



# the avalanche journal

Forecasting Blind **21**

Avalanche Forecast  
Quiz Project **27**

Remembering  
Peter Schaerer **40**



# Wyssen Avalanche Tower

The most **effective, reliable** and **time-efficient** way to trigger avalanches remotely

This avalanche tower protects the **Trans-Canada Highway** in **Yoho National Park**



**avalanche  
control**

**Wyssen Canada Inc.**  
Revelstoke BC  
+ 1 250 814 3624  
canada@wyssen.com  
[www.wyssen.com](http://www.wyssen.com)



ARC'TERYX



[arcteryx.com](http://arcteryx.com)

Tell your story in miles

DISCOVER YOUR TRAIL.

THE NORTH FACE

VECTIN

patagonia®

Be Searchable

RECCO Technology allows organized rescuers locate and help you faster when lost in the outdoors, or in the case of an avalanche.

More info

**RECCO**  
ADVANCED RESCUE TECHNOLOGY

recco.com

**ORTOVOX**

**LITRIC**  
AIRBAG SYSTEM BY  
ARCTERYX & ORTOVOX

ELECTRIFIED  
PROTECTION

Since 1980 it has been our goal to protect mountaineers. With our electric airbag system, we are presenting a new milestone in avalanche safety.

LIGHTWEIGHT | ELECTRIC | VERSATILE

ORTOVOX

## CANADIAN AVALANCHE ASSOCIATION BOARD OF DIRECTORS

**President** Eirik Sharp

**Vice-President** Steve Conger

**Secretary/Treasurer** Jesse Percival

**Director at Large** Kerry MacDonald

**Director at Large** Penny Goddard

**Director at Large** Matt MacDonald

**Director at Large** Sofia Forsman

**Director at Large** Kate Snedeker (public representative)

**Director at Large** Jeff Surtees (public representative)

## COMMITTEES

### Complaint Investigation Committee

Paul Harwood (Chair)  
Peter Amann  
Rod Gibbons  
Steve LeClair  
Al Matheson  
Matt Scholl  
Nigel Stewart  
Eoin Trainer  
Chris Turner  
Kenzie Wade

### Discipline Committee

Lisa Larson (Chair)  
Nick Morantz  
Bree Stefanson

### Education Committee

Iain Stewart-Patterson (Chair)  
Chris Dyck  
Tim Haggerty  
Matt MacDonald (BoD liaison)  
Andrew Nelson  
Tim Ricci

### Ethics and Standards Committee

Scott Thumlert (Chair)  
Steve Conger (BOD Liaison)  
Jeff Bodnarchuk  
Simon Horton  
Ben Jackman  
Brendan Martland  
Steve Robertson  
Tony Sittlinger  
Dave Tracz

### Explosives Advisory Committee

Steve Brushey (Chair)  
Chris Argue  
Ryan Bougie  
Ross Campbell  
Dave Cochrane  
Kyle Hale  
Andre Laporte  
Kevin Marr  
Ryan Merrill  
Jesse Percival (BOD Liaison)  
Bernie Protsch  
Rupert Wedgwood

### Governance Committee

John Martland (Chair)  
Phil Hein  
Bruce Jamieson  
Bill Mark  
Deborah Ritchie  
Jeff Surtees (BOD liaison)  
Albi Sol

### InfoEx Advisory Committee

Niki Lepage (Chair)  
Bree Stefanson (vice-chair)  
Steve Conger (BOD liaison)  
Kate Devine  
James Floyer  
Tim Haggerty  
Jeremy Hanke  
Ryan Harvey  
Mike Koppang  
Greg McAuley  
Josh Milligan  
Mike Sadan  
Michael Smallwood  
Judson Wright

### Membership Committee

Kerry MacDonald (Chair/  
BOD Liaison)  
Mike Adolph  
Ryan Bougie  
Colin Garritty  
Richard Haywood  
Julie Leblanc  
Lydia Marmont  
Peter Russel  
Ryan Shelly  
Dave Stimson  
Erin Tierney

### Technical Committee

Scott Thumlert (Chair)  
James Floyer  
Scott Garvin  
Penny Goddard (BOD liaison)  
Bruce Jamieson  
Dave McClung  
Bob Sayer  
Rob Whelan

