AVALANCHE news

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Photo: Julian Itagaki

inside

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Box 2759
Revelstoke, BC V0E 2S0
(250) 837-2435
canav@avalanche.ca
www.avalanche.ca

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canadianavalancheassociation **Avalanche News** Volume 75 ❄ Winter 2005

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

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

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

Editor, Avalanche News
Canadian Avalanche Association
PO Box 2759, Revelstoke, BC V0E 2S0
Tel: (250) 837-2435 Fax: (250) 837-4624
E-mail: editor@avalanche.ca

Editor Mary Clayton
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Team Work

BY MARY CLAYTON

Have you ever played on a team? It doesn't matter what sport, or at what level, but if you've ever been part of an organized group, united under a team name with a common goal (to beat those other guys!) then you'll know what I mean.

Do you remember how it felt when you put the team colours on? Whether it was a full-on uniform or just a t-shirt, it still managed to make you feel like you were part of something greater than yourself, something that demanded action from you, placed a sense of responsibility on you and rewarded you with a sense of community and purpose.

That's sort of how I see our new vision statement. It may not be as spiffy as a new jersey with your name on the back, but we hope it has the potential to exert the same power. Back in October, a group of us got together for a weekend to hammer out that vision statement. After that two-day session (which you can read about on page 12) we continued an e-mail conversation for weeks. It's not been a slam-dunk process, that's for sure.

The challenge to creating an effective vision statement is finding the words that describe the team we're on, the game we're playing, and what we're trying to win. My handy Oxford dictionary describes vision like this: "a mental image of what the future will or could be like." Mental images can be easy for an individual but they're a bit tougher for an organization as diverse as ours. There were representatives from the CAA, the CAC and the CAF at that session, board members, past presidents and staff. It was critical to the process to involve as wide a range of experience as possible, and the opinions were as varied as the people involved. Democracy's a messy process, but it's the best one we've got.

As I've noted before on this page, collaboration is something the avalanche community does very well. We've got some great examples of shared expertise in this issue, starting with Parks Canada's latest project to make all their avalanche bulletins bilingual. Grant Statham is leading that mission and his team has a draft copy of their French avalanche lexicon ready to go this winter. That means starting in January all Parks Canada's bulletins will be available in both official languages. You can read more about that on page 11. This will be the first season for this translation service and they're looking for feedback. If you speak and read French, Grant would love to hear from you.

We've also got some interesting input from outside Canada From Scotland we've got a tribute to the late Eric Langmuir. For those who aren't familiar with his name, Eric Langmuir was the Peter Schaerer of Scotland – the grandfather of that country's avalanche industry. The impetus behind this piece came from former CAA Executive Director Alan Dennis, who has fond memories of working and skiing with Eric in the highlands of Scotland. Eric's obituary appears on page 53.

John Brennan, from Snowmass Colorado, has researched a fascinating account of the development of the Avalauncher. It's a colourful and entertaining article that really captures the "can-do" spirit Americans are known for. You can brush up on your ordnance history on page 50.

We've got another opportunity for a little history lesson in the profile of the Canadian Pacific Railway, in our sponsor's corner section. As this issue goes to the printer, we're just getting ready for our next Avalanche Awareness Days to be held in the middle of January. The CPR is the presenting sponsor of that outreach program and they've been terrific partners for us. Almost 125 years ago, the CPR had a vision that would unite the nation. That vision ended up laying the groundwork for the avalanche industry we know today. It's a profound legacy and you can read more about the CPR on page 9.

Canada now has a remarkable depth and breadth of avalanche expertise. Our experts come from a wide range of backgrounds and many specialize in some very diverse applications. Take Janice Johnson, for instance, the subject of our Profile section this issue. Janice doesn't throw bombs, nor does she dig pits. But her work has probably touched as many members of the avalanche community as anyone's. Janice focuses on figuring out how people learn, specifically how adults learn. The CAA's professional training has developed an international reputation for excellence, and she has played a significant part in that growth. You can find out more about Janice's background and her contribution to the avalanche community on page 22.

By the time this issue hits your mailbox, it'll be close to voting day in the federal election. Make sure you exercise your right to vote and take part in that democratic process. Remember, it's the best one we've got. Let's use it.

Late Breaking News

Just as this issue was on its way to the printer, we received the sad news of Sue Ferguson's death. In her long career, Sue contributed greatly to the avalanche community in both the US and Canada. She was the co-founder of the American Avalanche Association, the founder and first editor of *The Avalanche Review* and the former director of the Utah Avalanche Center. She also co-authored the *ABCs of Avalanche Safety* with Ed LaChapelle in 1961, a book that served as the bible for many backcountry travellers. We will have a full tribute to the life and work of Sue Ferguson in the next issue of *Avalanche News.*

Winter Ready

BY CLAIR ISRAELSON

Winter is here, and as I write this we're into the season with good snow conditions in the high mountains. This is the time of year we all live for, these months when Canada's avalanche community makes its greatest contributions protecting life and property from avalanches. We all understand the awesome power of nature, and the responsibilities, uncertainties and difficult decisions we face every day working and playing out in the mountains.

More than ever before the CAA is here to assist you with programs and services that help provide a professional operating environment for front-line avalanche operations. We are continuing to develop our website www.avalanche.ca as your "go to place" for CAA- and avalanche-related information. Our first priority has been improving the information tools you use at every day at work: InfoEx inputs and outputs, weather forecasts, satellite imagery and weather model maps, and real time remote weather station data.

New research, directly applicable to what we all do, can be found in the Knowledge Centre. Everyone involved in avalanche work in Canada should be accessing the links to the UBC and U of C research programs pages, staying current with new knowledge that is continually raising the bar for our avalanche programs. We are not doing our "due diligence" as practitioners if we don't stay up to date with evolving knowledge and best practices. Society rightfully expects this of us.

Over the summer a team of the most capable people in North America has been busy designing and writing code to drive InfoEx and the Canadian Avalanche Information System (CAIS). I believe that in a few short years the CAIS initiative will come to be seen as the most important and valuable piece of work the CAA has ever undertaken. Special thanks to Roger Atkins, Chris Larson, Pascal Haëgli, Randy Bente, and Ted Weick for contributing their computer wizardry to this effort. Our goal is to continue with ongoing development so that you, the front-line decision makers, are supported by the most powerful and useful avalanche information system in the world. We are well on our way, and your ongoing participation and timely feedback will ensure we get it right for you.

"Everyone involved in avalanche work in Canada should be staying current with new knowledge that is continually raising the bar for all avalanche programs."

The website now serves InfoEx in real time to subscribers, using encrypted user names and passwords for data security. Data now goes directly into a data base that will, in future, allow all operators to do real-time graphing and analysis of current and recent information, and become even better at protecting people and property from avalanches. Key remote weather stations are now linked to the InfoEx page, allowing subscribers to see real-time weather data from Parks Canada and BC Ministry of Transportation sites. Hopefully other remote weather station networks will be added in the future. It's been a lot of work, and the results are now proving the effort has been worth it.

The "members only" section of the website has also been upgraded to serve you better. If you want to know about pro deals for equipment, browse past editions of *Avalanche News*, contact your directors or committees, or find out about the work they do and how they do it, go to the "members only" site. It's there for you. If you have forgotten your user name or password, just e-mail Audrey@avalanche.ca. Please update your members contact information when it changes. If you don't keep your coordinates up to date we may not be able to contact you when important things are happening.

CAA and CAC staff here at our Revelstoke offices have been working long hours getting ready for winter. In their new roles as operations managers, Ian Tomm (CAA) and John Kelly (CAC) have taken their respective teams to new levels of morale and productivity, and I'm thrilled at what they have accomplished to date. I have repeatedly said that hiring staff is the single the most important thing any organization does. As we settle into the winter operating season you will see the results of these team efforts, and conclude, as I have, that the CAA and CAC have hired well.

The Industry Training Program courses continue as the international standard for technical training for avalanche workers. Again this year ITP instructors will be teaching CAA courses in Japan and Iceland, and Ian continues to correspond with folks in the US, New Zealand, South America and Asia who are interested in licensing our training programs for use in their countries. Just last week I was informed that ranking government officials in India were interested in acquiring CAA programs for their use.

What I find most gratifying is that no one is sitting back saying, "our CAA training programs are world class, let's just leave them as they are." Instead, I'm hearing employers, instructors, members, students and staff saying "we can make these programs even better." What a powerful and positive attitude, and it's an attitude that lives in the genes of the Canadian avalanche community. We celebrate the contributions of pioneers like Peter Schaerer, Willi Pfisterer, Fred Schleiss, Garry Walton, Chris Stethem, Herb Bleuer, Phil Hein, Dave Smith, Randy Stevens, Janice Johnson, and everyone who has ever served on the CAA Board or Education Committee for their efforts over the years to ensure Canadian avalanche workers receive the best technical training in the world. As the next generation of CAA technical educators begins to make their mark, we are confident the legacy of the pioneers will serve them well.

CAC staff is hard at work on their public service programs. At their meeting in Penticton last May, program advisors of the Canadian Avalanche Roundtable set three priorities for this year: Developing support and capacity to deliver public avalanche programs in eastern Canada, delivery of avalanche awareness programs for youth, and effective outreach to the snowmobile community, especially in Alberta.

Since the spring we have been working with the Gaspé Avalanche Forecast Centre, provincial authorities and federal departments to raise awareness of the need for effective public avalanche safety programs tailored for the unique needs in Quebec, Newfoundland and Labrador, and Nunavut. Some progress is evident, albeit slow. The recent federal election call did not help. We will continue to work with all possible stakeholders toward our goal. I remain confident that in time we will be successful.

A November meeting of BC PEP AdventureSmart, Canadian Ski Patrol System, Canadian Avalanche Foundation and CAC representatives resulted in a collaborative plan to deliver avalanche awareness programs for youth. Young people make up a high proportion of out-of-bounds skiers at western Canadian ski resorts, and are now the fastest growing segment of winter backcountry users of avalanche terrain. We are working on strategies for reaching this group and if you are interested in helping out in your community, please contact Jennifer George.

"The CAC is looking for several regional "snowmobile champions" to deliver avalanche awareness outreach programs..."

The CAC had a well-received presence at major snowmobile shows in Edmonton, Calgary and Vancouver this fall. A heartening number of riders signed on to the public bulletin e-mail list, and there were a surprising number of requests for snowmobile Recreation Avalanche Course (RAC) training. If you're a RAC provider and a sledder, be sure your name is on the website's RAC Provider listings. There is a growing demand for your services. The CAC is looking for several regional "snowmobile champions" to deliver avalanche awareness outreach programs in areas of western Canada where high numbers of mountain sledders reside, particularly in Alberta. Our goal is to have expert and respected mountain sledders at club and social events in these communities, delivering a "big mountains, big game, play smart" message that will resonate with their audiences. If you are interested in helping out please contact John Kelly at jk@avalanche.ca

The highly-skilled public bulletin forecast team remains unchanged from last year. Alan Jones, Greg Johnson, Ilya Storm, Karl Klassen and John Kelly will be spelling each other off in 10-day stretches from early November to late April, generating timely, accurate and useful public bulletins and warnings. New forecast regions have been added for the Crowsnest and David Thompson regions of Alberta, and the forecasters are hard at work developing data and observer networks for these regions.

Peter Buchholz of New Zealand has been volunteering as a forecaster intern, helping to build these crucial data networks. Thanks Peter for your help! We are also trying to bring Antonia Zeidler to the CAC to work with our forecast team this winter. Antonia is perhaps North America's foremost authority on numerical avalanche forecasting (computer modeling to forecast avalanches) and we recognize that we must integrate all possible expertise and technology to achieve our goal of providing the best possible public avalanche forecasts and warnings for Canada.

Jennifer George, in her program services role, is providing strong support to the RAC providers. Her work to support the 150 or so RAC providers in Canada has been extremely beneficial. Brent Strand creates CAA and CAC publications and print materials, inspiring us with his artistry. With unflappable Mary Clayton overseeing content, *Avalanche News* has come to reflect the professionalism the CAA and CAC stand for. Audrey Defant and Janis Borden run the financial and client services aspects of our operations, continually providing better services more efficiently. Kudos to them for their determination as we made the transition to a more robust accounting and financial tracking system. Petra van Dijk serves as our receptionist, shipping/receiving clerk, and helper-to-everyone. Our previous receptionist Janice Sanseverino continues to volunteer for us one day a week, bringing her good cheer and "get it done" attitude. Finally, Randy Bente has joined our ranks as our IT specialist, bringing much needed systems networking, database management, website and programming skills. We are in the information business, and our customers rely on us to deliver every time, on time. Randy is helping us achieve this goal.

The people at the CAA and CAC are, like many of you, highly-skilled seasonal workers. None of us are employed here full time, year round. We love our work, and employ our skills here when we are most needed and can be the most productive. In our "off time" many of us take other avalanche-related work. As executive director, by late December my busy season of the year is over. Excellent people and programs are in place. The financial tools are in place. During winter I can get out of the way and let good people do good work. I'll be checking in, for two weeks out of every month, to catch up on those things that I need to do. The rest of the time I'll be out in the mountains every day, doing my best to understand and dance around these fascinating and powerful things we know as avalanches. I hope and pray my winter will be safe, with great times with wonderful people, and lots of good skiing. I hope and pray the same for each of you.

Game on!

Our Vision Quest

BY STEVE BLAKE

In the last gripping instalment of the President's Report, we were pondering the past and looking to the future. More questions than answers were evident so a cross section of members was gathered in Revelstoke to review and possibly renew the "vision" of the CAA, CAC and the CAF.

An interesting weekend, we did some looking back in order to help us move forward. A vision statement shouldn't be easily altered, nor should we spend too much time focusing on it. It is necessary though, at this stage in our evolution, to carefully look at our vision statement and other key documents guiding us, like our by-laws, in order to ensure we are building our future on a sound and relevant foundation.

I'll share my views on the weekend. First, thanks for all those who attended; your input very definitely gave me the insight I feel I need to help move us forward. I was quite worried coming into the meeting that many would insist that the CAA and CAC had gone astray over the years and that a drastic overhaul would be recommended. This is not the case!

We are where we are in large part because of a series of events that took place outside of our control. More importantly, we are where we are because of the specific foresight and well-considered responses to this series of events, which we did have control over. Our founding members, past presidents, past directors, and paid staff members over the years have done incredible work to position us where we are today.

It is no accident that the CAA and CAC are set up as they are. Look at CAA membership. Its composition hasn't drifted from our roots at all; it encompasses those truly interested in enhancing avalanche safety. This includes professional members, our employers, newer members developing their skills and members whose business interests relate to avalanche workers. The CAC now allows for inclusion of the public at large into the world of avalanche safety, a situation that can only be seen as a great step forward.

Some other details of the weekend – the CAA and CAC and CAF were all at the table. The fact we all share much common ground and a common vision was very apparent. What is slightly different about the individual companies is their respective purpose or what could be called their mission statements. The CAA pertains to the professional side of the avalanche scene, CAC the public side and CAF is the charitable organization.

The CAF has endorsed the vision statement and by the time you read this the CAA/CAC will have as well. It consists of one common vision for the three organizations: "Leading the world in avalanche awareness, education and safety services."

What of the distinction between the CAA and CAC? Who cares? I am not trying to be flippant here but who out there really understands the differences between the corporate entities, let alone cares about them? The CAC was created primarily for risk management reasons, to protect the CAA, and to ease the concerns from government organizations that could not be seen to be sponsoring a member-operated association. The legal distinction is there, governments are happy, the CAA has enhanced liability protection . . . success!

What seems much clearer to me is that there needn't be more distinction between the CAA and the CAC because there is no conflict between them. In fact, there is no "us and them," it's all just us! It may be akin having a child. The first move new parents make isn't to take steps to kick the kid out of the house! All that has happened is the formalization of the relationship between public and professional services.

Don't get me wrong. This does represent new ground and we know it. Someday more distinction between the "companies" may be needed as we respond to a future series of events that we have no control over. In today's world however, working closely together optimizes our strengths and efficiency.

Finally, a few words about the boards of directors. There is no "us and them" in this regard either. The boards belong to the membership. When I accepted this job it was with the expectation that I would participate on behalf of the membership, to do what is best for the membership, so that collectively you wouldn't have to consume your already busy lives worrying about the details. Please let me know if there is a disconnect between you and me at the board level. The boards feel like we're doing our best at keeping the information flowing but if you're not getting what you need to feel informed and confident that our affairs are in good standing, let me know.

Have a great winter,

Sponsor's Corner: Canadian Pacific Railway

BY PETER CLARK, CPR VICE PRESIDENT OF MARKETING AND COMMUNICATION

CANADIAN PACIFIC RAILWAY
Ingenuity.

For most Canadians, the Canadian Pacific Railway needs little introduction. In the five years from 1881 and 1885 that CPR was building its transcontinental line, Canada became one nation from east to west.

Many lessons were learned by the men who laid the track through the Selkirks, and those who struggled to keep the line open during those pioneer years of operation. Indeed, those lessons still resonate through Canada's avalanche prevention industry today. Our education came at a high cost. As early as February 1885, James Ross, manager of railway construction in the West, wrote to CPR general manager William Cornelius Van Horne with a warning: "The men are frightened. I find the snow slides in the Selkirks are much more serious than I anticipated, and I think are quite beyond your ideas of their magnitude and danger to the line." Thoughts of the two railway men who had died in recent slides no doubt weighing heavily on his mind.

Avalanches have since killed many railroaders, knocked bridges from their abutments, buried buildings, and closed the CPR main line for days at a time. Over the years, however, many strategies have been put in place to mitigate the disastrous effects of the giant, killer snow slides. Snow sheds, tunnels and constant vigilance now keep rail traffic moving in all but the worst-case scenarios, on this essential economic lifeline. Fatalities are mercifully rare.

CPR's sponsorship of the Canadian Avalanche Centre (CAC) is a natural progression of the railway's history. Our partnership with the CAC is more than a business decision. We also have a responsibility to our employees, their families and their friends to ensure their safety is paramount. As well, we're concerned with the collective good of the communities where we operate, and share a watchdog role with many others in protecting them.

The CPR began working with the CAC in 2003, shortly after the tragic Strathcona-Tweedsmuir accident. Both parents of one of the young victims worked at CPR's head office in Calgary, and the president of our company inquired as to how we might play a more active role in avalanche safety. As a result, we first offered temporary office space for the CAC. When an alternative location was found, CPR helped CAC, financially and creatively, to build a more effective web site. At the same time, CPR became the presenting partner for Avalanche Awareness Days. With such deep historical and ethical ties, we're proud to continue this remarkable legacy that our organizations together have built.

Parks Canada Integrates RECCO into Rescue Plan

Parks Canada has equipped Banff, Jasper, Yoho, Kootenay, Mount Revelstoke, and Glacier National Parks with the RECCO® systems for the upcoming season. The mountain parks' 11 safety specialists and 90 wardens who participate in search and rescue operations will be trained to use the Recco detectors as part of the Parks Canada Mountain Safety Program annual training.

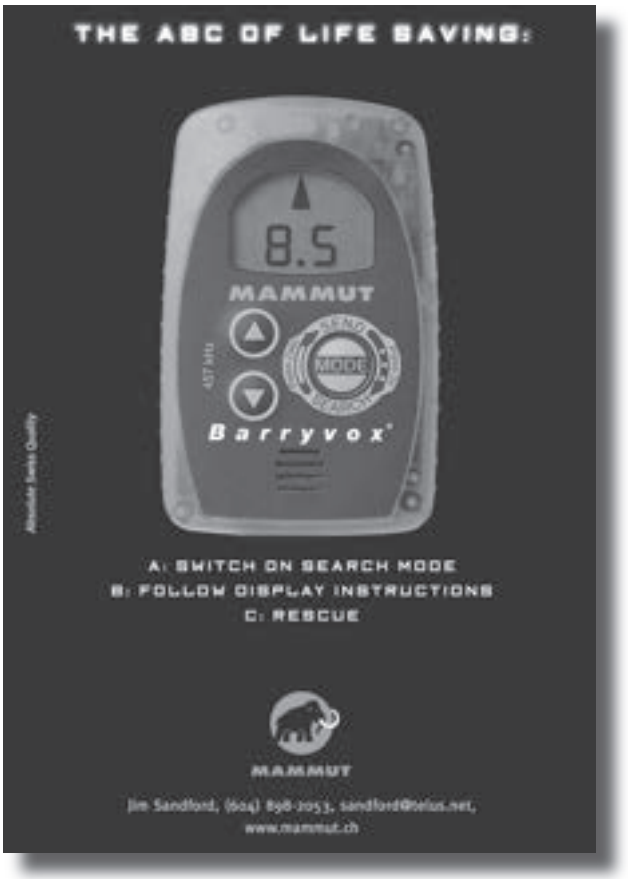
The area selected for coverage includes many of the most heavily trafficked backcountry ski areas in western Canada – including Rogers Pass, the Icefields Parkway, and the Lake Louise backcountry. The area also includes the off-piste areas adjacent to the ski resorts of Lake Louise, Mount Norquay, Sunshine Village, and Marmot Basin. Backcountry ski and snowboard usage in this area is estimated at close to 100,000 skier days per season.

