" trap. If you give people information and it still doesn't change their behavior, then we just give them more information and hope that works. It seldom does.

Our avalanche classes just got longer and more detailed. Our avalanche advisories did the same. Yet more and more people died each year. It was hard for me to admit that what we were doing just didn't work. I eventually realized that our customers didn't need more information, they just needed a better way to perceive it and a better system to make decisions based on it.

Twenty years ago, when I first started working as a backcountry avalanche forecaster, there was only one way to distribute avalanche information—by calling the avalanche hotline. And it was a good gig while it lasted. I still recall fondly the baritone, Tennessee drawl of Tom Kimbrough as he spun his avalanche yarns around the morning avalanche camp fire. When the Internet came along, we simply published the text version of the telephone advisory on the Web and we thought that was pretty cool. Then, we figured out how to hyperlink to photos or snow profiles and thought that was even cooler.

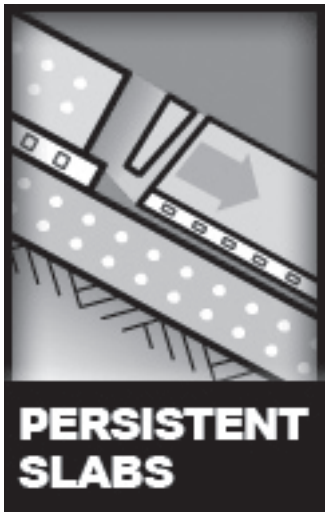
But the Web is a very visual medium. If you click around on the popular Websites you invariably find mostly graphics with short, bulleted text. We do, after all, now live in what one media consultant told me was the "post-literate society." No one reads anymore. Yet our avalanche advisories still were the old, long-winded text-based products originally designed for the telephone recording, which just doesn't work on the Internet. I overheard one young snowboarder refer to our Web-based advisory as the "blah blah forecast."

We are all avalanche geeks, after all, not Web designers, and in the blink of an eye, we found that we had not only missed the Internet boat, but we were stranded on the dock all by ourselves and no one else was paying attention. Our Web-based survey last year found that our customers accessed the avalanche advisory by telephone only 13 percent of the time. Sun Valley found only eight percent. The Canadian numbers for telephone access are less than one percent.

So for the Olympics in 2002, I wanted to find a better way to communicate avalanche information over the Web. I've noticed that most avalanche professionals are very visual and mechanical thinkers. We tend to communicate using our hands and we draw snow profiles and aspect-elevation diagrams on bar room napkins. In our avalanche classes I could finally see the students "get it" when I quit flapping my gums while flipping through photos in the slide projector and started showing videos and utilizing the rich graphical features and animations of PowerPoint. For instance, I'll bet that 10 times more people will scan the graphics of this article than actually read this sentence. Also, I'll bet that you would not have read this sentence without first being hooked by the graphics. Most of us would agree that a narrative is the most accurate way to communicate complex avalanche information. The only trouble is that few people would actually read it, and even fewer would retain its message. Graphics work better.

For the Olympics, we developed a graphic-based avalanche

advisory, which sported an avalanche danger rose (avalanche danger by aspect and elevation), as well as a "Powder the Polar Bear" icon that helped show avalanche danger and snow surface conditions. Unfortunately, the user interface was so difficult to use that after our extra staffing went away after the Olympics, we simply didn't have time in the morning to update the graphic product. So we slipped back into the old, long-winded text advisory and began planning the next generation graphical interface.



I started working with Jim Conway—a Salt Lake-based, extreme skiing athlete and guide turned Web designer—to create a new-and-improved, graphic-based avalanche advisory. We went through at least a dozen different prototype designs, which we have regularly passed around to the avalanche forecasting community for feedback. After we zeroed in on the current design, we posted the prototype on several Websites and received an avalanche of feedback from the target group we were trying to reach—the hard-core backcountry recreationist who is also young and very tech-savvy.

Mike Shields, a programmer from Ft. Collins, Colorado designed the avalanche rose interface (also used on the Colorado forecast). Sun Valley forecaster Chris Lundy did the PHP programming. And we went public with the graphic advisory format around Christmas time of this past winter. Since then, we have received a flood of e-mail and verbal responses which have been overwhelmingly positive. Sun Valley has also started using a simplified version of the design this past season and the Chugach National Forest Avalanche Information Center plans to start using it as well.

The idea behind the graphic-based advisory is twofold: first, to present avalanche information in an easier-to-understand graphical format; and second, to de-emphasize the overall danger rating and concentrate instead on describing the nature of the avalanche problems that backcountry users will likely encounter that day and where they will likely find them.

Many of these ideas came from the work of Canadian helicopter skiing guide, Roger Atkins. He found that professional guides made their critical route-finding decisions based not on the stability rating for the day, but on the character of the avalanches they were likely to encounter (Atkins, ISSW 2004). Roger came up with 27 different types of avalanche problems, which he grouped into five basic subgroups. He described their character, and how professional guides usually deal with them. We used similar groupings of basic avalanche dragons: wind slabs, storm snow, persistent slabs, deep slabs, wet avalanches and loose snow. Jim developed an icon for each avalanche type. Other icons describe the expected likelihood of triggering an avalanche, the expected size of the avalanche, the expected future trend of the instability and the aerial distribution of where you will likely find that instability by aspect and elevation. I am in the process of developing a clickable tutorial for each kind of avalanche type, which describes what each is, how they form, how to recognize them and how to manage them in the backcountry.

I'm excited about the new advisory. It makes me smile every day when I pull it up on the Web and see all those pretty colours. I see it posted much more often at backcountry access gates, kiosks and shops. And finally, at a glance, my dyslexic brain can understand the complexities of the daily avalanche conditions. We hope that it will become a better tool to communicate avalanche information to the more hard-core users and also capture the interest of the young, "post-literate" recreationist. And most importantly, we hope that it will translate into fewer avalanche fatalities, which of course, is the true measure of its success.

I think we're on the right track. I skied a few days ago with a long-time U.S. Army Intelligence Officer. His sole job has been to communicate details of expected enemy activity to large numbers of troops in both the Bosnian and Irag wars. His briefings are almost entirely graphics-based. He said that if his team were to design the perfect way to communicate avalanche information to the troops, he would have come up with the exact system we now use. He loved it. The only difference is that they would have spent a million dollars doing it.

After we test it for a season and make improvements over the summer, the format will be available to other avalanche centers to use if they choose.

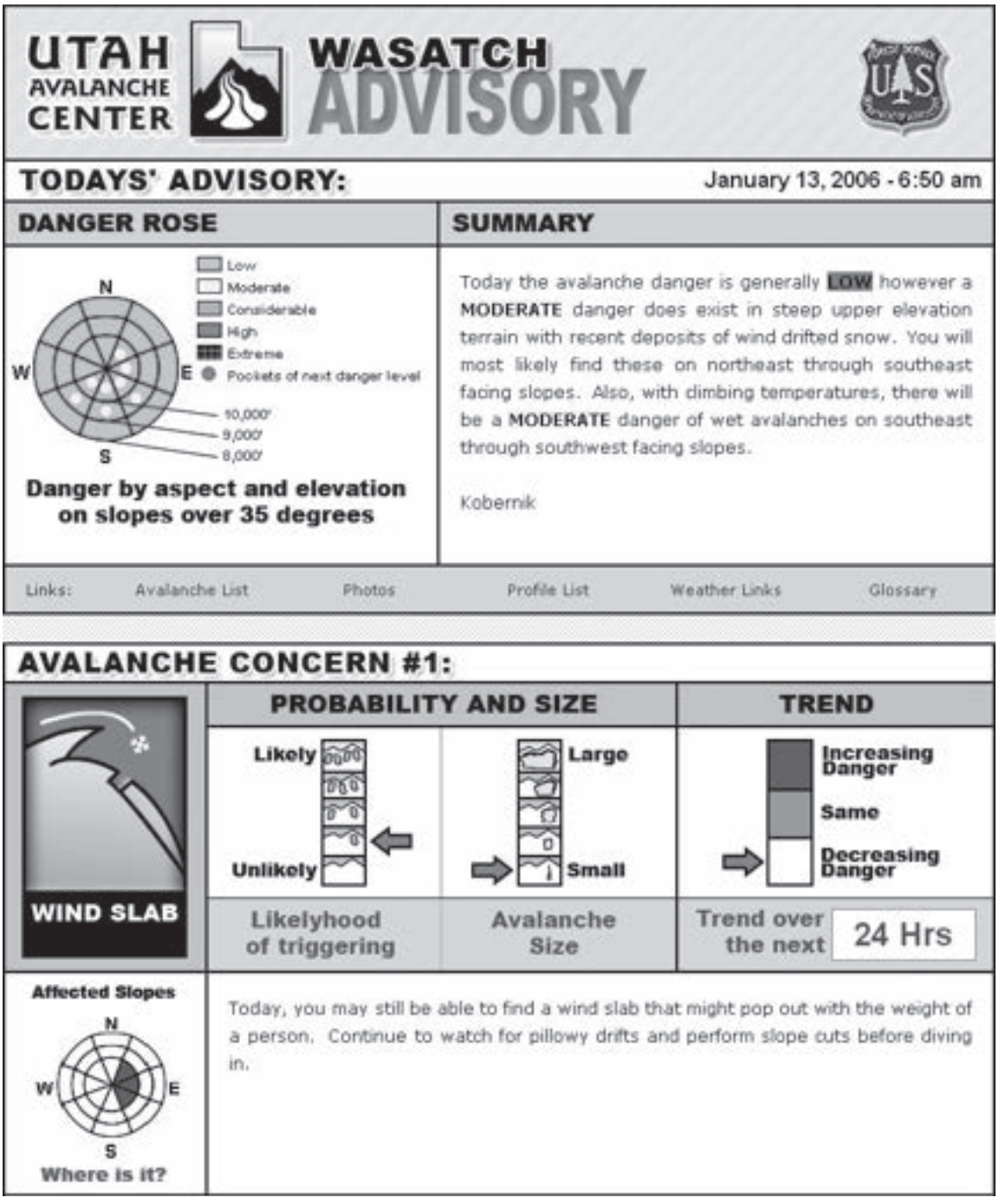
Avalanche Outreach Program

About 85 percent of avalanche fatality victims in Utah did not consult the avalanche advisory on the day of their accident. Moreover, most of Utah's fatalities occur on slopes rated as high danger, in contrast to Canada and Europe, where most fatalities occur on slopes rated moderate and considerable danger, respectively. In other words, it seems that we have an even more fundamental problem than the graphic-based avalanche advisory was designed to address—that most avalanche victims in Utah simply don't have even the most basic avalanche information. As Toby Weed wrote in the December issue of *The Avalanche Review*, "I can labour away forever at 6am, internally debating the precise wording of my advisory on a day with considerable danger. But the chances are pretty good that the next person to die in an avalanche will not have heard my warning."

Two years ago, Craig Gordon spearheaded the "Know Before You Go" avalanche education program designed for young adults, which has been phenomenally successful. The 15-minute video, alone, has become standard fare in most avalanche classes throughout North America. But even though the program reaches 12,000 people per year, that is still a small

percentage of the population. To reach everyone else, we are applying for grants to design an outreach program for people who are either not aware of the avalanche advisory or who don't normally consult it before going out.

The first prong of that outreach program is to publish danger ratings in all the newspapers, television stations and radio stations in Utah. For years, we have resisted publishing overall danger ratings because we felt that the information was too general to be of much use. Instead, we felt that backcountry travelers really need to know the details to stay safe. But it's hard to ignore the aforementioned statistics. We have finally realized that if people won't come to us; we have to go to them. We need to publish avalanche danger ratings in the media that most people already use—the newspapers, television and radio. In many cases, just one piece of information could prevent an avalanche accident. Also, when you try to capture avalanche novices, you have to begin with the basics, then spark their interest so that their curiosity leads them to the Website, a book or video where they can learn more, and eventually start using the avalanche advisory on a regular basis. Canadians also realized they had the same problem after two high-profile accidents in 2002-03. They started publishing danger ratings last season and they feel the program has been successful.



We debated for some time whether we should adopt the

Canadian three-level public advisory system of "Good, Serious and Poor" stability or go with the international standard five-level danger scale of Low, Moderate, Considerable, High and Extreme. I received pressure from both the Canadians and Europeans but we eventually decided to stick with the international standard five-level scale based on a nearly unanimous vote by all the avalanche center personnel at the fall National Avalanche Center meeting in Bozeman.

The second prong of the program will design public service announcements for various media outlets, post trailhead avalanche education posters, and design fun, Web-based tutorials for beginners to learn about avalanches. Speaking of which, we just published a new "avalanche encyclopedia" which describes avalanche terms in much more detail than a glossary (you can find the link on our avalanche advisory). Jim Conway designed many cool new graphics and flash animations. I provided the text and Chris Lundy helped edit everything. We hope that this will provide a fun way for people to learn about avalanches.

In other words, we are providing a tiered approach in which we provide several levels of complexity, depending on what the user needs. Basic, one-word avalanche danger ratings go out to the mass media, a graphic-based avalanche advisory is for people who go into the backcountry to recreate and finally, we provide detailed lists of avalanche activity and technical snow profiles for the hard-core users.

The Future of Avalanche Forecasting and Education

Ten years ago most of our office time centered around the telephone—talking with other avalanche professionals and observers, and recording the telephone hotlines. Now, we spend most of our time on the computer monitoring conditions and updating our Web products. As I look into the crystal ball even five years from now, I see a different kind of avalanche forecaster—one who not only needs the usual arsenal of avalanche and communication skills, but someone who also can design Websites, create graphics, edit videos and still photos, manage databases, manage Web servers and master all the other technologies that will come along in the mean time. It's a scary new world, especially for old dogs like me. Forecasters who can't or won't learn the new technologies could eventually find themselves out of a job.

Finally, for years, I have watched the TV meteorologists and salivated that someday, we could use the same technology to give an avalanche report. Think of it. We all would have an inexpensive broadcast studio in our office and we would stand in front of the green screen and point out weak layers on slick snow profiles graphics, show video clips of the day's avalanches, zoom in on terrain color-coded by avalanche danger and interview various avalanche pundits for their pearls of wisdom. "That's the avalanche news from our neck of the woods. Now back to you, Evelyn."

It's an exciting, new world because we have to figure out the best way to communicate the characteristics and complexities of avalanche danger to the public using an entirely new medium. And words are probably not the best tools for the job. Instead, it will probably require something like 80 percent graphics, photos, videos and animations, which are much more expensive to produce than hiring a lone avalanche geek to type on the computer at 4:00am. But before any of this can come about, we have to figure out how to finance it. And that will be the most difficult challenge of all.

Bruce Tremper has been the Director of the Utah Avalanche Center since 1986. He grew up in the mountains of western Montana where his father taught him the basics of avalanches at the age of 10. After a successful 15-year ski racing career, he did avalanche control at Bridger Bowl Ski Area in Montana and earned a Masters Degree in Geology from Montana State University. He then took over as the Director of Avalanche Control at Big Sky Ski Area in Montana and worked as a backcountry avalanche forecaster for the Alaska Avalanche Center. Bruce is also the author of *Staying Alive in Avalanche Terrain*, published by Mountaineers Books.

Technical Committee Update

The hard-working members of the Technical Committee have updated the *Observation Guidelines and Recording Standards* for fracture character, rutschblock release-type and the deep tap test. These updates include an improved definition of how to specify a fracture location in a snow profile, and an introduction of the rutschblock release-type to better define the fracture character of rutschblock test results.

This information is available online at avalanche.ca.
Just log on the "members only" section and click on Information> Technical Resources

New Guide Standards for the BC Commercial Snowmobile Operators Association (BCCSOA)

BY AMBER WOOD, GENERAL MANGER, BCCSOA

The BCCSOA was formed in 2005, as a platform where commercial snowmobile operators could share information, lobby for common goals and improve the commercial snowmobile tour industry as a whole. The association currently represents 14 operations from across BC who have come together to promote, unite and enhance professional commercial snowmobiling through the development of best operating practices, standards, guide qualifications and working committees.

Probe-line techniques taught during a recreational avalanche course for snowmobilers.

Photo: Alex Szirmai

BCCSOA Official Mandate

- To promote and enhance professional commercial snowmobiling,
- To develop a code of ethics, standards and best practices, in safety, operating methods, procedures and protocol for the industry;
- To act as environment stewards and promote backcountry ethics and awareness within the commercial snowmobile industry;
- To represent the industry as a collective voice in co-operation with government and non-government agencies;
- To strengthen the co-operation and promote working relations between its members and sponsors;
- To act as a governing body to ensure that all members of the association conduct themselves within the standards set out by the association.

Phil Hein leads an in-house guide training on Boulder Mountain for Great Canadian Snowmobile Tours.

Photo: Alex Szirmai

Guide Qualifications

With such a diverse group of snowmobile operations across the province, guide qualifications take into consideration the type of activities being conducted on an individual operator basis. Avalanche qualifications for professional snowmobile guides have been based upon the terrain exposure scale used by Parks Canada, and anyone guiding in "challenging" or "complex" terrain will be required to have a CAA Level 1. These qualifications are to be phased in within the next two years in order to get current guides qualified, and there will be an additional "non-classified" terrain category for operators operating outside of any avalanche terrain.

For more information on the BCCSOA, see www.bccsoa.com or contact:

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Explosives in Avalanche Control–Important Developments

BY CLAIR ISRAELSON, CAA EXECUTIVE DIRECTOR

On June 14 of this year, CAA Explosives Committee chair Bernie Protsch and I met with WorkSafe BC (WCB) representatives Dick Shaw and Warren Fulton in Kelowna. WCB and the CAA have been working together for more than 20 years to develop effective and safe methods for controlling avalanches with explosives, and training workers in these techniques. This has been an important relationship over the years, and we value the opportunity to have a voice in shaping policy for areas relevant to the avalanche community.

However, due to a variety of circumstances, there are changes coming to explosive-use policy that will have a significant affect on many of you. Key discussion items from the Kelowna meeting are outlined below. I urge all BC avalanche operators who control avalanches with explosives to take careful note of these issues, and provide timely feedback to the explosives committee.

Explosives Issues Background

Explosives are mission critical for many public- and private-sector avalanche operations in Western Canada. Continued access to explosives products is essential for these operators to protect vital transportation corridors, ski resorts, industrial worksites and commercial backcountry activities from avalanches.

- Natural Resources Canada (NRC)–Explosives Regulatory Division is responsible for regulating the storage of explosives in Canada. As security issues receive higher national profile the Explosives Division is revising their regulations. It is apparent that these changes could have significant cost and operational implications for avalanche operations.
- WCB–Certification Services, Program Design Division is responsible for regulating the use of explosives in BC, specifically licensing blasters and reviewing and approving operating procedures for all organizations that use explosives. Recent incidents and near misses with explosives used in avalanche operations has increased WCB's perception that safety standards and practices for avalanche control cannot be static, and must continue to evolve. This division of WCB is now soliciting the CAA to generate recommendations on how regulations and standards for best practice in avalanche control operations should change to achieve the highest reasonable level of safety.
- One major commercial supplier in Western Canada has recently decided to stop selling their explosives products for use in avalanche control, presumably because they conclude the potential for a serious accident and ensuing litigation outweighs the sales benefit.
- All avalanche control operations in Canada are highly vulnerable to fallout resulting from any serious or fatal accident involving explosives, even if that accident does not happen in Canada. A fatal accident at a ski resort in the US several years ago caused serious supply disruption to the supply of cap-fuse assemblies and pull-wire lighters in Canada, and costs of these items skyrocketed.
- Regulatory agencies and manufacturers cannot effectively communicate with the numerous and diverse organizations engaged in avalanche control operations in Canada. The members of the CAA Explosives Committee are selected to represent this cross section of private- and public-sector organizations. The explosives committee develops recommendations for matters relating to explosives use in avalanche control, and the CAA then serves as the point of contact for external stakeholders.
- It is clear that it is in the best interest of all avalanche control operations in Canada for the CAA to engage with federal and provincial regulatory agencies, as well as the manufacturers and suppliers of explosives materials, to promote effective regulatory change, facilitate a continuing supply of essential explosives products, and promote training, certification, and best practices for explosives use procedures that optimize workplace safety.

Key Issues Discussed

Avalauncher operations

Both parties agreed that Avalaunchers serve an essential role in avalanche control operations. Other gas-driven projectile launchers are being developed for military and other uses, but these new devices are not commercially available at the present time.