*All committee members are CAA Professional Members unless noted otherwise.*

### Past Presidents

Bruce Allen	Steve Blake	John Hetherington	Peter Schaerer (Hon)
Aaron Beardmore	Walter Bruns	Bruce Jamieson	Chris Stethem (Hon)
Jack Bennetto (Hon)	Phil Hein	Bill Mark	Niko Weis

### Executive Director

Joe Obad

### Operations Manager

Kristin Anthony-Malone

### Comptroller

Eiri Smith

### InfoEx Manager

Stuart Smith

### InfoEx Developers

Dru Petrosan and Martin Ho

### ITP Manager

Andrea Lustenberger

### ITP Curriculum Specialist

Emily Grady

### ITP Coordinator

Maris Fraser

### ITP Student Services

Audrey Defant

### ITP Logistics & Support

Sarah German

### Managing Editor

Alex Cooper

### Member Services & Partnerships Coordinator

Rosie Denton

### Publications & Properties

Brent Strand

### Office Administrator

Roberta Saglietti

### Bookkeeper

Christie Brugger



Contact *The Avalanche Journal* editor: [editor@avalancheassociation.ca](mailto:editor@avalancheassociation.ca)  
Return undeliverable Canadian addresses, change of address and subscription orders to: Canadian  
Avalanche Association PO Box 2759, Revelstoke BC V0E 2S0 Email: [info@avalancheassociation.ca](mailto:info@avalancheassociation.ca)  
Publications Mail Agreement No. 40830518 Indexed in the Canadian Periodical Index ISSN 1929-1043

# WE APPRECIATE OUR PARTNERS' ONGOING SUPPORT

Premier



Select



ARC'TERYX



Foundation



MAMMUT



COVER WREN MCELROY  
CONTENTS MARTIN HO

# CONTENTS

## SUMMER 2022

### in this issue

#### FIRST TRACKS

- 8 PRESIDENT'S MESSAGE
- 9 EXECUTIVE DIRECTOR'S REPORT
- 10 FROM THE EDITOR
- 11 ITP UPDATE
- 12 CAA SERVICE AWARD
- 13 HONORARY MEMBER
- 14 CISM PEER SUPPORT PROGRAM
- 15 SPRING CONFERENCE PHOTOS
- 16 CONTRIBUTORS

#### FRONT LINES

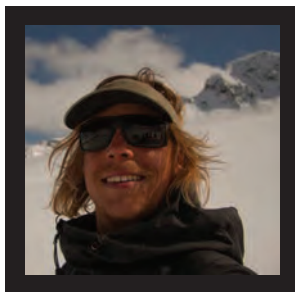
- 18 ESTABLISHING THE CANADIAN  
MOTORIZED BACKCOUNTRY  
GUIDE ASSOCIATION
- 19 ROCKIN' THE PARADISE
- 21 FORECASTING BLIND
- 23 GROUP SEARCHING

#### IN THE LOUPE

- 27 AVALANCHE FORECAST QUIZ  
PROJECT
- 32 RACS TESTING

#### SNOW GLOBE

- 38 THE DRAGON TAMERS
- 40 PETER SCHAEERER



**Eirik Sharp**  
CAA President

## CAA President's Message

### PETER SCHAEERER'S LEGACY

spread across remote locations. While it remained a technical article detailing the objectives of the Association, its membership structure, meetings, and some examples of actions to date, Peter's clear pride in the profession and his optimism for the community the new Association formalized is palpable.

As I read Peter's article, I realized I had been inspired by these same sentiments when, in 2006, I wrote my parents to tell them I was dropping out of grad school and moving to Golden to become a ski patroller in the hopes of launching a career in the avalanche patch. I had just completed my Ops 1 with James Blench and Margie Jamison at the Boulder Hut and I was captivated by the vocation they presented and the opportunity to do meaningful work in wild places as part of a well-respected professional community composed of an eclectic cast of colourful characters.

Much of this issue is dedicated to celebrating Peter's legacy. While the way we do avalanche work has changed dramatically over the intervening years, Peter's impact on both our Association and avalanche work is impossible to over-appreciate. The structure and objectives of the fledgling association established under his presidency remain at the centre of today's CAA, and many of the early actions he introduced became core operational areas.

**I RECENTLY CAME ACROSS** an article by the late Peter Schaeerer detailing the formation of the Canadian Avalanche Association that was written for the conference proceedings of the 1986 International Snow Science Workshop in Lake Tahoe. Peter had been instrumental in the foundation of the CAA in 1981 and was already a "Past-president" when he wrote the piece. What struck me most was the poetic tone he evoked as he described the lonely position avalanche workers occupied at the time—often as outsiders within larger organizations, carrying out vital but poorly understood roles, and

spread across remote locations. While it remained a technical article detailing the objectives of the Association, its membership structure, meetings, and some examples of actions to date, Peter's clear pride in the profession and his optimism for the community the new Association formalized is palpable.