Gord Irwin, Mountain Safety Program Manger for Banff, Yoho, and Kootenay National Parks says, "One advantage, now that RECCO is on more equipment and clothing, is for people who are accessing the backcountry from ski areas. The access is so easy to do from the ski hills in the National Parks, so we see this as an advantage because many of those backcountry users may not have any avalanche equipment."

"Self-rescue and prevention is our main focus," he continues. "But that said, all too often events occur where a group needs outside assistance and that brings into use of beacons, the dogs and the RECCO. Just as more and more clothing and equipment manufacturers include RECCO in their systems, the likelihood of someone having a RECCO goes up and therefore it becomes an advantageous tool for us to utilize."

The portability of RECCO detectors will allow them to be used as a primary search tool in all Parks Canada avalanche rescue responses in the six-park area. "The fact that most of our responses would also involve using a helicopter and that it's very small, very light, very easy to use, means that it's a piece of rescue equipment that will be taken to a rescue scene," confirms Irwin. "It would come with us to any search, then. Depending on whether there are witnesses or survivors, we would make a decision about what to utilize. Obviously being able to search with multiple tools early on is likely to have a better outcome than not having those tools at all."

Irwin sees RECCO as providing a significant benefit in the Parks Canada backcountry. "The biggest single asset is that it offers, with very minimal cost on the part of the skier, something in their clothing or equipment that would enable a rescue group to find them. I still don't think it's a substitute for self-rescue, but certainly from the point of view of a rescue team it will greatly reduce the amount of time that we would be in a search, particularly for the people who don't have beacons, and therefore it minimizes the risk and exposure time of the rescue team. But, more of a priority, it enhances the chances of survival for someone who is caught in an avalanche."



Special Thank You

In early October, Clair presented a certificate of appreciation to Greg Thompson of Parks Canada. Greg has headed up the project to take the CAA's jury-rigged and duct-taped computer network to the cutting-edge technology we're just figuring out how to use today. Thanks again to Greg and his team at Parks Canada.

Photo courtesy of Clair Israelson

French Avalanche Bulletins from Parks Canada

BY GRANT STATHAM, AVALANCHE RISK SPECIALIST PARKS CANADA

Parks Canada is involved in a project to create the specialty of avalanche translation in Canada, and to produce bilingual avalanche bulletins in all four reporting regions of the Mountain Parks. Translation is an extremely specialized skill – general translators have a bachelor degree, and specialists follow this with further education specific to their area. Translation specialists in the fields of law, medicine and science are common. Avalanche translation is a small market in Canada, and consequently no specialty exists yet in the translation community. Our goal is to change that.

Working with the Federal Translation Bureau, the Canadian Avalanche Centre, and the Centre d'avalanche de la Haute-Gaspésie, our group is building an Avalanche Bulletin Lexicon. This is basically a dictionary identifying the correct terminology and placing it in context for both languages. This is very detailed work requiring extensive research, and we are fortunate to have the leadership of Louise Claude, a Montreal-based professional Terminologist.

Parks Canada is also working with a group of translators from the Vancouver Translation Bureau office. This group of six translators has been studying avalanche terminology and practicing on historical bulletins. Starting in January 2006 they will begin translating each of Parks Canada's daily four bulletins. Translating a bulletin takes the same amount of time (or more) as a forecaster needs to write one. The translator needs to first understand what the forecaster is trying to say, and then decide how to communicate those concepts in French. There is much more to it than just selecting the equivalent words.

Starting in January, each bulletin published in English will be sent for translation and about two hours later it will be published in French. We expect that timing to be a bit slower at the beginning but we will be working towards a two-hour goal. Armed with OGRS, CAA course curriculum, websites from France and a brand new lexicon, these translators are poised to become an important new part of our avalanche community in Canada.

So look for a new template in the Parks Canada bulletins, along with an option for French. We are very interested in feedback from the French-speaking public, so please feel free to send comments on the quality and utility of the French product.

Thanks to Louise Claude, Lise Gautron, John Kelly, Marc Deschênes and Stéphane Gagnon for their invaluable help with this work. Also to the Official Languages Innovation Fund and Glacier National Park for funding this project.

Report on Visioning Session

BY MARY CLAYTON

Still smiling after two long days.

Photo: CAA Staff

On the last weekend of October, representatives from the CAA, CAC and CAF gathered in Revelstoke for a vision and mission workshop. The need for this session was identified at the AGM in 2005, where it became apparent that a few fundamental issues had to be addressed before constitutional and bylaw issues can be resolved. The members involved in the workshop were chosen for their wisdom and experience; collectively they represent the conscience and soul of the CAA, CAC and CAF. These "senators" held a wide spectrum of opinions on key issues, and brought considered and passionate arguments to the table.

Leading the session was facilitator Ian Montgomerie, who was chosen for his proven expertise in helping organizations become more effective. He was very capable at grasping the complexities of our issues and keeping us focused on achieving our goals for the weekend. At the end of the session, he made a point of stating how impressed he was at the level of dialogue and the respect paid to all participants, regardless of how hot some discussions became.

This compliment was well-deserved. Together the group resolved key contentious issues and came to some significant consensus-based decisions. Probably the most important one was the creation of a vision statement that encompasses all three organizations. The knowledge that we're united in this way – in our goals and aspirations – should resonate deeply with each and every one of you. We're all playing on the same team, with equally important roles.

Early in the session, the group came up with "CAX" as an over-arching title to reflect the shared aims of the CAA, the CAC and the CAF. Ian led an exercise where we were asked to envision the future if the CAX did not exist. As we talked about that idea, it became clear just how much essential work is being accomplished. Ian then asked us what we would like the future to hold for the CAX. That wish list included things like less economic loss from avalanches, avalanche accident rates decreasing, truly national programs, recognized professionalism and credibility for members, efficient and integrated use of resources and guaranteed funding for public programs.

Ian instructed us that, as an organization focused on outcomes, our vision should describe our aims, and our mission should illustrate how we will achieve that vision. He then asked us to walk him through a history of the CAX by listing the significant events shaping the organization. Speaking personally, I found that discussion especially interesting as we had a number of people in the room who have had a tremendous amount of influence over the organization's development. Hearing their perspectives of our history was fascinating and educational.

Ian pointed out the "mission creep" that had occurred to the CAX, as responsibilities and societal expectations increased over the years. That brought about a discussion on the various clients served by each organization, and how the individual roles of the CAA, CAC and CAF contribute to the overall vision. It became clear that these roles should become our mission statements, serving the

over-arching vision of the CAX.

Another important issue tackled that weekend concerned the nature of the CAA's membership. There were many strong opinions on this topic and the conversation was heartfelt, to say the least. At the centre of the debate was whether to make the CAA professional-members only, by moving affiliate members in the CAC, or to keep the CAA open to the wide range of members it has today. Arguments for the "professionals only" approach included enhanced public credibility and profile. Arguments against pointed to a decrease of CAA membership by two-thirds, thereby reducing legitimacy and organizational clout. As well, it was felt the loss of "youthful energy" could be a deterrent to succession planning.

Facilitator Ian Montgomerie with CAA Director Steve Parsons and CAA President Steve Blake.

Photo: CAA Staff

In the end, a consensus developed to keep the CAA inclusive, and to strengthen the standards for maintaining professional membership. A more rigorous process for monitoring CPD compliance and maintaining professional standards will be developed by the BOD, with help from the membership committee and the professionalism and ethics committee. As well, a new definition for non-practicing professional members will be proposed in the 2006 bylaws.

There were many other debates over the weekend, and you can read the record of decisions and unresolved issues in the members' only section of our website. The main message derived from the weekend was that the organization ain't broken. We're on track with our stated goals and we're doing very good, important work. That's not to say the session wasn't necessary. Anton Horvath put it well when he said, "we don't need to re-invent the wheel here, we just need to tighten some spokes."

And that's what the visioning workshop accomplished. We tightened some spokes, polished the rims, and we're ready to roll.

Epilogue:
In a flurry of email discussion following this session, a vision statement for the CAA, CAC and CAF was hammered out.

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CAA Industry Training Program Update

BY IAN TOMM, CAA OPERATIONS MANAGER

Change is the flavour of the season for the ITP. Enrolment patterns continue to fluctuate and demand for diversified and custom programming continues to increase. Combine that with the recent curriculum changes to the Level 1 program this year and it all adds up to an exciting and very dynamic program. Here is a quick snap shot of what the winter looks like for the CAA's Industry Training Program.

Avalanche Operations Level 1

While enrolment looked like it was slumping quite a bit early season, enrolment in mid- and late-season courses has increased this year. We forecast that Level 1 enrolment will be reasonably steady compared to last year at around 200 students. We've started the process of modifying and enhancing the Level 1 curriculum this year with new resources and lesson plans for instructors. We hope to make Level 1 enhancements on an annual basis from now on. Enhancements this year include fracture character, decision making, public bulletin content, profile indexing and terrain classification. Unfortunately the snowmobile program was cancelled due to very low interest this year. We are currently looking at alternative models to deliver this content to the snowmobiling community.

Avalanche Operations Level 2

Enrolment increased considerably in the Level 2 program this year, so much so that our program and instructor pool reached capacity. We offered two Module 1's, three Module 2's and three Module 3's with the third Module 3 running at 24 students instead of the regular 18. Plans are in the works to increase our capacity for the Level 2 program for the 06-07 season.

Resource & Transportation Avalanche Management

This newly revised five-day program saw a slight increase in enrolment this year, running with 19 students. The changes to the program have been very well received and thanks to Randy Stevens for helping to facilitate those developments. We are looking at even more new and exciting changes to this program in the coming year, which would incorporate additional training for supervisors and resource-specific applications, in addition to gearing some content towards the snowmobiling community. More information on these developments will appear in the spring edition of *Avalanche News*.

Introduction to Snow Avalanche Mapping

This course ran in September 2005 for the first time in several years. There is a lot of interest being expressed by the membership for another course in September 2006. We are planning to run this and enrolment will open June 1, 2006. A few quotes from the course this fall:

I just wanted to say thanks again for an excellent course last week in Nelson. What struck me the most was how much I didn't know I was going to learn (if that makes any sense). I really didn't know what to expect from the course, and really got a kick out of looking at avalanche terrain in another way. It's been a while since I've done that kind of work, and I wish now I'd had that course under my belt 10 years ago. It definitely will add to my skill set for much of the Parks work I am doing and anticipate.

You guys were great, well organized, and did a really good job flexing a challenging schedule to make it all fit.

I would recommend this course to any avalanche worker, even if they don't anticipate doing much of this kind of work. There is much to be learned from taking an intimate look at avalanche terrain from many different perspectives.

Intro and Advanced Weather Skills Courses

We ran two of these two-day courses this year, one at the end of October and one in early November. The feedback from the courses was very similar from previous years in that the content was very technical and needs to be more oriented towards front-line workers. We hope to initiate discussion at the AGM and spring conference to develop more guidance for weather training for avalanche workers in Canada and work throughout the summer on developing this program further.

International

Programs will be running in Japan and Iceland this year. The CAA continues to field inquiries from countries around the world regarding our programs, curriculum and expertise.

Avalanche Control Blasting

Enrolment increased in this course this year. We ran the course at the end of November with 22 students. This winter and next summer we will be working on the curriculum as an Intellectual Property Renewal Fund project. The goal is to enhance the program further by incorporating the changes to explosives use and regulations since the initial project four seasons ago. Enhancements include improve A/V resources like video and still imagery, updated student manual and resources, and incorporation of shot placement, effective range and new emerging technology.

ICAR Update

BY CLAIR ISRAELSON, CAA/CAC EXECUTIVE DIRECTOR

Thanks to a free flight through CAA credit card airmiles points I was able to attend the 57th annual ICAR Congress in Cortina. The ICAR Avalanche Committee is chaired by Hans-Jurg Etter, an avalanche forecaster with the SLF in Davos, Switzerland, and is co-chaired by Dale Atkins from the Colorado Avalanche Forecast Center in the US. This year more than thirty national representatives participated in the meetings of the Avalanche Committee. For more information about the ICAR Avalanche Committee visit their website at www.ikar-cisa.org The significant issues addressed by the Avalanche Committee this year are described below.

Avalanche Transceivers – Manufacturer's Advertisements of Maximum Range

One of the purposes of the ICAR is to make recommendations to manufacturers of rescue equipment. François Sivardiere of ANENA (France) proposed a resolution that manufacturers of avalanche beacons should not advertise a maximum range for their products as this could lead to searchers missing buried persons during search operations.

As beacon range depends on sensitivity of the receiving beacon, battery power of the receiving unit, battery power of the sending unit, efficacy of signal coupling between brands of transceivers and the relative positions in space of the antennae of the sending and receiving units, advertising maximum ranges may be misleading. François made a strong argument that manufacturers should only advertise useful range which would be a far more conservative statement of a beacon's range.

Manufacturer's representatives in attendance (Arva, Barryvox, Ortovox, Pieps, Tracker) acknowledged that during a search it is advisable to assume a working range of approximately 1/5th of the beacon's maximum range, confirming the validity of François' position. After much discussion the conclusion was that in the absence of a comprehensive international technical standard to objectively determine useful range, beacon advertising should contain a statement that a maximum search strip width of 20 meters is recommended.

Canadian users of avalanche beacons are advised that when searching for buried persons with avalanche beacons, the distance between searchers, or the slope distance between search strips, should not exceed 20 meters.

Multi-lingual glossary of avalanche rescue terms

Dale Atkins (USA) has been working to develop a multi-lingual glossary of avalanche rescue terminology to ensure accurate translation of documents and papers. English, French and German sections are pretty much complete; national representatives for other languages were requested to submit equivalent terminologies for their respective languages. The glossary will be posted on the IKAR-CISA website for ease of access.

Avalanche rescue statistics for national annual reports to ICAR

Much effort was put into defining the various data fields for the ICAR's annual avalanche rescue data base. Hans-Jurg Etter showed national data submissions that were obviously not comparable due to differing assumptions of what was being requested. A working group was tasked to clearly define all ICAR avalanche data fields to ensure consistency of these data prior to the end of the Congress. I worked with the Norwegian and US representatives to do this, and our definitions were accepted by the Avalanche Committee during our final working session. The call for 2004-05 avalanche rescue data circulated to Canadian SAR organizations in late October contained these new data field definitions.

Risk evaluation checklist for organized avalanche rescue

Heine Malue of Germany requested feedback regarding various countries' use of the risk evaluation checklist for organized avalanche rescue developed at the 2003 meetings in Lichtenstein. This checklist is intended to assist managers of rescue organizations in determining if the risks to rescuers are justifiable under the existing conditions. While this kind of risk evaluation by SAR organizations is common in North America, it is apparent that in some countries, especially those reliant on volunteers who may respond to avalanche accidents infrequently, some guidance for avalanche SAR managers was appropriate.

Response from national representatives was that most professional or highly-tasked avalanche rescue groups had better processes in place for ensuring rescuers did not charge out into the mountains without a careful evaluation of risks to rescuers. The ICAR list is being used by volunteer groups and military and police organizations in places where organized avalanche rescue responses are less frequent.

If you or your organization would like to obtain a copy of this ICAR risk evaluation checklist please e-mail clair@avalanche.ca

Expectations for new avalanche rescue devices

Hans-Jurg Etter distributed a draft list of desirable technical specifications for new avalanche rescue devices. This list includes factors such as maximum weight, range, operating temperature tolerances, isolation from electrical interference from other devices, and is intended to offer guidance to organizations or companies developing new technologies, so they do not spend inordinate

amounts of money to develop avalanche rescue tools that are not useful in the field. This list will be reviewed and finalized next year. Please contact me if you would like to review and comment on this list of desirable technical specifications for rescue devices.

"Time is Life" medical training in avalanche rescue

The ICAR mountain medicine committee (with financial support from Canadian Mountain Holidays) has prepared a training DVD demonstrating best practice for avalanche rescue. This DVD is for sale at a price of €20.00 and can be ordered from brugger.med@pass.dnet.it or from info@newportmusic.it Portions of this DVD were shown at the Congress and from what I've seen this DVD is highly relevant for the Canadian avalanche community.

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An Update on the CAA's Weather Product

BY IAN TOMM, CAA OPERATIONS MANAGER

For over a decade now, the CAA has worked closely with the Meteorological Service of Canada (MSC) to produce a proprietary weather forecast for avalanche operations in western Canada. In November, Alan Jones, coordinator of the CAC public bulletin program, and I traveled to Vancouver to run a one-day avalanche training seminar for MSC forecasters and managers who work out of the Pacific Storm Prediction Centre (PSPC). Seventeen people attended the eight-hour seminar and we were pleased to see that many of the forecasters who work on the CAA's weather forecast were in attendance.

The morning consisted of a whirlwind tour through the formation of avalanches and their nature, including recent research into spatial variability, skier triggering, fracture character and new ideas about fracture mechanics. Alan took the stage in the afternoon and covered avalanche hazard forecasting from the perspective of both individual operations and the public bulletin program.

Those in attendance remarked on the complexity of the phenomenon that avalanche workers deal with on a day-to-day basis. Many were not aware that avalanche workers essentially take the forecast weather products from MSC, that are susceptible to the natural variations of mother nature as we all know too well, and apply them to the complex realm of the snowpack. As we filled them in on how much the snowpack varies, due to the same causes that create the complexity of weather and climate, and add in the different terrain variables affecting snowpack specifically, they were impressed with the complex combination of variables. By mid-morning, the audience started to understand what it is that avalanche workers really do.

There was ample discussion throughout the day. The weather forecasters had suggestions about methods and approaches that avalanche workers and forecasters could look into and consider testing, while Alan and I had ideas for enhancements to the MSC avalanche weather forecast. There were lots of ideas all round on how the two organizations can continue to strengthen our working relationship. The seminar was such a success that we have tentatively made plans to make this an annual event, at approximately the same time every year.

The New InfoEx

BY IAN TOMM, CAA OPERATIONS MANAGER

On November 15, 2005, we officially launched the new InfoEx system. While last season saw the development and implementation of a database-driven InfoEx, few of the subscribers perceived any changes to the end product. This year is different in that the database was totally redesigned and rebuilt over the summer, to accommodate the data ownership concerns expressed at the InfoEx subscribers meeting in the spring. That meant wholesale changes to the SnoInfo input tool as well. We are pleased to announce that after much work and long, endless days that the new InfoEx system is up and running and SnoInfo (version 1.3) is being officially rolled out to subscribers throughout this season.

Along with the new database, SnoInfo program and data security protocols the CAA also launched increased services to InfoEx subscribers through a password protected website found at www.avalanche.ca. This site, in addition to hosting subscriber maps and help files, now includes expanded weather data services and real-time InfoEx reporting. This is indeed a significant step forward for the InfoEx program, as the product is now well on its way towards a real-time data feed of conditions, with 24/7 access to the current product through the website.

We are hoping that by the end of January, daily e-mail distribution of the InfoEx reports will be halted. With the power and utility found on the subscribers' website, the level of service and quality of the InfoEx product is much greater online than the reports generated at nine pm each night and emailed out. In addition, viewing InfoEx reports through the website has been configured so that users can sort through data much easier via HMTL views. This is a feature that many subscribers have requested in the past, as the InfoEx data set grows larger and more complex year after year.

This coming season is one of great change for the InfoEx program. The increased services to subscribers and future upgrades to SnoInfo and the InfoEx system will no doubt aid avalanche risk management programs in Canada. Future upgrades currently being planned include visualization of the data, image and snow profile transmission capabilities and, one day, terrain atlas capabilities, although the latter feature is some time and expense away.

Special thanks to Roger Atkins (project coordinator), Pascal Hägeli, Chris Larson and Randy Bente for their tireless work in bringing the new InfoEx and SnoInfo system online this fall.

Reading InfoEx

BY ILYA STORM, CAC PUBLIC AVALANCHE FORECASTER

The Information Exchange™, or InfoEx™, was created in 1991 upon the recommendations of the BC Coroner's Office following several tragic accidents. It is a voluntary exchange of avalanche-related information between subscribers administered by the Canadian Avalanche Association. Currently, InfoEx consists of more than seventy subscribers from operations that deliver avalanche protection programs for ski areas, commercial backcountry skiing and snowmobiling, highways, railways, resource industries, parks agencies, and other winter activities employing avalanche professionals. The primary benefit to subscribers participating in the InfoEx program has been the timely and open exchange of snow, weather and avalanche-related information between peers, for operational decision making purposes.

With its pages of codes, abbreviations, technical jargon, and assumed knowledge, first encounters with the InfoEx can be intimidating. It's worth investing the time and effort required to effectively use this tool. The purpose of this article is to assist this learning process.

Components

InfoEx is divided into sections which are then organized by region. The six sections are: Weather Station observations; Daily Summary of field-based snow and weather observations; Avalanche Summary table; Discussion and Stability evaluation; News; and Operational Issues.

Quantitative data is typically presented in tables; qualitative descriptions are found in the Discussion and Stability Rating section. Abbreviations and codes typically conform to OGRS specifications and an alphabetical list of InfoEx abbreviations and codes is available from the CAA. However, InfoEx is a dynamic forum where field practices can precede OGRS specifications and actually drive the process. For example, fracture character was first reported, discussed, and refined in InfoEx. Now fracture character is being considered for adoption into OGRS.

"I approach InfoEx like a conversation: I ask questions, watch for answers, and listen intently to what the talented eyes and ears in the field have to say."