- There have been recent near misses involving Avalaunchers, which have been investigated by WCB.
- Component quality control for existing and prototype guns and projectiles remains a concern.
- Integration of system components supplied by different manufacturers remains a concern.
- Lack of defined standards or "best practice" to physically protect workers firing Avalaunchers remains a concern.

The explosives committee will be requested to propose recommendations for the CAA to submit to WCB and manufacturers of Avalauncher system components that:

- Identify Avalauncher system component integration and quality control concerns of the users, and propose methods or mechanisms to resolve these issues.
- Develop recommendations for standards or "best practice" to enhance safety for workers firing Avalaunchers.

WCB blaster licensing

WCB is requesting assistance to update some parts of their written exam for avalanche blasters tickets. The explosives committee

will be requested to review sections of the WCB blasting exam and make recommendations that:

- Correct technical errors or misinterpretations of fact
- Improve clarity of questions or answers
- Bring questions and answers in line with evolving best practices

The explosives committee will also be requested to make a recommendation as to whether or not successful completion of the Avalanche Control Blasters course should be a prerequisite for workers applying for their first avalanche blasters ticket.

Operating procedures

The WCB representatives asked if it was reasonable to expect that all operating procedures submitted to WCB for approval should contain detailed mapping of avalanche paths and maximum runout zones where avalanche control with explosives would be conducted. The CAA representatives replied that this requirement could be reasonable for perennial operations at fixed locations such as ski areas, public highways and railways, and some industrial sites. We explained that this requirement was not a reasonable expectation for backcountry skiing operations or for industrial sites that are occupied for short periods of time during the winter season.

The WCB representatives also requested CAA perspective on best practice for annual explosives-use training, and documenting currency of licensed blasters.

- The explosives committee will be requested to develop recommended best practices for recurrent training, and methods for documentation of that training.

WCB and the CAA agreed that the generic CAA explosives-use procedures were useful guidance for operators developing avalanche control procedures for their organizations, and that these generic procedures should be periodically reviewed and updated to ensure evolving best practices are reflected in these documents. This will be done.

Operating procedures–non-explosive devices

The WCB representatives asked if there were documented, comprehensive operating procedures in place for non-explosive avalanche control devices such as GAZ-Ex. The WCB interest seemed to be in ensuring that some regulatory authority, somewhere, was in position to ensure reasonable operational safety for workers and the public. The CAA representatives suggested that WCB contact Karl Ernst, Canadian distributor for GAZ-Ex, and BC Ministry of Transportation for these issues. If requested, a section on GAZ-Ex use could be added to the CAA's generic explosives-use procedures document, to serve as standing guidance for organizations embarking on GAZ-Ex programs.

NRC–Explosives Regulatory Division
Proposal for Storage of Explosives on Ski Hills

The Explosives Regulatory Division is soliciting feedback on their proposal regarding storage of explosives on ski hills. Their primary concern seems to be quantity–distance issues in areas of high public use. The most recent publicly available regulatory proposal is available from the CAA office, or from Bernie Protsch. If you are a manager of a ski resort that use explosives for avalanche control, I urge you to read this document thoroughly, and forward your comments to any member of the explosives committee.

- The explosives committee will be requested to synthesize feedback received from ski resort operators on this topic, and propose a CAA response to NRC–Explosives Regulatory Division.

What you can do

For the explosives committee and the CAA to effectively represent our community to federal and provincial regulatory agencies, it is essential that we understand your operational perspectives and issues. Without access to explosives for avalanche control, many operations could not continue to operate. It's in our collective best interest to engage now, in a professional manner, to do all we can to ensure explosives continue to be available for avalanche control, and that explosives are transported, stored and used responsibly. The members of the explosives committee are:

Bernie Protsch (Chair)–Whistler-Blackcomb Ski Resort
Scott Aitken–BC Ministry of Transportation
Colani Bezzola–Canadian Mountain Holidays
Dave Iles–Resorts of the Canadian Rockies, Lake Louise
Brian Johnston–Resorts of the Canadian Rockies, Fernie

I urge you to contact these knowledgeable and hard-working committee members, pass along your concerns and comments, and make sure that your issues are clearly understood. If you don't know how to contact these folks, call the CAA office, or check on the "members only" section of the CAA website for contact information. Your feedback on these issues is required before the end of August.

Working together, we can help promote regulatory change that moves us forward in directions that are appropriate. If you use explosives for avalanche control, engage now.

Profile: Roger Atkins

BY MARY CLAYTON

Roger Atkins is the kind of guy you tend to pay attention to when he speaks. It's not only because his voice is low that you listen carefully. He has a way of articulating and communicating his thoughts that makes a listener quickly realize they're hearing a very interesting and very smart fellow.

People with exceptional abilities like Roger's are often in the enviable position of leveraging their skills to get what they want–more money, more fame, more sex, drugs and rock 'n roll, the list goes on. In Roger's case, it's been pretty simple. He's used his talents for more skiing.

"I first skied at four years old at Mammoth Mountain in California," he remembers. "My parents were skiers and that was the best thing we did as a family. I was always enamoured of skiing. Then once I hit high school and discovered powder skiing at Alta, *that* really stuck with me."

Born in Berkeley, Roger moved around the west coast with his family until he left home to study physics at UCLA in Los Angeles. After his bachelor's degree he took a year off from school to ski in Utah and "I'm still on that year off," he laughs. When a torn knee ligament forced him to take a break from skiing he took a job designing medical equipment in Salt Lake City.

It was there that he wrote his first computer program, and the die was cast. A year later the research facility he worked at was eliminated and he saw a job advertised for a computer programmer with a meteorological consulting firm. With the breath-taking confidence of youth, he figured "I wrote a program. I can do that." He not only got the job, but he had the audacity to dictate a key condition: "If it's snowing, I'm skiing."

As it happened, his first day of work was a powder day. Roger, never being one to mix up his priorities, went skiing. The next day it was still dumping, so Roger put off his debut once again–and again, and again, and again. After five days of being a no-show, his boss gently suggested he better come in to work. Despite that inauspicious beginning, Roger stayed with the firm for eight years, maintaining his powder-day condition throughout his career there.

It wasn't long before his unique blend of computer skills and mountain sense caught the attention of the skiing world. Mike Wiegele was one of the first to express an interest in what Roger was doing and invited him to Blue River. "I created a prototype of a system for avalanche data and modeling stability," Roger remembers. "It never really came to anything but it caught the interest of Alta."

Roger started working with the Alta ski patrol to develop one of the first snow and avalanche information programs. That work then piqued the interest of the local heli-skiing company, Wasatch Powderbird Guides. For a skier like Roger, it was a dream come true and his eyes still light up when he remembers the moment. "One morning Powderbird's lead guide Darwon Stoneman approached me and asked, 'what are you doing today? My answer was, 'what do you want me to be doing today?'"

He managed to take advantage of this new opportunity for more skiing by always insisting that his computer work play second fiddle to his skis–all bets were off on powder days. The balancing act between the two careers must have been tricky, but nothing that a lot of hard work couldn't solve. "It was full-time work for part-time pay," laughs Roger, and it's obvious the pursuit of money hasn't exactly been the guiding light of his life.

While his heart was always firmly in the mountains, Roger's intellectual interest was also excited by many of the challenging projects he faced in computer programming. At a point when the meteorological service started slowing down, he began looking for other opportunities. The medical device company he began his computer career with had since been re-established, and they came courting. Once again Roger took some work with them and was soon developing life-support systems for newborns, a project he describes as "incredibly rewarding."

It was around this time that his career took a sharp turn north, across the 49th parallel. Clair Israelson, who was then head of public safety for the mountain parks, contracted Roger to help develop Parks Canada's new avalanche forecasting systems project. Colani Bezzola and Walter Bruns took an interest in what he was doing and invited him to come to a CMH training week at the Adamants in 1991. Roger describes this tangent in his life path succinctly: "I came, I liked what I saw, and decided to take the ACMG exams."

Roger's skills and previous guiding experience served him well, and he was soon a full-certified ski guide. His guiding career in Canada has been spent with CMH, first at the Bobbie Burns, then at the Adamants Lodge for eight years, and most recently in Galena. By all accounts it's been a successful run, but it's been his summer work that has had the biggest impact on the avalanche community.

CMH contracted Roger almost immediately to develop what's now known as SnowBase - a comprehensive snow, avalanche and terrain cataloguing and reporting system. The success of that program caught the interest of the CAA and BC's Ministry of Transport. "InfoEx was crying for technological upgrade," remembers Roger, "and

I was looking to extend SnowBase to more people without reinventing the underpinnings."

Roger met with the CAA and MoT to see if there was common ground but it quickly became obvious that a universal system wasn't feasible. Luckily, the dream didn't end there. "After that disappointment, the idea came up to build CAIS (Canadian Avalanche Information System) based on the concept of standardized communication between different systems," he explains. "From there we could build a comprehensive database from all sources, existing and new."

His excitement is apparent as Roger describes the new technology that allows such a forward-thinking vision. "When I first started SnowBase I would have given my eye teeth to have more than one colour on my monitor," he laughs. "I never would have imagined the photos, graphs and videos we have now. The technology and possibilities both advance so fast, it's amazing."

With the changes in tools and his own gains in practical knowledge, Roger has found his focus has shifted over the years. "When I originally got interested in this, I was young with a technical background," he says. "I wanted to manage the data to be a feed for the modeling. As I gain more experience, I'm less enamoured of the modeling and more aware that the accessibility of the data is the greater benefit."

Now that the underlying infrastructure has been built for the CAIS, that data accessibility is becoming a reality for more people. "The next step is to make the infrastructure more solid," he says. "We'll add front-end tools to allow a more standardized structure for small operators to manage their own avalanche systems."

When asked about the future of CAIS, Roger stresses the importance of a common database. "I hope to see a unified exchange and collection of data," he says. "That will create the opportunity to analyze and present the information in a way that places emphasis on visualization."

Along with his career goals, Roger's personal life has undergone a number of major changes as well. He and his wife Carol Carrigan bought a house last year in Johnsons Landing, just south of the Galena tenure on the north end of Kootenay Lake. They're also both well along in the immigration process to become Canadian citizens. When asked what prompted him to make such a profound decision to leave his country of birth, Roger points first to leadership.

"I'm a Bush refugee," he says. "The current political situation is abhorrent and I don't mind leaving it. And, almost half my career has been spent in Canada, and my business associations and friendships are much stronger here than the US."

Despite the intellectual clarity of the decision, Roger admits that changing his citizenship hasn't been that easy. "Prior to actually making the move, I didn't think it would be hard to leave. But I'm getting older and I'm finding change more difficult." That said, he's still clearly pleased. "The immigration process is in its final stages, and there will definitely be a party once it's over," he says with a smile. For all the people whose work and lives he's affected, it should be quite the celebration. Welcome to Canada, Roger and Carol, we're glad you're here.

All photos courtesy of Roager Atkins

CAA Annual General Meeting – May 2, 2006

FROM MINUTES BY SUSAN HAIRSINE

President's Report

Steve Blake opened this year's AGM with a discussion on the efforts to create a common vision for the CAA/CAF and CAC. The result was developed after a visioning session was held in Revelstoke in November 2005 with members of the audit committee (past presidents) and board members from the CAA, CAC and CAF in attendance. The vision statement for all three organizations is: "To be a world leader in avalanche awareness, education and safety services."

Steve reviewed the function of the board of directors, which is a policy and governance board that sets strategic direction regarding program development, business principles and performance goals. The sole employee reporting to the board is the executive director. Steve explained the BOD meetings now include in-camera discussions whereby the paid staff (Clair, Ian and John) leave the call and the BOD conducts a monthly evaluation of the goals and performance of the previous month. Steve then discusses the results of this evaluation with the executive director.

Steve explained the bylaw amendment process that had occurred over the past year, and how those bylaw revisions would be tabled later in the AGM. He also mentioned the new proposed category of "Active" members that would be up for vote as well. He then went on to discuss future CAA BOD initiative priorities that include sound management policies, financial sustainability, being representative and responsive to members, Canada and the world, effective partnerships, and providing a collective voice for membership and committees.

The other idea that is currently being investigated following discussion at the visioning session in the fall is the common goals of the CAF, CAA and CAC. We may work towards bringing these under one umbrella and branding all three organizations as "avalanche.ca" and then direct the people to the organization that best meets their goals.

Financial Report

Secretary-Treasurer John Hetherington delivered the financial report for 2005/06. There is a surplus of almost $40K in Operations and the Intellectual Property Reserve Fund (IPRF) has increased from $24K to $41K. Comptroller Janis Borden prepared a five-year balance sheet and John showed the membership that the purchase of the building caused a large draw down of the cash assets. We self-financed this building but given savings in rent, we are now repaying the IPRF back by $900/month and did not have to pay interest costs to purchase the building. It is becoming apparent that the purchase of the building was a sound financial decision and will continue to show profit to the CAA because of the savings on office rent.

Last year we had a deficit of $44K and this year we have a surplus of $77K. John added that the organization has been very well managed this year, and revenue projections were more conservative and realistic. John discussed the capital asset fund that decreases every year due to amortization. This gives the CAA a clearer picture of the current value of its equipment and other capital assets. The IPRF is used to fund internal projects within the CAA. Some of the surplus was re-allocated to the IPRF, and a number of projects with IPRF funding are underway. John reviewed the financial reports for the various cost centers. These were also made available to any members requesting them.

Membership Report

Director for the Membership Committee Steve Parsons summarized the membership report for 2006. We have seen the CAA grow in the past few years but now things are beginning to slow down. There are 356 professionals, 346 affiliates and 106 associate members.

Steve explained the new "active" membership category, which is a stepping stone into professional membership. This category will have a CPD structure of 60 points per year with a three year total of 180. Yearly membership dues would be $125.00. This new category will allow the CAA to meet the requirements of the Societies Act, whereby voting members must be in the majority of the membership.

Steve stated that work has been done to improve and strengthen the CPD program and it was decided that the number of member audits would be doubled to twenty people per year. The ITP instructors will also do an annual audit over the summer months. The membership committee may grow given this greater workload. A Web-based portal will be created so members can fill in their CPD with drop-down boxes, and members will be able to be saved their records on their own computer.

Steve briefly talked about international members and added that the BOD and membership committee will discuss this in the next few months.

Technical Committee Report

Rob Whelan, chair of the technical committee, reported that Simon Walker will be stepping down from the committee this year. Simon was thanked for his hard work and participation, and Doug Wilson was welcomed in to take his place. Doug worked on the OGRS revision and is employed by BC MoT. The other members of the committee are Bruce Jamieson, Dave McClung, Cam Campbell, and Bob Sayer.

The technical committee worked on fracture character observations guidelines and rutschblock release-type guidelines. Rob showed the five-level fracture character scale and said the committee determined that it is more realistic to have the observation

guidelines reflect the snow crystal classification system. They are also working on a rutschblock release-type classification system which is currently in draft form. *(**Editor's note:** See page 16 for more information on these updates.)*

Other issues for the committee have included dissemination of fracture character guidelines, communication with members via the Web page, liaison with CAA forecasters regarding danger scale revisions, new transceiver protocols evolving, and avalanche size classification system review. Members were advised that if they had any other issues, they should discuss them with any technical committee member.

Education Committee

Marc Deschênes is chair of the education committee, and he listed the other members as Helene Steiner, Sylvia Forest, and John Buffery, with Janice Johnson and Ian Tomm as honorary committee members. This is now a working committee, which means they report to the Executive Director. Their mandate is to review, comment and endorse course proposals, curriculum, etc. This year they were asked to review and endorse the field book, digital weather station use, IPT Level 1 program changes (ATES, etc), and the snow profile program checklist. They also reviewed the Resource and Transportation Course curriculum, and endorsed the fracture character guidelines. The committee has looked at the Online Learning and ADFAR project work to date and Marc stated there has been great work on both these initiatives.

Other initiatives include some work regarding international education questions, equivalencies etc, and involvement with the RAC committee from the CAC side. Marc closed by stating that the education committee is small and recruiting now. They are looking for a senior ITP instructor or professional member in the workplace with some educational background. Contact Marc if you are interested in becoming involved.

Professionalism & Ethics Committee

Rupert Wedgwood co-chairs this committee, with BOD member John Hetherington as chair, and Ilya Storm and Peter Amann as the other committee members. This year they examined CPD to increase audits and compliance. The committee developed a number of ideas that were also adopted by the membership committee including incentives for audit, publishing names of people successfully completing their CPD audits, developing a more simplified audit (spreadsheet) and having ITP instructors submit their CPD prior to engagement next year, as these individuals represent the industry.

Information Technology Committee

Alan Jones reported that he will be stepping down as chair, but Jeff Goodrich, Jan Bergstrom and Donna Delparte will remain members of the IT Committee. The committee completed work on the CAA data policy once the data ownership issues from last year were resolved. This was summarized in the Executive Director's report in Volume 74 of *Avalanche News*, Fall 2005. Future issues for the IT committee include data standards, metadata, and XML standards.

Explosives Committee

Report deferred but congratulations to new dad Scott Aikens.

Executive Director's Report

Clair Israelson began by acknowledging the work from the BOD and committees that set the stage with hard volunteer work for the collective good of the CAA. Clair also acknowledged Peter Schaerer for his work over the past 25 years with the CAA. Clair stated the CAA is running well and we are meeting the high public expectation and demand for avalanche services. The BOD and staff agree on our collective vision and we need to focus on service delivery, and continue to recruit good people into our committees and boards.

Clair thanked John Hetherington for his diligence in overseeing the financial work. He added that our operating surplus in the Association cost centre would not be there if we were not being paid management fees from external projects. He expects future sustainability to improve with last year's increase in member dues.

Evan Manners left the CAA for other employment opportunities last summer and the meeting participants gave Evan a standing ovation in recognition of his hard work and dedication over the years. Following Evan's resignation, the organizational structure was redesigned and Ian Tomm was hired as the CAA Operations Manager. Clair thanked the membership for their open dialogue that occurred during the year. He then introduced Ian Tomm.

Ian provided a summary where he stated that the BOD is paving the road ahead, and the staff and members are in the bus, with Clair driving. Ian is the mechanic trying to keep the bus moving and making the ride better for the passengers. He is continually learning, and Evan left big shoes to fill but Ian is really enjoying the challenges.

Ian added that he is very excited about the visioning concept of "avalanche.ca," and the possibility of growing this publication in terms of production and distribution. Ian is also very keen on the Website expansion for the membership and he is looking forward to increasing the offerings there over the summer.

Ian went on to give a report from the Industry Training Program, which he called the core of the Association. Training avalanche workers and meeting current workforce needs with CPD is a large challenge. The schools program has undergone 40% growth in four years, and it is a true testament to the instructors, who have maintained a high quality product. Ian added that he is trying to respond to new training requests. The Level 2 modular format is highly successful, and 30% of participants are there for CPD

requirements. The curriculum of model 1 will be slightly revised in the summer.

Chris Larson developed an excellent product for on-line course registrations this year and all course registration will be handled electronically in future. Ian closed by stating that other industry programs continue to expand and have great developments and the InfoEx subscribers group had a good meeting last night. He is looking forward to next season.

Bylaw Revisions

John Hetherington was the primary author of the bylaw revisions and spent many hours of his personal time, as well as engaging the thoughts and opinions of the audit committee, which is comprised of the CAA's past presidents. He reviewed the substantial changes that had occurred.

Two or three years ago, he said, we realized our bylaws were out of date and required major revisions. A new set of bylaws was presented at the AGM last year and they were not passed. The audit committee was then tasked to review the bylaws so they would be acceptable to membership. We did not begin this work until after the visioning session in November.

The bylaws were reviewed on screen. John stated that the CAA is incorporated under the Societies Act of BC and Alberta. John explained the rationale for the categories of non-practicing professional member and active members. BC Society Act states that you cannot have more non-voting members than voting members, and so we are currently in non-compliance of this act.

The audit committee agreed to the concept of "active" member class following a conference call this winter. If 48 members were to move from the affiliate category to the active member category, the CAA would no longer be in contravention of the BC Societies Act. RAC providers will be required to become active members under the terms of their contract, and all active members will have CPD requirements.

John also explained the rationale to changes to the committees given that the BOD is now a policy and governance board. The committees provide guidance to the BOD. The bylaws also have changed the size of the membership committee from three to five people in anticipation of the increased workload of this committee given the new CPD requirements. The bylaws now spell out what happens if a director resigns mid-term.

John discussed the section regarding practicing professional member work experience and work experience outside of Canada. The previous bylaws were ambiguous in this section. The audit committee and BOD agreed that two of four working years should be in Canada.