As I now inherit this seat from a long lineage of trailblazers before me, I would also be remiss not to praise the significant contributions of Walter Bruns over his six-year term as president. The CAA was founded in part to establish the professionalism of avalanche workers. Walter steadfastly championed this objective through his leadership, steering the Association along a path toward self-regulation and competency-based membership.

The changes to the names of membership categories that were passed at the May AGM mark a significant milestone in this process, although it could be argued the more things change, the more they stay the same. While the application process has evolved, early membership in the CAA required members: "must have made extensive observations of the snow and avalanches, have experience with hazard evaluation, make decisions that affect the safety of the public or clients as part of their job, and have a sense of responsibility." These are traits that remain foundational today.

Walter also deserves credit for his stalwart leadership through the tumult of the last two years. Today, the staff and board continue to adapt to the post-pandemic reality and current economic uncertainty. Indeed, some of the changes forced upon us have also proved a boon. A move to online delivery has made several services more accessible. The hybrid virtual/in-person AGM was a resounding success, with record-setting attendance, and the Industry Training Program will be delivering a fully online Intro to Weather course this fall, streamlining ITP progression.

I'd like to take this opportunity to welcome Sofia Forsman to the board of directors. Looking ahead, the board is finalizing an updated strategic plan that defines the Association's development goals for the next four years. This update acknowledges we must provide more comprehensive resources for members and stakeholders to support professional practice and self-regulation. It reflects the membership's desire to foster a diverse and inclusive professional culture. It also addresses the need to provide additional resources for our membership's mental health support systems.

While there is always room for improvement, from the President's chair, the Association Peter founded has never looked stronger. I share his earliest pride in our profession, along with his optimism for our future.

**Eirik Sharp, CAA President**





**Joe Obad**  
CAA Executive Director

# Executive Director's Report

## PETER SCHAEERER — STILL GIVING

**The purpose of life is to discover your gift.  
The work of life is to develop it.  
The meaning of life is to give your gift away.**  
- David Viscount

**ON A WARM DAY THIS PAST JUNE**, I found myself at a quiet church in North Vancouver, along with several other members of the avalanche community, to celebrate the life of Peter Schaeerer.

Sitting amongst his family, friends, and colleagues, it did not take long to realize Peter was still offering lessons.

Over the years, like everyone else, I have been impressed by the enduring work Peter started. Whether it was the courses that eventually became the Industry Training Program, the development of OGRS, the founding of the CAA, or *The Avalanche Handbook* with David McClung—so much of Peter's work still abides and benefits us all. In my little personal crossover with Peter, I sensed he lived life fully. I was once fortunate to heli-ski with him and others for a day. I recall pausing to consider my line down. Not one for my dawdling, Peter double-polled ahead of me and stole my line! I believe he was 89 at the time.

Sitting in the pews of the church, we heard more profound glimpses into Peter's life. As ever, these lessons came by example. We learned he enjoyed a balance between his home and professional life. His daughter Gillian's gracious eulogy noted how her father left work at work. The avalanche legend to so

many put his professional passions down at the end of the day to pick up the rhythms of home life with his wife and three children. Equally, I gathered he didn't bring his home life to work.

Peter's formula may not be the one for everyone. However, by all accounts, it allowed him to live a life in full both personally and professionally—a life of discovering and sharing out in the world of mountains and snow, and at home raising a family.

Professionally, beyond the technical and professional achievements, Peter set an example of mentorship. He set an example for those who learned from him and further advanced avalanche practice and professionalism in Canada, like Chris Stethem, Bruce Jamieson, Dave McClung, Clair Israelson, and many others. This gang took up his example to be generous mentors to future generations.

If part of the meaning of life is to share one's gifts, Peter exemplified that lesson doubly. He not only gave his talents generously, but fostered a culture of sharing and mentoring that has touched thousands of practitioners in Canada and around the world. The coda to this example I took from his memorial service is that we should take care of ourselves along the way and not lose sight of our loved ones.