Suggestions for Reading

Typically, operational constraints rule out the luxury of a leisurely reading. You must be focussed, directed, and efficient to find what you need in a limited time. Therefore it's worthwhile thinking about your goals and considering the questions you're investigating before reading. Are you preparing for an arriving storm and want to know what's happening upstream? Has a weak layer become active yet? If so, where and why? Has anyone reported mid- or lower-pack temperatures? Are large loads stepping down? While reading with a purpose is valuable, preconceived ideas (aka tunnel vision) can be blinding and work against hearing what the data and reports say.

I approach InfoEx like a conversation: I ask questions, watch for answers, and listen intently to what the talented eyes and ears in the field have to say. If you want more information, you can always follow up with an e-mail or telephone call to a fellow subscriber, or submit a question for the News section to start a conversation with the whole community. (One of the unforeseen benefits of InfoEx is how the daily connection fosters a community of avalanche professionals, amongst people who otherwise only see each other infrequently.)

Typically, I want to start my day by finding out what's new and important so I scan the headlines like I'm reading a newspaper. In InfoEx that generally means a quick overview of the News, Operational Issues, and Avalanche Summary sections (paying particular attention to avalanche size and trigger, but also depth and number). After my quick scan I turn to page one and skim the Weather Station and Daily Summary tables to gain a better sense of the weather patterns and snow distributions at a synoptic (overview) scale, within my specific region(s) of interest, and to my upstream side for the weather that's coming my way. I return to the Avalanche Summary table and scrutinize it for significant or anomalous events, as well as better sense of general patterns and trends. Then I turn my attention to the Discussion & Evaluation Summaries.

I hope to find answers to my questions in the details of the descriptions, qualitative assessments, avalanche comments, and the stability ratings and comments. This section is also where people may add value to their quantitative data by sharing their thoughts, theories, concerns, and uncertainties. It's where the dialogue between writer and reader can really happen. Extremely valuable information relating terrain to both avalanches and stability ratings are often included here.

While the Avalanche Summary Table identifies general terrain parameters (i.e. mountain range, aspect, elevation, slope incline), comments linking terrain specifics to the avalanche(s) can provide a more nuanced understanding of what happened and why the avalanche(s) are important. Similarly, terrain comments attached to the stability ratings are where you gain additional precision in your quest to understand the operation's message. It takes effort to communicate the terrain specifics behind avalanches and stability ratings; however, as a reader I focus on these terrain comments because they provide a more precise and nuanced message.

I look forward to the day when InfoEx includes links to photos, sketches, and other visual aids. A picture's worth a thousand words but the value of a 10- or 15-word comment is in how it helps readers colour the picture themselves. Finally, depending on my needs, time constraints, and current conditions, I might return to certain items of interest, return to page one and scrutinize the entire document, or I may feel satisfied and move to the next task in my day.

Still, using InfoEx effectively requires more than just active reading. Using InfoEx requires careful analysis of the

reports, evaluating the information you glean, synthesizing all the different (and sometime conflicting) parts into a coherent picture, summarizing it, and finally integrating the insights with all your other data and information sources.

Analyzing InfoEx

InfoEx is probably most commonly used as a tool for *Neighbourhood Confirmation*—checking in to see that what you're seeing and thinking generally maps onto what neighbouring operations are seeing and thinking. While Neighbourhood Confirmation is useful, its opposite is likely more important. *Anomaly Awareness*—being alerted to unexpected or surprising events, or dangerous conditions that were previously observed elsewhere. This was the original rationale behind creating InfoEx. When considering surprises, the critical question that demands asking is whether the event or condition is truly anomalous, a completely unique and bizarre circumstance, or does it represent a more general phenomena.

Often, so called anomalies serve as insights into more general conditions or provide insight into a future pattern. This awareness prompts a reassessment of existing evaluations and conditions and assists the identification of emerging trends, patterns, and changing conditions before they would otherwise be noticed. Conflicting data also heightens awareness of confidence (or uncertainty), allowing an adjustment of our "margins for error." Being aware of contradictory information for a certain aspect or elevation zone helps us consistently apply extra caution in our decisions when working within these areas.

"Recognizing spatial patterns and temporal trends are important skills for an avalanche worker and InfoEx can assist..."

Recognizing spatial patterns and temporal trends are important skills for an avalanche worker and InfoEx can assist with these needs. At the simplest level, the exchange identifies specific aspects, elevation zones, or terrain features of importance. A more complex skill is identifying patterns and trends within and between regions. Examples of this could include: discerning that a surface hoar problem becomes less pronounced along a south to north gradient through your region; seeing a particular layer becoming progressively more active over time and distance as a new load builds; or recognizing that after a storm cycle, reports generally evolve from natural avalanches to controlled releases to accidental human triggering. Potential avalanche risk is not randomly distributed across the landscape or over time. The identification of patterns and trends is one of the key benefits of using InfoEx when making operational decisions to manage avalanche risk.

Of course, recognizing patterns and trends isn't always easy. The number of observers out in the field (aka observer effort), the visibility, and terrain selection can all vary and dramatically affect InfoEx reports. A classic example is the well-known phenomena of reported avalanche activity increasing after a storm. Often this isn't a case of increased natural activity as the new load builds, but rather it's the first opportunity for observers to get out and report current and recent activity. Everyone who can is enjoying the coziness of a warm hearth while the storm rages. Therefore readers must interpret reported data. Limited observations during bad weather results in under-reporting avalanche activity, especially in alpine areas where backcountry operators don't go when the weather is bad. This quirk of the data is particularly noticeable on the first blue sky day after a storm when observers can actually see something.

The information received from backcountry skiing operations is likely the most affected by terrain selection. Helicopter skiing operations are typically flexible and choosy when selecting terrain for the day. They'll avoid areas where the snow is bad (in the sense of not pleasurable to ride) so there may be long periods when, for example, these operators don't report sun, wind, or rain crusts when you're sure they exist, because they simply aren't travelling on south aspects, alpine areas, or close to the valley floors. On the other hand, such flexibility in terrain choice can help the reader understand situations when there's a known and lingering problem, say a band of surface hoar near treeline. If you know operators have eased off on the terrain throttle and tightened their guiding procedures because of this problem, intermittent but regular reports of small accidentally-triggered slides suggests conditions are trickier than they appear and extra caution is called for.

Different types of operations provide different data and information. Because of regular avalanche control, ski areas may not be the best source for deep instabilities, just as highways may not be concerned about small surface avalanches that don't threaten a road a thousand metres below, and backcountry operations won't enlighten you on alpine conditions if it's wind hammered and skiing quality is marginal. Reading InfoEx requires considering the type of operation, their mandate, their concerns, how they interact with and modify the snowpack, and what sort of terrain, aspect, or elevation bands they are interested in at any particular time.

In summary, when reading InfoEx, interpretation skills are important to get the most information out of the data available.

Looking Forward

InfoEx is being reinvented and modernized for the 21st century. In 2003 the CAA, in partnership with InfoEx subscribers and others, began development of the Canadian Avalanche Information System (CAIS). One of the benefits of this initiative is that InfoEx is now database driven. This means improved data input tools, the ability to view reports in real time, and, most importantly, new output tools can be created to view the data in ways customized for your specific needs or operation.

Historically, InfoEx has been presented once a day in the

same single view—pages and pages of numbers and text. This will change as software is developed that customizes how the data is sorted and viewed. Examples of this could include viewing only your nearest neighbours, displaying historic data to help identify trends over time (e.g. since the last storm), or presenting data visually using charts, graphs, and similar visualization tools. These changes will affect how we use the InfoEx, and how we transform this powerful dataset into useful information. New tools will require new strategies when "reading" InfoEx in order to tap its new power. However, no matter how InfoEx develops, using it will continue to require the reader's careful *analysis, evaluation, and synthesis.*

Ilya Storm moved to Banff when he was two and grew up under the spell of the mountains. His early plans to become a mountain guide were derailed by the philosophy department at the University of Victoria. He never got a degree in that discipline but did acquire a partner, Heidi, who is now a professor of philosophy. Ilya has a Masters in geography and has now turned his attention back to the mountains. This is his third year as a forecaster at the CAC. He is also an assistant ski guide and is working at becoming a ski guide.

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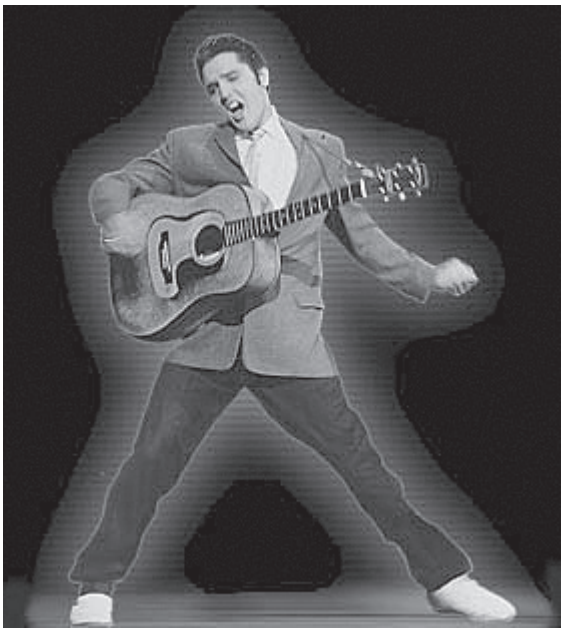

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Profile: Janice Johnson

BY MARY CLAYTON

If you have ever taken a Module 1 course, taught a Level 1 avalanche course, or participated in an Instructional Skills Workshop, then you have come across the work of Janice Johnson. Janice works for the Centre for Teaching and Academic Growth at the University of BC, and specializes in adult education. But she's also had a long career in the avalanche patch, and that combination makes her one of the CAA's top "go-to" people for any type of educational initiative.

Her first introduction to the avalanche world was back in 1977, when the BC Highways' avalanche program had been underway for just over a year. Janice was enrolled in the geography department at the University of Victoria and was hired, along with three other students, to work on highways avalanche atlases for the province.

"I knew what avalanches were because I was focusing on natural resource management," she says. "The atlases involved a lot of map and air photo work and we spent a lot of time hiking through avalanche paths." That summer job lasted for three years until she finished her degree in 1979. That fall, she was offered a full-time job with the avalanche section of the BC Highways.

The department was still working on the avalanche atlases, but Janice's work would now include more operational tasks, covering the province's avalanche trouble spots. "At that point there were only three regional avalanche technicians – in Terrace, Hope and Creston – so we spent a lot of time on the road. Over time more regional people were hired but we would still be involved in working with them as they developed their programs."

Janice with her chocolate lab Jock.

Photo courtesy of Janice Johnson

Her work in the field was fulfilling, but not always easy. "I'm not a phenomenal skier so that part of the job was challenging," she explains. Another aspect of her job had its own brand of challenges – training highways crews in taking weather observations and avalanche search and rescue procedures. She recalls how the deck was stacked against her in that position. "First, I was from Victoria, which was known as 'Fantasy Island.' There's no snow there, so how could we possibly know anything about avalanches? Second, I was very young and often teaching men old enough to be my father or even my grandfather. And third, I was blonde and a woman."

Developing the skills, techniques and abilities that helped her overcome those odds would serve Janice well in her career. "It was exciting," she says with a laugh. "Because I worked like that, it's made me very good at what I do now. I understand where people are coming from as learners and why they react the way they do."

Aside from teaching, Janice also did a lot of long-term avalanche hazard work. Other government departments would come to their section to have subdivision and ski area applications reviewed for avalanche safety. "It was very interesting work and part of why I stayed," she remembers. "I got to work with Peter Schaerer a lot, Norm Wilson, Chris Stethem." When asked about her mentors, Janice singles out Geoff Freer, who was then head of the avalanche section, and Peter Schaerer. "They expected I could do the job, they trusted me, yet when I needed assistance it was always there. And neither were micro-managers, which is a wonderful thing."

Janice left BC Highways in 1990, after the first round of program cuts due to privatization. But the lessons she learned from teaching highways workers never left her, and she decided to pursue adult education. She got her Masters at UBC and did work towards a PhD, which is currently on hold due to family obligations. "I've done all but complete my dissertation," she says. "At one point I'll get back to it but not right now."

While she was working on her Masters, she was asked to evaluate some workshops for UBC's Centre for Teaching and Academic Growth, and was ultimately offered the job of coordinating those programs. When she decided not to finish her PhD in 1998, she was hired in the position she holds now. Her work sounds fascinating, and challenging – exploring a whole spectrum of new ideas and approaches to education. "I lead workshops and hold seminars for all members of the UBC teaching community, do peer coaching, develop and occasionally teach mixed-mode and online courses related

to teaching and learning, design curriculum, and facilitate curriculum review for programs having challenges."

Janice's former colleagues in the avalanche world were staying abreast with her work, and she was asked to put in a proposal for instructor training. "The CAA had gone to outsider training after BCIT got out of coordinating the professional avalanche training," she remembers, "but they wanted an approach more relevant to avalanche safety instruction. Peter, Phil (Hein) and Allan Dennis knew what I was doing, they liked it, and I started doing instructor training in 1996."

That was the beginning of a long association that continues today. Janice has been involved in a number of NSS projects, including the avalanche hazard mapping project and revising the Level 1 curriculum. She has also facilitated instructor training and, most recently, served as the educational consultant for the online Avalanche First Responder training program.

CAA Operations Manager Ian Tomm has been running the Instructor Training Program for the last four years, and he has no hesitation when asked about Janice's influence. "We'd look very, very different without her," he says. "Her impact has been phenomenal."

"Basically, Janice has had a profound affect on three very important areas," says Ian. "She's led the development of a curriculum based on sound educational theory, she's been instrumental in training instructors to become better adult educators, and she has helped shape policy and given valuable guidance for all our education initiatives within the CAA."

Executive Director Clair Israelson goes even further in his description of Janice's impact. "She's our matriarch," he says. "She's been fundamental in charting the direction for the CAA. She's helped develop board policies, facilitated key strategic planning sessions and designed the CPD program back in 1998 that continues today."

When asked to single out a memorable project from such a long list of accomplishments, Janice immediately points to the Module 1 of the Level 2 Operations course. "I was part of the team that developed it, I've been teaching on it since the beta course, and I'm very proud of it," she says. "I think the team that came together to build it and the instructors that have worked on it have developed something very positive."

That's high praise from someone with Janice's experience, and she's quick to give credit to the others involved. "It works so well because of the commitment of the instructors to make it better," she explains. "People come together from all different backgrounds, to build things that benefit everyone."

The ability to bring diverse skills together to create a better product is one of the things the CAA does best. And when people like Janice Johnson are part of that collaboration, the advantage goes to us all.

RAC Update

BY JENNIFER GEORGE, CAC PROGRAM SERVICES

There have been a lot of changes in the RAC program, and we're looking forward to even more developments in the coming year. One of our first priorities this season was to bring the community of RAC providers closer together, and one of the ways we're doing that is to initiate an electronic newsletter created specifically for RAC providers. The newsletter contains information on upcoming CAC events, RAC training sessions and policy updates. It's published monthly throughout the winter season and is available via e-mail to all RAC providers.

We are also continuing to push forward on enhancing supporting materials for the RAC curriculum. We recently added two new DVD's to the RAC collection: "Intro to Avalanche Awareness", produced by the Quebec Collaborative Avalanche Project (bilingual and appropriate for all regions of the country), and Bruce Tremper's "Know Before You Go". We are selling these at CAC cost to RAC Providers. These DVDs are also available to purchase by all members for $15.00 each.

As the ADFAR project advances, our goal is to include any preliminary results into enhancements for the RAC curriculum. The CAC is targeting the spring season to commence the development of new course curriculum generated from initial ADFAR results. Stay tuned for more information on that.

In response to a request from the RAC committee, we have proposed a policy for continuing development for RAC instructors. We drafted a working version of continuing development policy that aims to enhance the ability of providers to deliver high quality RAC training while keeping up with the public demand for availability of course providers in a wide geographic area. This proposal is currently being reviewed for recommendation by the RAC committee and may be forwarded to the BOD for consideration of adoption as a CAC policy.

Mountain Equipment Co-op is the presenting sponsor for the RAC program. The CAC and MEC have been working together to create special offerings for the RAC program including free avalanche safety gear rentals for students of RAC classes. Other joint program initiatives geared toward the RAC providers are in the works. We are considering utilizing the MEC store venues for RAC training programs to reach the coast and Vancouver Island areas.

The RAC program is gaining a lot of momentum and the CAC is working hard to guide it to where it will benefit the widest audience. If you've got some ideas or input on how we can improve things, please feel free to let us know.

RAC students in Newfoundland practice their probe-line technique.

Photo: Keith Nicol

Columbia Brewery Backcountry Avalanche Workshops 2005

BY ILYA STORM, CAC PUBLIC FORECASTER

"Outsmart the Dragon" was the theme of the 3rd Annual Columbia Brewery Backcountry Avalanche Workshops held at Vancouver's Ridge Theatre and the University of Calgary's Rosza Centre on November 19th and 20th. A great collection of avalanche professionals shared insights, introduced new ideas, and explained techniques to an audience of several hundred backcountry enthusiasts. Many thanks to Jill Fredston, Pascal Hägeli, Bruce Jamieson, Clair Israelson, John Kelly, Grant Statham, Ken Wylie, and Lori Zacaruk for their presentations and to Mike Mortimer for mastering our ceremonies!

John Christensen, head of Kananaskis Country, presented a cheque for $100,000 to Clair Israelson at the Calgary event. The money will go towards increasing outreach efforts to the snowmobiling community and to youth. In his speech, Mr. Christensen spoke about the valuable services the CAC provides to the public. We thank the Alberta government for its generous donation and support.

John Christensen, head of Kananaskis Country, presented a cheque for $100,000 to Clair Israelson at the Calgary event.

Photo:CAC staff

The mini-tradeshow outside the theatres was well attended and provided an opportunity for many of our sponsors and partners to showcase their products and services. Our thanks to all those organizations for coming out and participating; the gear on display, the posters and enthusiasm all contributed to a fun-filled atmosphere. Some terrific draw prizes were donated as well, which created some good anticipation over the day for the audience. Columbia Brewery, our title sponsor, deserves a special mention because their continued support makes these important early-season avalanche safety events possible.

A huge team of volunteers helped out organizing and executing the two events. Many thanks to all of you for helping the program come off with few hiccups and lots of positive feedback. This strong community support helps make the workshops happen.

Looking forward to next year, we plan to shake things up to build on our successes and improve upon the shortcomings. Many people in Calgary filled out an exit survey with their thoughts on what they liked, what they want more of, and what they could live with less of. Speakers, sponsors, and volunteers also had great ideas for the future. Our vision for next year is to take the location out of the urban centres. We are also looking at making the format more active through combining presentations with small-group, hands-on, practical activities. If you have creative ideas to share, give us a call at 250-837-2435 or e-mail ilya@avalanche.ca

Our thanks to these other sponsors and partners for their participation

- Eider
- Arc'teryx
- Mammut
- Pieps
- ROI
- RECCO
- Canadian Avalanche Foundation
- AdventureSmart
- Canada West Mountain School
- G3
- Parks Canada
- Kananaskis Country
- ACMG

The crowd in Calgary enjoys the tradeshow during a break.

Photo:CAC staff

Backcountry Avalanche Workshops on DVD

Kellie Erwin and Golden Friends of the CAC

Kellie Erwin is a member of the American Mountain Guides Association and professional videographer living in Golden BC. Kellie has put her talents toward avalanche safety for many years, most recently by applying her audio-visual expertise. Kellie has taped the last two Backcountry Avalanche Workshops in Calgary and we plan to capture some of the talent and insights of these workshops on DVD, making it available to people who weren't able to attend the Calgary or Vancouver shows. Kellie has also taped the past two ISSW conferences. That video is available on line at www.warifoundation.org.

Last year, working with Carol Dascher of the Golden Snowmobile Club, Kellie brought together Golden's professional avalanche resources under one roof to promote awareness, to further avalanche safety and education, and to raise money for the CAC. We'd like to thank Kellie, Carol, and all the Golden Friends of the CAC for their grassroots effort. Contact us if you'd like to organize a local night of avalanche awareness in your community; jennifer@avalanche.ca has the resources, ideas, and experience to work with you and help make it a success.