Steve Conger questioned the change in the affiliate member section, and added that by including the words "in Canada" in the definition would exclude approximately 40 affiliates who are currently members.

John reviewed this section and stated there was no intentional exclusion proposed by adding the words "in Canada" in the active and affiliate member definitions. A motion was taken from the floor to remove those words and to make three other small changes. The matter was put to vote and the proposed bylaws were accepted with all present in favour.

The members applauded John Hetherington, the audit committee, and the board of directors for the hard work on these in the past two years. Another resolution, to appoint past presidents as honorary members, was passed with all in favour.

Vice-President Anton Horvath, Director at Large Alan Jones, and Associate Members Director Mike McKnight stepped down from their positions on the board. These individuals will all be missed and were thanked for their hard work.

Board of Director 2006

These people were acclaimed to the following BOD positions:

Steve Blake–President
Rob Rohn–Vice-President
John Hetherington–Secretary/Treasurer
Steve Parsons–Membership Chair
Andrew Nelson–Director for Associate Members

Alberta Auditors–Mark Klassen and Grant Statham were appointed in their absence.

The Director at Large positions were changed to reflect the addition of the new active member category. Elections were held and these positions were filled:

Mike Boissonneault was elected as the Director for Professional Members and Janice Johnson was elected as the Director for Affiliate Members.

The new position of Director for Active Members was appointed by the BOD. Dr Pascal Hägeli (former Director for Affiliate Members) is the new Director for Active Members. He is currently an affiliate member in transition to become a professional member, which is exactly what this active member category represents.

Mike Rubenstein, Ken Bibby, Johann Slam and Helene Steiner were nominated for the Membership Committee and all accepted. Bill Mark thanked the membership for the opportunity to have an election, and added that it is a great sign of a healthy association.

Canadian Avalanche Data System Initiative

BY IAN TOMM, CAA OPERATIONS MANAGER

There is a new initiative underway at the CAA to develop a comprehensive data management system for the collection of snow, weather, avalanche and terrain information. This system will be compatible with the InfoEx and CAIS systems although subscription in those exchange programs will not be mandatory to participate in this particular initiative. The CAA has received several requests to spearhead this project and we are soliciting input from interested parties at this time. If your operation, or the operation you work with, has been talking about developing some sort of database management tool then this initiative is for you. While the details of the initiative are still in their early stages, please read further for a more thorough review of the project.

Canadian Avalanche Data System Initiative

We are formally soliciting input and expressions of interest from the Canadian avalanche community regarding the request to develop a snow/weather/avalanche/terrain data management system for operators. The following is a brief outline of the proposed project:

- Custom develop a data-management system leveraging the technologies developed to date (CAAML, SnoInfo, CAIS System) for use by operators in any given avalanche-related field where the collection of snow, weather, avalanche and terrain information is required.
- Data would be owned by the operator and stored locally on the operator's computer and only relevant, permitted data would be submitted into the InfoEx system (if the operator is a subscriber). For those using SnoInfo, this software would replace it.
- The system would be a basic data management tool for snow, weather and avalanche information with capabilities to expand into terrain (i.e. run lists, open/closed areas, avalanche control sheets, terrain and route photos, etc.). Visualization and GIS capabilities would be integrated into the system, although funding will determine how much these capabilities are developed initially and in the future. The system will ideally be GML-compatible, which means it will be able to speak to third-party GIS systems.

Development costs will be considerable. However, by coordinating our efforts we can realize a software program that will be much more powerful than individual operators customizing systems on their own, and will certainly cost less than going it alone. We also have a significant opportunity to leverage the work done to date on the InfoEx/CAIS system. The CAA requires firm commitments and seed money by interested operators as soon as possible to get this project off the ground. If you are interested in the initiative please reply as soon as possible to Ian Tomm, CAA Operations Manager at ian@avalanche.ca regarding the following questions:

- **How much money would you be willing to provide for the development of this software?**
- **What would you feel would be an affordable annual license fee for use of this software?** (The CAA proposes that operators not contributing to the initial development will be charged a one-time buy-in fee to fund ongoing development and ensure all subscribers are equal for the future.)
- **When would you like to see the first version of this software available for use?** (The CAA is proposing that a beta version could be available as early as this coming winter if enough operators express interest and enough seed money is provided for development.)

Please reply with your statements of support including funding options as soon as possible. Should we collect enough interest it is very possible that we may have something in beta form by this coming winter.

In order to ensure that the CAA and its development team produce a product that is as optimal as possible for all the end-users we propose the formation of an advisory group for this specific initiative comprised of a few operators who have committed to the project. If you are interested in being a part of this group, please make note of that when you contact Ian.

For more information or to express your interest in this new initiative please e-mail me at ian@avalanche.ca.

New CAA Membership Category: Active Members

BY IAN TOMM, CAA OPERATIONS MANAGER

At the annual general meeting this May in Penticton, the membership approved amendments to the CAA bylaws that create a new category of membership we're calling Active Members. These amendments were recommended by the CAA Board of Directors, and were made in response to many years of solicitation from RAC providers and others. Active members have full voting rights in all CAA business, have a representative on the board of directors (currently Pascal Hägeli) and must comply with the CAA's newly revised policy for continuing professional development (CPD).

The transition for affiliate members who wish to become active members will take some time, so it would be helpful to start the process soon.

Eligibility for Active Membership

You are eligible to be an active member if:

- You have successfully completed CAA Industry Training Program Avalanche Operations Level 1 or equivalent technical training,

or

- You have successfully completed academic studies acceptable to the director and membership committee at a recognized post-secondary institution,

and

- During two of the previous four winters you were engaged in avalanche-related activities in Canada, or were the direct supervisor of one or more persons engaged in such activities, and were involved in making decisions that affected the safety of persons and property with regard to avalanches and avalanche conditions.

Applying for Active Membership

To apply for active membership please download the CAA membership application form at www.avalanche.ca. This form can be found by on the "Members Only" site by clicking on Information > Active Membership Information. Please note your application must include at least one letter from a CAA professional member in good standing.

Continuing Professional Development

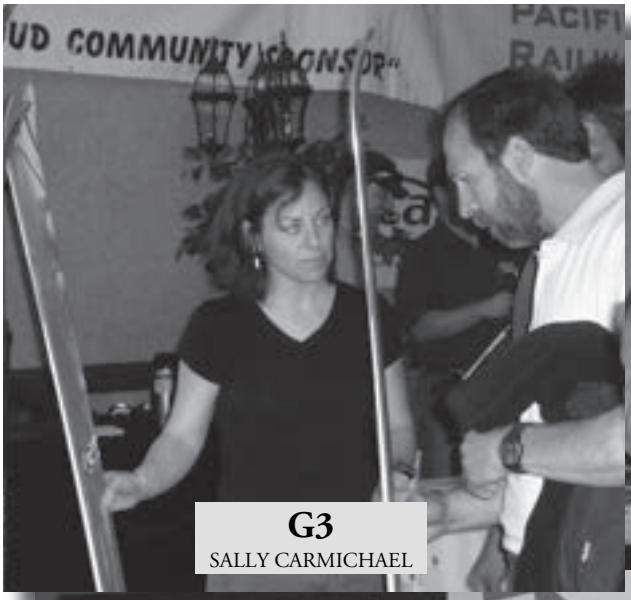
Information on the CPD requirements for active membership is now posted on the "Members Only" site, under Membership & CPD resources section. The process for active members to earn CPD points is very similar to the process for professional members (see CPD policy). Active members are encouraged to earn 60 CPD points annually, and must accumulate 180 points over three years. Professional members are encouraged to earn 80 CPD points annually, and must accumulate 240 points over three years.

Membership Fees

Active membership costs $125/yr. Your affiliate membership dues will be credited towards your active membership should you wish to apply. There will also be a $20 processing and administration fee charged at the time of application resulting in a total charge to upgrade your membership of $45. Please call us directly in Revelstoke if you wish to discuss this further. All of us here at the CAA look forward to serving you into the future and wish you all the very best for the summer months ahead.

Tradeshow Pro Purchase Seminar

ALL PHOTOS CAA/CAC STAFF

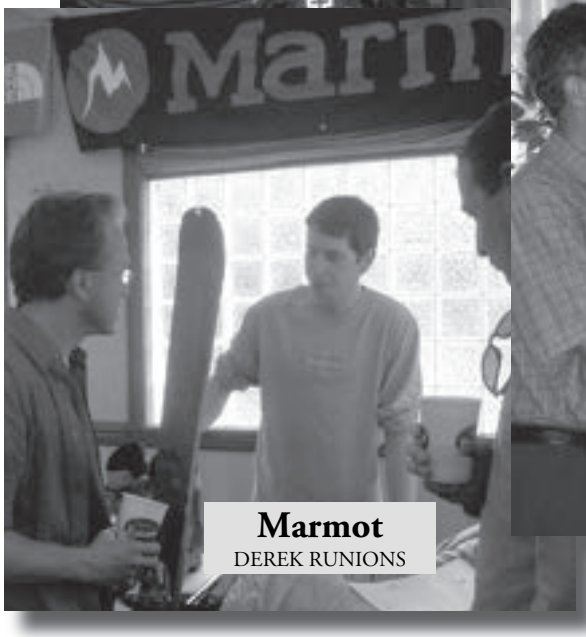


G3
SALLY CARMICHAEL

Arc'teryx
JOHN IRVINE

Ferno Canada
DOUG HARSTROM

Gaz-Ex
KARL ERNST



Marmot
DEREK RUNIONS

Swiss North Marketing/Kelley Sports Int.
OTHMAR KAGI / PETER MUELLER / BRIAN KELLEY

3rd Annual CAA/CAC Photo Contest Winners

1st Place
Dave Quinn

2nd Place
Brad White

3rd Place
Bonnie Hooge

Important Changes for RAC Providers

BY JOHN KELLY, CAC OPERATIONS MANAGER

One of the critical issues in recreational avalanche training is the need to ensure a high standard of course delivery, while also maintaining a wide network of course providers. RAC providers themselves have spearheaded this issue in committee reports and representations to the board in the past two years, penning a number of suggestions centred on the need to ensure a high standard of instructor qualification for people who are training others to go out into the winter backcountry. These suggestions have resulted in changes to the Recreational Avalanche Course Materials License Agreement and the RAC Field Trip Policy that were approved by the CAC Board of Directors in June 2006.

The proposed changes are an exciting new departure for RAC. By taking advantage of the new active member category in the CAA, RAC providers will gain full voting rights, ensuring a strong voice in the association on behalf of recreational avalanche education. Active membership is structured to ensure that continuing professional development is a requirement for good standing, and these members are subject to CAA code of ethics guidelines. These features will ensure that instructors of recreational avalanche courses are continuing to develop their skills and knowledge related to avalanche safety–with spin-off benefits to course quality.

Another board of directors' decision that will affect the way recreational avalanche courses are delivered is a change in the Field Trip Policy for Active Member providers. Currently, introductory recreational avalanche courses delivered by affiliate members are restricted to non-avalanche terrain. With the change in RAC field trip policy, all active member RAC providers will be able to deliver courses in terrain that is rated as "Simple" according to the Avalanche Terrain Exposure Scale (ATES). As ATES comes into wider use in Canada, more terrain possibilities will be opened up for RAC course delivery. Please note there are no changes to field trip policy guidelines for CAA professional member RAC course providers.

Here is a bullet-point summary of the changes and what will be required of RAC providers:

- All affiliate members wishing to deliver introductory recreational avalanche courses in 2006-2007 must apply to the CAA for membership in the new Active Member category. Only active or professional members of the CAA will be permitted to sign a RAC provider agreement.
- Application for membership as an active member can be found on the "Members Only" section of the CAA website. Just click on Information > Active Membership Information
- RAC provider agreements will cease to be valid for affiliate members of the CAA as of October 1, 2006
- Instructors leading Introductory RAC field trips who are CAA active members are responsible to ensure those field trips take place on terrain which has been rated as "simple" according the Avalanche Terrain Evaluation System (ATES), in guidebooks or other documentation produced by a responsible third party. In the absence of ATES documentation, only non-avalanche terrain can be used.

Canadian Avalanche Roundtable

BY JOHN KELLY, CAC OPERATIONS MANAGER

The Canadian Avalanche Roundtable is a unique stakeholder body that brings together interested parties in public avalanche safety from all levels of government as well as non-profit agencies, backcountry user groups and private enterprise. Many have a financial investment or business relationship with the CAC, and all share a vital interest in avalanche safety. Through the roundtable structure these stakeholders are given an opportunity to comment on public avalanche safety programming delivered through the CAC and offer advice on future directions of CAC programming.

I say the roundtable is unique, and by that I mean to my knowledge no other national-scope public avalanche safety organization is structured to have a similar input mechanism from such a broad spectrum of interested parties. I believe this brings to our organization a powerful tool to develop the most complete picture possible of true needs for CAC services. In the long run this will help us develop effective programs. In the short run it has already affected our thinking on priorities for the coming season.

There were more than 20 individuals sitting around the table at our meeting on May 2 of this year. To give some idea of what it looked like and who these interested parties are, here is a partial list of participants: Steve Blake represented the board of directors of the CAC and CAA, Scott Flavelle was there on behalf of the Canadian Avalanche Foundation, Jim McAllister and Jeff Haack were there from the Provincial Emergency Program of British Columbia, Lori Edwards represented Mountain Equipment Co-op, Dominic Boucher and Stephane Gagnon were there from the centre d'avalanche de la Haute Gaspésie, Grant Statham was the Parks Canada Agency representative and Gabor Friscka represented the Meteorological Service of Canada.

Overall, the tone at the roundtable was very positive and cooperative. The stakeholders reminded us during the meeting that there is a need to continue the push to bring programs to areas of the country outside of Alberta and BC. They also signalled that there is still a great need for avalanche safety awareness and education programs at the basic level. With regards to snowmobilers, indications remain that avalanche safety messaging is not penetrating to a wide audience, even though we are making advances in some sectors. The largest single concern of the roundtable group was to bring avalanche safety education to youth.

In the weeks following the meeting we surveyed the stakeholders to help identify priorities, and to gauge their level of satisfaction with the CAC as a service provider, collaborator and partner. The results of the survey were an interesting snapshot of how the CAC is situated in the perception of the avalanche safety community.

All of the survey respondents rated themselves as "very satisfied" about the structure, transparency and value for investment of the CAC. The large majority also were "very satisfied" with staff and management performance. When asked what CAC program priorities should be over the coming year, survey respondents identified coordination and promotion of youth programming as the most important priority, followed by stabilizing Eastern Canada programs. Improving snowmobile programs and providing services to users who are at a basic level of awareness of avalanche safety–the unaware and untrained–were also high on the priority list.

From the CAC perspective, I feel these priorities are truly on target with the current public avalanche safety needs in Canada. During strategic planning in June we incorporated all of them and we are now in the process of creating action items and performance goals that will set them squarely in our sights for progress.

Review of Avalanche Accidents in Canada, Winter 2005-06

BY ALAN JONES, PUBLIC AVALANCHE FORECASTER, CANADIAN AVALANCHE CENTRE

The winter of 2005-06 saw a return to much better snow conditions for Western Canada than the previous few years, thanks partly to a relentless series of storms from late December through early February. Although most areas were dealing with deep instability problems for the first part of the season, this problem gradually decreased as snow depth increased. By late in the season, the intrepid weak-layer sleuths from the University of Calgary were forced from their winter home at Rogers Pass eastward to the Rockies in search of buried weak layers.

The end result of a reasonably good snowpack with a limited number of persistent weak layers, combined with improving public avalanche warning services, was the third season in a row of a decreasing avalanche fatality trend in Canada. The following article summarizes the avalanche fatalities in Canada during the 2005-06 season, discusses long-term trends in the statistics, and describes improved avalanche reporting at the Canadian Avalanche Centre (CAC)

As of the end of May, there were a total of eight people killed in seven avalanche accidents in Canada. The first avalanche-related fatality of the season occurred January 7 and the last of the season was April 21. Seven of theses fatalities were in BC, and one was in Alberta. Table 1 provides a summary of the 2005-06 avalanche fatalities.

Table 1. Summary of 2005-06 avalanche fatalities in Canada

Date	Location	Activity	Fatalities	Summary
Jan. 7, 2006	Kicking Horse Mountain Resort, BC	Out-of-bounds skiing/boarding	1	Lone boarder in permanent closure at ski area. Buried by self-triggered size 2.
Jan. 14, 2006	Wolverine Bowl, Island Lake, BC	Non-recreation	1	Guide struck by avalanche while making weather/snowpack observations.
Feb. 12, 2006	Commonwealth Valley, Kananaskis, AB	Backcountry skiing	1	Skiers triggered size 3.5 avalanche. Two caught; one succumbed to trauma.
Mar. 3, 2006	McBride Mountain, Valkyr Range, BC	Backcountry skiing	2	Self-guided skiers based out of backcountry lodge. Three caught in skier-triggered size 2.5 avalanche; two killed.
Mar. 5, 2006	Fairy Creek, Fernie, BC	Snowmobiling	1	Snowmobiler highmarking triggered avalanche, burying partner below.
Apr. 20, 2006	Mt. Deltaform, Kootenay National Park, BC	Mountaineering	1	Two climbers on the Supercouloir route, triggered size 3 avalanche on descent. One fatality; other rescued three days later with severe injuries.
Apr. 21, 2006	Nordschaw Drainage, Bella Coola, BC	Snowboarding	1	Professional Austrian snowboarder triggered size 3 slab during photo shoot.

In terms of statistics, this season's eight fatalities are below the average of 12 per year observed from 1984 to 2006. There were 265 avalanche fatalities recorded during this period. Figure 1 shows the trend in avalanche fatalities for the period of 1995 to 2006, including a 10-year running average trend. It can be observed in Figure 1 that both the average number of fatalities and the 10-year trend has been decreasing the past three seasons, with the obvious peak during the season of 2002-03.

Figures 2, 3 and 4 show additional long-term trends in avalanche fatalities in Canada. Figure 2 shows the percentage of avalanche fatalities by activity, almost half (44%) of which are related to backcountry skiing and snowboarding. Snowmobiling comprises the second largest activity contributing to avalanche fatalities (24%), with the rest fairly evenly distributed among out-of-bounds skiers at ski areas, other recreation (e.g. snowshoers) and non-recreational (i.e. workers, residences, etc.).

Figure 3 shows avalanche fatalities by jurisdiction, with the majority of avalanche fatalities occurring in BC (65%), followed by National Parks (16%), and Alberta and Quebec (8% each). Figure 4 shows avalanche fatalities in BC by place of residence of the victim. Almost half (46%) of avalanche victims in Canada are British Columbians, followed by Albertans (22%). Americans (16%) and Europeans (14%) together comprise almost a third (30%) of fatalities in Canada, illustrating the importance of targeted messaging for visitors, not just Canadians. The fatality numbers for 2005-06 are fairly consistent with the trends shown in Figures 2, 3 and 4.

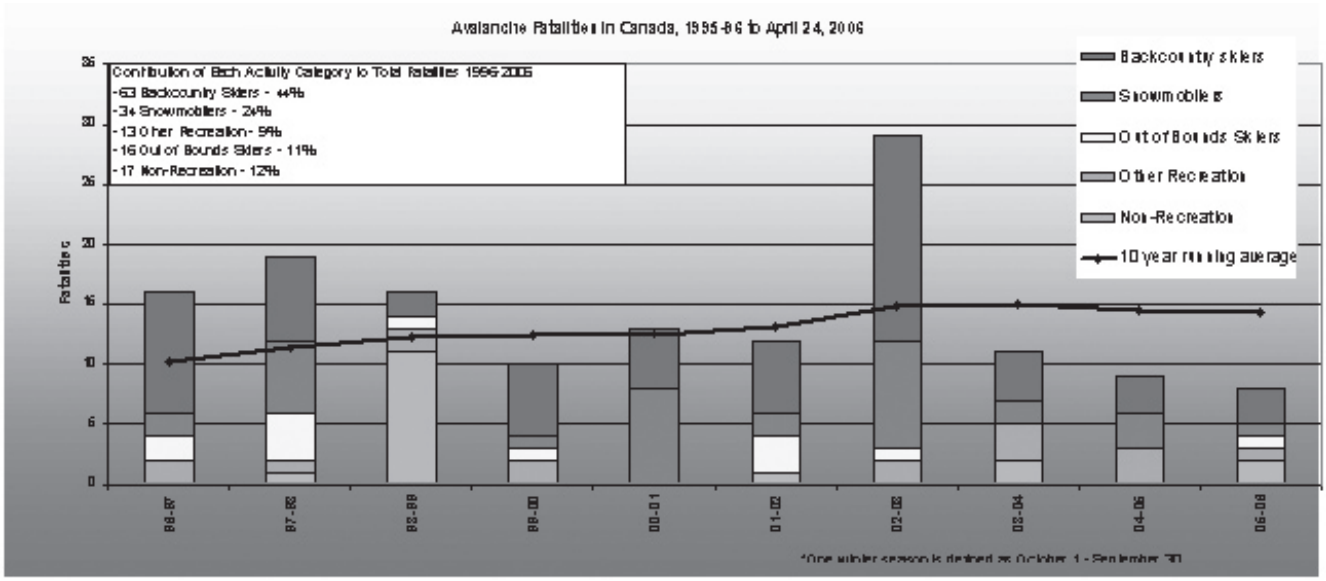


Figure 1. Avalanche fatalities in Canada, 1995-96 to May 30, 2006.