Many of you will read this issue of *The Journal* in the light of summer. I hope all of you get a chance to recharge. The winter ahead will be a time for sharing your talents with students, clients, and co-workers. I hope you all recharge yourselves and prepare for the upcoming season so you may give at work while keeping reserves for a happy life at home. Few of us will have a career that shines as bright as Peter's, but we can take heart from his example that with care, we can give generously as professionals while living fully at home.

Thank you, Peter, for this and your many other lessons.

**Joe Obad, CAA Executive Director**



**Alex Cooper**  
Managing Editor

## From the Editor

### THE ENDLESS WINTER

regret my decision? Maybe just a little. At the same time, one thing I've learned over the past year is the need to hold back, take it easy, and listen to the body rather than always feel the need to be getting after it.

It was great to get back to the Spring Conference in early May. I heard lots of great stories from the past winter—both in the conference room and outside in the lobby. My list of future articles is lengthy and I hope they will begin to filter into future issues of *The Journal*. I couldn't include any this time because the endless winter kept many potential contributors working.

Despite this challenge, I think this is a great issue. Leading things off, Jason Smith looks at Toby Creek Adventures, which we believe is the only snowmobile guiding operation in Canada that uses active avalanche control as part of its program. Next, Tyson Rettie, founder of the Braille Mountain Initiative, writes about his experience re-entering the avalanche industry after losing his vision. I worked with him last winter at Avalanche Canada and can say his vision loss did not impair his ability to work

**IN MID-APRIL**, after a particularly heinous day failing to avoid breakable crusts while ski touring, I decided it was time to put away the skis. The bike trails were opening up and my garden was finally snow free. I accomplished my goal for the season, which was to simply not re-injure the knee I had ACL surgery on a year prior. I hadn't skied much earlier in the winter and missed many powder days, but why risk it for some mediocre spring turns?

Little did I know, this would be the winter that would keep giving. As I got myself dirty in the valley, the snow kept falling up high and many of you were still out controlling avalanches. An already deep snowpack reached new heights in some places—doubling the normal depth for the spring as the snow piled up instead of melting away. Do I

as a public avalanche forecaster. He may be tired of hearing this, but his story is inspirational. Curtis Pawliuk introduces the emerging Canadian Motorized Backcountry Guides Association, which is working to establish standards for snowmobile guides.

For the *In the Loupe* section, Katie Fisher summarizes a portion of her master's research into avalanche bulletin users. Her article looks at using learning interventions such as quizzes in the forecast as a way of continuing the education of backcountry recreationists. As a follow-up to her article, we present the work done by Paul Diegel in Utah and Kevin Grove in Oregon, who put Katie's recommendations into practice.

Recently retired University of Montana professor Robb Larson looks at the research his team conducted into remote avalanche control systems. The actual master's thesis by his student Brandt Seitz is over 500 pages long and includes all the charts and tables you could ask for. This article summarizes the work in 3,000 words. If you're so inclined, you can find a link to the thesis at the end of the article.

Of course, the heart of this issue is a look back at the life of Peter Schaerer, the "Patriarch" of the Canadian avalanche industry, who passed away in May. I was aware of his importance to our industry, but researching his life and reading stories from those who worked closest with him really drove home the impact of his leadership on our small world. Not only did he undertake research that had immense practical implications, he also set an example by teaching and mentoring upcoming avalanche professionals, and organizing the industry to work together. The Canadian avalanche industry would be a very different place if it weren't for him.

I hope the snow has melted by the time you read this and you're enjoying a great, if delayed, summer.

**Alex Cooper**

# Industry Training Program 2021-22

Andrea Lustenberger

**THIS WAS ANOTHER CHALLENGING WINTER** for the CAA's Industry Training Program, but even with the historic weather events and the pandemic working against us, we managed to hold 48 courses for 1,292 students in 2021-22.

The start of the season was interesting, to say the least. The highway closures in B.C., which were prompted by consecutive atmospheric rivers and record precipitation, posed significant challenges. They prevented some students and instructors from making it to their courses, but with hard work and adaptability, the majority of them were able to attend.