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Events Schedule

January 13-15, 2006

Avalanche Awareness Days

The CAC's annual event is already promising to be the best ever. This year, the national media event will be held on Jan. 13 at Big White in Kelowna, BC. Over the Jan. 14-15 weekend, some 30 communities and ski areas across Western Canada and the US will take part by hosting a variety of activities aimed at avalanche awareness and education. Remember, there's always room for more volunteers!
Where: Big White Village in Kelowna, and at a ski area near you.
Info: www.avalanche.ca
Contact: Call Jennifer George (250) 837-2435 or e-mail: jennifer@avalanche.ca

February 24-25, 2006

CAF Annual Fundraising Dinner

Once again, the Canadian Avalanche Foundation has organized two terrific benefit dinners for avalanche awareness. Both events will be co-hosted by CAF Director Justin Trudeau and CAF President Chris Stethem. The evening includes a silent auction – with everything from artwork to ski vacations up for bid – and Laurie Skreslet as the keynote speaker. Tickets are $150, supported by a $75 tax receipt.
Where: Feb 24 - Vancouver Rowing Club, Feb 25 – Calgary Hyatt Regency
Info: www.avalanchefoundation.ca
Contact: Call the CAF at (403) 678-1235 or e-mail: info@avalanchefoundation.ca

April 2-7, 2006

European Geosciences Union General Assembly 2006

This year there will be two sessions on snow avalanches. "Snow cover and avalanche formation" is devoted to the latest results and views on avalanche formation from field, laboratory and numerical studies. "Snow avalanche dynamics and risk assessment" will highlight the movement and effect of avalanches, and recent developments in the area of avalanche hazard/risk assessment and mitigation.
Where: Vienna, Austria
Info: meetings.copernicus.org/egu2006
Contact: Juerg Schweizer (SLF) at schweizer@slf.ch or Mohamed Naaim (ETNA-Cemagref) at Mohamed.Naaim@cemagref.fr

April 17-20, 2006

Western Snow Conference 2006

The theme of the 74th annual meeting of the Western Snow Conference is "Water Supply in a Time of Increasing Demand: The Importance of Snow in Arid to Humid Regions."
Where: Las Cruces, New Mexico
Info: www.westernsnowconference.org
Contact: Al Rango, Technical Committee Chair, alrango@nmsu.edu

May 1 – 5, 2006

CAA Annual General Meeting and Spring Meetings

Planning is already in place for our annual get-together and catch-up. Committee and instructor meetings are slated for April 31- May 1. The AGM for both the CAA and the CAC will be held on May 2. Public and technical presentations will take place May 3-4. Remeber if you or your team has come up with some initative to make life easier or safer, why not share it with your colleagues by giving a presentation at the AGM. As always, the last day focuses on Continuing Professional Development. Our topic this year will be "Legal and Ethical Issues in Canadian Avalanche Risk Management."
Where: Penticton, BC
Contact: Call Ian Tomm at (250) 837-2435 or e-mail ian@avalanche.ca

2006 CAA/CAC Annual General Meeting & Spring Conference

May 2-5, 2006
Ramada Inn, Penticton, BC

May 1	Industry Training Program Instructors Meeting InfoEx Subscribers Meeting CAA Weather Forecast Product Meeting Committee & Working Group Meetings
May 2: 10am - 12pm	CAC Annual General Meeting
May 2: 1pm - 5pm	CAA Annual General Meeting
May 2: 6pm-9pm	CAA/CAC Member Appreciation Night & CAA Photo Contest
May 3: 8:30am-5:30pm	Spring Conference: Public & Technical Presentations
May 4: 8:30am-5:30pm	Spring Conference: Public & Technical Presentations
May 4: 6pm - 9pm	Silent Auction & Summit Awards
May 5: 8:30am - 5pm	CAA 10th Annual Continuing Professional Development Seminar: Legal & Ethical Issues in Canadian Avalanche Risk Management. Presentations & Panel Discussion.

Prices:
May 3-4 Spring Conference
CAA/CAC Members: FREE
Non-members: $40 for the two days or $25 for one day.

May 5 CPD: Members $60, non-members $120

The 10th Annual CAA Continuing Professional Development Seminar

Legal & Ethical Issues in Avalanche Risk Management in Canada
Best practices for front-line workers, managers and CEO's.

Initiated by Chris Landry and endorsed by the CAA Education Committee.

May 5, 2006
8:30 – 5:00
Penticton Convention Centre, Penticton BC

A look at best practices, emerging trends and new initiatives by front-line workers and operators to improve avalanche risk management in Canada. Here what everyone is doing to enhance both front-line and operational best practices.

Presentations, panel discussions, and breakout workshops focused on real issues for real workers. If you've been wondering how your actions measure up to modern expectations this is the day for you and everyone you work with.

Presentations to include: mechanized and non-mechanized commercial backcountry guiding; snowmobiling; ski area programs; transportation and resource sector programs; provincial and national park programs; and the independent guide.

The day will be comprised of four sessions, each covering a distinct topic in Canadian avalanche risk management. The focus will be on short presentations including panel discussions and questions, discussion and comment from the audience.

Sessions:
Traditions: "Old School" practice and "New School" trends, what are front-line workers and managers doing these days.
Law: Expectations, intent and actual outcomes. What it means to everyday operations.
Risk Management: Theory, practice and the role of emerging science.
Ethics in Natural Hazards Risk Management: Professional codes, ethics and practice in natural hazard professions.

Pieps DSP and Pieps DSP/O Software Update & Testing Facilities

BY OTHMAR KAGI

Swiss North Marketing, Kelley's Sports International and Stubai-Pieps have announced the introduction of the world's first software update and testing for the Pieps DSP and Pieps DSP/O avalanche transceivers. This software update allows Stubai-Pieps to offer the most up-to-date software to consumer and commercial Pieps DSP or Pieps DSP/O avalanche transceivers. The test feature assures users that the Pieps DSP or Pieps DSP/O avalanche transceiver is working within the most exacting industry standards.

Upon retail introduction of the Pieps DSP and Pieps DSP/O fully digital transceivers in 2003, Stubai-Pieps, Swiss North Marketing and Kelley's Sports International announced that Canadian-based update and testing would soon be available to the Pieps DSP and Pieps DSP/O models. Transceiver development began over seven years ago and operating units were produced over five years ago. Stubai-Pieps subjected these units to over three years of manufacturer and commercial field testing prior to introducing them to general consumer and commercial use.

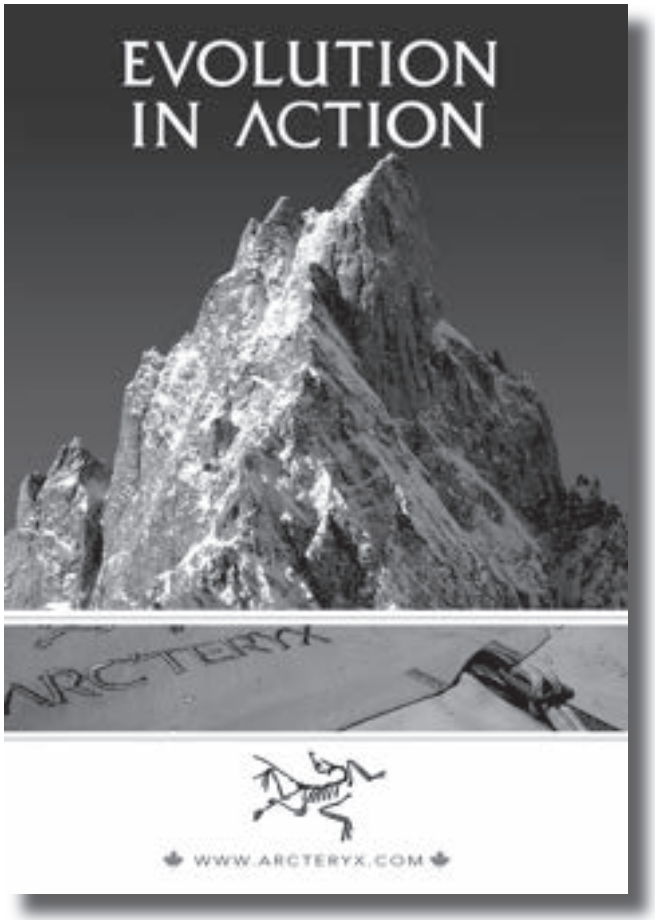
The Pieps DSP and Pieps DSP/O avalanche transceivers feature the greatest digital receiving range (60+ Meters) of any avalanche transceiver, and with the world's only three-antenna system provide distance and direction indication from the first signal received.

The features of the Pieps DSP and Pieps DSP/O avalanche transceivers include multi-signal reception and separation capabilities, closest signal priority, signal log-out feature, and signal scan feature. The DSP/O model also includes a compass, altimeter and thermometer.

For further information on Pieps DSP and Pieps DSP/O Software Update & Testing contact:

Swiss North Marketing Corp.
Attn: Othmar Kagi
32522 Best Avenue
Mission BC V2V 2S6
T/F:604-820-6737
info@swissnorth.com
www.swissnorth.com

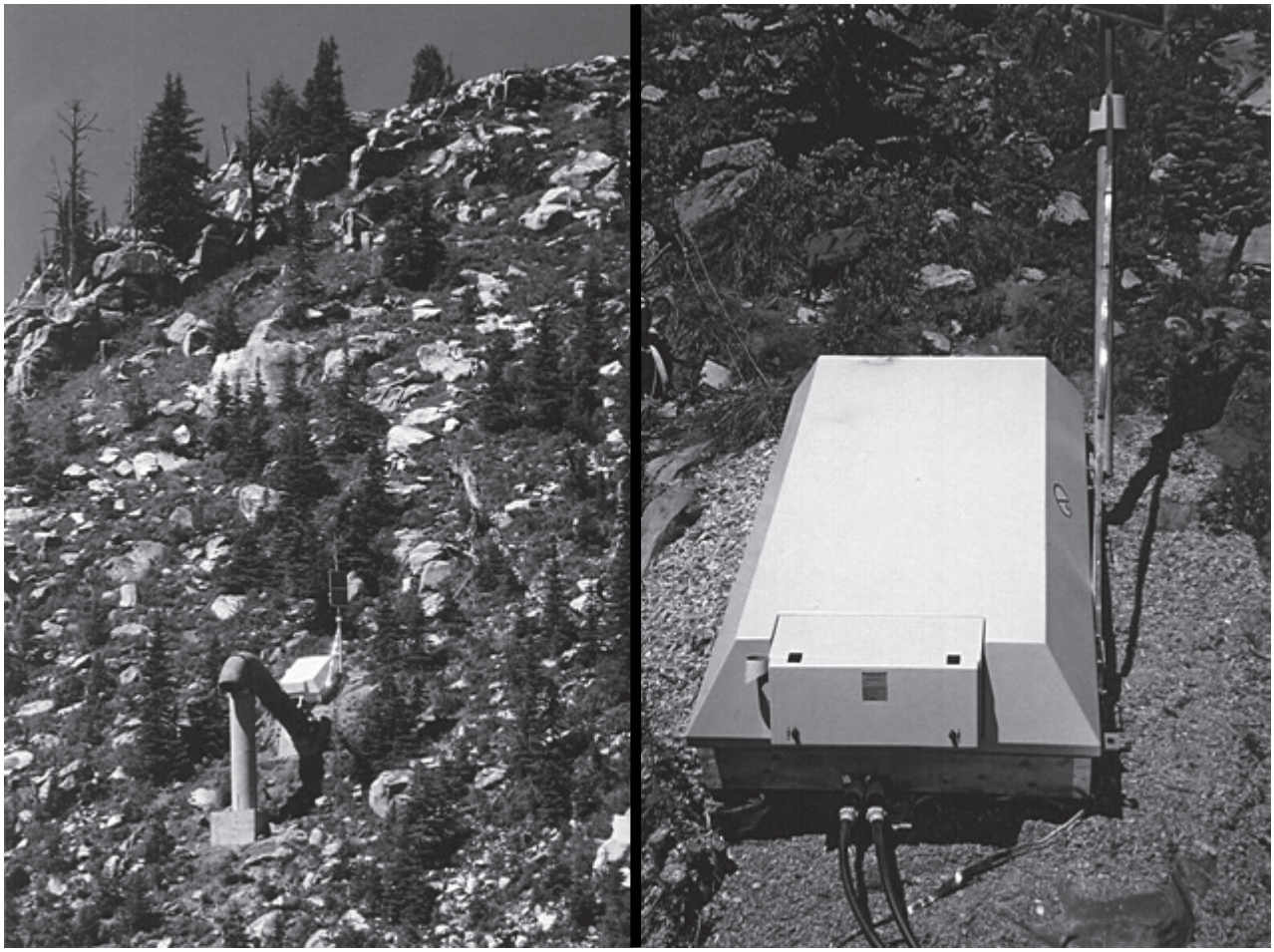
Kelley's Sports International
Attn: Brian Kelley
27 - 51128 Range Road 261
Spruce Grove AB T7Y 1B8
T:780-987-4756 F:780-987-5456
ksi@telusplanet.net
www.ksi.ab.ca



Kootenay Pass Avalanche Staff Lay Down Their Guns

BY KARL ERNST, AVATEK SYSTEMS LTD.

During the summer of 2005, avalanche control technicians at Kootenay Pass retired the last of their 30-year-old Avalaunchers. It was replaced with an autonomous Gaz.ex Exploder, which is a compact version of the regular Gaz.ex system designed for single or double slide paths. With this latest addition to the Kootenay Pass avalanche control system, the most problematic avalanche starting zones of the Salmo-Creston section of Highway #3 will now be controlled with a total of 21 Gaz.ex exploders, all remotely activated from Kootenay Pass headquarters.



The autonomous model, or "Inertia" type exploder, is a variation of the standard Gaz.ex that's used for installation at sites where poor rock or soil prevents effective anchors. The gases, which are stored in a chest behind the exploder, are fed into a large open-ended tube which is located in the avalanche starting zone. Once the predetermined mixture has been reached, a high-voltage spark is introduced into the mixture creating an explosion above the snow surface. The $3m^3$ exploder has the approximate explosive equivalent of 15-18 kg of TNT and will control an area which previously required several shots with the old system.

In August, after the basic foundation was built, the exploder was installed and tested within three days. Each component is so light that only an A-Star helicopter was necessary for the entire installation.

Special thanks to Mike Boissoneault, manager of the Snow Avalanche Section for BC Ministry of Transportation, Jacques Dupas, manager of the West Kootenay District for BC Ministry of Transportation, John Tweedy, senior avalanche technician at Kootenay Pass and Ninco Construction for their excellent cooperation.

For further information contact:

Avatek System Ltd. 6252 Silver Star Rd. Vernon, BC Ph: (250) 542-4176 Fax: (250) 542-2263
e-mail: avatek@250net.ca www.gaz-ex.com

Learning Multiple Burial Techniques

BY JOHN BRENNAN

A stint in the military is mandatory in Switzerland. When his time came, Manuel Genswein enlisted in the mountain division where part of his training involved beacon searches. The standard was high. After completing a primary and secondary search, if the first probe attempt wasn't a direct hit, a cordial invitation is extended to conduct another search.

This experience got Manuel thinking about search strategies and associated instructing methods. With his training in electrical engineering and extensive ski mountaineering experience in the Swiss Alps, Manuel has a background well suited to understanding beacon technology and their use in avalanche rescue. He also has a gift for passing along this information in an easy-to-understand format.

Snowmass and Aspen Highlands recently had the opportunity to host an avalanche rescue seminar taught by Manuel. Since he was traveling to the States for several other engagements, it was possible for us to share his travel expenses among the different organizations.

The "Easy Search 3."

Photo: John Brennan

Manuel giving pointers during the field exercises.

Photo: John Brennan

Although Manuel was teaching a bargain-priced two-day seminar for the Summit County Rescue Group several hours from our resort, we felt a separate course for a smaller group of like-minded professionals would best serve our needs.

The course was broken down into three days, the first being a set-up day for the field session as well as an opportunity to "train the trainers" who would be assisting. The second day was in the classroom and the final day was held in the field. The field day consisted of four scenarios and, because he had four assistant trainers, Manuel could spend his time where he was most needed.

One of the focuses of the field day was the multiple-beacon training site. Manuel has developed the "Easy Searcher 3" for this purpose. Up to 16 of these radio-controlled units, each the size of a small briefcase, can be run by a control unit. Beacon signals from each buried target can be toggled on either manually or automatically, depending on the search scenarios you want. The targets alert the control unit when they have been struck by a probe. Additionally, the target's transmit signal can be turned off while the strike indicator feature continues to operate, which is a useful feature for probe-line exercises. The "Easy Searcher" can be permanently installed and toggled for automatic use by rescue groups or the public.

Multiple burial exercises can be difficult at best. Manuel has taught his search strategies for these events in over 14 countries as well as presenting them at the International Snow Science Workshop in 2000 and 2002 and in *The Avalanche Review* (See Pinpointing in a Circle, Vol. 19, No 3, pp 8-9, and Statistical Analyses on Multiple Burial Situations and Search Strategies for Multiple Burials, Vol. 21, No 3, pp 9-11).

While some of our patrollers were scratching their heads a bit over Manuel's strategies during the classroom session, in the field it became crystal clear that these systematic approaches were the best way to find an unknown number of buried beacons. The field day also provided a chance to learn Manuel's strategy for pinpointing deeply buried victims – another potential exercise in futility given the number of false maximum readings that can be produced in these events. Once again, when theory and practice united, it became clear we were learning and honing live-saving skills. His web site http://www.genswein.com contains specific information on rescue courses as well as downloadable copies of all his papers.

Preparing the search sites for the field day.

Photo: John Brennan

Editor's Note: *Telemark Tips is an American website dedicated to backcountry skiing with a focus on telemark skiing. The writers keep tabs on new products, movies, books, just about anything that would appeal to their backcountry skiing audience. The site also hosts discussion forums which are often interesting to check out. This glowing review of the CAA's online learning project was first posted in November and can still be found on the site's home page.*

Telemark Tips Reviews Avalanche First Response Training Program

Funded by Canada's National Search and Rescue Secretariat, and the RCMP, produced in a collaborative effort by many individuals and organizations involved with avalanche safety in Canada, including the Canadian Avalanche Association, the Avalanche First Response Training Program consists of seven modules, each with specific learning objectives.

The title of the course is somewhat misleading in that while avalanche first response skills (the steps you and your companions should take during and immediately after an avalanche) are a focus, the course also introduces students to other important aspects of avalanche safety, such as route-finding, snow stability, and trip preparation. While not designed to replace a traditional, face-to-face, Level 1 avalanche safety course, this free online tutorial covers a lot of ground and it should be a part of every backcountry skier's multi-pronged approach to avalanche awareness studies. With this new program, online avalanche training takes an important place alongside video, books, classroom and field work.

Before the course begins the goals are outlined and its focus detailed on the home page. A 10-question quiz designed to give the student an idea of out how much they already know about avalanche safety prefaces the course.

"With great enthusiasm we whole-heartedly recommend that our readers and members of our online community take full advantage of this avalanche safety resource."

Read the questions carefully, I didn't and only answered 8/10 correctly, despite decades spent learning this stuff! Perhaps that's a good thing though, they say it's usually the little missed details that trip up backcountry experienced avalanche victims, so the quiz was a good reminder of how this can happen. Once finished with the home page material, it's time to start the course. The program's website makes extensive use of Macromedia Flash, so you'll want to have the latest player and probably a high speed connection as well. Also, there are dozens of pop-ups you'll want to see, so go ahead and either disable your pop-up blocker or add the course website to your "pop-ups allowed" list.

Module One addresses the recognition of avalanche hazards associated with backcountry travel. Avalanche causes, their size and impact, triggers, and how risk factors can change over time, or even during the course of a single day, are discussed. Another section in Mod One discusses the importance of the time factor in the rescue of an avalanche victim: To have a 95% chance of saving someone who has been buried by an avalanche, you must find and dig out that person within 15 minutes. The first of many flash animations drives home the point that by the time 35 minutes have passed --the absolute minimum amount of time necessary to secure outside help, even in the best situations-- the survival rate has dropped perilously close to nearly 10%. The point is made, you need to be able to find and dig out your lost partner right now, there is no time to get help. If you don't have the expertise and the tools to do the job, your buddy, friend or loved one is almost certainly toast.

Module Two deals with Pre-trip Preparation. Outlining your goals and plan, gathering avalanche, weather, and route information, being prepared with appropriate equipment and clothing, and knowing the importance of letting someone back home in on the details of your plans, and what time they should expect your return. The module ends with an excellent "Reality Check," urging students to ask themselves a number of important questions before heading out, such as "can I use my equipment competently,?" and "Do my companions really know what to do if an avalanche hits? Am I comfortable putting my life in their hands?"

Module Three, Reducing Risk in the Field, is my favorite. In mod three we find various sections delving more deeply into issues of avalanche terrain recognition, including terrain hazards, the correlation between slope angle and the type and size of avalanches, identifying slide paths, and guidelines to help the student select safer routes.

The section on safety measures covers topics such as maintaining a wide margin of safety ("Many people who enjoy the mountains are goal-oriented. Some become so focused on a perfect line or big air that they continue on their trip even after learning of potentially dangerous conditions...If you find yourself thinking, 'It won't happen to me' or 'It's probably okay to cross this slope,' your safety margin is too narrow. The mountain snowpack continues to surprise even the most experienced skiers...").

Also covered are considerations for safe travel, including human factors, terrain, snow and weather conditions, observations, and of course that very important "gut feeling" that those who survive year after year in the winter backcountry learn never to ignore.

A wonderful route finding exercise involves studying a photo, locating the start point "A" and end point "B," then using your computer's mouse to draw in the route you would choose. Go the wrong way and a red zone will appear with text indicating why this is an area to be avoided.

This part of the course is simply fantastic for its educational value and for the way it makes use of modern interactive technology. The only real criticism I have of the entire Avalanche First Response Training Program involves this section: there are only two of these exercises provided-- there should be dozens, for if there is one thing I have learned over the years it is that skiers and boarders are going to head out even when conditions indicate they probably should not, that's just the way it is and always will be, the critical survival factor in these situations (outside of dumb luck) is safe route finding.