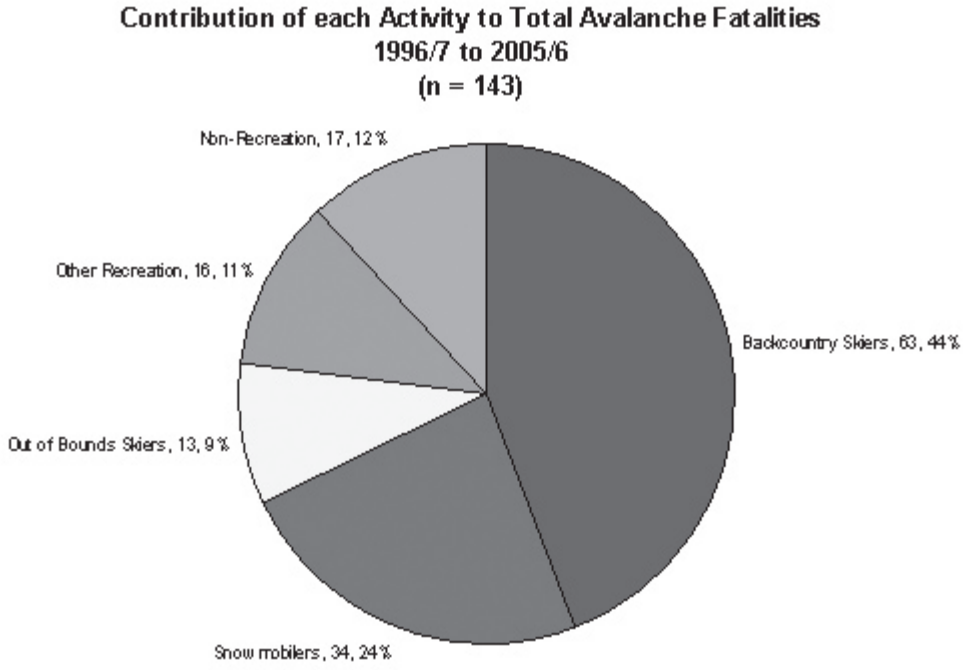


Figure 2. Avalanche fatalities in Canada by activity.

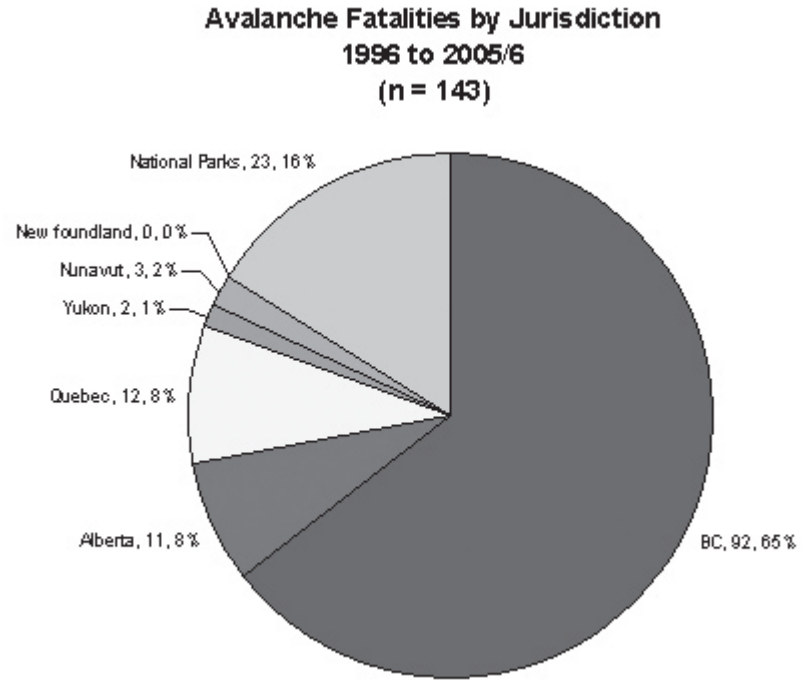


Figure 3. Avalanche fatalities in Canada by jurisdiction.

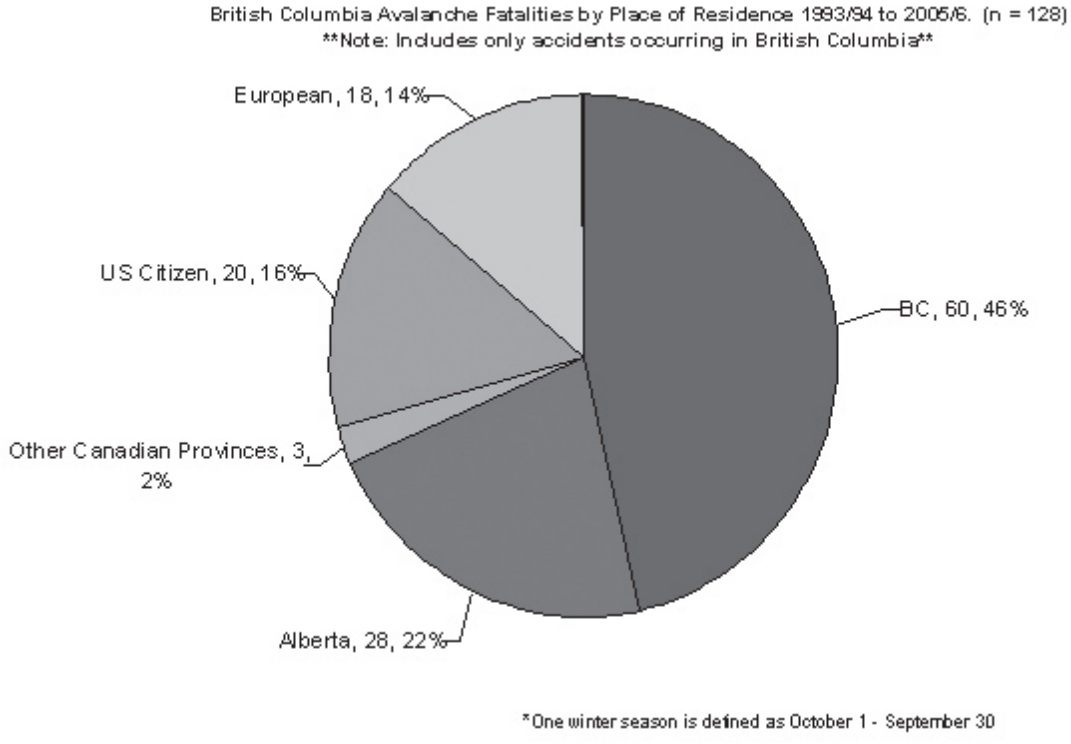


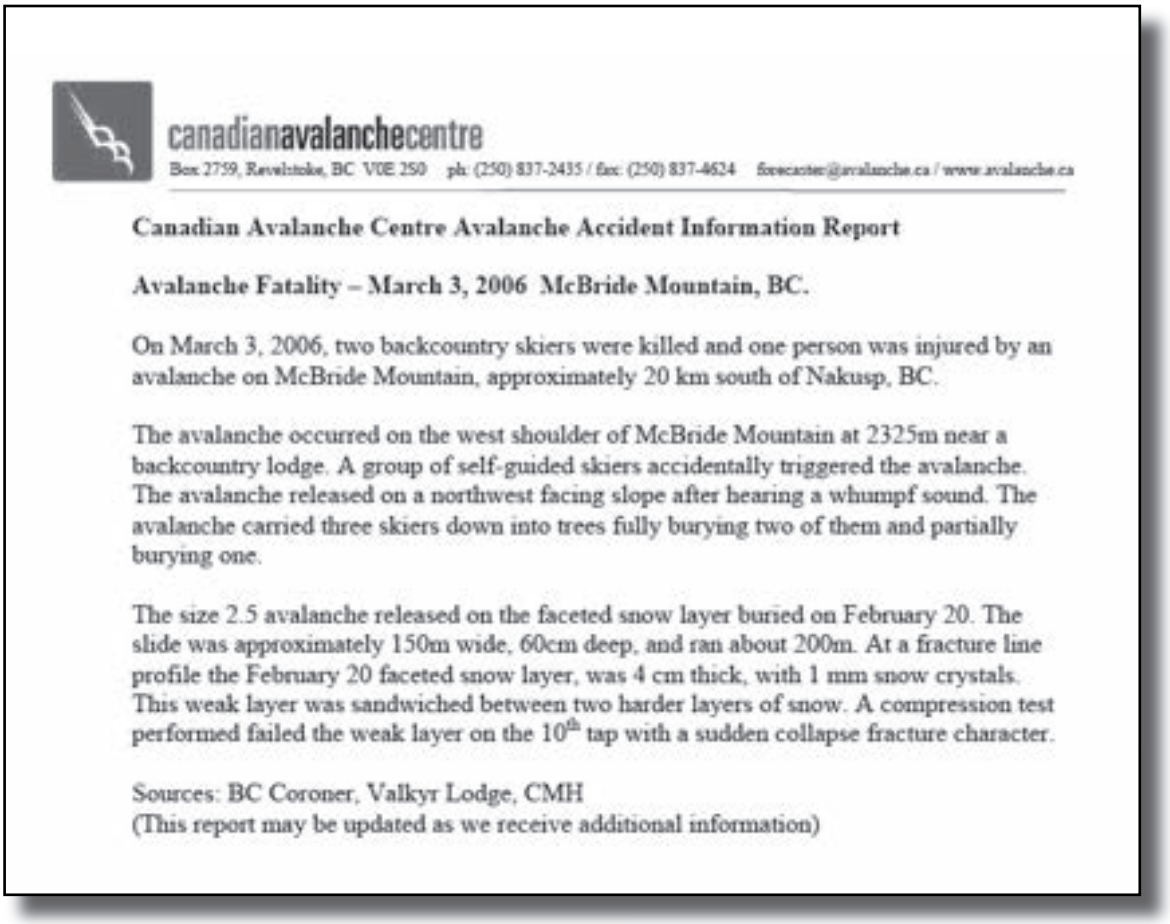
Figure 4. Avalanche fatalities in BC by place of residence.

One significant change that occurred at the CAC this past season was the continued improvement of timely reporting of fatal avalanche accidents. As soon as possible following a report of a fatal avalanche accident, CAC forecasters track basic factual information to provide to the public in order to help prevent similar accidents. This type of reporting exists among professionals (i.e. InfoEx), but in the past public information regarding accidents has often been lacking and left to the media for reporting. As we all know, sometimes the media gets it right, and sometimes they don't.

In order to improve this situation, the CAC now obtains factual, verifiable information from credible sources, including the BC Coroners Service, RCMP, BC Provincial Emergency Program, avalanche operations, and CAA professionals. The CAC avalanche forecasters produce a summary report of these facts (Figure 5) and provide this information to the public as soon as possible. Information is posted to the CAA/CAC website (Figure 6), updated as required, and archived for future reference.

Many of you are probably aware that the www.avalanche.org has been archiving accident information for both Canada and the US for years, so you may be wondering "what's the big deal?" In contrast to the CAC, www.avalanche.org predominantly publishes articles from the media, especially for Canada where official source information has been limited.

The CAC will only post information from credible sources, checked and summarized by our forecast team. This information may be missing some of the drama often associated with the media accounts of these events, but we aim to supply the public with sufficient information to help avoid similar accidents. So, you can still check in with www.avalanche.org for accident information, which appears to continue publishing both the CAC's reports and media articles.



canadianavalanchecentre

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Canadian Avalanche Centre Avalanche Accident Information Report

Avalanche Fatality – March 3, 2006 McBride Mountain, BC.

On March 3, 2006, two backcountry skiers were killed and one person was injured by an avalanche on McBride Mountain, approximately 20 km south of Nakusp, BC.

The avalanche occurred on the west shoulder of McBride Mountain at 2325m near a backcountry lodge. A group of self-guided skiers accidentally triggered the avalanche. The avalanche released on a northwest facing slope after hearing a whumpf sound. The avalanche carried three skiers down into trees fully burying two of them and partially burying one.

The size 2.5 avalanche released on the faceted snow layer buried on February 20. The slide was approximately 150m wide, 60cm deep, and ran about 200m. At a fracture line profile the February 20 faceted snow layer, was 4 cm thick, with 1 mm snow crystals. This weak layer was sandwiched between two harder layers of snow. A compression test performed failed the weak layer on the 10th tap with a sudden collapse fracture character.

Sources: BC Coroner, Valkyr Lodge, CMH
(This report may be updated as we receive additional information)

Figure 5. Example of avalanche accident summary for the Mt. McBride accident.

Figure 6. Avalanche accident archive at the CAA/CAC Website.

Also improved this past season was avalanche accident reporting to the CAC for non-fatal accidents. The CAC avalanche forecasters have access to avalanche accidents that occur within the professional avalanche industry thanks to continuing access to CAA InfoEx data. However, past reporting of avalanche incidents and accidents involving the public has been sporadic. This is very important information since the public often travel in different backcountry areas and have different usage patterns than professionals.

The CAC forecasting team observed a markedly increased number of public avalanche accident reports this season compared with previous years (i.e. an increase of more than 20 reports). This could be at least partly attributed to increased, pro-active solicitation of public avalanche and accident information using methods such as e-mail links and online accident forms. Also, the recently improved accident database will help archiving and future research of accidents.

Making it easier for the public to report accidents to the CAC will continue to improve the products our forecast team provides and improve our public messaging. In turn, hopefully our improved ability to report both fatal accidents and less serious, but still important, non-fatal accidents to the public will help them make good decisions in the backcountry. Our products will only continue to improve as we can incorporate more and better information from a variety of sources. Hopefully this will translate into a continued downward trend in avalanche accidents, despite increasing backcountry usage.

Avalanche Awareness Days–East Coast Style

BY PHILIPPE GAUTIER, CENTRE D'AVALANCHE DE LA HAUTE-GASPÉSIE

The Centre d'avalanche de la Haute-Gaspésie (CAHG) hosted its second annual Avalanche Awareness Days on Easter weekend (April 14th-16th) in the Chic-Choc Mountains of the Parc national de la Gaspésie. While this is later than events held in the rest of the country, the centre takes advantage of the busiest weekend of the winter in order to convey its message to the most number of people.

The CAHG staff knows how to throw a party. The apres-ski scene at the gîte.

Photo: CAHG Staff

For the weekend, four activity centres were created: a conference supper, an information booth, a field activity centre and an après-ski barbeque. The intent of Friday night's conference supper was to create a setting that would allow the CAHG and the CAC to present their message to decision makers and the media. As a result of this effort, a very positive article was printed in a widely-distributed daily Quebec City newspaper. Radio reporters from both provincial and local stations were also present at the event.

Justin Trudeau's presence was instrumental in attracting the media, and his words at the conference supper and during interviews were very compelling and supportive of the CAHG and CAC's missions. The local Deputy Nancy Charest also spoke, along with the Prefect Majella Emond. CAC Operations Manager John Kelly and the CAHG coordinator Dominic Boucher where also present to present their messages. The soirée ended with special guest François Boulanger, director of the Parc national de la Gaspésie, who entertained the audience with a historic voyage through the Chic-Choc Mountains painted with pictures and anecdotes of old.

JK discussing the finer points of transceiver technique.

Photo: CAHG Staff

On Saturday, the CAHG set up an information booth along side industry supporters at the Interpretation and Services Centre where most backcountry travelers begin their adventure. The Serpentine Shelter is the busiest location in the area and that's where CAHG staff were that day, wearing Hawaiian-print shirts, talking to the public, conducting beacon searches and giving away Easter eggs. On Saturday afternoon, with the last of the weekend's good weather, the CAHG staff hosted a BBQ. With the help of generous industry supporters including Le Yeti, Recco, Black

Diamond, Sport Dinaco, Arc'teryx, Backcountry Access and the local IGA, the CAHG was able to offer a free beer, hot-dogs and many door prizes to the more than 100 people present.

The weekend was a success and the CAHG met its objectives of reaching most, if not all, of the people present in the park over the weekend. Next year, the CAHG is considering hosting the event over three days in order to dedicate a full day to the media. This would also be an opportunity to revise the event's intent. This year, it was planned as a complimentary event to an already busy weekend. It might be possible to create a happening that would attract its own specifically targeted public –an East Coast Avalanche and Mountain Culture Festival.

CAHG staff at the transceiver practice site, decked out in their special AAD uniform.

Photo: CAHG Staff

Fin de Semaine de Sensibilisation aux Avalanches dans les Chic-Chocs

PAR PHILIPPE GAUTIER

Au cours de la fin de semaine de Pâques (15-16 avril 2006), le Centre d'avalanche de la Haute-Gaspésie (CAHG) a organisé des activités de sensibilisation aux avalanches dans les Monts Chic-Chocs du Parc national de la Gaspésie. Ces dernières étaient réparties dans quatre centres : un souper-conférence, un kiosque d'informations, des activités de sensibilisation directe sur le terrain et un 4 à 7 BBQ.

L'objectif du souper-conférence visait à créer une plateforme propice à la transmission du message du CAHG et du Centre Canadien des Avalanche (CCA) aux politiciens et aux médias. La présence de Justin Trudeau a fortement contribué à stimuler l'intérêt de ces derniers. De plus, lors de son allocution au souper-conférence et durant ses entrevues, il a réitéré son appui envers les missions du CAGH et du CCA. La députée provinciale Nancy Charest et le préfet de la MRC Majella Émond ont aussi montré leur soutien par leur présence et leurs discours. Étaient également au menu des présentations de John Kelly, directeur des opérations du CCA et de Dominic Boucher, coordonnateur du CAHG portant sur les enjeux provinciaux et nationaux de ces deux organisations. Pour conclure cette soirée, les desserts sucrés ont été rehaussés par les mots et photos de François Boulanger, directeur du Parc national de la Gaspésie qui a su transporter l'audience dans un voyage historique à travers les Monts Chic-Chocs.

En plus de ce repas frugal, cette soirée a porté fruit. Un article très positif est paru dans un quotidien à grande distribution de la ville de Québec. De plus, le message du CAGH a été rapporté par des radios provinciales et locales de même que par les journaux locaux.

En ce qui a trait aux activités prévues pour le grand public au cours de la fin de semaine, le CAHG a tenu un kiosque d'informations en compagnie des partenaires de l'industrie au Centre d'interprétation et de services. Cet endroit constitue le point de départ pour la majorité des utilisateurs du Parc et ainsi le CAHG a profité de cet achalandage pour faire passer son message. C'est à l'abri la Serpentine que le personnel du CAGH a tenu des activités de sensibilisation directe telle la pratique de recherche de victimes d'avalanche avec ARVA et des discussions avec le public sur place.

La fin de semaine a connu son point culminant le samedi soir lors d'un 4 à 7 BBQ au Gîte du Mont Albert. Grâce à la participation et la générosité de ses partenaires, Le Yeti, Recco, Black Diamond, Sport Dinaco, Arcteryx, Backcountry Access et IGA, le CAHG a été en mesure d'offrir des consommations et des hot-dogs gratuitement. De plus ceci a été accompagné par plusieurs prix de présence distribué aux participants qui dépassaient la centaine.

La fin de semaine a été un franc succès. Le CAHG a rejoint la grande majorité des utilisateurs du Parc au cours de la fin de semaine. Pour augmenter le retour média, le CAHG considère présenter l'évènement sur trois jours l'an prochain afin de consacrer une journée complète à ces derniers. Il est aussi envisageable de créer un évènement qui attirerait sa propre clientèle sous la forme d'un festival de la culture de montagne.

Dominque and Stéphane serving up the chien-chauds.