Module Four covers the vital information needed for the previously mentioned mandatory self-rescue. For the purposes of this section the words "self-rescue" and "survival" mean the same thing, they refer to the actions of the person both before and after being caught in an avalanche. Many of these preparations were covered in previous modules but are tied together here. Fifteen distinct steps one should follow if caught are explained in detail. These self-rescue steps are deemed to be so important by the authors that Mod Four ends with a detailed review exercise, intended to make sure the steps are remembered and followed in order. Module Four is very detailed, allow plenty of time to click on all the links to make sure you have learned and reviewed all of the important information.

"Free online course takes advantage of the web's unique interactive technologies to teach winter backcountry users avalanche safety and first response emergency procedures."

Module Five deals with companion rescue and coming to the aide of other avalanche victims. How to prepare yourself for such an eventuality, guidelines for rescuing victims, the actual steps to follow in a basic avalanche rescue scenario, and how to deal with deep burials and/or multiple burials are some of the subjects covered. This Companion Rescue module ends with another discussion of the efficacy of summoning outside help. It is said that among the points to be considered before making a decision to go for help are:

- How much time may elapse before the organized rescue team arrives
- The victim's chances for survival over that period.

The admonition to consider the Burial Minutes versus Chances of Survival graph is sobering and will probably be effective in encouraging many serious backcountry skiers and riders who take the course to review the extensive information in Module Four until the procedures become second nature to them.

Module Six covers post-recovery actions in the field and upon your return from the backcountry, while Module Seven covers the "Next Steps" students need to take --beyond the online course-- to get the training needed to be avalanche safety educated. Module Seven also has a detailed review section, as well as two case studies designed to help the student apply what they have learned in the previous 6 modules by recognizing certain missteps and errors made by the parties involved, and encouraging the student to figure out what could have been done to avoid them. This is an exercise often undertaken on our own Telemark Talk Forums after publicized or personally experienced avalanche accidents, feathers can be ruffled by the comments and the participants are generally accused at some point of "second-guessing" the choices made by the victims and their companions. But as the inclusion of these case studies in this online course would suggest, learning to be avalanche aware is an ongoing process, and the vetting of actual scenarios is an important part of the continuing education and "knowledge check" that even the most experienced and active winter backcountry traveler is wise to engage in from time to time.

Conclusion: This Avalanche First Response Training Program developed by the CAA and its partners, and hosted by the Justice Institute of BC, is a terrific online resource for all levels of backcountry skiers and snowboarders. Novices will learn many of the basics and veterans will be reminded of key points... all will enjoy this excellently crafted website, the 16 web videos that accompany it, and the clear and concise way the information is presented.

We applaud the CAA, the BC Provincial government and major sponsor Recco for the effort they put into this program. With great enthusiasm we whole-heartedly recommend that our readers and members of our online community take full advantage of this avalanche safety resource. We hope all of you who venture into avalanche country will bookmark the site and return often for a refresher after completing the course.

Snowstruck: In the Grip of Avalanches

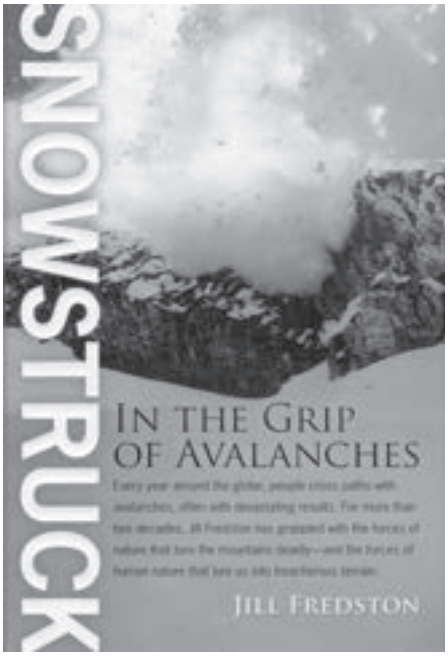
REVIEWED BY CLAIR ISRAELSON

I read the first three chapters of *Snowstruck* and had to put it aside. It's superbly written, and so terrifyingly real that it grabs you by the guts. Later, personal memories and ghosts at bay, I took it up again and finished it in one sitting.

This book chronicles the life and work of Alaskans Jill Fredston and her husband Doug Fesler, who have spent decades battling to keep the avalanche dragon from its prey. Like Alaska, where the action takes place, the story is big and rough, intellectually and emotionally demanding, sometimes cruel. In the end, reflecting on what they learned during more that twenty years of fighting the dragon, Jill debunks the "heroic myth" with surprising honesty, integrity, and a not surprising residue of anger and grace.

Jill Fredston's stories about her career in avalanche safety proved very popular with the BAW audience, and many bought her new book Snowstruck. *Jill and her publisher, Raincoast Books, generously donated all the proceeds from the sales during the BAW to the CAC.*

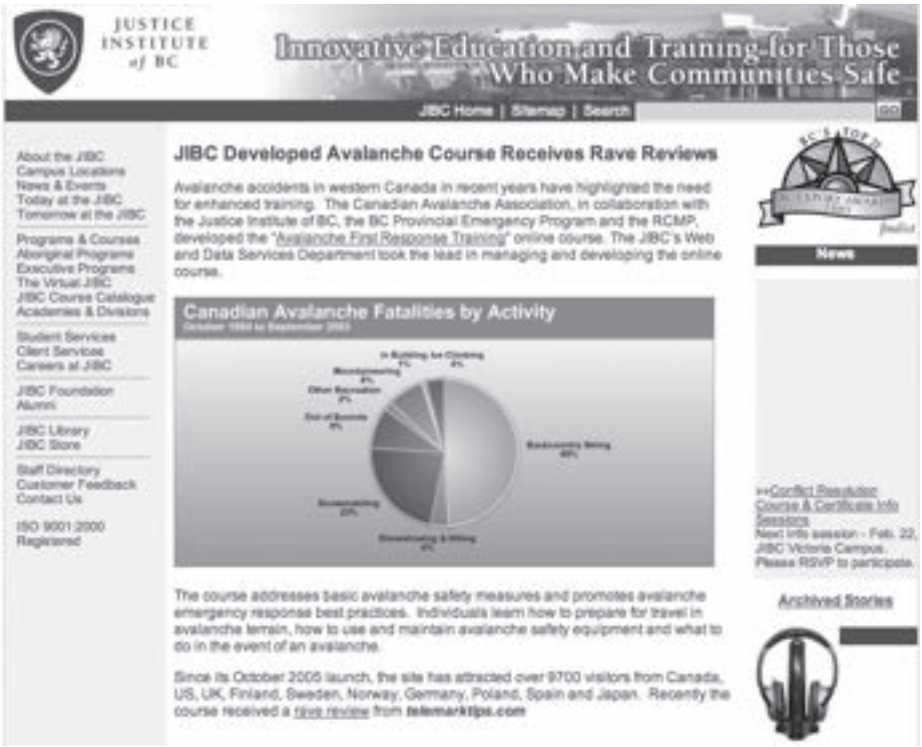
Photo: Lori Zacaruk



The book is about avalanches, but you don't need to be an avalanche geek to be captured by this first rate human drama. Mountains and avalanches are only the backdrop. The story is about why and how the people of Alaska choose to live and die in the mountains that have seduced them.

Who should read this book? Everyone intrigued by the power of snow-covered mountains, and anyone interested in understanding human nature. *Snowstruck* is the new gold standard for mountain journalism.

The website of the Justice Institute of BC recently highlighted the CAA's online course.



The Risky Shift Phenomenon: What Is It, Why Does It Occur and What are the Implications for Outdoor Recreationists?

TONY WEBSTER
ADVENTURE GUIDE PROGRAM, THOMSON RIVERS UNIVERSITY, KAMLOOPS, BC

"Climbing is high risk. But for me, there are intrinsic rewards in this risk—an ability to fill the desire for adventure, which we have 7-Elevened out of our life"
- Conrad Anker

Introduction

It is generally accepted that a certain amount of risk is an inherent part of any adventure (March, 1998). Indeed, some have argued that without risk there can be no adventure. Given that hazards are an ever-present and unavoidable component of any outdoor pursuit, the ability to identify, assess and manage the risk associated with these hazards is a critical skill for outdoor leaders.

Hazards associated with outdoor pursuits have been split into two basic categories: objective and subjective (March, 1998). Objective hazards are those associated with the natural environment over which humans have little control. Examples include darkness, storms, avalanche, rockfall, weather, etc. Subjective hazards are the less obvious psychomotor, cognitive and affective hazards associated with the group including factors such as technical skill, judgement, physical fitness, emotional state and group dynamics (March, 1998).

The ability to recognize, avoid and minimize exposure to objective hazards is, of course, an expected characteristic of an experienced outdoor leader. The most successful leaders, however, are the ones who have a thorough understanding of not only objective hazards but also subjective hazards that might be equally as destructive to the group's objectives. An interesting phenomenon that has been observed in a group setting is the "risky shift." Although it is difficult to obtain precise statistics, it is likely that this phenomenon is at least partly responsible for many accidents and fatalities in the outdoors every year and therefore it is important for outdoor leaders to understand its causes and ramifications.

"Most humans are culturally insensitive to the backcountry, unable to speak its language and unwilling to accept its culture."

The purpose of this paper will be to examine this risky shift phenomenon. First, the phenomenon will be described and theories that have been postulated as to why it occurs will be examined. Then the implications for outdoor leaders and recreationists will be discussed, with emphasis on some practical issues that may help leaders and groups to recognize the potential for a risky shift and manage the problem, should it occur.

What is the "Risky Shift"?

This phenomenon was first discovered as part of a master's thesis by Stoner in 1961 and refers to the tendency for decisions made in groups to be less conservative than the decision of the average group member (Shaw, 1976). The results were initially met with surprise in the scientific community as they contradicted some prevailing theories of the time, most notably the "normalization theory" which stated that group decisions would reflect an average of opinions and norms. The 1960's saw a flurry of research interest in the area and it was indeed confirmed that group risky shifts occurred. The shift was demonstrated in countries around the world and with many kinds of group participants (Forsyth, 1990).

The risky shift is actually a form of "group polarization" - the tendency of group members to decide on a more extreme course of action than would be suggested by the average of their individual judgments. Interestingly, this polarization is not always towards the risky end of the spectrum – cautious shifts have also been found, though less frequently (Forsyth, 1990). A more accurate description of the situation is given by the group polarization hypothesis (Myers & Lamm, 1976) which states that "the average post-group response will tend to be more extreme in the same direction as the average of the pre-group responses" [italics added by current author]. Therefore, when the average choice of the group members before discussion is closer to the cautious pole of the continuum than the risky pole, a cautious shift may occur. Of course, by very definition, adventurous risk-taking individuals are far more likely to experience the shift in the risky direction.

A further point is worth mentioning. It has been found that a critical element in producing group polarization is discussion (Forsyth, 1990). It has been demonstrated that discussion, with or without consensus, produces polarization; however consensus without discussion yields an averaging effect (Forsyth, 1990). This has important implications for outdoor leaders and will be elaborated upon below.

What causes group polarization and risky shifts?

This is an important question for outdoor leaders to ponder. If there is good understanding of the cause of a risky shift, a group member/leader may be more likely to prevent it from occurring or to detect it when it does occur. Since the discovery of group polarization, group dynamicists have put forward a number of theories to attempt to explain why such shifts happen. These include illusory cultural norms, the diffusion-of-responsibility theory, leadership theories, familiarization theory and value theories (Forsyth, 1990; Powter, 1998).

In the sphere of mountaineering, an example of an illusory cultural norm might be represented by an attitude of "we're a team on the mountain, therefore we'll live" (Powter, 1998). Humans are innately social beings and tend to feel more comfortable being part of a social group, a phenomenon known as the herding instinct (Tremper, 2001). This instinct may have served us well during evolution but it can be deadly in the mountains, especially in avalanche terrain. Another common

perception trap that could be classed as an illusory norm is to bring our human culture into a non-human setting, in essence a form of cultural arrogance. As Tremper (2001) points out, "city thinking and mountain thinking are very different things... when we go into the mountains, [city skills], more often than not, are liabilities". Most humans are culturally insensitive to the backcountry, unable to speak its language and unwilling to accept its culture. Every year humans suffer the consequences of such an attitude and many pay for it with their lives.

The diffusion-of-responsibility theory states that group members will be more likely to recommend a risky course of action because of the feeling that they have less personal responsibility for the negative consequences of such a decision within the group setting (Forsyth, 1990). Stated another way, it is easier for an individual to hide within the group when making contributions to group decisions – they can take greater chances because they feel they are less likely to be blamed. A few investigators have cast doubt on this theory though.

Leadership theories revolve around the notion that high risk-takers tend to exercise more influence over group members due to their greater persuasiveness, confidence, assertiveness and involvement in the discussion (Forsyth, 1990). This theory may carry some weight but is undoubtedly an oversimplification. If an individual demonstrates excessive amounts of these qualities, his credibility will almost certainly be undermined. Several researchers have been unable to demonstrate that this leadership effect occurs.

"Clients skiing untracked powder may be so deep in the throes of ecstasy that they fail to listen to directions."

Photo courtesy of Phil Johnston

The familiarization theory asserts that as individuals mull over problems with others, they become more familiar with the items; as familiarity increases, uncertainty decreases, creating a willingness to advocate more risky alternatives. This theory appears to tie in nicely with the point made above that group discussion is a critical element in producing a risky shift. This theory would also imply that individuals who are allowed to familiarize themselves with an issue while alone should demonstrate a risky shift but this has not been consistently found. Therefore, similar to the above theories, some doubt has been shed on whether this is a valid theory.

The most widely accepted theories to explain the cause of a risky shift revolve around the notion that risk taking is a cultural value in itself. The general idea is that people in our society value risk, and in the group situation most individuals want to appear to be willing to take greater risks than the average person in order to be able to enhance their status in the group. Group discussion is essential as it allows the individual to learn his relative standing in the group as a risk-taker. Studies have clearly shown that most people regard themselves as above average risk-takers (of course a statistical impossibility) and tend to exhibit feelings of admiration for others who are perceived as being greater risk-takers than themselves (Forsyth, 1990). These findings provide clear evidence that the underlying assumption of the value hypothesis is correct.

Group dynamicists have developed two schools of thought within this general approach (Forsyth, 1990). The "social-comparison" theory argues that group members are trying to accomplish two inter-related goals during discussions. First, they are attempting to evaluate the accuracy of their own position on the issue by comparing it with others and, second, they are trying to make a favourable impression with the group. The result is a tendency to describe one's own position in more extreme terms. The "persuasive arguments" theory, in contrast, stresses the information obtained during discussion and asserts that if the individual is exposed to a persuasive argument, they are more likely to shift or move their own decision in that direction. Both of these theories have been supported by researchers and this has prompted several investigators to suggest that the two processes combine to produce polarization.

Implications of the risky shift and practical issues for outdoor leaders

A key question to be addressed in this section is in what kinds of situations is a risky shift most likely to occur? Armed with this information, prevention, detection and/or management of the phenomenon becomes substantially easier. The answer will unfortunately never be clear-cut, as the operation of any group, even the smallest, is a complicated union of many factors. Powter (1998) discussed group dynamics in a number of common wilderness experience situations: the guided trip, the growth/challenge experience, the personal recreation experience and the expedition.

The guided trip has probably the simplest and clearest norms for the group concerned, ones that are common knowledge; the

guide makes the decisions in virtually all situations and client involvement is a matter of the guide's discretion. Democracy in this instance would defeat the client's intent in hiring a guide - to be provided with a controlled experience. As there is, in theory, little discussion between guide and client about precise details of the guided experience, there should be little opportunity for a risky shift to emerge. Of course, there may be situations where a group might conceivably place some pressure on a guide to attempt to change or modify a decision, but the guide always has the final say in decision making and most guided clients will respect this fact.

The growth/challenge experience, such as those offered by Outward Bound, uses the wilderness as a classroom for both skills and self-learning (Powter, 1998). The experiential learning model used necessitates a certain degree of democratic empowerment of the student which increases the possibility of a risky shift. However, the leader/instructor makes the autocratic decision as to the level to which the students will be empowered to make decisions and exercise control. Therefore, similar to a guided trip situation, excessively risky decisions will likely not be implemented.

The personal recreation experience is a classic situation where leadership issues and group process norms are often not clearly defined. The situation can be very confusing for group members and emergent leaders, particularly if active and open communication is lacking. It can be democracy in its truest form – the "free-for-all" – but unfortunately this kind of scenario is precisely the one where the risky shift has the greatest chance of surfacing. Characteristics of group members that might further increase the chance of a risky shift occurring will be discussed further below.

"It appears that male Caucasians of western origin are amongst the most 'risk prone' individuals."

The expedition is a situation where group dynamics become exponentially more complicated. As individuals have usually invested substantial time and money into such an experience, they have more to gain and more to lose and will be far more likely to fight for themselves. A paradox operates here: people on expeditions are usually strong independent individuals who often struggle with authority, but once on the expedition they are essentially in a controlled situation. Hardly surprisingly, tension often ensues and decisions may be clouded by this fact. The expedition leader is in a very delicate situation and must be sensitive to environmental and intra-group factors and prepared to be somewhat flexible with his/her leadership and decision-making style, depending on the situation. One could argue that risky shifts are more likely to occur on expeditions as individuals are often prepared to take greater risks to achieve their goals/dreams. However, this would be pure conjecture as there are a multitude of factors involved that are in a high state of flux.

It has been established, then, that the personal recreation trip, and the corresponding democratic decision-making process that tends to accompany it, is prime breeding ground for a risky shift. What are some further group characteristics within this situation that might influence the emergence of excessively risky decisions? Some factors that may come into play include size of the group, gender, age, personality, skill ability, cultural origin and mood of the group members.

Though little information could be found in the literature about the affect of group size on a risky shift, the topic deserves some attention. If one accepts some of the theories presented above regarding the possible causes of group polarization, it would seem reasonable to speculate that risky shifts may be more likely to happen in larger groups than smaller groups. Imagine a scenario where a small group of two individuals are deciding whether to ski a questionable snow slope versus the same situation but with a group of six individuals. Humans tend to feel safer when in larger groups and also there is a greater chance that someone in a larger group may have a more extreme view that might influence the group's decision. Intuitively, one might deduce that there is a greater chance of a risky shift with more group members. It is unlikely, however, that the chances of group polarization will continue to increase with increasing group size. Presumably, a point will be reached where the democratic decision-making process will be "bogged down" by the increasing numbers involved. The affect of group size on the emergence of a risky shift in the outdoor setting would be an interesting area for future research.

There are vast amounts of scientific research that suggest that males are greater risk-takers than females (Wilde, 1994), a trait that likely has both physiological (hormonal) and social roots. Numerous accident statistics support this assertion. For example, in the period 1984-1996 in Canada, 90% of avalanche fatalities were male (Jamieson & Geldsetzer, 1996). In addition, the age category with the greatest fatalities was 20-29 (just under 30%). This agrees with research that has consistently shown that young individuals show greater proclivity for risk than later years. Therefore, it appears that young males may be particularly susceptible to a risky shift. Undoubtedly, there is truth to the statement, "Know the male yet keep to the female"! (Lao-tsu). Tremper (2001) states that, "I like to go into the mountains with women. I feel like I'm safer when I do. When I am out with my male friends, I know that I have to keep a sharp eye out for competition, pride and all the other traits that tend to go along with groups of men, because I'm often the worst of the bunch."

Risk-takers also tend to be more competitive, aggressive, type A personalities than non risk takers (Begum & Ahmed, 1986) – "sensation seekers" as they are often called. A further finding that has emerged from avalanche accident statistics is that victims are often skilled in the activity (skiing, snowboarding, snowmobiling, etc) during which they suffered the accident (Tremper, 2001). It is likely that overconfidence in one's skills "spills over" into one's decision making regarding hazard and terrain assessment.

Some interesting findings have emerged regarding cultural origin and risk taking. It appears that male Caucasians of western origin are amongst the most "risk prone" individuals. Hong (1978), in a comparison of Chinese and American students,

found that cautious shifts were far more likely in the former and risky shifts were far more likely in the latter. As discussed above, this is likely related to the value that risk carries in the Western culture as opposed to Asian cultures.

Finally, the influence of mood on group decision making and risky shifts is of importance and must be recognized. Heli-skiing guides are very aware of the euphoria phenomenon – clients skiing untracked powder may be so deep in the throes of ecstasy that they fail to listen to directions. Also, it is known that most avalanche accidents occur on the sunny days following a large snowfall when people are likely too busy enjoying themselves to pay attention to the hazards around them (Tremper, 2001). "Summit fever" is another example – becoming fixated upon a goal at the expense of sound decision making. Negative moods, however, may also cause risky shifts. Take the scenario of a group of hungry, cold and wet hikers in foul weather who want to get home at the end of the day. The tendency will be for the group to rush decisions and cut corners which could have serious consequences. Just when they most need to pay attention, the weather and their mental state has pushed them to do the opposite.

Summary & Conclusions

Most outdoor enthusiasts and hopefully all outdoor leaders understand the importance of respecting objective hazards in the backcountry. There appears to be less appreciation for some of the more subtle subjective hazards associated with group members and group dynamics, yet these are no less important to understand. The risky shift is an example of such a hazard. In the outdoor setting, risky shifts are most likely to occur on a personal recreation trip where the group members consist of young, competitive and enthusiastic Caucasian males who perceive that they are highly skilled in the activity in which they are engaged. The risky shift is one of many cognitive factors that can contribute to poor safety decisions in the outdoors, including lack of experience, inappropriate attributions, inattentiveness, "smelling the barn" and simply poor judgment (Priest & Gass, 1997). The importance of active and open communication amongst group members as a form of hazard avoidance cannot be underemphasized. If excellent communication combined with a deeper understanding of subjective hazards were a major priority for all groups involved in outdoor pursuits, there would undoubtedly be less accidents and fatalities annually in the wilderness.