Photo: CAHG Staff

CAC Annual General Meeting – May 2, 2006

FROM MINUTES BY SUSAN HAIRSINE

Board of Directors' Report

CAC President Steve Blake welcomed everyone to the second annual general meeting of the Canadian Avalanche Centre and reviewed the agenda.

Steve stated the BOD discussed the issue of common vision this year. A meeting was held in Revelstoke, November 2005 and participants included the audit committee (past presidents), and members of the CAA, CAC, and CAF Board of Directors. The common vision developed from that visioning session is "To be a world leader in avalanche awareness, education and safety services," and the CAC's purpose statement was reconfirmed.

The CAC BOD is a policy and governance board, and sets strategic direction. The BOD has one employee (the Executive Director). The other key element of the CAC is the Canadian Avalanche Roundtable group, which is an advisory committee comprised of stakeholders from funding government organizations and other user group representatives. This advisory committee proposes priorities for the CAC annually.

There is some uncertainty around government funding, but BC PEP now has committed multi-year operational funding to the CAC. Discussions are ongoing with other federal and provincial partners. Program delivery and sustainability in Eastern Canada continues to be a concern. Growing the CAC membership was discussed at the CAC Roundtable, however we were cautioned yesterday that we could spend a great deal of time and money fostering membership growth, and this could detract from our delivering the CAC mandate for public avalanche safety program delivery.

Relevance to stakeholders and target audiences was also discussed at the roundtable meeting. We need to be relevant to youth and responsive to public interests, trends and needs. We must continue to develop partnerships and maintain a relationship with the CAA to move our programs forward.

The common goals of the CAF, CAC and CAA were discussed. In future, a common logo could be developed ("avalanche.ca"); respective boards are exploring this concept.

Steve reviewed the membership categories of the CAC (Friend and Supporter). He then showed the make-up of the CAC BOD and explained what positions were vacant and would require elections later in the meeting.

Financial Report

John Hetherington delivered the 2006 financial report for the CAC. There were assets of $94.5K and liabilities of $91.2K. The balance at year end was $3.3K. Support funding from government organizations was $408K, and private and miscellaneous sources including the CAF was $220K. The CAC was not established to incur large surpluses, and John was pleased to report a modest operating surplus. As well, all outstanding start up costs, (legal and governance fees) incurred in 2004 were paid from this year's revenues.

Public avalanche bulletin costs were $277K with a net surplus of $3K. John explained how expenses were allocated and added that the goal is to have a budget balance as close to zero as possible, given that this is public service. In summary, John said the CAC is in reasonable shape financially and we are looking for the federal commitment to be renewed.

Executive Director's Report

It has been three years since the CAC was formed and Clair Israelson acknowledged the work of the BOD, which has provided crucial guidance and strategic direction. The CAC has one policy committee that reports to the BOD (RAC Policies Committee). Clair acknowledged this group and CAC staff.

Clair outlined the approved CAC roundtable operating model and explained the role of roundtable members in providing guidance. He also discussed strategies to achieve the CAC vision. Clair reviewed the mission statement for the CAC and outlined tactics to achieve this mission. These include working with all stakeholders, coordinating the lead role and avoiding duplication, developing ongoing, reliable funding, etc.

Eastern Canada continues to have a real need for public avalanche safety programs and service delivery. CAC highlights for 2005 included BOD guidance and vision development, ongoing dialogue with the Canadian Avalanche Roundtable, collaborations with a number of partners, Alberta Community Development support, and positive ongoing dialogue with federal and provincial agencies, and Eastern Canada. John Kelly was hired as the CAC Operations Manager in the summer of 2005 and has been working hard on a variety of CAC programs.

Clair reviewed progress with 2005 Canadian Avalanche Roundtable priorities including developing Alberta programs, developing Eastern Canada programs, and youth programs. Clair thanked the organizations that provide funding and in-kind support to the CAC. These include BC PEP, Parks, MSC, etc. as well as the InfoEx subscribers who supply data in support of the public avalanche bulletins. The CAC continues to achieve credibility with government and stakeholders.

Clair was asked if there are strategies in place if any key government funding is lost. He stated that we have developed governance and operating structures so we can shrink or grow depending on the amount of funding that is available. This is tenuous, but we have built the organization around that uncertainty.

Operations Manager's Report

John Kelly (JK) summarized the operational season at the CAC and avalanche season highlights across Canada. This included the season's weather (he added that snowfall was 20-50% more than average in the South Columbia and South Rocky Mountains). Other areas had average snowfall, except the North Coast which experienced significant drought. There were eight total fatalities; six recreational fatalities (three backcountry skiing or boarding, one snowmobiling, one mountaineering, and one out-of-bounds), and two occupational fatalities. JK had plotted these fatalities on a map. *(**Editor's note:** For more information on this season's fatal accidents, see summary on page 29.)*

JK added that this was a low year for fatalities in terms of recent history, but noted last year we had three summer avalanche accidents in Western Canada. As well, there were a number of injury accidents and close calls.

The CAC staff spent energy this year in understanding their audience. Backcountry-use trends from ADFAR surveys indicate that the area with the strongest relative growth was in Southeastern BC. Out-of-bounds skiing seems to be the fastest non-commercial backcountry segment. Snowmobile riders seem to be the largest user group. JK also discussed user demographics and risk propensity. Up to 15% of out-of-bounds skiers surveyed stated that being seriously injured or dying in avalanches is an acceptable outcome of their activity.

JK also reviewed the improvements made to the RAC courses over the past few months. Jennifer George has been hired, and a significant part of her role is to assist RAC providers. Early season training for RAC providers occurred and new supporting materials were developed. A RAC newsletter was developed and the RAC providers indicated their support of this initiative. JK showed increased RAC course participation over the past five years and RAC sales.

For 2006/-07 the CAC hopes to continue to enhance RAC curriculum subject to recommendation by committee and the BOD. This could include online learning integration, pops and drops (ARAC), ADFAR/Avaluator Decision Tool, ATES, public avalanche bulletins and how to best utilize them.

RAC student survey statistics were collected from 384 individuals. Sixty RAC providers also participated in this survey and there was high agreement that the course manual and content met their expectations. Many people taking IRAC indicated that they were interested in taking an ARAC course. The theme for Avalanche Awareness Days 2007 will be education and RAC will be promoted at these venues.

JK also discussed growth in CAC partnerships. The CAC has expanded the Backcountry Avalanche Advisory icon program to all reporting areas in Western Canada. A special avalanche warning program in conjunction with PEP BC is now in its third year, and is a proving to be a good risk communication tool. A French-English lexicon of avalanche terminology has been developed with Parks Canada.

There were 142 media interviews logged by CAC forecasters last year. Total media contacts were more than 200 for the year ; this media outreach is a huge part of the CAC program. The CAC developed a communications plan to outline responsibilities for communication within the CAC and help other stakeholders to understand the messages that the CAC is promoting with the public. There was continued cooperation with partner agencies.

JK reviewed some additional activities that occurred with the CAC. He explained a number of initiatives carried out specific to Alberta. This included forecaster and outreach in the South Rockies, snowmobile outreach, and avalanche awareness events. Avalanche information reports were obtained from the Bighorn area of Alberta, and these are an important addition given the number of ice climbers in that area.

JK explained national scope activities and highlighted work carried out with forecasters at the CAHG in Quebec. The program remains strong, with new staff coming on stream, however funding remains a challenge. Justin Trudeau was involved in the CAHG's Avalanche Awareness Weekend in the Gaspesie area *(**Editor's note:** See a report on this event, in English and French, on page 34)* and the Online Learning module was released in French in January.

The CAC continues to develop links with youth education delivery (i.e. AdventureSmart, SNOWSMART, etc.). A youth programs strategy and sponsorship package has been developed and we hope to obtain a sponsor for these initiatives. Avalanche Awareness Days targeted out-of-bounders this year, a group largely comprised of youth.

JK then went on to discuss the public avalanche bulletins program. An information region was added in Alberta, and the backcountry avalanche advisory icon program is now in its second year. Forecasting staff was expanded this winter as required and 486 avalanche forecasts were issued. JK reviewed bulletin user statistics and added that direct e-mail delivery is the fastest growing segment of bulletin use. There were approximately 650,000 targeted bulletin deliveries last year. The CAC forecasting team continues to work on streamlining the creation of the bulletin and posting.

Future challenges include continued investigation in best practices in program development, targeting programs for dollars spent, and stabilizing and growing Eastern Canada initiatives. JK closed by stating that there are many people to thank for their collective effort in public avalanche safety programming.

Membership Issues

CAC Director for Members Steve Parsons discussed the two categories of membership at the CAC–Friends and Supporters. He wanted participants to approve the cost structure to these two membership groups. Friends are for anyone who wants to belong, while Supporters are targeted to corporate members. CAA members are automatically members of the CAC, at no additional charge, if they select this option on their membership form. Associate members can also choose to be a member of the CAC by ticking their membership box. However, some corporations may opt to belong only to one organization.

Voting rights were discussed, Clair stated that according to CAC bylaws all members have voting rights in the CAC and are eligible to be elected to the CAC BOD. After a vote with all in favour, annual membership fees were set at $20.00 for Friends and $200.00 for Supporters.

CAC Board of Directors

President	Steve Blake
Vice-President	Rob Rohn
Secretary-Treasurer	John Hetherington
Membership Committee Chair	Steve Parsons
CAA Director	Mike Boissonneault
CAF Director	Jack Bennetto

Dan Markham was elected as the CAC Director for Friends and Mike Mortimer was acclaimed as the CAC Director for Supporters. Former Director for Friends, Lori Zacaruk, stepped down from the board and was applauded for her time and efforts.

Canadian Bulletin Writers Workshop

BY ALAN JONES, PUBLIC AVALANCHE FORECASTER, CAC

On May 2, 2006 the CAC and Parks Canada hosted a half-day workshop for public avalanche bulletin writers at the CAA/CAC spring meetings in Penticton. Approximately 45 forecasters attended this meeting, including representatives from every operation in Canada producing avalanche bulletins for the public. Operations in attendance included the CAC, Parks Canada, Kananaskis Country, North Shore Avalanche Advisory, and several BC ski resorts that provide public avalanche information. Other special invited guests included Knox Williams and Mark Moore from the Northwest Avalanche Center in Washington State, Bruce Tremper from the Utah Avalanche Center, Gabor Fricska and Allan Coldwells from the Meterological Service of Canada, and several senior instructors from the CAA Industry Training Program.

A meeting of the minds at the Bulletin Writers Workshop.

Photo: CAC Staff

The theme for this year's workshop was "exploring our understanding and communication of deep instability to the public." Discussions included the increasingly important topics of avalanche hazard versus stability, integrating consequences into public messaging, and revisions to the avalanche danger scale.

Powerpoint pontificating was kept at a minimum. Instead, the workshop was run in true "workshop" format with participants divided into small groups of eight. Grant Statham from Parks Canada and I facilitated the exercises, and we ruthlessly threw a series of complicated questions to the participants. These questions were debated vigorously by the groups until the melee was broken up by Grant and myself, the topic was summarized for each group, and the next question was presented. The morning was wrapped up by Bruce Tremper who gave a brief summary of the new graphical-based advisory system used by the Utah Avalanche Center last winter (see Bruce's article on page 13).

This workshop turned out to be an excellent forum for bulletin writers to meet each other, discuss important topics, and present new ideas or new ways of doing old things. It also served as an excellent way of bringing old dogs together with younger forecasters, and helping transfer knowledge throughout our industry.

Based on the success of this year's workshop, we plan to continue these events at future CAA/CAC Annual General Meetings. If you have ideas for future workshops, feel free to contact me (alan@avalanche.ca) or Grant Statham (grant.statham@pc.gc.ca). Also, stay tuned for this year's International Bulletin Writers Workshop on October 1 at the ISSW in Telluride. Contact Greg Johnson (greg@avalanche.ca) if you're a public avalanche forecaster interested in attending this meeting.

The energy level was high during workshop scenarios.

Photo: CAC Staff

CAC Snowmobile Champions

BY JOHN KELLY, CAC OPERATIONS MANAGER

This winter, the CAC initiated the Snowmobile Champion program, an exciting new departure for avalanche safety activities. We hired two qualified, high-profile members of the snowmobile community to present avalanche safety messages directly to their peers. The goals of the Snowmobile Champion program are:

- To promote awareness of avalanche risks during mountain snowmobiling activities.
- To raise awareness of CAC avalanche safety materials and programs.
- To encourage the use of avalanche safety information and promote avalanche awareness training.

Lori Zacaruk and Amber Wood were hired as snowmobile champions. In a tag-team effort, Lori and Amber presented workshops and attended awareness events in 10 snowmobiling communities across Alberta. These communities were selected by virtue of their proximity to mountain recreation areas and in some cases by the number of snowmobilers they send to the mountains each weekend.

Low-cost, evening workshops targeted at families in their home towns were offered to make avalanche safety education accessible and economical. The evening programs were organized and promoted with assistance from the local snowmobile clubs, snowmobile dealers, and community volunteers. The workshops ran weekday evenings for two-three hours and included a Powerpoint presentation, a 15-minute DVD, equipment demonstrations and a question-and answer-period. Information covered included:

- Canadian Avalanche Centre Web services and training courses.
- Promotion of snowmobile RAC classes and instructors.
- Public avalanche bulletins, reports, and special warnings.
- First tracks, first reactions, and tips for group safety.
- Avalanche gear, tips and types, and beacon basics.

Promotion for the Snowmobile Champion program focused on e-mailed flyers to snowmobile contact lists and to local snowmobile clubs and dealers. Community newspapers and radio stations also advertised our events, but the lack of snow this winter made the avalanche message a bit of a tough sell and it was challenging to place information articles.

Posts were updated regularly on popular on-line snowmobile forums such as Snowest.com, ValemountSledTalk.com, the Alberta Snowmobile Association Events pages, and Sled Revelstoke. These posts introduced the activities for the public and also highlighted outreach sponsors. More than 600 views were logged on these threads.

Dealerships and snowmobile clubs represent important nodes of contact in the snowmobile community. The CAC snowmobile champions made visits to 27 dealers in each of the 10 Alberta communities visited in outreach activities, forming important links for future initiatives. Twelve snowmobile clubs were also visited.

For next year, the CAC proposes to mirror activities conducted in the winter of 2006. Building on the contacts and promotional opportunities developed throughout this initial season's work, the Snowmobile Champion program will benefit from improved scheduling, economical yet effective promotional exposure, increased sponsor support, expanded geographic coverage, and greater media interest. The feedback we received makes us confident we have made some important inroads into these communities, and another season of outreach activities will be welcomed by the local riders.

Alberta communities visited by snowmobile champions:

Caroline
Fort McMurray
Pincher Creek
Blairmore
Drayton Valley
Leduc
Hinton
Rocky Mountain House
Edson
Calgary

Photo: Lance Amos

Events Schedule

Sept 4 – 8, 2006

Avalanches and Related Subjects, International Conference

This year marks the third annual gathering in Russia. This year's topic is the contribution of theory and practice to avalanche safety.
Where: Kirovsk, Murmansk Region, Russia
Contact: PChemous@apatit.com or phone 00 7 81532 96230

Oct 1 – 6, 2006

International Snow Science Workshop

You are cordially invited to join other snow scientists and avalanche practitioners in attending this biennial international conference celebrating "A Merging of Theory and Practice." Set amidst a rich history of mining and avalanches in the spectacular San Juan Mountains, this meeting of the minds provides the avalanche industry a forum in which to discuss theories, present papers and explore innovative new research topics during a five-day period of interaction and conviviality.
Where: Telluride, Colorado
Info: www.issworkshop.org
Contact: Craig Sterbenz at 970-728-3829 or e-mail info@issw.net

Oct 4 - 7, 2006

SARSCENE 2006

This year, the national Search and Rescue Workshop will be co-hosted with the Surete du Quebec. The theme of the 15th annual event is "SAR: Strength in Community." Don't miss the games, workshops, tradeshow and search and rescue demonstrations. Early registration deadline is August 31, 2006.
Where: Gatineau, Quebec
Info: www.nss.gc.ca
Contact: Call 1-800-727-9414 or e-mail SARSCENE2006@nss.gc.ca

Oct 27 - 29, 2006

2006 Wilderness Risk Management Conference

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

Oct 30 - Nov 2, 2006

International Workshop on Snow Avalanches

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

International Bulletin Writers Workshop Telluride 2006

The Canadian Avalanche Foundation, the Colorado Avalanche Information Center, and the Canadian Avalanche Centre are hosting the 3rd International Avalanche Bulletin Writers Workshop and Information Exchange at the ISSW 2006 in Telluride, CO. The workshop is free and will be held on registration day, October 1 from 8:30 am until 3:00 pm. Location and discussion topics to be announced later this summer.

The goal of the workshop is to discuss issues related to backcountry avalanche forecasts. Attendance of avalanche professionals who write avalanche forecasts for public use is highly encouraged. The workshop will be a great place to discuss interesting topics, exchange ideas and meet new faces.

We need to know how many people would like to participate. If you would like to attend, contact Greg Johnson at greg@avalanche.ca. Attendance will be limited to those who have previously worked for or work at an organization with an established public forecasting program.

Hope to see you there!

Time is Life

The ICAR Medical Commission has created a training DVD called "Time is Life" that promises to be very helpful as a training tool for both professional and volunteer rescuers who respond to avalanche accidents. The techniques and standards demonstrated are of the highest calibre, and are the result of the combined expertise of some of the most knowledgeable and experienced medical professionals in the world.

Hermann Brugger, co-author and chair of the International Commission for Mountain Emergency Medicine ICAR MEDCOM, says: "In this presentation you will find the most up to date information on the medical aspects of avalanche rescue. By demonstrating the best practices for the on-site treatment of an avalanche victim, we aim to improve your knowledge and expertise. After watching this DVD you will be more familiar with what happens when a person is caught by an avalanche and, hopefully, you will be able to provide your friends or any persons buried by an avalanche with the best treatment possible. All video scenes have been acted but they do reflect real situations in accidents that have happened in the past. Please spread this information as widely as you can; this may improve avalanche survival in the future. However, don't ever forget that triggering an avalanche is one of the most dangerous hazards in mountaineering. Be aware that prevention is the most effective measure to avoid a fatal accident."

"Time is Life" costs 25€ and can be ordered online at www.ikar-cisa.org

Experiences in Iceland

BY JAMES BLENCH, CAA INSTRUCTOR

This past March, Randy Stevens and I traveled to Iceland where we spent almost three weeks. This was the second time the CAA has run courses in Iceland. In 2005, Randy was there with Marc Ledwidge. As well, there are a number of Icelandic students who have come to Canada for Level 1 and 2 courses and graduate studies.

Our mission in Iceland was to conduct a CAA Level 1 out of Dalvik and a two-day forecasting seminar in Reykjavik at the request of the Icelandic Meteorological Office (IMO). In addition to weather prediction, the IMO's mandate includes earthquake warnings and avalanche protection of towns, villages and small farms. While Randy and I are familiar with Western Canadian-style avalanche issues, we found many of the problems the Icelanders face to be quite unique and their approaches to the issues equally so.

Audur Kjartansdottir - Assistant and interpreter for 2006.

Photo: Randy Stevens

Most of the island lies below 1400m elevation. The general terrain pattern consists of a short costal plain or piedmont with steeply rising slopes of up to 1000m leveling off to an upland plateau. Many of the villages are found on long fjords sandwiched between the ocean and the avalanche-prone slopes. In some cases, the main hazards for the villages are not from the avalanches themselves but from the tidal wave created when the slides hit the water and then overcomes the opposite shore!

Climate and avalanche regimes in Iceland are best described as maritime. Temperatures are relatively mild, precipitation events are frequent and rain to the highest terrain is not uncommon. Direct-action avalanching due to intense precipitation and wind loading are locally considered the cause of most avalanching. During our stay we observed some surface hoar development and also a persistent facet weakness in the transition zone between the rain line and the thicker snow cover. A two-week long avalanche cycle failing on this crust/facet interface buried in late February produced several large avalanches up to size 4 in the Siglifjordur area.

Recreation–both in ski areas and the backcountry–roads, and power line corridors create significant involvement between people and avalanche terrain. Icelanders are keen on outdoor recreation including ski touring, cross country skiing, sledding and crossing their huge icecaps in "super jeeps." There was a crevasse rescue accident involving a jeep and a 30 m fall into a crevasse making headlines when we arrived!

The Dalvik rescue team says they know the avalanche danger is high when the power goes out, as the nearby power line is taken out annually. There does not appear to be any organization whose mandate is to mitigate problems for ski areas, recreation or industry. The people involved are simply expected to exercise good judgment. Rescues are conducted by the police and each village has its own well-trained and equipped volunteer rescue team.