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Tony Webster has a PhD in exercise physiology from the University of Alberta (2000) and an Adventure Guide Diploma from Thompson Rivers University (2004). He holds a CAA level 1 ski operations avalanche certification, and is certified as a SKGABC sea kayak guide and WKABC advanced river kayak guide. Tony is currently living near Madrid, Spain and looking forward to checking out the snowpack in the Sierra de Madrid and Spanish Pyrenees this winter.

Avalanche Judgment and Decision Making
Part II: The Influence of Human Factors

LAURA ADAMS
SELKIRK COLLEGE AND THE SELKIRK GEOSPATIAL RESEARCH CENTRE, CASTLEGAR BC

Editor's note: *This is part two of a three-part series on expert decision making in avalanche terrain. In Part I, which appeared in* Avalanche News *Vol 74, Laura provided some background into her research and described the judgment and decision processes used by avalanche professionals when making decisions. Part III will appear in the Spring edition.*

Introduction

It is widely recognized that human factors heavily influence the way we think and behave in life. As the findings of my Masters research on avalanche experts suggest, human factors exert a significant influence in avalanche judgment and decision-making. The decision process involves the integration of complex information from a variety of sources, and occurs within a dynamic interaction of human systems that brings widely different perceptions and values to the decision process. Thus, decisions are not made as isolated events or individual moments of choice, and understanding the human context that surrounds the decision process is essential.

Human factors exert both positive and negative impacts in avalanche judgment and decision-making. While human factors have received considerable interest in high-stakes decision-making domains, much of the focus has been on their negative influence in judgment and decision processes. It is curious how little research has been directed towards identifying and examining human factors in light of their positive influences. I will examine the positive human factors that support decision success in the next installment of this series. In this article, I discuss the human factors that negatively influence avalanche experts' ability to make sound judgment and decision actions.

Part II Highlights

- Human factors exert both positive and negative influences in the decision process.
- Human factor influences include individual, team, client, organizational, and socio-political categories.
- Avalanche decision-makers face conflicting challenges as they strive to achieve a balance between the widely varying goals and objectives within the realms of human influence, and the dynamically changing conditions in the physical and environmental systems of influence.
- Repeated experiences of non-event feedback or false positive events can result in dysfunctional strategies for future decision-making.
- The fear of appearing incompetent and uncertainty regarding performance results in anxiety that significantly decreases judgment and decision accuracy.
- The quality of communication within teams correlates directly with the quality of decision actions.
- Avalanche decision-makers require a high level of personal mastery and strong leadership capacities to avoid being overly influenced by negative human factors.

Categories of Human Factors

Avalanche-related judgments and decisions occur within a dynamic context that is influenced by internal and external categories of human factors. Internal human factors are directly related to the individual decision maker and include cognitive, physiological, and psychological influences. External human factors include team, client, organizational, and socio-political human influences (Figure 1).

A. Individual Human Factors

1. Cognitive Factors

Cognitive factors relate to our perception and understanding, and result from how we interpret the current information and situation in relation to our mental model (Table 1). Mental models, which can be thought of as the lens through which we view the world, are developed from our life experiences. They are conceptual structures in the mind that drive our cognitive processes of understanding.

In Part I I described how experience, knowledge and skills, and information relevant to the human, physical, and environmental systems of influence were the foundation of sound avalanche decisions. Interestingly, deficits within this core foundation were the fundamental factors contributing to the close calls and avalanche accidents in this study. For example, a highways avalanche forecaster described to me how his lack of specific knowledge and experience influenced his decision-making: "My knowledge did not include snowpack or weather conditions characteristic of the day of the involvement." In another case, a ski-area forecaster related how "there was no wind and snowfall data available, and no information regarding alpine conditions other than visual observations that were limited due to weather." This finding is consistent with those reported in aviation accidents where a lack of relevant knowledge and information led to the misdiagnosis of problems and to the choice of a poor solution.

2. Physiological Factors

Physiological factors such as fatigue, mental, emotional, and environmental stress impact our human functions, and significantly degrade our capacities to execute sound judgments and decisions actions (Table 1). For instance, a ski guide related, "The accident happened late in the day. I was feeling tired, but

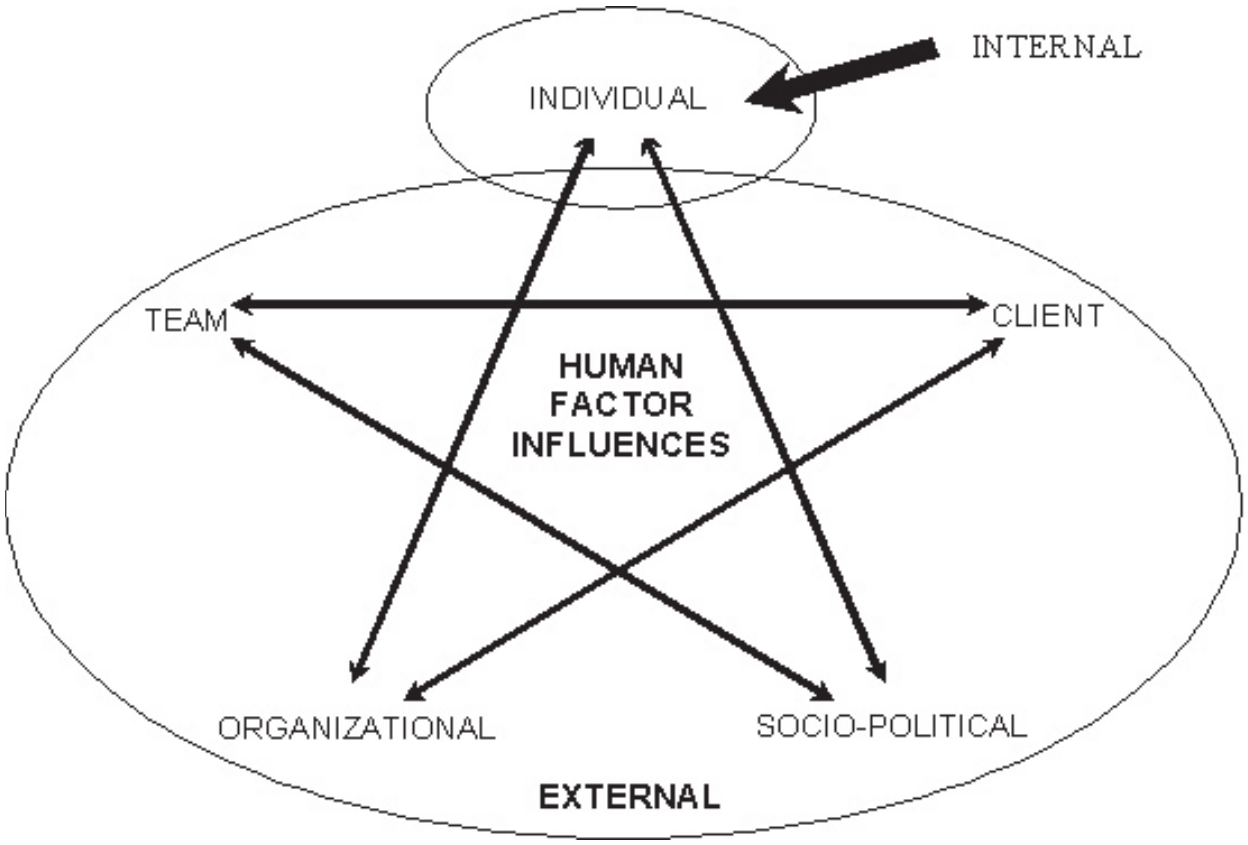

Figure 1: Human factor influences in avalanche judgment and decision-making.

wanting to please the guests and 'squeeze' another run in on the way back." In another situation, a ski-touring guide described, "it is amazing how fatigue starts whispering, 'oh it will be okay, the other, safer route is so long.'" This theme had two distinct timeframe characteristics. In the first, participants described the effects from a long day or several days of challenging decisions, and in the second, the cumulative effects throughout a season.

The theme of time-pressured decisions also emerged within this finding, and was identified by a majority of participants in my research. For example, a ski-area forecaster related: "We are expected to open everything as quickly as possible, with as little staff as possible, and under budget of course." In another case, a ski area forecaster explained the critical effects of time pressure on his decision-making: "The clock is my personal nemesis. I am never more likely to put myself at risk than when I pay too much attention to the time our avalanche control operations are taking. I never let the clock push my teams into danger; however, I sometimes let the clock push me. That is my biggest weakness at work, but at least I'm aware of it." Physiological factors have long been recognized as a key influence in our ability to execute sound decisions. Recognizing their presence, as explained by this forecaster, is fundamental to reducing their impact.

3. Psychological Factors

Psychological factors such as goals and objectives, emotional influences, pride, ego, and overconfidence are a third significant influence in our judgements (Table 1). For example, a national parks forecaster described how group goals influenced their decision. "I believe the decision to enter the slope in the first place was influenced by our desire to complete the trip as planned. It would have been new ground for all of us and establish the aesthetics of the line we were attempting." In another situation, emotional (affective) influences were described by a ski guide who stated, "the beauty, snow, and calmness that covers the mountains in winter shows little sign of the monster sleeping, and the white rush that we get is a powerful force that beckons us on."

Pride, ego, and overconfidence also have significant

COGNITIVE	PHYSIOLOGICAL	PSYCHOLOCIAL
• Inadequate knowledge • Inaccurate perceptions • Limited processing capacities	• Time Pressure • Fatigue • Mental & Emotional Stress • Environmental Influences	• Goals and objectives • Emotional influences • Pride and ego • Overconfidence

Table 1: Individual Human Factors

psychological impacts, such as in the case of this participant who stated "the reward of being a hero led to taking unreasonable risk." In another case, a highways forecaster related to me, "I thought I had more ability to forecast the extent of the activity than I actually did. This misconception, combined with an eagerness to serve the clients, led me to err on the side of recklessness rather than caution."

"The group had the vision of experiencing one more great run, and I twisted the picture to justify my decision and give them what they wanted."

As the findings of my research suggest, psychological factors are inherent in avalanche decision-making. A high level of personal mastery and the use of mindfulness (metacognition) and critical thinking are powerful strategies to ensure we are not overly influenced by these factors.

B. External Human Factors

1. Team Factors

The avalanche experts in my study described how team human factors negatively influenced their capacity to gather critical information and resources, to engage in critical thinking, and to arrive at an objective and well-informed decision (Table 2). For example, an avalanche safety specialist for extreme ski events related, "this was probably the most stressful mountain decision of my life, due to enormous outside pressures and lack of confident peer exchange." In another situation, a helicopter ski guide explained, "I had asked the guides for advice on an alternate line I had been eyeing with little response. After the avalanche incident, another guide said, 'I never ski there unless the slope has slid.' That single piece of advice would have prevented my close call."

Inadequate communication was also described within the context of the team atmosphere. For example, a ski area forecaster explained: "It makes a huge difference if team members are respectful and investigative, rather than self-focused and judgmental. If the environment is non-supportive and dismissive of input, then I am prone to withhold information or take an observing role rather than contributing." Participants emphasized how the atmosphere created by the lead guide, team supervisor, or dominant member in the group often set the tone in which the exchange of information and resulting decision-making occurred. They also described a culture of pride and self-sufficiency that existed within some operations, and expressed the serious implications this had upon their ability to inquire for information in order to reduce the uncertainty they were experiencing during field and office-based decisions. One participant expressed, "it was not until after the accident that I really started pressing for information. Before this, I felt like I needed to make my own evaluations and it felt like cheating to ask."

In another case, a ski touring guide described resistance to a differing opinion: "At the morning meeting, another guide was adamant about not skiing a piece of terrain. I found myself frustrated and trying to manipulate his decision. He was correct in his decision not to expose people to a hazard that was totally unnecessary in an unusual year. The human element was definitely what failed me in this situation."

2. Client Factors

Client human factors were also a significant influence in my research. I define clients as the people for whom avalanche safety services are being provided; for example, visitors to national parks, public traveling on highways, film crews, or ski resort, helicopter, snowcat or ski touring guests. Pressure from clients to access avalanche-prone terrain was the most commonly cited client human factor in this study (Table 2). Participants described the tremendous pressure they experienced from ski resort guests demanding terrain to be opened, highways vehicle traffic needing to continue their journeys or backcountry ski and snowboard guests requesting to be guided in more aggressive terrain. For instance, a ski-touring guide explained how client pressure during high avalanche hazard resulted in him being seriously injured in an avalanche accident: "I chose to take my group into some conservative terrain where I had dug a snow profile several days before. The group was not very happy with that decision since they had skied there once before, and suggested I find some different terrain where they had not been. I wanted to stay conservative, but at that point was pushed into pleasing my guests on their last day."

TEAM	CLIENT
• Inadequate communication • Resistance to differing opinions • Failure to challenge assumptions about goals or values • Being overly influenced by the judgments and decisions of others • Social pressures to conform	• Pressure to access avalanche terrain • Inadequate communication • Loss of visual contact
ORGANIZATIONAL	SOCIO-POLITICAL
• Lack of risk comprehension by management • Financial, logistical, and time pressures	• Collective sense of professionalism and pride

Table 2: External Human Factors

In another case, a ski-area forecaster described the decision-making challenges he faced as a result of demanding clients during conditions of terrain closures. Even with guarded control lines, aggressive skiers would jump the lines to access untracked powder, therefore placing themselves and his avalanche control teams who were working in the area in potentially perilous situations. Clients' reluctance to follow terrain use guidelines resulted in high levels of stress for these avalanche experts, since the safety of clients who are in avalanche terrain is ultimately their responsibility.

Inadequate communication with clients was a key factor in the close calls and avalanche accidents in this study. A ski-touring guide explained to me how a group's reluctance to be guided influenced the quality of his communication. He was given a group that had skied unguided at the same lodge for the previous five years. However, the lodge owners had concerns regarding the groups' avalanche skills and assigned them a guide that season. "On our first descent, they all took off on their own. I take the blame for not being more clear about the experience of being guided even before setting foot on the slopes."

Loss of visual contact was another related factor, as described by this ski-touring guide: "I went a bit too far down the run and realized I had lost sight of the group. I called back up to the group to let them know that I was coming back up. All they heard was an incomprehensible voice so they assumed it was a go. A skier began his descent above me and triggered an avalanche on his second turn, which caught and partially buried me."

3. Organizational Factors

Avalanche programs that were managed by people who did not understand the phenomena presented great challenges to effective decision-making by the avalanche experts in my study (Table 2). For example, an avalanche forecaster described to me how difficult it was to secure management support for his decision to close a mine access road during a mid-winter storm cycle. "No avalanches had reached the road through December and most of January, and the new foreman of the operation became more and more sceptical of the avalanche program." A safety specialist working on a mountain film related a similar experience: "I told the boss the risk was too great. There was a cornice overhanging a steep rock face directly above. If it fell off, it would probably sweep across the upper glacial bench with enough momentum to carry on down the ice tongue to where 80 people were destined to be. My opinion was the likelihood of it occurring was possible, that the magnitude of destruction could be a large number of fatalities, and that the risk of being under it with an 80 person crew for 12 hours was unacceptable. He thought it would have fallen by now if it was going to, and that besides, it probably wouldn't reach the film crew location. I disagreed because it felt like a decision based on 'by guess and by god,' that the likelihood of a disaster was 50/50. I was overridden by the boss and moved on to the next task – minimizing the risk now that we were going there."

Financial pressure was an additional organizational human factor influence. As a helicopter ski guide related, "We'd been dodging clouds all day, when the pilot saw a stake and said he could put me there. In order not to burn more $'s we landed there, got out, and the helicopter headed for the bottom." Participants also faced logistical pressures, as explained by this forecaster: "There was great pressure on the avalanche crew to keep the road open. I allowed this pressure to override safety concerns." In another case, a ski-area forecaster explained, "It was logistically difficult to close off this slope in the middle of a busy spring day, which added weight to keeping it open."

4. Social / Political Factors

Social and political human factors were another negative influence in the judgements and decisions of the avalanche experts in this study (Table 2). Participants described how a collective sense of professionalism and pride in accomplishing the complexities of their craft influenced their decisions. For example, a mountain safety specialist described the pressure he experienced: "Our professional pride is what cranks up the pressure to venture forth into the fine line where the acceptable risk is blending with the unacceptable risk. That is why we are hired – to make the ultimate decision. Can we do it or not?"

The Impact of Human Factors

As the findings of my study suggest, human factors exert significant influence in both the internal and external realms of avalanche decision-making. While human factors encompass both positive and negative influences, I have limited my discussion to the negative impacts in this article. These negative influences can produce a narrowing of attention, a failure to search for new alternatives, and may interfere with recognizing the inappropriateness of our actions. In addition, our judgments are subject to systematic biases that result from time pressure, spatial variability, incomplete information, limited cognitive processing capacities, and a lack of understanding regarding methods to reduce uncertainty. Under these circumstances, decision accuracy is often decreased through faster and less discriminate use of information, and the increased use of heuristic strategies. Heuristics are cognitive shortcuts that enable us to make evaluations on the basis of one or a few simple rules or cues. However useful heuristics can be in complex decision-making, they can also result in sacrifices in accuracy and severe errors and biases in judgment.

"There was a cornice overhanging a steep rock face directly above. If it fell off, it would probably sweep across the upper glacial bench with enough momentum to carry on down the ice tongue to where 80 people were destined to be."

Stressful conditions may also result in high levels of anxiety as we assess our personal resources that are available to meet the task demands. Greater uncertainty regarding task performance increases our anxiety, and, when coupled with the fear of appearing incompetent, significantly impairs our decision performance.

A failure to simulate consequences (mental simulation) when experiencing time pressure or increased cognitive workload was an additional related factor in my study. This was particularly prevalent when conditions in the human, physical, and/or environmental systems of influence were undergoing

subtle changes. This concept is consistent with Klein (1998) who reported that failure to simulate outcomes frequently leads to errors in choosing decision actions.

These findings suggest that limitations of cognitive and emotional processing are inherent in avalanche decision-making. As I discussed in Part I, situation awareness, mindfulness (metacognition), and critical thinking are powerful strategies to counter the influence of these negative human factor influences in the decision process.

Coping Strategies

When faced with difficult choices and negative human factor influences, I found participants adopted several strategies to cope: (1) Managing the uncertainty (2) sticking with the status quo by continuing with their original goals, (3) explaining away the hazard, or (4) being influenced by the judgment and decisions of others. Cognitive economics and negative human factor influences appeared to be equally influential.

"That is why we are hired – to make the ultimate decision. Can we do it or not?"

1. Managing Uncertainty

Our ability to make rapid and effective judgments is particularly crucial to successful avalanche decision-making. However, the risk analysis process is complicated by inherent uncertainty resulting from complex human, physical (terrain), and environmental (weather, snowpack) factors. Lack of information, time pressure, dynamically changing risks, and human factor influences resulted in uncertainty, and exerted significant limitations on the cognitive capacities of the avalanche experts in my study.

Photo: Clair Israelson

An avalanche forecaster explained to me how spatial variability presented great challenges in managing avalanche risk: "It is easy to identify the safe areas, and it is easy to identify the unsafe areas, but it is difficult to manage the gray areas." Participants emphasized how complicated it is for them to make decisions that fall within this zone of uncertainty. For example, a rescue specialist explained, "none of us on scene really knew for sure that there would not be another release. In the end, I decided that the need to complete the rescue outweighed the risks."

Uncertainty is a sense of doubt that blocks or delays our actions. It is also a subjective factor, since different people will experience different levels of uncertainty when faced with the same situation. As a result of complex situational and human factor influences, it is unrealistic to assume that uncertainty can always be reduced. However, it can be managed effectively. In Part III of this series, I will examine the effective management of uncertainty in order to enhance decision success.

2. Goals and Objectives

Goals and expectations influence how our attention is directed, and how information is perceived and interpreted within our mental models. We select decision actions that line up our perception of the environment with our goals and objectives. As a result, we may have a clearer understanding of what we want to do (goals and objectives), compared to assessing more cognitively complex factors within the decision problem. This factor has also been referred to as the commitment heuristic.

3. Explaining Away the Hazard

We may respond to complexity by ignoring information about probabilities that do exist, or by accepting the status quo. For example, a ski guide explained: "There were a number of factors indicating avalanche potential, yet the data I collected started to outweigh the potential and point to a better picture. Was this a matter of my perception? The group had the vision of experiencing one more great run, and I twisted the picture to justify my decision and give them what they wanted."

There are many task goals in dynamic decision situations that may be in conflict with each other, and generating reasons enables us to justify decisions to ourselves and to others. While explaining away the hazard may appear to be an irrational response, decision researchers argue that this strategy is a coping mechanism that helps us avoid the paralysis of being unable to effectively deal with uncertainty. In addition, decision-makers often find it difficult to change their plans when faced with uncertainty and negative human factor influences, since the presence of expensive consequences, for example cancelling a day of helicopter skiing, requires high confidence levels.