Even the super jeeps get stuck sometimes.

Photo: Randy Stevens

Unique to Iceland is the number of villages and small towns at risk from avalanches. Mitigation measures mostly take the form of highly developed hazard mapping with the resultant zoning and evacuation plans. There are some villages with deflectors, retarder mounds and retarding structures in the start zones. Explosive control is not used in Iceland.

Avalanche forecasting for all the villages is centralized at the IMO office in Reykjavik. The team has a strong

James on exam day.

Photo: Randy Stevens

scientific background including meteorology, geography and engineering, but little "field experience" in the Canadian sense. There are three CAA Level 2 grads on staff. Meteorological parameters form the basis for most of the forecasting decisions, assisted by local observations from a "snow observer" in each of the villages. Most of the snow observers have little technical training but longtime experience in the village.

While the IMO is usually quite successful using this approach, it sometimes fails as it did in the winter of 1995/96 when several villages were hit resulting in loss of life and significant property damage. Since then the IMO has engaged with the CAA and other organizations to further develop their avalanche expertise and forecasting capacity.

Randy hard at work in Iceland.

Photo: Audur Kjartansdottir

James Blench is a mountain guide from Canmore, Alberta and has been involved in avalanche- related work for more than 25 years. If you don't care where you are, you can't get lost so that's why he likes the opportunity to travel to unusual places like Iceland.

Demystifying Terrain

IAN TOMM, CAA OPERATIONS MANAGER

What is avalanche terrain anyway?

The first avalanche course I ever took, the instructor (who shall remain anonymous but is likely reading this article right now) said there are three ways to avoid avalanches: terrain, terrain and, you guessed it, terrain. But little of the course actually addressed terrain beyond the over-simplified (but still important) characterizations like slope shape, incline, and exposure to sun and wind.

The next year on my CAA Level 1 course, terrain again played a central role but the lessons there were much the same as my previous experience. There was little in the way of additional insights and tools as to how to structure an analysis, or tips on categorization and decision-making around avalanche terrain. It seemed a black art. There was (and still is) something missing.

Badshot Range, south central Selkirks.

Photo: Laura Adams

I have often asked myself why we have such rudimentary interpretation tools when it comes to terrain. I think this is one of the main reasons why so many of us struggle to teach terrain and route-finding concepts to others, and even to fully understand and appreciate them ourselves. I'm not at all professing to understand terrain completely. I'll be the first to admit that terrain skills are challenging at the best of times, and I struggle with terrain decisions on a daily basis when I'm at work guiding.

Terrain skills are largely the product of experience and intuition, which may be one of the reasons why there are large variances in how each of us looks at, breaks down, analyzes, categorizes, behaves in and ultimately teaches avalanche terrain. It's murky, but the good news is that I think I see a light at the end of the tunnel, although it is a long tunnel.

For those who attended this year's CAA/CAC Spring Conference, you may have noticed that tools to aid the avalanche worker and educator in our efforts to describe, understand and communicate the complexities and subtleties of terrain seem to be, at long last, converging. There was so much it was hard to take it all in, but for those not in attendance, or for those who wish a recap of the events, please read on.

Geovisualization and Augmented Reality

Ranae Kowalczuk

Ranae's presentation on GIS visualization and education stands out as one of the most impressive presentations of the two days. For her Masters thesis Ranae is working on terrain visualization and education tools using the CAA's Online Avalanche Course as a case study and point of reference for development in this domain. Of significance is her focus on evaluating the effectiveness of traditional means of teaching avalanche terrain concepts and learning from that to develop new tools for avalanche terrain education.

Ranae is specifically exploring the potential of using highly interactive Web-based and 3D augmented reality visualization tools. Her work is being closely watched by me, in the context of the CAA's efforts for education of avalanche workers (Level 1 & 2), John Kelly of the CAC for public utility, Grant Statham of Parks Canada regarding their initiatives with avalanche awareness, terrain classification and terrain guidance for the public, and Pascal Hägeli in the use of her methodologies to implement online training for the Avaluator–the decision tool that is soon to be released from the ADFAR project.

With one short presentation and a lot of work educating all of us she has managed to catch the attention of many. I personally am quite excited to see where this goes in the next 12 months. More information can be found at: http://sirl.sfu.ca

Terrain Terminology Glossaries

Scott Davis & James Blench

Both long-time ITP instructors and ACMG guides, Scott and James began speaking about the need for standardized terrain terminology glossaries at about the same time. Scott has introduced his thoughts on Module 3's in the last two seasons and James lead a thought-provoking session at the fall ITP instructors training to try and develop a standardized terrain glossary. At the training

session , it was interesting to see so many experienced instructors and avalanche workers struggle over words to describe seemingly simple terrain concepts. It was clear that a term that means one thing to one person could mean something entirely different to someone else. Anyone understand what I'm talking about? I thought so.

The utility of a standardized terrain glossary has the potential to be a powerful communication tool in our industry. Think of what OGRS did for the communication of detailed snow, weather and avalanche information amongst workers and operators. Currently there is a lot of very valuable terrain information contained (sometimes hidden) in various data exchange programs that this community utilizes (InfoEx, the CAIS, the BLBC Exchange, the ACMG Informalex, the ACMG Mountain Conditions Report) and I've heard increasing dialogue in the past six months that the capabilities of these programs to relay more and better terrain information needs to be improved. I couldn't agree more.

In my opinion this should start with a standardized terrain glossary–a Terrain OGRS if you will. It is clear the terminology that isn't standardized now is one of the reasons why we struggle to community effective about terrain. Development of something like this won't be easy, but we've started at the CAA's Industry Training Program by capturing the incredible wealth of knowledge and expertise in our instructor pool. A goal of mine is to refine this further over the course of the summer and try and open it up to a sort of "open source" project for CAA Members and InfoEx subscribers. I hope I have the time. If you are interested in helping out with this initiative drop me a line at ian@avalanche.ca

The view at Corbin Pass, east of Revelstoke.

Photo: Brent Strand

Spatial Variability

University of Calgary/Applied Snow and Avalanche Research Consortium

Bruce Jamieson has been speaking about spatial variability for some time now and it is certainly a core focus of many research and educational initiatives. One of his grad students James Floyer has been painstakingly developing an electronic resistance probe to try and study spatial variability more thoroughly. The results are promising and his presentation at the AGM hinted at good things to come next season, now that much of the development work is behind them.

More information: http://www.schulich.ucalgary.ca/Civil/Avalanche/

Parks Canada: Avalanche Terrain Exposure Scale

Bruce McMahon and Grant Statham's work in the analysis and categorical breakdown of avalanche terrain to produce the ATES scale cannot be overstated. I find it very interesting how something that seems so simple has produced such profound changes in our community since its inception. While still being a tool primarily focused on the public, it is being used as legislation dictating the behavior of some avalanche workers, albeit in a very specific context with custodial groups, guides and avalanche terrain found within national park boundaries. It is being adopted by recreational groups, snowmobilers, guide book authors and numerous other organizations. It's here to stay and momentum in its use is building.

Grant and I tested the ATES Technical Model (v1.4) on CAA Avalanche Operations Level 1 courses, independently, during the winter of 04-05. We found the technical model very successful in teaching a more in-depth understanding of avalanche terrain on Level 1 courses. For those who don't know, or have forgotten, much of the traditional Level 1 terrain content was practically a carbon copy of RAC terrain lessons and content. The development of ATES and looking at ATES as a way of starting to understand avalanche terrain better through the systematic breakdown, analysis and categorization lead to a greatly improved way of educating level 1 students about avalanche terrain. I'd say that's a pretty good measure of its success. This past winter it was formally adopted as the standard terrain lesson on Level 1's and the ATES held a strong presence in each module of the Level 2 program, including the classroom and theory-based Module 1.

I've been trying to spark some interest in developing the technical model into a more comprehensive model but with limited success. It is definitely one of those things that sounds easier than in actually is. Where do we need to go? Discussions with numerous individuals including Pascal Hägeli, Grant Statham, Chris Stethem, Clair Israelson and several senior ITP instructors have hinted at expanding it into two criteria–topological and climatic–plotted against both spatial and temporal dimensions.

For example the current model contains almost all topological criteria except avalanche return frequency, which is climatic in nature. What other criteria can be included in topology? How about climatic? Spatial means over space and as avalanche workers I think we're all quite familiar with spatial distribution but how do we describe it better? What about temporal, or time? How do these factors fit into these criteria and how can we further refine ATES (or its professional companion) to incorporate these ideas? Or do we even need to?

Lots of questions to answer for sure, but I am encouraged by ongoing dialogue on how we can take the Parks Canada ATES model and develop it further, maybe in entirely new directions into a distinct tool/model altogether. Who knows, but I'm keen to see what v2.0 looks like. Aren't you?

More information: http://www.pc.gc.ca/pn-np/ab/banff/visit/visit7a9_E.asp

Decision Making in Avalanche Terrain

Pascal Hägeli

Pascal Hägeli, who by now is a familiar name and face in this industry not to mention a member of the CAA's board, is presently entering a two-year post doctoral studies program at Simon Fraser University to study the decision-making process of amateurs and avalanche professionals when traveling in avalanche terrain. An initial study on amateurs conducted as part of the ADFAR (Avalanche Decision Framework for Amateur Recreationists) project showed that amateurs do not use terrain to minimize their exposure to avalanche hazard in the same way that professionals do.

While he is planning to look at amateur decision-making in more detail, he also has just launched a survey on professional decision-making to identify differences in amateur and professionals more clearly. If you haven't already participated, he is asking for participation of avalanche workers in his study at http://www.avalanchepro.rem.sfu.ca/.

Pascal is also pursuing ideas for monitoring professional use of terrain under different avalanche conditions. I am excited to see the results of his work as I hope there will be insights into how we, as avalanche workers, approach and interact with terrain during the course of our day and career.

More information can be found at http://www.avisualanche.ca.

Geographical Information Systems

University of Calgary/Selkirk Geospatial Research Centre

Currently a PhD candidate at the University of Calgary in GIS, Donna Delparte has been presenting at the CAA's Annual General Meeting and at ISSW's on GIS concepts and their application to the avalanche field for some time now. Her current interests are avalanche terrain modeling with GIS and her presentation at the AGM showed the power and functionality of new tools like Google Earth.

As part of her presentation she used GIS to plot the Parks Canada ATES Scale over terrain at Rogers Pass and then published it to Google Earth and performed a live demonstration to the audience. Trip planning all of a sudden took on a whole new meaning after her presentation and it will be interesting to see how her research and material gets adopted by industry and public safety organizations in the future.

In side-bar discussions Donna also informed me that GIS also holds great promise as a tool for the collection of avalanche information over time, resulting in a very powerful knowledge base in the future for both operators and researchers. The technology is becoming highly affordable now and it's just a matter of time before many avalanche organizations adopt it and start to realize its utility.

More information: http://www.geog.ucalgary.ca/index.cfm?page=people&style=2&this=81

Google Earth

I think everyone knows what this is doing to our knowledge of terrain; if you haven't seen it yet you need to. With Donna incorporating Google Earth functionality into her work, Ranae's work at SFU and potential applications to Google Earth it is obviously that this free, publicly available program has a future in our business.

Download Google Earth for Mac or PC at: http://earth.google.com/

With all of these exciting initiatives in varying states of development and implementation it is difficult not to think that we're at some sort of crossroads when it comes to our comprehension of avalanche terrain. This isn't an exhaustive list by any extent of imagination. I haven't even touched on avalanche mapping, for example, but I do hope this has sparked some interest for you to think about all of these initiatives. I look forward to working with these individuals more and developing our knowledge of terrain and our capacity to understand it, describe it, categorize it and educate about it further. I already know that I have many more tools to answer that question I get asked a thousand times a winter: "How do I route find and navigate through avalanche terrain?" I'm excited to see if those tools can become better, much better, with all of these new and interesting developments.

Acknowledgements

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Editor's note: *This paper was written in February by Clair Israelson, Ian Tomm and John Kelly, at the request of the Ministry of Public Safety and Emergency Preparedness Canada (PSEPC). At that time, Minister Stockwell Day and his staff were working on a natural hazard mitigation strategy, and they wanted a full briefing on the hazard posed by avalanches in Canada. We are currently in dialogue with PSEPC in regards to stable federal funding for avalanche safety services. At the time of publication that conversation is ongoing.*

Avalanche Worst-case Scenario

The nature of extreme avalanche occurrences

Avalanches are an annually recurrent natural hazard that will continue to threaten lives and property in Canada for the foreseeable future. There is a great deal of difference between a one-in-100-year avalanche season, a one-in-100 year avalanche cycle and a one-in-100-year avalanche event Due to the limited historical avalanche records in Canada, it is likely that we have no accurate documentation of a true 1:100-year **avalanche cycle** or season in Western Canada.

A 1:100-year **avalanche event** is a single avalanche that may considerably exceed historical expectations for maximum avalanche extent, impact force and mass of snow transported. An example of an extreme avalanche event in Western Canada is the avalanche that destroyed 12 buildings and killed 25 miners at the Granduc mine near Stewart, BC in 1965. In Eastern Canada, an example of an extreme avalanche event is the accident of 1782 in Nain, Labrador where 23 aboriginal people were killed when an avalanche overran their camp. Extreme avalanche events pose a threat to transportation corridors, industrial sites, residential developments and commercial and private recreational activities in Canada.

A 1:100-year **avalanche cycle** would involve intense avalanche activity affecting one or more geo-climatic regions for a consecutive multi-day period. Avalanches would be large, releasing most of the accumulated winter snowpack at once, destroying extensive areas of mature forest and creating new avalanche paths reaching to valley bottoms. These avalanches could contain timber, rocks or other debris, and be extremely destructive. Known run-out zones may be exceeded, with avalanches running across and up the other side of narrow mountain valleys. Extreme avalanche cycles pose a significant danger to transportation corridors and industrial and residential sites. An example of this kind of event occurred in mid-March 1910 when a large avalanche cycle occurred at Rogers Pass. In one of the resulting avalanches 58 workers were killed, a train was destroyed and the principal east-west transportation corridor across Canada was closed for an extended period of time.

In Eastern Canada, we cite the Charlevoix avalanche cycle in March 1936 that caused the death of 10 residents and destroyed at least three dwellings in separate incidents.

Extreme avalanche cycles are an obvious signal to recreational users that conditions are not appropriate for their activities, access roads to prime recreation areas may be closed, and intense precipitation and wind make outdoor recreational activities unpleasant. For these reasons few recreationists are killed by avalanches during extreme avalanche cycles.

A 1:100-year **avalanche season** would consist of several distinct periods of intense avalanche activity between December and April, affecting different geo-climatic regions of the country at different times. In Western Canada examples of severe avalanche seasons are the winter of 1971/72 when avalanches forced extended closures of highways and railways, and the winter of 2002/03 when avalanches killed 29 people. Fitzharris (1981) describes the winter of 1971/72 as a 1:70-year avalanche season at Rogers Pass. That winter the Trans-Canada Highway was closed to traffic for a total of 583 hours, equivalent to >24 days. A 1:100-year avalanche season could cause numerous closures of all major east/west road and rail corridors across the western Cordillera, with closure times equaling or exceeding those experienced in 1971/72.

Destruction caused by 1959 avalanche in St. John's, Newfoundland.

Photo: Shirley Eames collection

In Eastern Canada, a 1:100-year avalanche season could affect transportation, industry, domestic–subsistence activities and recreation. An example of a relatively severe avalanche season is the winter 1998/1999 where avalanche activity caused damage in several areas of Quebec, with 11 fatalities, several serious injuries, and destruction of buildings and other damage to property.

Avalanche worst-case scenario–Western Canada

As the economic and social impacts of a 1:100-year avalanche cycle are likely greater than those of 1:100-year avalanche season, this scenario describes possible impacts of a 1:100-year avalanche cycle in BC, recognizing that parts of Alberta and Yukon could simultaneously experience similar but less severe effects. We do not know if we have experienced a 1:100-year avalanche cycle since European settlement of Western Canada, so the scenarios that follow are based largely on the informed speculation of the CAC staff.

Weather patterns for a 1:100 year avalanche cycle in BC

Fitzharris studied major avalanche winters in Rogers Pass and determined that the major avalanche winters there (and

by extrapolation in the southern interior of BC) resulted from two distinct weather patterns. Winters with strong zonal (west to east) flow resulted in frequent storms, rapidly fluctuating but not extreme temperatures and sustained snowfalls. These winters were responsible for the type of frequent, but slightly less than maximum-sized avalanches that caused extensive highway closures in the winter of 1971-72. The second winter weather pattern identified by Fitzharris that results in extraordinary avalanche cycles in Rogers Pass is associated with winter weather patterns similar to the one described below.

Cool temperatures and significant snowfalls occur in October and November, with snow cover extending down into the valleys. A warm storm in November brings significant rain as freezing levels rise to the mountain tops. The rain freezes on contact with the snow and forms a thick icy crust. This warm storm is followed by an outbreak of cold arctic air which brings light snow as the arctic air settles over all of southern BC for a period of several weeks. The light snow that falls at the start of the arctic outbreak forms into a layer of facetted grains overlying the icy crust, creating a persistent weak layer and setting the stage for the winter to follow.

December is characterized by light to moderate snowfalls that settle into a denser layer overlying the crust and facetted weak layer. Throughout January and February temperatures are colder than normal and snowfalls are frequent, but no individual storm drops enough snow to generate widespread avalanching that reduces the volume of snow accumulating in the starting zones. Snow accumulates on the ground in the low elevation valleys connecting Vancouver and Prince Rupert with the interior of BC.

In March, Western Canada comes under the influence of the subtropical jet stream bringing a series of "Pineapple Express" storms. These storms are well known for bringing heavy and sustained precipitation events to southern BC. While these storms bring several days of continuous heavy snowfalls to all mountainous areas, embedded warm fronts can result in dramatic temperature changes and quickly drive freezing levels to near 3000 m. Accompanying heavy rains can last for several days. The 1:100-year avalanche cycle begins.

It may be unusual, or even impossible that all of BC south of a line drawn from north of Prince Rupert and Prince George to the Alberta border could experience the winter weather pattern described above that culminates in a period of simultaneous and intense avalanche activity. Whether such weather could occur in any given 100-year period is a question best answered by the Meteorological Service of Canada.

The worst-case scenario for BC

Heavy snowfalls during the preceding months have made snow removal on highways and rail lines difficult; snow banks several metres high build up along these transportation routes, impairing the effectiveness of the speed plows and graders normally used for snow removal. As the final snow storm hits BC, large avalanches breaking all the way down to the November rain crust begin to run on many of the more than 1600 avalanche paths that threaten key transportation corridors in BC. Maintenance crews are pulled off the job because the intense avalanche activity makes it too dangerous for them to continue working. Within a 24-hour period Highway 16 between Prince Rupert and Terrace, and all routes through the Coast Mountains that connect Vancouver with the interior of the province (Highways 1, 3, 5, 99) close, as do the CP and CN rail lines that parallel these highways. Key north-south highways through the interior dry belt of the province remain open, but continuous heavy snowfalls and drifting snow challenge snow plowing activities and inhibit the flow of traffic.

In the BC interior Highway 97 through Pine Pass closes, but Highway 5 between Kamloops and Edmonton remains open. Highway 1 from Sicamous to the Alberta border closes. The Salmo to Creston section of Highway 3 closes but an alternative route remains open through Crawford Bay and Nelson.

On the highways and rail lines that close, some vehicles and even trains become trapped by the deep snow or between avalanche deposits. An undetermined number of people trapped could die from cold or from being struck by avalanches as they attempt self-rescue. As a metre or more of storm snow falls, these closed roads and rail lines become choked with snow, and maintenance crews cannot resume snow plowing until avalanche control has been completed and it is safe to resume work. Avalanche control crews are hampered by deep snow that prevents them from accessing artillery positions and explosives caches, and low cloud and poor visibility keeps helicopters used for avalanche control operations grounded for days at a time. When the weather clears avalanche control crews release more

Mur des patroulleurs on Mont Albert in Quebec's Chic Choc mountains.

Photo: John kelly

large avalanches that cross highways and railways in numerous locations. It is several days from the onset of the storm before maintenance crews can get to work clearing fallen snow and avalanche deposits from the rail lines and highways that have been closed, and several more days pass before those roads and rail lines are open to traffic.