4. Influenced By Others

Participants were heavily influenced by the decisions and actions of others when faced with situations of uncertainty. For example, a helicopter ski guide explained how he resolved his uncertainty about the snowpack stability of a particular slope by observing the actions of a respected peer: "It must be okay if the lead guide is going there." In another situation, a guide described how assumptions about what teammates were thinking resulted in a close-call: "This near miss was the result of group-think, where each guide based their opinion of the morning terrain selection on what they thought the other guides were thinking. I was thinking that if guide 1 and guide 2 are comfortable with that slope, I guess it must be okay. I

suspect that in turn guide 1 was thinking, if guide 2 and guide 3 think it is okay, then it must be okay. I considered all of us experts and had a great deal of respect for the other guides. I feel these factors all contributed to this case of group-think."

Team Decision-Making

I found the capacity of teams to make effective decisions was a direct function of the quality of interactions amongst team members. This finding correlates directly with research in the aviation field showing that minimal communication, negative expressive styles, and low task motivation results in poor coordination and high performance errors.

Social factors exert a significant influence on judgment and decision-making, and create goal conflicts that can result in an unwillingness to admit lack of knowledge, and to continue even in the face of uncertainty. Orasanu et al., (2001) suggested that implied expectations amongst team member may encourage risky behaviour, and may result in people behaving as if one is an expert, while in fact they may lack the knowledge to effectively execute an independent decision. An example provided by the experts in my research described how assistant guides are often expected to assume complex tasks of significant responsibility with limited supervision or discussion; for example, snow safety for helicopter ski operations. While these experiences offer tremendous learning potential for less-experienced avalanche decision-makers, they may result in high levels of performance anxiety and acute stress. Baumann et al. (2001) found uncertainties regarding performance and the fear of consequences of failure separately contribute to the level of anxiety experienced, and result in significant reduction in decision performance.

Status or conformity pressures exert strong influence against checking one's assumptions. Groupthink (Jannis and Mann, 1977) is the most well known failure in team decision-making, and occurs when an individual and/or group suspends its judgment in order to maintain group cohesion. This finding is also consistent with heuristics research; for example, McCammon (2002) described this as the 'expert halo.' The experience of negative team interactions was particularly strong in situations involving supervisors, lead guides, or individuals with higher status. Orasanu and Salas (1993) reported a similar finding in their aviation research, stating "high status can be used effectively to manage a team, or it can lead a team to disaster" (p. 338). They found that the pilot's point of view carried more weight, regardless of whether s/he was correct or not.

This finding emphasizes the critical role that avalanche team supervisors have in leading their teams towards decision success. Verbalizing thoughts so the entire team can develop a shared situational model, encouraging diverse views, and providing positive feedback and direction during difficult tasks are examples of exemplary team leadership. Thus, individual skills and knowledge alone are not sufficient for successful team performance. Communication must be a key emphasis within the team decision-making process, and has significant potential in decreasing human error and increasing decision success.

Examining Decision Errors

Decision errors can often be attributed to the situation assessment as opposed to the selection of actions. While accurate perception is fundamental to good decision-making, our goals and mental models are integrally linked and are critical to the formation of accurate situational models. Endsley (1997) argued that decision-makers often make the correct decision for their perception of the situation, but that perception may be in error.

In Part I, I identified experience as the key element in the formation of mental models and the fundamental component of the avalanche expert's decision foundation. Repeated experience develops mental models and expectations about future events that predispose us to perceive information that is in agreement with our mental models. However, all experiences are not equivalent in their capacity to develop good judgment and decision capacities. As I found in this study, repeated experiences of non-event feedback or false positive events can result in dysfunctional strategies for future decision-making. For example, snowpack instabilities exhibit spatial variability in the terrain, and areas within which it is possible to trigger a propagating fracture for a slab avalanche may be as small as one metre. If a skier does not make contact with this area, the slope may not release resulting in a false positive result for the decision-maker. As one participant related to me, "positive reinforcement is a powerful learning impetus."

"...all experiences are not equivalent in their capacity to develop good judgment and decision capacities."

Avalanche accidents and close calls are infrequent and are therefore an insensitive indicator to the quality of our decisions. False positive feedback experiences may reinforce poor decision actions, and may lead to overconfidence or inaccurate perceptions. Research has shown that if a person repeatedly makes dysfunctional decisions, those dysfunctions would become automatized. For example, Orasanu et al. (2001) found that pilots' experience and success in risky situations in the past, (e.g. making a landing in poor weather conditions), influenced their expectations to succeed the next time. In a study of recreational avalanche accidents in the United States, McCammon (2002) found the familiarity that resulted from past experiences and actions led avalanche accident victims to believe their behaviours were appropriate in the current situation.

The impact of goals and mental models on judgment and decision-making is particularly problematic in the high-stakes avalanche domain. The avalanche decision-making environment is often not structured to provide effective feedback or to show our limitations. I suggest the use of critical thinking and mindfulness (metacognition) can correct these biases by requiring decision makers to think about the reasons and assumptions that underlie their judgments and choices. In addition, it is of critical importance to seek external feedback when available, and to reflect upon our judgment and decision actions in order to build accurate mental models to support future decision-making (a point I will discuss further in Part III).

Understanding Decision Errors

Decision actions do not stand alone as events that can be judged independent from the broader situational and task features. While the biases and decision traps that I have reported may appear to be an irrational response, we must consider the strong influences of the individual, team, client, organization, and socio-political realms in these processes. Cognitive limitations, spatial variability, physical and environmental stress, fear of appearing incompetent, social pressures within teams, pressure to open avalanche-prone terrain by clients, logistical and financial pressure from organizations, and desires to maintain cultural cohesion within associations are several examples that resulted from my study. Additionally, varying perceptions of risk and varying levels of acceptable risk exist within these human realms.

The successful reduction of uncertainty and negative human factor influences is cognitively taxing, and requires time, motivation, and the use of structured thinking processes such as metacognition and critical thinking. While in retrospection, a majority of the participants in my study recognized the human influences present; they simply succumbed to the excessive pressure they faced. My research illuminates the conflicting challenges that avalanche decision-makers face as they strive to achieve a balance between the widely varying goals and objectives within the internal and external realms of human influence, and the dynamically changing conditions within the physical and environmental systems of influence. It also highlights the fact that avalanche decision makers need a high level of personal mastery and strong leadership capacities to avoid being overly influenced by these factors.

Concluding Remarks

Avalanche judgment and decision-making must be examined in a holistic manner in order to discover efficient, adaptive, and satisfying solutions to the decision problems we face. As I found in my research, human factors exert both positive and negative effects in the decision process. It was how the decision maker recognized, considered, and managed the presence of negative human factors that made the critical difference between decision success and human error. I suggest that a more complete understanding of the influence of potentially negative human factors will enable avalanche decision makers and stakeholders to recognize and manage their presence, therefore reducing the frequency of human factor decision errors in avalanche accidents. In Part III Developing Expertise in Avalanche Decision Making, I examine the positive human factors that influence successful judgments and decisions, and discuss these findings in light of recent advancements in strategies for decision skills learning, decision support, and effective avalanche accident prevention.

Acknowledgments

My research is dedicated to the group of Canadian avalanche professionals who took the time to reflect upon their experiences and relate their insight to me. We can all learn a great deal from their experiences of decision success and human error. My thanks are extended to the Canadian Avalanche Foundation, Selkirk College, and the Social Sciences and Humanities Research Council of Canada for providing financial support and to Arc'Teryx for outdoor clothing and equipment. I wish to acknowledge Bruce Jamieson and John Tweedy who offered valuable insight and good thinking in their role as avalanche expert advisors to my research, and to Roger Atkins, Ian McCammon, and Kim Kratky for reviewing my draft.

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Petra van Dijk: Reception

Those of you who have phoned or dropped by the office in the last couple of months will have heard a new voice. Petra van Dijk was hired in October to replace Janice Sanseverino as our receptionist. Petra and her husband emigrated from Holland in May of this year, and have recently bought a church that they're busily converting into a home.

"Peter and I always talked about moving away from Holland," Petra explains, "but we never knew which country to move to." Their first exposure to Canada was in 2001, when Peter's employer sent him to Nelson for three months. Petra visited him for ten days and the two of them decided to spend their next holiday here.

They traveled around BC in 2003, and made their first visit to Revelstoke then. "We both liked Canada a lot and after that vacation we decided to apply for a visa," Petra says. They used the time it took to get approved as skilled workers – just under a year – to explore the province and decide where to make a start with their new life. "It was difficult to choose, because BC has lots of nice places," says Petra, "but we're very glad we ended up here in Revelstoke."

In Holland, Petra worked for 17 years at a non-profit housing cooperative that owns 6,500 rental homes. That company's work was to provide affordable housing for people unable to buy their own home. Her experience with people and solving problems has already served her well in her new position, and she's fitting in easily, despite the obstacles inherent with so many changes. "Coming to Canada is a new challenge and so is this job," Petra explains. "In Holland it's not possible to work in this industry, as we have no mountains and just a little bit of snow in the winter. So it's really something completely new and I have a lot to learn, not only about avalanches but also because English is not my first language."

The ease at which Petra has adapted to a new country, a new language and a new job is inspiring, and makes us all more than confident she can handle any issue that crosses her desk. Make sure you say hi to Petra the next time you're in touch – you'll know it's her by the accent and the smile.

Petra and her pals, Maybelle and Elvis, who came with her from Holland.

Photo courtesy of Petra van Dijk

InfoEx Technicians

In order to keep up with all the changes to the InfoEx system, the CAA felt the need for plenty of backup in the data entry department. We advertised in October to all the members and to the community of Revelstoke, and in November hired four InfoEx technicians. Verena Blasy and Dave Healy are on full-time, while Ami Haworth and Terry Duncan have part-time backup positions. They are all active in the outdoors and two of them – Terry and Dave – are professional members of the CAA. They've hit the ground running and apparently the team motto is: "100% accuracy – all the time." Sounds good to us.

The new InfoEx technicians say cheese. (clockwise from top left) Verena Blasy, Dave Healy, Terry Duncan and Ami Haworth.

Photos CAA

Avalaunchers: A Brief History of the Big Bang

BY JOHN BRENNAN

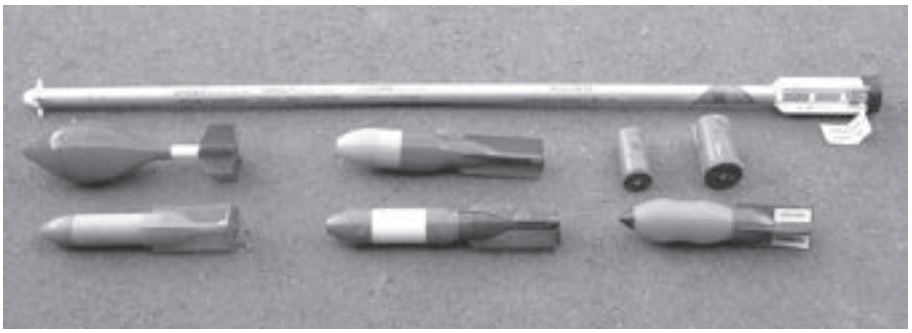
OK, I'll admit it: I've always been a big Monty Atwater fan. Not only is the man credited with being the father of modern avalanche forecasting and safety in the United States, but he is also responsible for developing the Avalauncher. Through its more than 40-year history, the Avalauncher has gone through many changes yet continues to prove its worth in avalanche mitigation work.

After Atwater's stint in the 10th Mountain Division in World War II, he took his skills to Alta, Utah in 1945. It was there that Atwater began applying a practical approach to both studying and mitigating the effects of avalanches. In 1951 Atwater was able to bring artillery into the picture. Almost as soon as the military weaponry began their assault on the Little Cottonwood Valley did the murmurings of the imminent obsolescence of both the guns and their warheads begin.

Jerry and Monty with an MK 16. The projectile utilized three cast primers, each weighing eight ounces. Photo taken by Pete Peters in 1974.

While Atwater experimented with a variety of alternatives, each had their drawbacks. In the summer of 1961 one of Atwater's supervisors showed him some product literature of a pneumatic baseball pitching machine. The wheels began turning and after several conversations with the machine's inventor, Atwater was able to view a demonstration of the first Avalauncher late that same year.

Frank Parsoneault was the genius behind both the pitching machine and the Avalauncher. His full time job was as a fixtures engineer for Douglas Aircraft but on the side he was an inventor. What made both machines work was a valve that would allow for the almost instantaneous release of compressed gas. By the late 1950s, many Major League teams were using Parsoneault's "Fireball" pitching machine.



A number of rockets as well as a one-pound and a two-pound cast primer for reference. The long projectile in the back is the French model.

Photo: John Brennan

While the pitching machine received a patent, the valve assembly itself did not. Soon the valve was copied for many different industrial applications. Today, derivations of the Parsoneault valve are used in air cannons to blast clogging and caking from railway car hoppers, kilns, silos, power stations, and cement works. In these applications, large quantities of compressed air are sufficiently forceful to remove material obstructions from the equipment to which they are attached.

There are roughly 200 Avalaunchers being used throughout the world today. The first production model was the Mark 10 and it sold for $500. Atwater and Parsoneault's sales strategy was to sell the guns at their cost then make their meager profits off the projectiles. Sales for the first launchers began prior to the 1962/3 season. Originally monikered a "400 yard Launcher," the Mark 10 was quickly superseded by higher-pressured, longing-ranging units. Early projectiles, if they could even be referred to as that, were simply a few one-pound cast shots taped together. Conveniently, their three-inch diameter mated precisely enough with the standard sized aluminum pipe that formed the barrel. The rounds were lit, dropped down the barrel and the fire valve was released.

It doesn't take a rocket scientist to realize there were drawbacks to this projectile. Aside from the glaring safety issues associated with a shot burning in the barrel, the flight characteristics were poor. Fin-stabilized rockets soon followed. Their fusing systems saw a short piece of safety fuse coupling a detonator to the old-style t-handled pull wire igniter. The t-handle, which was just an old piece of out-dated fuse, was removed and the remaining wire passed through a hole in the projectile's base plate. The igniter wire was then tied off to a fixture on the gun. This way, when the gun was fired it would begin the ignition sequence.

It was an idea that looked good on paper but also one that

lead to several accidents. In April of 1966 two United States Forest Service (USFS) workers lost their ear drums when an in-bore pre-detonation occurred at Tuckerman's Ravine. In September of the same year, three gunners were killed by a similar accident in the Rio Blanco mine in Chile. In both accidents small amounts of escaping gas proved forceful enough to move the projectiles far enough up the barrels to ignite them but not forceful enough to eject them completely. While work on an impact fusing system had begun in the mid 60s, these accidents now saw that system though to fruition.

The idea behind the earliest impact fusing system was to have a firing pin, which was held in place by a magnet, be driven into a shotgun shell's 209 primer when the rocket hit the ground. A 209 primer is made up of a pellet containing lead styphnate – the same compound found in the ignition mixture of most blasting caps. When the firing pin hit the 209, the energy of detonation would be driven into the open end of a blasting cap.

An accident occurred with this system when Atwater was demonstrating a launcher in 1968 at the Idarado mine in Colorado. At this time the magnets being used were donut shaped because it was easier to induce magnetism into them. Apparently the hole in the old style base plate lined up with the magnet hole and when the gas was released it was able to drive the firing pin forward. A gunner was killed and Atwater lost hearing in one ear.

This accident caused the development of the flight safety system and the use of solid magnets and base plates. In this system, a spring loaded pin sits in front of the firing pin. The basic logic behind this safety feature was that the firing pin would only be able to travel towards the 209 primer once the shot was approximately 50 yards from the barrel.

There is one application where the flight safety system is not used, because the target is so close to the barrel. This need arises inside mines, where transfer tunnels are bored between mining floors in order to transport ore. When these six-foot diameter holes become clogged, the easiest way to unplug then is with an Avalauncher shot. In this situation, the firing is done remotely.

From the first fin-stabilized rockets in the early 60s and continuing through the early 70s, projectiles at this time used explosive products designed to be lowered into oil wells. These products, called "perforators" within the industry, were sturdy units built to withstand the extreme pressures found deep within the wells. Ammonium nitrate and TNT oil formed the explosive that were packaged within steel cans. Not only could several of these cans be screwed together, but they had a nose cone that could be screwed onto the top of the can. Parsoneault made dies for stamping out aluminum tail fins and Atwater assembled these together at his home.

In an attempt to find a replacement for artillery, the USFS began accepting contract bids for alternative systems in the early 70s. In addition to the Avalauncher, the Bermite Corporation's RAMP system (Rocket Assisted Military Projectile) sought the USFS contract and Honeywell pitched their 57 mm recoilless rifle that could fire a plastic-cased warhead. Even though the Avalauncher was being used extensively, RAMPS got the contract. This weapon used a 40 mm mortar cartridge to launch the rocket and then an onboard propulsion system kicked in. RAMPS unfortunately were never able to deliver a viable product. The Forest Service was not only disappointed but also

Monty Atwater at Squaw Valley with an MK 10 Avalauncher, circa 1962. Photo provided by Monty Atwater Jr.

A "Fireball" baseball-pitching machine in the background and a prototype Avalauncher in the foreground. Photo taken in late 1971 by Monty Atwater.

out the contract money. Another contract was never offered.

An interesting woman in the history of the Avalauncher was Jerry Nunn. Jerry began patrolling at age 18 at Donner Pass, California. Despite having seven children by age 30, Jerry continued to patrol. In 1957 she began working at Squaw and when the Olympics came in 1960, she worked with Atwater doing avalanche control. She originally met Atwater in 1957 when she went to Alta for the U.S. Forest Service's Snow Ranger course. Almost blocked from the course because she was a woman, Jerry went on to become the country's first female snow ranger. Over the years, Jerry was credited with selling close to 30 Avalaunchers. She was also responsible for introducing Pete Peters to Atwater in 1973.

"It doesn't take a rocket scientist to realize there were drawbacks to this projectile..."

Shortly after their introduction, Atwater partnered up with Peters and together they formed Avalanche Control Systems. Peters promptly put $16,000 into the company so that plastic molds could be purchased to manufacturer the next generation of the tail fins and rockets. In 1976 Atwater passed away after a heart attack. He was 72 years old. Peters took control of the company and continues to manufacture and sell the projectiles. In the late 80s Peters quit building the guns and it was at this point that their prices began to skyrocket.

A side view of the LOCAT, provided by Marty Schmoker.

Currently there are three commercial producers of Avalaunchers in the world with another company making a similar product. Of the launchers, the US-made weapon of the Launcher Company sells for $15,000, the Canadian SEAR's gun for about $17,000 and the French launcher for $42,000 (all figures US dollars). For comparison, Peters sold his last guns for under $1200. While the US and Canadian gun are both designed for Avalanche Control System's 82.55 millimeter shell, the French Launcher shoots an 83 mm round that is almost six feet in length. In addition to its pricy gun cost, the French Launcher charges $170 for its projectile. Its binary explosive, which is mandated to become inert within a short time period, drives the total shot cost up even more.

Another gun that deserves mention here is the LOCAT. This is a compressed gas weapon that operates up to 3000 pounds per square inch (psi) - compared to the 400-450 psi max pressures of the previously mentioned Avalaunchers. The higher pressure not only allows greater range but also the ability to use a military style detonator. The LOCAT price tag is a staggering $190,000. Reserved for only those with the deepest pockets, LOCAT ironically stands for Low Cost Artillery Trainer.

With their ability to place several pounds of high explosives up to two thousand yards away, the Avalauncher continues to be a viable tool for avalanche mitigation work today. Its effectiveness is owed to the hard work and foresight of many men and women, not all of whom have been mentioned. There are some interesting prospects for the future of the Avalauncher and I hope to cover that in a later article.

Special thanks for help in this article go to: Pete Peters, Monty Atwater Jr, Mark Parsoneault, Ron Perla, Ed LaChapelle, Jerry Nunn, Paul Hauk and Marty Schmoker

John Brennan has worked as an avalanche and explosives specialist at Snowmass, Colorado for about a decade. He's also patrolled and done avalanche consulting at Las Leñas, Argentina. He's an affiliate member of the CAA and sits on the American Avalanche Association's board as the Rocky Mountain Section representative. In the spring of 2005, he hit the road to gather information for this article – logging almost 3000 miles in seven days and skiing in each of the four states he passed through. If you want to contact John, you can reach him at JBrennan@aspensnowmass.com.

Remembering Eric Langmuir

BY ALAN DENNIS AND BLYTH WRIGHT

May 3, 1931 – September 18, 2005

Eric Langmuir was the first person in Scotland to undertake systematic snowpack observation. His work in the 1960s, as Principal of Scotland's National Outdoor Sports Centre at Glenmore Lodge in the Cairngorms, gave him an ideal opportunity to carry out this work. His position also enabled him to assist and supervise other researchers carrying out fieldwork for the first avalanche-related degrees in the country. He was able to bring experts from beyond the UK, in order to gain their perspective on the nature of the avalanche problem in Scotland. This culminated in a visit by Andr Roch in 1978, when he fronted the first National Avalanche Seminar to be held here.