As a result, for a period of five to seven days or more, the key east-west transportation routes across BC are closed, and numerous communities along those routes are completely isolated. In some of these isolated communities electrical services are disrupted as the power transmission lines servicing those communities are destroyed by avalanches. Businesses close, homes go cold, and the pumps required to fuel vehicles necessary to open roads and streets cannot operate. Given the reliance on just-in-time delivery, in many locations food and other essential commodities start to run out, and a provincial state of emergency is declared. The Canadian military forces and all available civilian helicopters and fixed wing aircraft begin to airlift essential supplies to isolated communities. Many rural residents receive no outside help.

The Rockies' Polar Circus on a bad day.

Photo: Garth Lemke

A five- to seven-day closure of main roads and rail lines across BC spawns an economic ripple effect that reaches across Canada. Factories and businesses reliant on goods transported through BC are affected, as is delivery of commodities to shipyards in Vancouver and Prince Rupert. Once major roads and rail lines are reopened it is at least a week before backlogged vehicles are cleared and life returns to normal. The wide network of forestry, mining and electrical transmission line access roads in mountainous areas are also affected and many would be closed for several more days than the major transportation routes due to their lower levels of avalanche control and snow clearing capacities.

The industrial and residential toll of a one-in-100-year avalanche cycle could be estimated as follows: 30-100 avalanche fatalities; transportation closures in discrete periods of three to 10 days on east-west routes through BC; residential and industrial structure damage on the order of 10 or more structures; shutdowns in forestry within mountain ranges, mining in mountain areas and service to transmission lines of 30-60 days.

The immediate and long-term impacts of an extreme avalanche cycle in BC, such as the one above, have not been assessed in detail, but it is apparent that the economic and social impacts could be significant. A detailed risk and economic impact analysis could serve as the basis for contingency planning for a 1:100-year avalanche cycle so that economic and social impacts are mitigated to the greatest extent possible.

Avalanche worst-case scenario–Eastern Canada

Avalanche accidents in Quebec, Newfoundland and Labrador, Nunavut and Nova Scotia are related to the identified winter storm patterns in Eastern Canada. A 1:100-year avalanche cycle would likely impact residences, transportation, industrial operations and recreation. This scenario describes possible economic and social impacts of a 1:100-year avalanche cycle in Eastern Canada that simultaneously affects Quebec, Newfoundland and Labrador, and potions of Nunavut.

Weather patterns for a 1:100-year avalanche cycle in Eastern Canada

Dr. Bernard Hétû (University of Quebec at Rimouski) reports that the synoptic conditions responsible for most avalanche activity in Quebec (and likely much of Eastern Canada) are related to storms bringing large accumulations of new snow followed by blizzard conditions of strong or extreme winds and blowing snow. Avalanche activity peaks on the day of the storm and continues for one to two days following. A maximum avalanche cycle may involve such a storm that lasts for an extended period of time, or storms arriving back-to-back linked by a windy periods.

According to Hétû, another typical weather pattern associated with extreme avalanches in Quebec is sudden warming and rain events delivering 60 mm or more of rain occurring after a substantial snowfall. This weather can result in wet avalanches and slush flows that can be very damaging, running abnormally long distances and entraining an enormous mass of snow. This is the type of weather that will also produce maximum single avalanche events.

Research into past avalanche accidents in Quebec and Newfoundland and Labrador shows that most damage occurs when avalanches overrun occupied buildings, especially wood frame residences. The wide geographic dispersal of terrain with potential to spawn avalanches in Eastern Canada is counter-intuitive to our sense of avalanches occurring only in well-defined high mountain areas with obvious avalanche paths and run-out zones. The highest historical incidence of destructive avalanches in the province is in the Quebec City region–an area not known for high alpine terrain. These avalanches occurred

in gullies, ravines and on short slopes of varied characteristics, many with as little as 50 metres of vertical relief.

The historical record in Quebec demonstrates the high incidence of avalanche fatalities occurring on short slopes in residential areas. Between 1825 and 1898 the city of Lévis experienced nine deadly avalanches that took the lives of 16 people (Hétu, 2006). In the heavy snow winter of 1869 alone at least nine dwellings in Lévis were damaged or destroyed by avalanches, resulting in five deaths and nine injuries. The largest recent avalanche event affecting residents was a single avalanche that killed nine people and injured 25 in Kangiqsualujjuaq, Quebec on January 1, 1999. Likewise, avalanche accidents in Newfoundland also typically affect residences. A single avalanche accident in 1959 killed five residents, destroyed two houses and damaged several more on Battery Hill in Saint John's.

Houses destroyed in 1912 avalanche, Tilt Cove, Newfoundland.

Photo: Smith Family collection

With avalanche zoning at the nascent stage in both Quebec and Newfoundland, there is a good chance that avalanche hazard has not been taken into account in many existing residential and industrial situations. Currently, it is possible there are even more residences and other kinds of infrastructure in locations threatened by extreme event avalanches than there were in 1869 or 1959. In a 100-year maximum avalanche cycle in Eastern Canada it could be guessed that the number of residential avalanche fatalities would be between 10 and 100, in a probability distribution highly skewed towards the lower end. We could expect injuries on the same order and 10 or so dwellings and structures damaged.

The historical record in Quebec and Newfoundland has not been thoroughly examined to determine the effect of a 1:100-year avalanche cycle on the transportation network. However, it is known that avalanches can close major transportation routes in both provinces, such as in 1922 when an avalanche derailed a train in Rapid Pond, NF (Liverman, 2000), or in 1956 when a worker was killed and in a separate accident a snow plow was completely buried on highway 132 in Gaspésie, Quebec. Since mitigation measures for avalanches on highways and railways are rudimentary or non-existent in either province it can be expected that road and railway closures from avalanches are just as likely to occur in the future.

The main avalanche threats to roads in Eastern Canada are along Highway 132, 299 and 198 in Gaspésie between Ste Anne des Monts and Grande Vallée, involving the principal, and in some cases only, access routes for a dozen communities. Historically, these roads have avalanche closures up to a day in length. In Newfoundland, the Trans-Canada Highway and rail line through the Humber Valley is also threatened with avalanche closures of the same magnitude.

Primary and secondary roads on the lower North Shore and the Charlevoix region, as well as many secondary roads in Newfoundland in steep rocky shoreline communities, may also be threatened by avalanches. The historical record contains at least one transportation related fatality in Charlevoix from Les Éboulements in 1936.

Avalanche activity in the past has threatened electric transmission and communication lines in Quebec. Known historical power and telephone outages are limited to the Gaspé region of Quebec where transmission lines lie alongside highways 132, 299 and 198. However, data linking power outages to avalanche activity has not been researched. The widely distributed occurrence of avalanches coupled with an incomplete historical record of avalanche activity makes the development of a 100-year avalanche cycle worst-case scenario very difficult in Eastern Canada. The conclusion that is easily drawn, and supported by our expert contacts in Eastern Canada, is that avalanches are a much more significant natural hazard than commonly thought in both Quebec and Newfoundland, and have a wide geographical distribution touching areas that are not normally associated with the avalanche phenomenon.

The damage caused by a one-in-100-year avalanche cycle in Eastern Canada, according to our assumptions above, will likely be measured in the loss of lives and injury to individuals. The best estimate for potential loss of life is between 10 and 20.

Infrastructure damages are also certain to occur during an extreme avalanche season, which will range from the destruction of homes and buildings to destruction of vehicles and power lines.

Avalanche Judgment and Decision Making Part III: Developing Expertise

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INTRODUCTION

Several decades of Naturalistic Decision Making (NDM) research have shown that studying the skills experts use to make decisions in real-world settings can form the critical foundation of highly effective decision-skills learning and support programs for less-experienced decision makers. Using Cognitive Task Analysis and the Critical Decision Method, I studied the most significant decision-making experiences of a group of expert Canadian avalanche professionals. My objectives were to: (1) examine and identify the judgment and decision processes of avalanche experts; (2) identify the human factors that influence avalanche experts' ability to make sound judgments and decisions; and (3) explore how these findings may be used to develop strategies for decision skills learning, decision support, and effective avalanche accident prevention.

In Part I of this series, I discussed the processes and strategies that avalanche experts use to solve the decision problems they face in their profession. In Part II, I discussed the human factors that negatively influence avalanche experts' ability to make sound judgments and decision actions. In this article, I examine the positive human factors that support sound avalanche decision-making. While human factors have received considerable interest in the avalanche field, most of the focus has been on their negative influence. I argue that human factors also exert positive impacts in avalanche judgment and decision making. For example, while low levels of motivation to solve decision problems may lead to decision error, high levels frequently lead to decision success. Thus, taking a strength-based approach to enhancing positive human factors is a tremendous tool for decision quality enhancement and support.

From this perspective, I will discuss the characteristics of avalanche expertise, and key methods for enhancing decision-making performance. I then offer a set of focused strategies for decision skills learning and training, and interventions for decision support.

PART III HIGHLIGHTS

- Motivation to learn and improve avalanche decision-making is a critical component for the development of expertise, for those who lack motivation will never perform at the level of experts.
- The level of skill and expertise a person attains is directly related to the amount of deliberate practice in which they engage.
- By applying and practicing the key strategies used by avalanche experts in real world settings, decision makers can target their learning to develop the skills that are proven to really work.
- Well-designed scenario-based training approaches can provide more learning value than direct experience.
- High-quality communication enables decision makers to dramatically enhance their knowledge and expertise.

1. CHARACTERISTICS OF EXPERT DECISION-MAKERS

I found that expert avalanche decision makers have specific characteristics that differ from their equally experienced partners. They are motivated to learn, have high levels of personal mastery, approach their profession with an attitude of safety and respect, and are exceptional communicators.

Motivation to Learn

The avalanche experts in my study possessed a deep motivation to learn and improve their knowledge and decision-making capacities. For example, one expert related, "I'm constantly trying to expand my knowledge base by reading books, taking courses, and spending time with other experienced professionals." Motivation to learn is the most cited condition in the literature for improving decision performance and developing expertise.

Avalanche experts are passionate about their work. They actively seek feedback and opportunities to learn, they read and discuss their experiences with other practitioners, and they frequently reflect upon their experiences. These experts are also highly motivated to solve the decision problems they face. High levels of motivation to reduce situational uncertainty frequently leads towards decision success, while low levels may lead to negative consequences (see Part II). The finding that participants were motivated, self-directed learners is an important result of my research, since this suggests that avalanche decision-makers of all levels can significantly improve their judgment and decision-making capacities by engaging in targeted activities and decision-skills training.

Personal Mastery

Highly effective decision makers are distinguished by their ability to frame the decision problem well. However, as I have shown in Part II, avalanche judgments and decisions are subject to internal (cognitive, physiological, and psychological) and external (team, client, organizational, and socio-political) human factor influences. I suggest that successful avalanche decision-making requires decision makers to have a high level of personal mastery and leadership skill. Personal mastery involves making decisions based upon a strong set of core values and principles, continually learning to see the situation more clearly, and having the personal confidence to not be overly influenced by the words and actions of others.

CMH guides studying the snow in the Bobbie Burns.

Photo: Laura Adams

These qualities are key to achieving an accurate perception of the factors influencing the decision problem, to being aware of the biases and assumptions that may be present, and making suitable decisions in light of this awareness. Personal mastery reduces the influence of negative human factors in the judgment and decision process, and incorporates mindfulness (metacognition) and situation awareness (see Part I). Thus personal mastery plays a significant role in the capacities of avalanche decision makers to make objective and principle-based decisions, and is a fundamental factor in the quality of competence for avalanche decision expertise.

Attitude and Approach

"Anticipate the unexpected, prepare for the worst-case scenario, and be prepared to be wrong or fooled" (research participant).

Knowledge of their limitations and a deep commitment to safety was fundamental to how these avalanche experts approached their practice. All of the experts in my study had experienced close calls during their careers as avalanche professionals. These experiences have increased their respect for the uncertainties associated with avalanche phenomena, for the serious consequences of involvement, and for the imperfect nature of human decision-making. For example, one participant related, "I recognize I have made errors in the past and will do so in the future." Our ability to take our strengths and limitations into account is a key strategy (metacognition) to successful decision-making.

Experientially-created knowledge enabled participants to objectively manage avalanche hazard and risk, and reinforced the importance of including a buffer zone of safety within their decision actions. For example, one expert suggested it was critical to "maintain a margin of safety that is just a hair bigger than what I think I need." Consequently, these experts dealt with uncertainty by increasing mitigation, reducing terrain exposure, or choosing terrain closure or avoidance. These simple tactics require limited cognitive processing, and can be executed by decision makers of any level of expertise to result in higher levels of safety.

High-Quality Communication

A key characteristic of expertise is the ability to communicate thinking and expertise to others. Additionally, high-quality communication results in high-quality decision making and team performance. For example, a ski area forecaster related, "Good communication and discussion is critical to my decision process. We always talk about what we are seeing and thinking before an action is taken."

I found that exceptional avalanche decision-makers were exceptional communicators. They encouraged an atmosphere of open communication, listened carefully, and showed respect and encouragement for different points of view. They also used critical thinking techniques extensively, such as raising vital questions, analyzing their own and their peer's assumptions to determine whether they were justified, or examining the reasoning process for consistency in interpretation when drawing conclusions. High-quality

communication enables decision makers to dramatically enhance their knowledge and expertise. Greater levels of communication results in richer mental models, reduced uncertainty, and higher levels of decision confidence. It also reduces subjective biases that may have been present in an individual decision maker. A key recommendation of participants in my study was that communication skills training should be a key focus in team decision-making environments, and should include an emphasis on leadership skills for those in supervisory positions.

Heli-ski group, CMH SilverTip.

Photo: Laura Adams

2. ENHANCING DECISION MAKING PERFORMANCE

"Experience, an unconscious feel for the situation, and a commitment to safety overriding all other factors–another day in the life of an avalanche professional" (research participant).

Avalanche decision makers of all levels can enhance their decision-making performance by learning from the successes of avalanche experts and engaging in the following targeted activities:

Deliberate Practice

Avalanche experts have superior knowledge, skills and information processing capacities acquired through experience. However, the accumulation of experience as a single factor does not necessarily produce decision expertise. It is what we do with our experiences that make the difference. Engaging in deliberate practice has been found to be the most effective way to improve decision-making performance. Exceptional mental conditioning results from engaging frequently in activities specifically designed to improve decision-making skill. These activities include practicing the key decision processes and strategies used successfully by experts, pursuing professional development and learning activities, seeking out coaching and mentoring, and engaging in critical thinking and reflection. Extensive research in performance acquisition shows the level of skill and expertise a person attains is directly related to the amount of deliberate practice in which they engage.

Mentoring and Coaching

A key recommendation of participants in my research was to implement mentoring and coaching more formally into the avalanche domain. We all need external feedback to provide us with a realistic picture of our effectiveness. No matter how accurate we think we are, we are constantly challenged by the reality that our personal interpretative filters may lead us into distorted ways of thinking. In order to transform our experiences into expertise, we need to actively gather and interpret this feedback from others whom we respect.

Hearing the perceptions of our peers helps us gain a clearer perspective of our thoughts and actions, and alerts us to our judgmental ways of seeing. Sometimes, these conversations may also confirm the correctness of the instincts that we felt privately but doubted for a variety of reasons. Cognitive and process feedback are two techniques to improve high-stakes decision making. Cognitive feedback provides information about the interrelationships between the environment and the decision maker's perceptions, while process feedback provides information on how decision makers can make effective adjustments to their decision-making approach.

Critical Thinking and Reflection

It is widely recognized that learning and performance enhancement cannot occur without questioning and reflective processes. Critical thinking and reflection enables us to derive new insights, richer mental models, and an understanding of the causal influences that may not have been evident at the time of our decision actions. Utilizing questioning instead of answer finding, considering how our assumptions are shaping our viewpoint, and searching for information that opposes our position, as well as supporting it, are several examples. Building upon our knowledge and experiences with critical questioning and reflective insight can make the key difference to the quality of our problem solving and deriving effective solutions.

3. DECISION SKILLS LEARNING AND TRAINING STRATEGIES

Well-designed decision skills learning and training strategies can help avalanche decision-makers of all levels acquire and enhance critical skills, perceptual cues, and knowledge more quickly. Following are a set of strategies designed to help avalanche decision-makers achieve expertise more quickly.

Experiential and Action Learning

Research in adult education identifies experience as the most valued resource in the learning process. In addition to field experience, exposure to new ideas and practices through well-designed learning strategies has a powerful impact upon our learning. These activities result in improved judgments and a greater capacity to gather, interpret, and communicate relevant information. I suggest the emphasis must be placed on Action Learning–learning how to learn in realistic situations. In addition, this emphasis must support and enhance the decision processes and strategies actually used in the real world, rather than generic skills that confirm to optimal procedures. These are key principles, since it is only through testing ideas and strategies in practice that we are truly able to know whether they are effective or practical in real-world situations.

Build Experience Learning Like an Expert

A widely used strategy to develop decision expertise is to build experience learning like an expert. By applying and practicing the key strategies used by avalanche experts in real-world settings, decision makers can target their learning to develop the skills proven to really work. Avalanche experts use the decision strategies of pattern recognition to make effective judgments, and mental simulation to analyze if their planned actions will work. They utilize mindfulness (metacognition), situation awareness, and critical thinking to analyze whether their judgments are accurate, and they communicate effectively with others to gain additional insight and perspective to their decision processes (Part I). These strategies are integral to objective and sound decision making and offer powerful tools to counter the influence of potentially dangerous biases and heuristic traps in the decision process. An awareness and understanding of these key strategies can enhance our capacities to strategically apply them with greater accuracy and success.

However, it is important that decision makers utilize the appropriate decision- making processes for their level of knowledge and skill. As I explained in Part I, avalanche decision-makers evolve through a cognitive hierarchy of decision processes from rule-based to integral-systems thinking. Thus, the use of higher-level processes such as intuition should not be encouraged in novice decision makers. While our intuitions can be valuable, we need to use them accurately, and make our decisions based upon informed gut feelings. Novices lack the rich experience base and mental models essential to perform at this level of cognitive function, and to accurately recognize and interpret complex patterns in a set of information or high-stakes decision. As a result, their intuitions may be strongly based in the affective (feeling and emotion) domain, which may result in potentially dangerous biases in their judgment and decision processes. Thus, decision learning and training strategies should emphasize decision processes and strategies appropriate and effective for specific levels of knowledge and experience. For a further discussion on the hierarchy of avalanche-decision modes and decision strategies, please see Part I of this series.

Encourage Pre-Decision Making

Pre-decision making is a fundamental part of the systems approach to decision making used by the avalanche experts in my study. Pre-decision making involves anticipating and identifying critical decision conditions or points, and then planning strategies and options for associated decision actions prior to their occurrence. Pre-decision making is an extension of mental simulation. Examples include planning route options, making determinations about specific terrain use, and logistical planning. The run list is a typical example in the ski guiding industry.

Heli-skiing in the Cariboo Mountains.

Photo: Laura Adams

This strategy serves a critical function in reducing cognitive workload in field situations, and reduces the influence of human factors that inhere in the avalanche decision process. Prior research suggests the more preparations and information analysis that decision makers engage in before entering stressful situations, the less anxiety they experience. Since anxiety levels correlate directly with performance levels, pre-decision making is an important tool for sound avalanche decision-making.

The southern Selkirks offer a good example of terrain demanding good decisions.

Photo: Laura Adams

Increase Situation Awareness and Perceptual Capacities

The key to effective avalanche judgment and decision-making rests in an ongoing, accurate perception of the conditions in the human, physical (terrain), and environmental (weather and snowpack) systems of avalanche phenomena. Situation awareness, rich mental models, and metacognition (mindfulness) are the primary input into decision processes, and are the fundamental components that guide our selection of decision actions. Thus, increasing these capacities should be a key focus for avalanche decision-makers and for decision skills training strategies.

Focus on Scenario-based Approaches

Lack of experience is often discussed as a fundamental barrier in enabling decision skill. However, we do not learn only through direct experience. Recent NDM research has shown that well designed scenario-based approaches can provide more learning value than direct experience. I recommend i) case studies and ii) simulations as key methods to build avalanche decision skills and to enhance leadership capacities and team communication.

i) Case studies combined with effective coaching enhances the learner's vicarious experience base and enriches their mental models through a process of studying and reflecting upon how decisions were made under specific circumstances. Creatively designed case studies enable judgments and decisions to be examined and learned in the context within which they naturally occurred. They also encourage learners to identify key vulnerabilities and human factor influences. They are an excellent method to develop perceptual expertise, since decision makers can see how the cues appear within the context of a realistic situation while they receive valuable coaching from the facilitator.

ii) By engaging in realistic and detailed simulations, decision makers have the opportunity to critically assess situations, and build a sense of characteristic cues and common patterns (mental models) essential to intuition. Simulations are designed to capture the essence of difficult and uncertain situations, and challenge decision makers to utilize proven decision strategies to decide upon an effective course of action. Learners are encouraged to develop alternative explanations, identify conflicting evidence, and describe the actions they would take at specific points during the simulation. Simulations also provide insight into how different decision makers perceive the same situation, and provide learners with the opportunity to practice their skills for communicating essential information and working effectively in team environments.

Integrate Human Factor Training

Recognition processes are a key strategy used by avalanche decision-makers (Part I). Integrating human factor training into professional and recreational learning curricula will bring a critical awareness of the influence of positive and negative human factors in the avalanche judgment and decision process. Thus, avalanche decision-makers can strategically increase their capacities to recognize and manage their presence with greater accuracy and success. This strategy is of critical importance, since the more negative human factors present in a situation, the harder it is to apply good judgment and decision making.

Enhance Team Decision Making

Team decision-making can be enhanced through effective management of information resources and workload, coordination of actions, and more effective communication. Communication enhances predictability, which helps team members and stakeholders to set expectations, plan for future contingencies, share a common mental model, reduce ambiguities, and decrease stress levels. Improving communication is a primary strategy for improving individual and team decision-making performance, and for reducing human error.

4. DECISION SUPPORT INTERVENTIONS

As I have shown throughout this series, avalanche decision-makers use uniquely individual processes of decision making. Thus, interventions to support decision making and enhance decision performance need to be designed with flexibility and focus on methods that naturally lead to supporting appropriate choices. I offer four focused interventions for effective decision support.

Capture Avalanche Domain Knowledge and Experience

Knowledge is now being recognized as being the single, greatest asset of individuals, teams, and organizations. Recent research indicates that knowledge doubles every three to four years; therefore a focus on the acquisition, creation, storage, transfer, and utilization of knowledge (mentofacturing) is fundamental to support effective decision making. Capturing key knowledge and information that describes historical and current avalanche system dynamics (human, physical, and environmental) provides a virtual mental model to support decision making, individual, team and organizational learning, and future systems design. Knowledge banks are key learning tools as they direct decision makers' attention to critical aspects of the decision problem, and illustrate mental models of the avalanche domain. GIS is a particularly useful application enabling real information to be displayed spatially using visual symbols that are easily understandable for users of varying levels of expertise.

Identify the Architecture of Good Decisions

Avalanche decision-making has a heavy reliance on tacit knowledge–knowledge that is not easily verbalized. Deliberating upon and deconstructing good decisions is necessary to expose this tacit knowledge and to understand the underlying architecture of good decision making. In addition, defining the qualities of good avalanche decision-making is necessary for constructing the models from which decision-skills learning programs can be effectively designed. Debriefing exceptional decisions takes a strength-based approach to decision capacity enhancement and is a tremendous learning tool for individuals, teams and organizations.

Lone track in the Kootenays.

Photo: Laura Adams

Record Human Factor Influences

In Part II, I identified the human factors that negatively influenced the judgment and decision actions within my research participants. However, limited research exists in this area. In order to gain a deeper understanding of these influences, descriptive empirical data is needed. I suggest that defining criteria for the recording of human factor influences in avalanche accident and near-miss records, and implementing the capture of this information, will offer critical insight into avalanche risk assessment, decision skills learning initiatives, hazard communication, and decision support.

Ensure Learning Initiatives are Accessible

Learning is not only undertaken by individual decision-makers, it must also be encouraged and supported by organizations committed to foster individual, team, and societal learning through sharing information, creating a sense of community, and fostering creative and accessible learning initiatives.

As I have emphasized, decision makers need to have the motivation to pursue them. I suspect the benefits clearly outweigh the costs for professional avalanche decision-makers. However, it is unclear whether recreationists would be willing to devote the time, money, and effort required to engage in these activities. Creative avalanche decision-skills learning programs are a critical tool to enhance recreational decision-making, and one that I suggest would be most effective in reducing avalanche involvements. Thus, ensuring these programs are accessible to the public by securing funding from industry sponsors and granting agencies should be a primary focus for decision support initiatives.

CONCLUDING REMARKS

Developing expertise in avalanche judgment and decision making takes time and energy. However, we can train decision makers of all levels to achieve expertise more quickly by learning from the successes of avalanche experts, and by engaging in targeted activities and decision-skills learning strategies. Motivation to learn and improve avalanche decision-making is a critical component for this development, for those who lack motivation will never perform at the level of experts.

Effective and successful decision making is critically dependent upon attaining a good understanding of the situation. Thus, building strong mental models and developing accurate situation awareness through scenario-based approaches should be a key focus of avalanche decision skills learning strategies. Well-designed strategies can be more effective in developing good knowledge and skills than direct experience, since repeated experiences of poor decision making or false-positive events can result in dysfunctional strategies for future decision making.

The learning methods I recommend take a strength-based approach to facilitating the development of key decision skills and learning strategies used effectively by expert avalanche decision-makers in real-world settings. These methods offer a meaningful opportunity to enhance individual, team and organizational learning, and to infuse avalanche training programs and decision support interventions with vital tools to support and enhance avalanche judgment and decision making.

ACKNOWLEDGEMENTS

Yet again, I offer my thanks to the Canadian avalanche professionals who participated in this research so we can all learn from their wisdom. I must recognize the impact of Gary Klein on the naturalistic decision-making approach I have taken, and the interest and support that I have received for my research from Buzz Reed at Klein Associates. Additionally, I thank the Canadian Avalanche Foundation, Selkirk College, and the Social Sciences and Research Council of Canada for providing financial support.

FURTHER READING

Chi, M. T. H., Glaser, R. E., & Rees, (1982). Expertise in problem solving. In R. S. Sternberg (Ed.) Advances in the psychology of human intelligence, 1. (pp. 1-75). Hillsdale, NJ: Erlbaum.

Endsley, M., (1997). The role of situation awareness in naturalistic decision making. In C. Zsambok, & G. Klein (Eds.). Naturalistic decision-making. (pp. 269-284). Mahwah, New Jersey: Lawrence Erlbaum Associates.

Klein, G. (1998). Sources of power: How people make decisions. Cambridge, USA: The Massachusetts Institute of Technology Press.

Klein, G. (2003). The power of intuition. New York: Currency Books. Orasanu, J., & Salas, E. (1993). Team decision making in complex environments. In G. Klein, J. Orasanu, R. Calderwood, & C. Zsambok, (Eds.). Decision making in action: models and methods. (pp. 327-345). New Jersey: Ablex Publishing.

Sexton, J.B. (Ed.). (2004). The better the team, the safer the world: Golden rules of group interaction in high risk environments. Ladenburg: Gottlieb Daimler and Karl Benz Foundation, & Swiss Re Centre for Global Dialogue.

New Members of the CAA Board of Directors

Mike Boissonneault: Director, Professional Members

Mike Boissonneault has worked in the avalanche industry for the past 27 years. Mike's initial exposure to avalanche work began as a member of the Granduc Mine Avalanche Program in Northwestern BC. In 1985, he began his current career with the BC Ministry of Transportation's Avalanche Program. He started as an Avalanche Technician in Bear Pass, near Stewart, and soon became a Senior Avalanche Officer. Mike now manages the Avalanche and Weather Programs for the entire province. He also spent eight years as chair of the CAA Explosives Committee, working to establish industry-wide explosive use procedures and training guidelines. His dedication and accomplishments in that position were recognized by his peers, who awarded him CAA Volunteer of the Year in 2001 and Professional of the Year in 2002. Mike is looking forward to continued contributions towards the avalanche industry's growth and direction.

Janice Johnson: Director, Affiliate Members

Jan Johnson first became involved in the avalanche field in 1977, when she began doing long-term avalanche hazard work for the BC Highways avalanche safety program. Her career there lasted nearly 15 years, and, among many other things, included work on the avalanche safety programs for the Coquihalla highway. In the early 90s, Jan left the government to pursue graduate studies in adult education. She has worked with the Centre for Teaching and Academic Growth at UBC in various capacities since 1992, where she is now a Facilitator and Instructional Developer, working with all members of the UBC teaching community. She is also co-chair of the Instructional Skills Workshop (ISW) International Advisory Committee, which provides support, guidance and leadership to an international network of instructors, facilitators and trainers. Luckily for the avalanche community, she has continued to stay involved in the field, lending her expertise as an educator to the development of many training programs. As a board member for the CAA, Jan is looking forward to working with a strong team of other directors to meet the challenges facing the Canadian avalanche community as it evolves to meet changing social needs and expectations.

Pascal Hägeli: Director, Active Members

Pascal came to Canada from Basel, Switzerland, in 1998 to pursue a PhD in snow studies at the University of British Columbia. He took his first CAA professional training course in 2000 and was soon sharing his technical and computer skills with the association in an advisory role for the CAA's data management project. He acquired his doctorate in the same year that he became a Canadian citizen–2004. In that year he also became the manager for the three-year ADFAR project (Avalanche Decision Framework for Amateur Winter Recreationists), a role with a tremendous amount of responsibility as this project is expected to dramatically affect the way recreational avalanche courses are taught. Pascal has recently been granted a post-doctoral fellowship at Simon Fraser University, where he will study the human component of the decision-making process in avalanche terrain in more detail. Pascal is looking forward to a more direct role in the CAA's growth and direction.

Andrew Nelson: Director, Associate Members

Andrew's career in the avalanche industry began when he came west from Thunder Bay, Ontario. Armed with an honours degree in biology from Lakehead University, he was looking for graduate study work when he ended up at Panorama Mountain Village, near Invermere, BC. He took a job as a ski patroller in 1995 and never left. His work there began when the mountain was first expanding into avalanche terrain and his personal skills and training have since grown with the program. Andrew is now the head forecaster for Panorama and the past president and current technical director for Columbia Valley Search and Rescue. He is eager to share his experience and views with the other board members and is looking forward to creating growth in the associate membership for the CAA.

New Members of the CAC Board of Directors

Mike Mortimer: Director for Supporters

Mike Mortimer is the President of Ortovox Canada, and has been at the centre of Calgary's backcountry scene for nearly 25 years. During this time, he owned and operated one of the city's most popular outdoor equipment stores, the Hostel Shop, and was the founding President of the Calgary Area Outdoors Council. Originally from South Africa, Mike has a Bachelor of Commerce degree from the University of Calgary. His life-long passion for the mountains brought him to the Alpine Club of Canada (ACC), where he remains extremely active. He has received many awards for his volunteer work there and is currently the Director of External Relations for the Calgary section as well as an honourary member. This year he's heading up the organizing committee for a series of events to celebrate the Alpine Club's centennial. Mike is also the North American delegate to the International Mountaineering Federation (UIAA) and sits on the governing council of that body. Mike has been attending CAA meetings for nearly 20 years and his perspective and experience are sure to be a valuable addition to the board.

Dan Markham: Director for Friends

Dan Markham brings a wealth of experience and enthusiasm to the board of the CAC. He has an MBA in marketing and finance from the University of Calgary, and was a member of Premier Ralph Klein's communications team in the early 1990s. Dan left political life to join an advertising agency in Calgary and, most recently, was Director of Marketing and Communications for the Canadian Pacific Railway. Dan is now a marketing consultant in Calgary, a city that allows him to indulge his passion for mountain-biking in the summer and backcountry skiing in the winter. He's also an active volunteer, donating his time to help raise funds for the Multiple Sclerosis Society as well the Canadian Avalanche Foundation. Dan hopes to dramatically increase the membership of the CAC, through greater public support and increasing opportunities for a wider range of people to participate in the building of the CAC.

Janice Sanseverino accepts volunteer of the year award from President Steve Blake.

Photo: CAA Staff

Yves Richard: Information Technology Specialist

Yves Richard was born and raised in Bouctouche, New Brunswick, where his love of the outdoors was developed early. He grew up biking, hiking and exploring the beach. After graduating from college in Moncton with a diploma in electronic engineering technology in avionics, he turned his attention to the mountains and moved to Vancouver.

There, he found his training was in demand and he soon had work in the aeronautic industry. His interests shifted to robotics and automation, and he worked for Nikon Optical for a year before deciding that he had had enough of living in the city. He left the professional life behind to be a ski and climbing bum, supporting himself through tree planting and seismic exploration.

A mountain-biking accident proved to be a turning point for Yves. He was on his way to go climbing in Squamish when he stopped in Golden to visit a friend and do some biking. That ride led to an injured shoulder and, with his climbing holiday over, Yves decided to stay in town for a couple of weeks. That was four years ago, and he's been there ever since. He's worked as a ski patroller and assistant IT administrator at Kicking Horse Mountain Resort, met his wife, Marie-Hélène Bergeron, and eight months ago they had their first child, Téo.

Yves' connection with the CAA began around the same time he moved to Golden, when Evan Manners hired him to do some contract database work. Since then he's become a Microsoft certified database administrator and, earlier this year, he phoned up the centre to see if there was a position available. Now that Yves is on board, he calls this his dream job and says he feels very lucky. He's not the only one–we feel very fortunate to have him on the team.

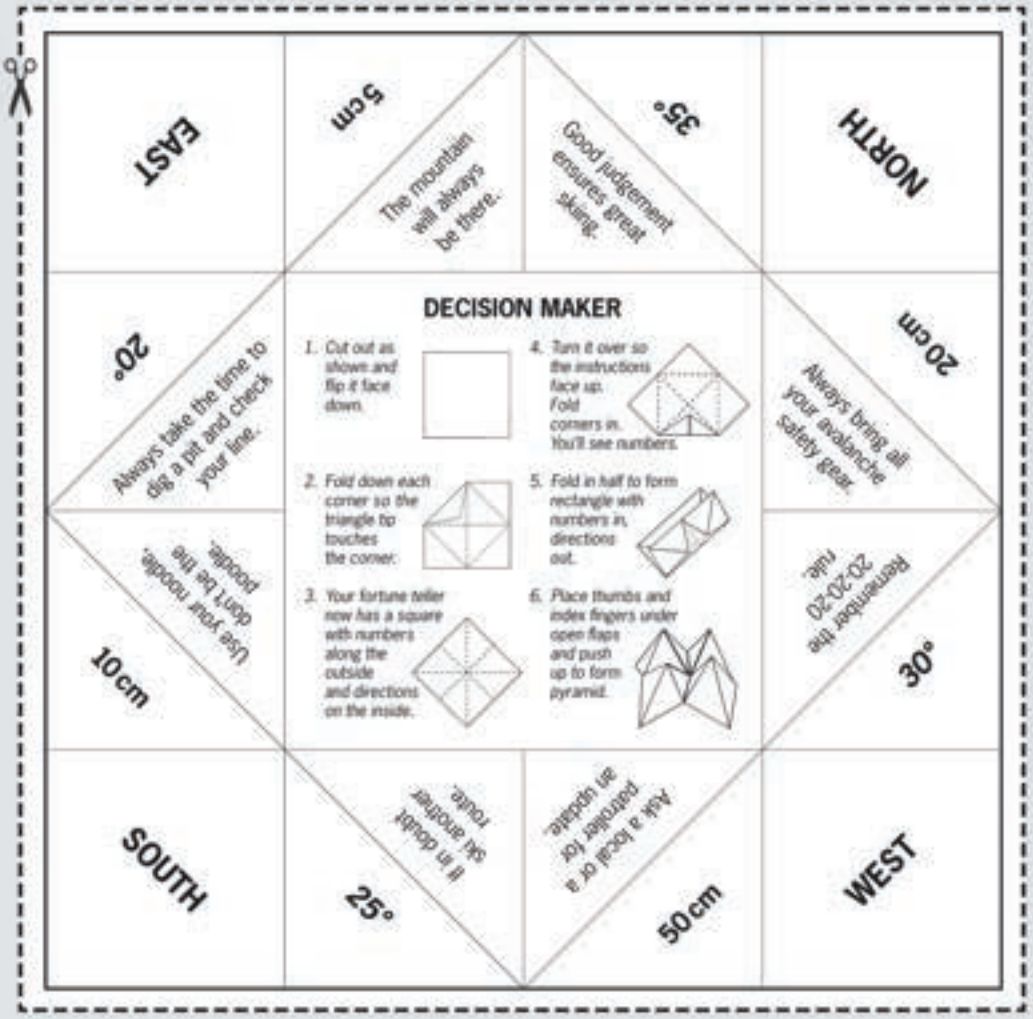
Yves and Marie-Hélène at the top of "Ozone" in the Dogtooth Range of the Purcells.

Photo courtesy Yves Richard

Photo Submissions

Photo: Brent Strand

Photo: Roger Atkins



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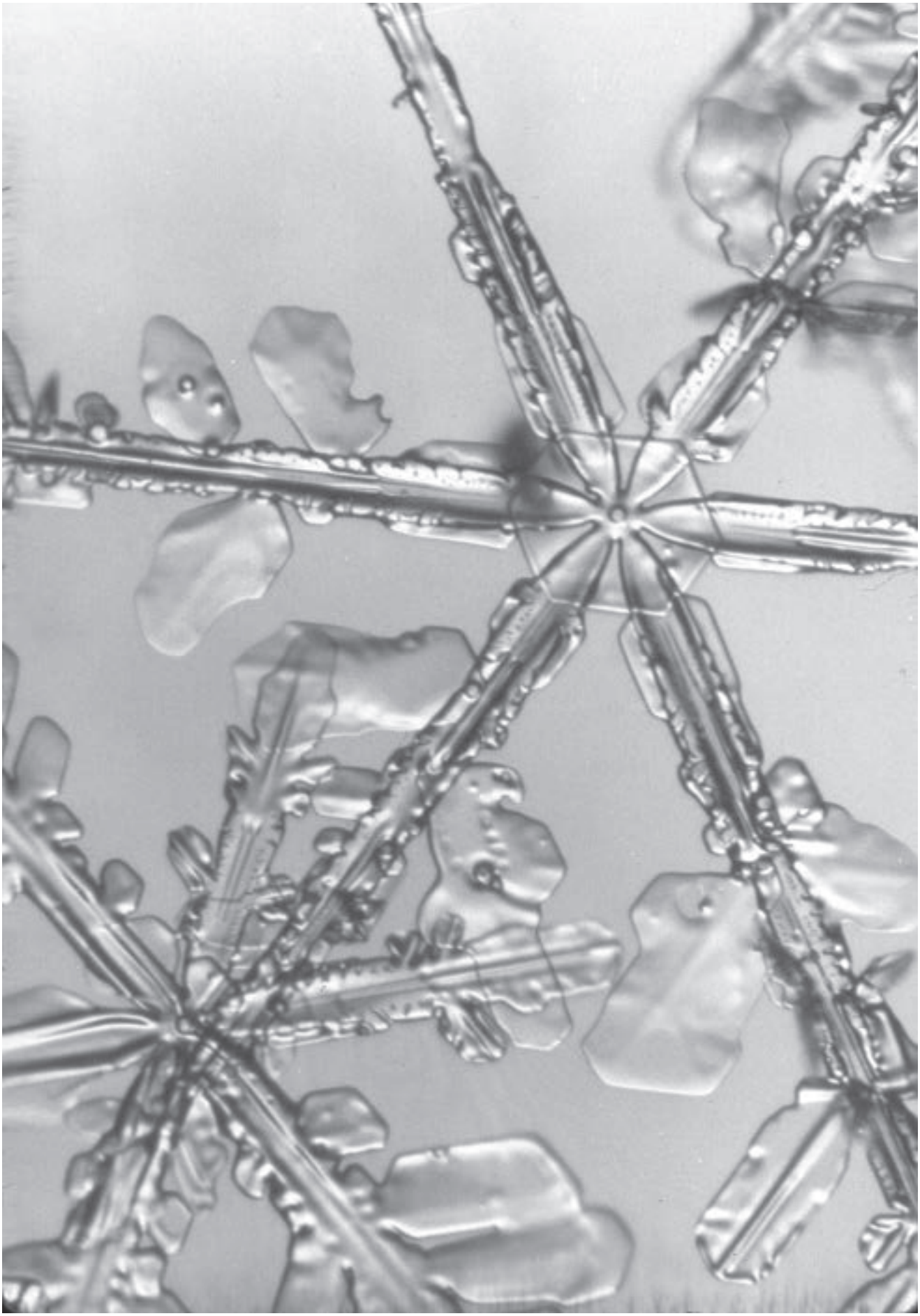

Photo: CAA Industry Training Programs