Following a series of fatal avalanche accidents in the mid-1980s, Eric, along with Hamish MacInnes, was able to persuade the government that the avalanche problem had to be taken seriously. Tim Walker, the current principal of Glenmore Lodge, described how Eric's influence affected public policy at the time. "Eric was in a position to explain and justify why mountaineers do what they do to people who had little understanding of the sport, but who were in decision making positions. He was able to steer government departments, education authorities and sceptics to accept that risk in the outdoors could be managed, and that there were huge benefits in educating out of doors."

Eric Langmuir inspecting the site of an avalanche accident in Coire an Lochan. An avalanche had pushed two boys to the edge of the lake, burying them with their heads inches from the water. They dug themselves out with a Swiss army knife.

Photo: Alan Dennis

The Scottish Mountain Safety Group was formed in 1988 to supervise the creation of an avalanche forecasting service. This commenced as the Scottish Avalanche Project, providing daily avalanche forecasts in two of the main climbing areas in the Scottish Highlands (90% of avalanche victims in Scotland are climbers or winter hill-walkers). Eric was the founding chair of both SMSG and the Avalanche Project.

After the initial two-year pilot, the project was deemed a success and over the years has expanded to cover five areas. It is now known as the Sportscotland Avalanche Information Service (SAIS). Although a full-time coordinator was eventually appointed from the staff of Glenmore Lodge to administer the service, Eric maintained a close watching brief.

By 2001, it was felt the SAIS was too heavily involved in the work of producing the daily forecasts to have much time for research work and a new body was formed. The Snow and Avalanche Foundation of Scotland (SAFOS) brought together academics, climbers and skiers with an interest in and experience of avalanche work. Eric again was the founding chair. He carried on in this role until 2004, when illness obliged him to step down. However, he remained a member of SAFOS and indeed attended its latest meeting in April 2005.

The current project for SAFOS is to raise funding to build an avalanche research centre. Eric had great enthusiasm for this and reveled in selecting the best site from a number offered by Glenmore Lodge. The building will also house SAIS and the Glenmore Lodge Mountain Rescue Team. The necessary permissions have been obtained and a successful outcome is confidently expected. The centre will make an appropriate memorial for Eric.

Memories of Eric Langmuir from Alan Dennis

It was a tribute to the life Eric led and contributions he made in many areas that he was still in demand as the chairman of SAFOS. Hundreds turned out for his memorial, and his grandchildren performed cartwheels in the aisles of the crematorium at the end of the service. He would have loved that.

Eric's Canadian connections go back to when he first graduated from Cambridge and spent two years in geology exploration in northwestern BC. Eric and I enjoyed comparing the photographs from the same presumably-unclimbed areas 30 years later when I worked prospecting there as well.

When I showed up to work for the Scottish Avalanche Information Service with the wrong accent (Canadian) and wrong choice in beverages (not single malt) he was a very supportive mentor. We had a number of fine Highland ski tours, including passing the place where he was buried by an avalanche. When this incident happened he had recently returned from a visit in Switzerland with Andre Roch and appreciated the irony. We discussed their risk assessment of the day as 'lessons learned the hard way."

Sadly, due to illness we were not able to return, fifty years later, to Glen Etive Slabs where his first ascents still demand respect from modern climbers. The quote below, taken from Eric's obituary in the London Times, seems relevant for all activists, apologists, lawyers, coroners and others with an interest in staying out of harms way.

"Langmuir argued that adventure was not so much a matter of seeking danger, dangerously, but rather facing risk. It was his maxim that a decision without the pressure of consequence was hardly a decision at all."

SARScene

BY IAN TOMM, CAA OPERATIONS MANAGER

In early October, the CAA/CAC team of John Kelly, Susan Hairsine, Pascal Hägeli and I traveled to Charlottetown, PEI for the annual SARScene conference. While the primary objective of the trip was to showcase the CAA's current NIF projects (ADFAR and our Online Learning program) the team was also tasked with learning about the newly revised NIF funding policies, developments in national and international search and rescue best practices, and to network with organizations in both avalanche and public safety sectors in Canada and abroad.

On day one, I gave a 45-minute presentation on the CAA's online learning project history, scope, development challenges and successes. I ended with a brief demonstration of the final product, with emphasis on the interactive flash animation exercises developed to date. Feedback was very positive and numerous organizations approached the CAA with questions about development methodology and seeking advice for future projects.

NSS Senior Program Administrator Mary Thomas expressed her appreciation for the presentation and the outcomes of the project to date, and remarked on how polished and informative presentations by CAA members always are. Representatives from the New Zealand alpine and avalanche community expressed their support for the project and are taking home the message to use the CAA's online educational resource. They also expressed interest in being involved in future collaborative upgrades and/or development projects on the site.

The following day, Pascal and Susan presented a 45-minute lecture on the CAA's ADFAR project. They outlined the milestones achieved to date, including the collaborative brochure with Parks Canada and BC PEP, discussed the results of various related social science studies, and gave a brief outline of the future for decision support tools. This particular presentation solidified the CAA's reputation with our NSS and SAR partners as a leading organization in prevention initiatives and strategies.

John attended the annual meeting of the NSS SAR Prevention Working Group, where the social sciences research underway by the CAA caught the attention of stakeholders. The concept of standardizing a method for measuring the success of prevention strategies was discussed, and the methods currently being used by the ADFAR project were recognized for their potential. To help ensure this discussion continues, Pascal has posted preliminary ADFAR findings on the NSS's SAR Prevention Extranet, which is a discussion forum available to the working group.

One of the marquee presentations for the conference was Dr. Colin Powell from the University of Wales. His talk on risk perception in outdoor adventure activities illustrated how advanced the social sciences research of the ADFAR project really is. The CAA is finding answers to questions regarding risk and risk perception that other prevention programs have yet to ask.

Ian and JK survey potential sites for the Prince Edward Island avalanche centre.

Photo: Susan Hairsine

The CAA/CAC team met up with Stephane Gagnon of the Haute Gaspésie Avalanche Centre (CAHG) to discuss the latest critical funding crisis. An action plan and communications strategy were developed during the week to try and engage government partners one last time to permit the continued delivery of the important avalanche safety services in the Chic Chocs and other threatened areas in eastern Canada. While this article is being written the future of the Gaspésie avalanche centre is at risk and it is hoped that the funding crisis can be solved in time to ensure its continued operation this season and in years to come.

SARScene is a unique annual opportunity to meet with the CAA/CAC's sponsoring organizations and talk with representatives from all of our partners in avalanche safety in Canada. Jim McAllister from BC PEP presented a status report on the current AdventureSmart program and clearly identified the CAA/CAC as a vital partner and strong collaborator in avalanche safety programs in western Canada. Jim used the ADFAR brochure as an example of this collaboration during his presentation. We continue to

develop strong links with the AdventureSmart program. This season there will be AdventureSmart staff working out of the CAA building in Revelstoke delivering youth oriented avalanche safety programming in the Columbia Mountains. (*Editor's note:* Find out more about AdventureSmart below).

The CAA/CAC also looks forward to continued collaboration with BC PEP, fostering a strong working relationship to build public safety initiatives in this province. Meetings with the RCMP (sponsor for the Online Learning project) and with Michel Villeneuve of Parks Canada (sponsor of ADFAR) were again very positive and clearly demonstrated the high level of professionalism, quality and effectiveness of CAA NIF projects.

SARScene 2005 was a very successful trip for the CAA/CAC team. It is apparent that both past and present NIF projects developed and run through the CAA are looked upon very favorably and that our relationship with NSS and our funding partners only continues to grow stronger. SARScene 2006 will be in Gatineau, Quebec October 4-7. We plan to attend and further showcase the progressive and innovative SAR prevention strategies and projects run by the avalanche community in Canada. Transcripts and audio recordings of this year's presentations are available through the main offices of the NSS in Ottawa. For more information on NSS and SARScene 2006 please visit www.nss.gc.ca.

AdventureSmart Website

AdventureSmart is a PEP program, aimed at reducing recreational accidents in the outdoors. Launched in November, 2004, AdventureSmart encompasses a number of outdoor safety programs that already exist, and will be encouraging new ones. They also have a youth team that has been making presentations at schools, mountain bike and ski races, and a host of other events to deliver the outdoor safety message to teens.

Their website, www.adventuresmart.ca, provides information and links to outdoor safety and recreational programs and businesses throughout the province. During the winter avalanche education figures prominently, with direct links to our online rescue program, our list of RAC providers and the public avalanche bulletin.

Thanks to AdventureSmart and PEP for helping us reach an even wider audience.

NSS Best Practice Review

Every year, the National Search and Rescue Secretariat (NSS) undertakes a review of prevention materials such as videos, brochures and posters as well as programs and campaigns from the SAR community and others interested in safety. This review aims to identify the most current and effective techniques for planning, implementing and evaluating SAR prevention activities. The Best Practice Review enables the NSS to share this information with the national SAR community so that a nationwide perspective may be obtained.

This year, the CAC was recognized, along with the Mountain Equipment Co-op, for our work in producing a series of avalanche awareness articles. The six articles were all written by CAA professional members and were posted on the MEC website from November 2004 to February 2005. NSS called the project "a good example of safety advice and education being made available through a cooperative effort by both safety organizations and user groups."

We are honoured by this recognition. Congratulations to all involved.

Heritage Award

Last year's renovations to our building have given us more than additional office space. In November, the city of Revelstoke presented Clair with the 2005 Commercial Detail Award. This award is voted on by Revelstoke's Heritage Commission and recognizes superior effort in design and décor, suited to the town's heritage.

Clair receiving heritage award from Mayor Mark McKee and Heritage Committee chair Mike Dragani.

Photo courtesy of Clair Israelson

Free web advertising for all members!

Did you know that members receive a free text listing on the Avalanche Industry Pages? Wouldn't it be nice to have another 80,000 people per month have access to you and your business?

From the photo files...

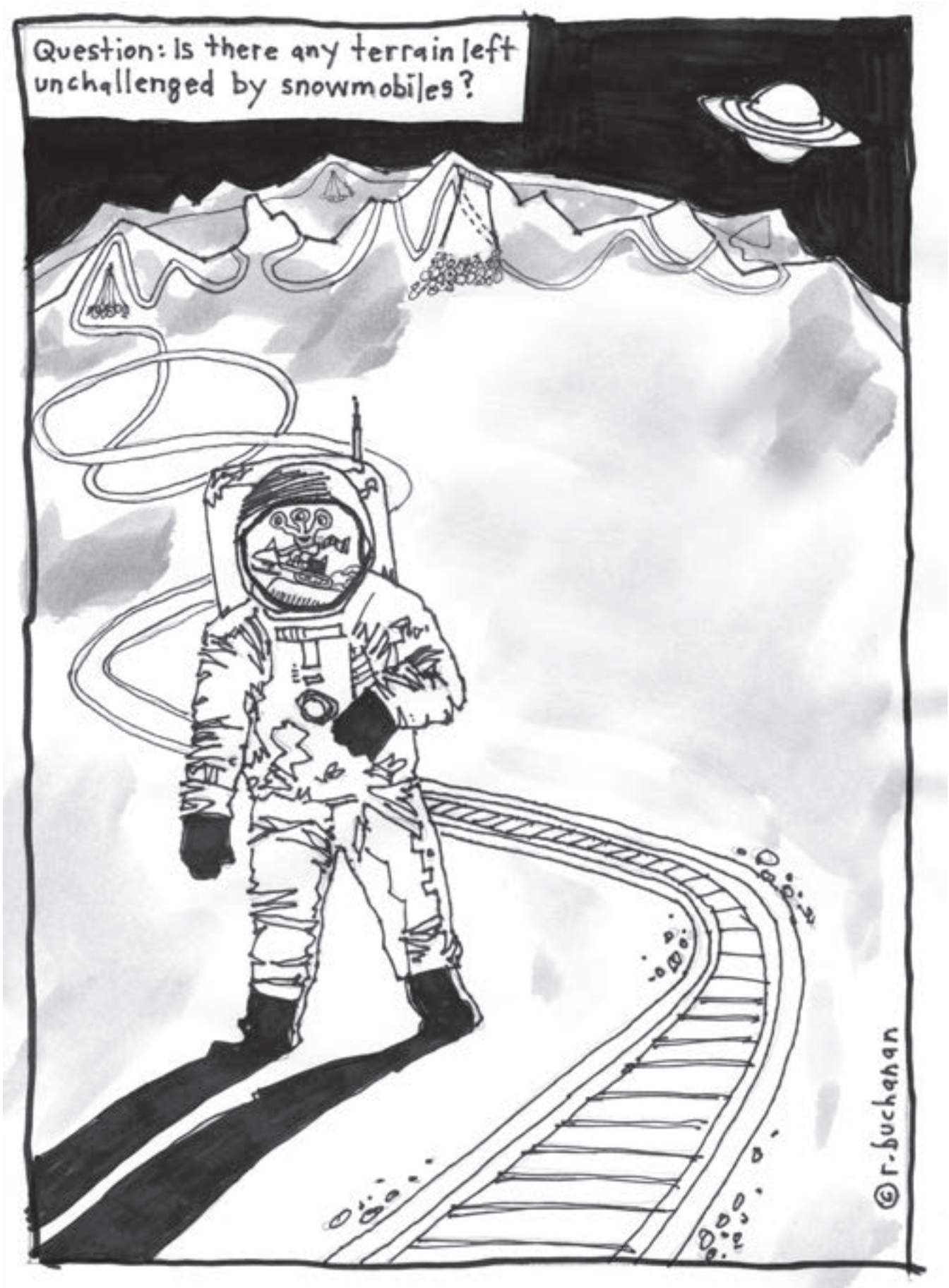
International avalanche researchers Sam Colbeck, Karl Birkeland and Juerg Schweizer find metres are bigger in Canada.

Photo: Bruce Jamieson

Evan Manners sent us this photo, along with a quick note. He writes, "Things are going well here. Kids and wife are happy, sun shines every day, etc. This photo was taken just south of Pincher Creek over the border in Montana. I'll let you know when I get mine. Should fit on the red Toyota just fine!"

Photo: Evan Manners

Flakes
BY ROB BUCHNAN



Field Notes

Just How Many Words do the Inuit Really Have for Snow?

BY ALAN JONES

Photo CAA

Now that the weather gods have moved the jet stream over our heads, it's time to get used to watching snow fall from the sky, build on the ground and spray in our faces as we move about in the mountains. Many of us have chosen to work in the avalanche business because of our love for snow and all things winter. We have options though; we can choose to move to Vancouver or Victoria where flowers bloom and the grass remains green year round, and where rain jackets outnumber down jackets. We can also take a mid-winter vacation to Mexico or Cuba, where we can lounge on the beach and burn our pasty mid-winter skin.

But what about those members of Canadian society that still live simple, subsistence lives in northern Canada; hunting seals, traveling through the tundra on snowmobiles or dogsleds, and weaving dream catchers? Many of these people do not have the luxury to take mid-winter vacations or go surfing in Tofino. Their lives are tied to the land and, for about eight months of the year, dominated by snow.

So, for a people surrounded much of the year by the cold white stuff, they certainly must have an entire lexicon for the word snow. This would be much in the same way that Rastafarians have many words for Cannabis (e.g. ganja, sensimilla, herb, etc.), Pygmies have many words for things that will kill them (e.g. "run like hell…there's a ---- coming after us!") and cops have many words for donuts (e.g. a jelly, Boston cream, Long John, etc).

But do the Inuit really have 400 words for snow? Or is it 50? By comparison, there are a lot of words for snow in English depending on where one draws the line. In the avalanche business in particular, the count is very high. We have things like powder, surface hoar, slush, crust, cold smoke, boot-top, "packed powder" (only found at ski resorts in the Rockies for some reason), spindrift, crud, breakable crust, etc. Think about it and you might find that we have 50 or 100 words for snow.

It turns out that the "great Inuit vocabulary hoax" is a bit of a joke played on us by anthropologists. Who ever thought that anthropologists would have a sense of humour? Apparently, this all started in 1911 when anthropologist Franz Boaz casually mentioned that the Inuit had four different words for snow. Excuse the pun, but that snowballed through the years with succeeding references, in textbooks and the press, growing the number to as many as 400 words! Lucky for us, a clever fellow named Phil James has compiled the definitive list of 100 Inuit words for snow. We reprint this list below, taken from an on-line e-zine called "Word". What would the world be like without the diligent research of people like Mr. James?

The Inuit's Hundred Words for Snow

BY PHIL JAMES

tlapa	powder snow
tlacringit	snow that is crusted on the surface
kayi	drifting snow
tlapat	still snow
klin	remembered snow
naklin	forgotten snow
tlamo	snow that falls in large wet flakes
tlatim	snow that falls in small flakes
tlaslo	snow that falls slowly
tlapinti	snow that falls quickly
kripya	snow that has melted and refrozen
tliyel	snow that has been marked by wolves
tliyelin	snow that has been marked by Eskimos
blotla	blowing snow
pactla	snow that has been packed down
hiryla	snow in beards

wa-ter	melted snow
tlayinq	snow mixed with mud
quinaya	snow mixed with Husky shit
quinyaya	snow mixed with the shit of a lead dog
slimtla	snow that is crusted on top but soft underneath
kriplyana	snow that looks blue in the early morning
puntla	a mouthful of snow because you fibbed
allatla	baked snow
fritla	fried snow
gristla	deep fried snow
MacTla	snow burgers
jatla	snow between your fingers or toes, or in groin-folds
dinliltla	little balls of snow that cling to Husky fur
sulitlana	green snow
mentlana	pink snow
tidtla	snow used for cleaning
ertla	snow used by Eskimo teenagers for exquisite erotic rituals
kriyantli	snow bricks
hahatla	small packages of snow given as gag gifts
semtla	partially melted snow
ontla	snow on objects
intla	snow that has drifted indoors
shlim	slush
warintla	snow used to make Eskimo daiquiris
mextla	snow used to make Eskimo Margaritas
penstla	the idea of snow
mortla	snow mounded on dead bodies
ylaipi	tomorrow's snow
nylaipin	the snows of yesteryear ("neiges d'antan")
pritla	our children's snow
nootlin	snow that doesn't stick
rotlana	quickly accumulating snow
skriniya	snow that never reaches the ground
bluwid	snow that's shaken down from objects in the wind
tlanid	snow that's shaken down and then mixes with sky-falling snow
ever-tla	a spirit made from mashed fermented snow, popular among Eskimo men
talini	snow angels
priyakli	snow that looks like it's falling upward
chiup	snow that makes halos
blontla	snow that's shaken off in the mudroom
tlalman	snow sold to German tourists
tlalam	snow sold to American tourists
tlanip	snow sold to Japanese tourists
protla	snow packed around caribou meat
attla	snow that as it falls seems to create nice

Photo: Brain Wilson

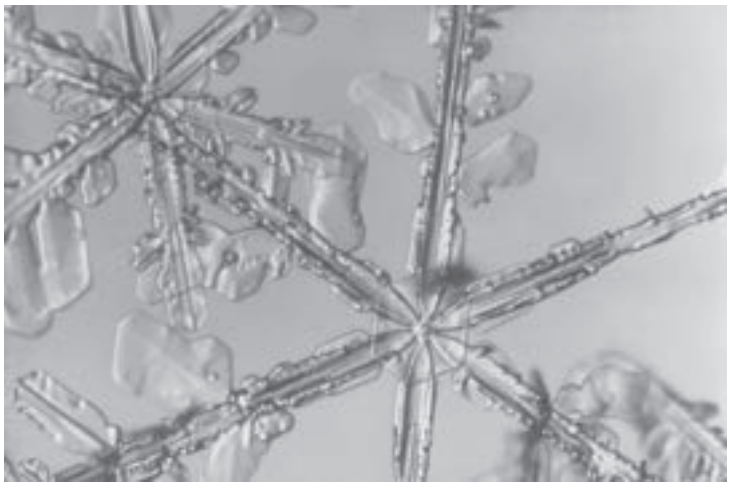


Photo: CAA ITP

	pictures in the air
sotla	snow sparkling with sunlight
tlun	snow sparkling with moonlight
astrila	snow sparkling with starlight
clim	snow sparkling with flashlight or headlight
tlapi	summer snow
krikaya	snow mixed with breath
ashtla	expected snow that's wagered on (depth, size of flakes)
huantla	special snow rolled into "snow reefers" and smoked by wild Eskimo youth
tla-na-na	snow mixed with the sound of old rock and roll from a portable radio
depptla	a small snowball, preserved in Lucite, that had been handled by Johnny Depp
trinkyi	first snow of the year
tronkyin	last snow of the year
shiya	snow at dawn
katiyana	night snow
tlinro	snow vapor
nyik	snow with flakes of widely varying size
ragnitla	two snowfalls at once, creating moire patterns
akitla	snow falling on water
privtla	snow melting in the spring rain
chahatlin	snow that makes a sizzling sound as it falls on water
hootlin	snow that makes a hissing sound as the individual flakes brush
geltla	snow dollars
briktla	good building snow
striktla	snow that's no good for building
erolinyat	snow drifts containing the imprint of crazy lovers
chachat	swirling snow that drives you nuts
krotla	snow that blinds you
tlarin	snow that can be sculpted into the delicate corsages Eskimo girls pin to their whale parkas at prom time
motla	snow in the mouth
sotla	snow in the south
maxtla	snow that hides the whole village
tlayopi	snow drifts you fall into and die
truyi	avalanche of snow
tlapripta	snow that burns your scalp and eyelids
carpitla	snow glazed with ice
tla	ordinary snow

Photo: Ray Mason

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