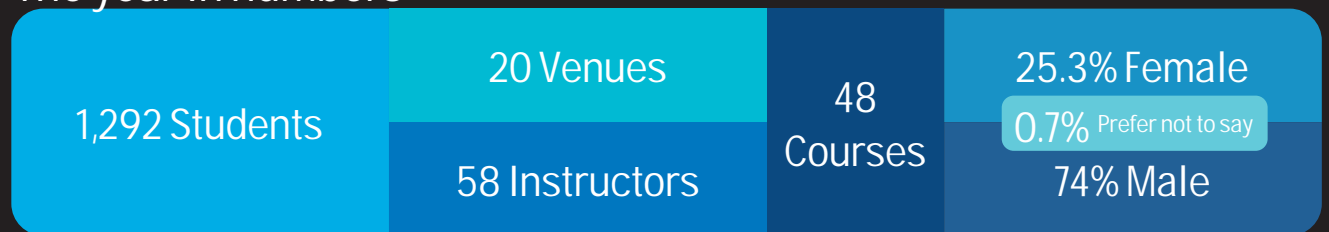
After dealing with the weather, we then had to adjust to the Omicron wave of the COVID-19 pandemic. Health restrictions tightened in late-December and as a result, we ended up cancelling the Level 1 courses scheduled at Burnie Glacier Chalet and Kootenay Pass in January. We were able to offer students on the Burnie course an alternative Level 1 in Smithers, B.C., and worked with Kootenay Pass students to get them on another course later in the season.

## COVID ON COURSES

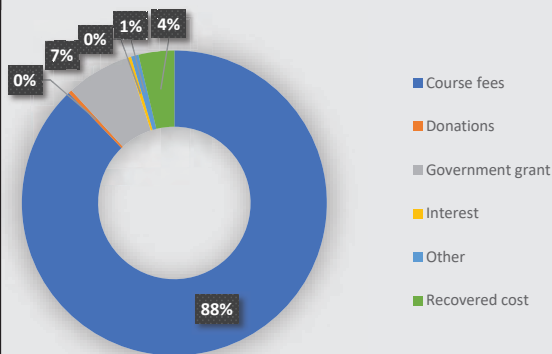
Even with protocols in place, we couldn't keep COVID off courses during the Omicron wave. We had four students test positive on one course, resulting in the final field session being cancelled. In addition, throughout the season we had two instructors test positive, two students unable to complete courses, two test positive following courses, and a number unable to attend due to symptoms prior to the course start. Thank you to every student and instructor who worked so diligently this winter in managing COVID.

Like many operations, we were impacted by instructor shortages resulting from COVID and injuries. We worked hard to fill holes in the schedule, but sometimes we were unable to do so. Instructors worked incredibly hard to complete courses with a larger student ratio. While these scenarios are less than ideal, we are proud that our courses were able to continue and students were able to continue their education.

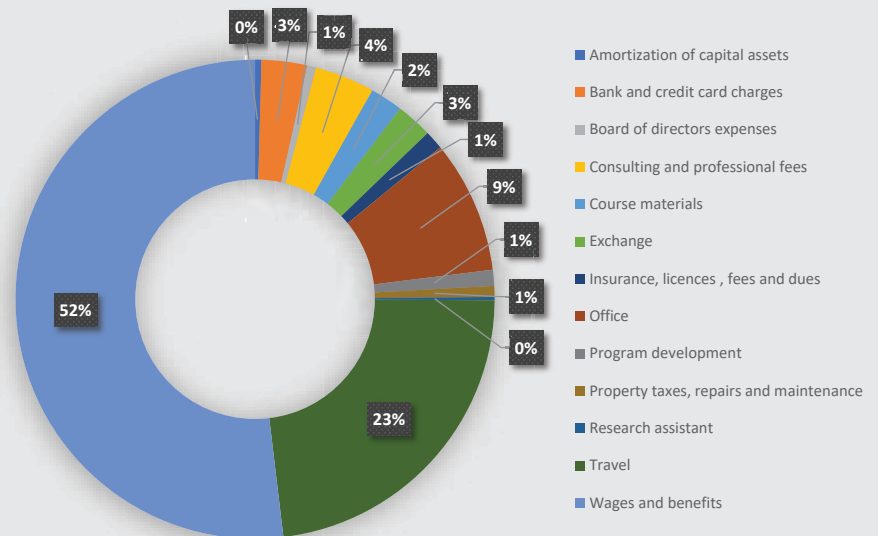
## The year in numbers



### 2021 ITP Revenue



### 2021 ITP Expenses



## WHATS NEW FOR 2022-23

The Industry Training Program is pleased to announce a new option for Introduction to Weather students. As of October 2022, this course will be available both online and in-person. The online course will take place over eight weeks and will be facilitated by an ITP weather instructor. It will be primarily self-directed, with weekly one-hour Zoom sessions hosted by the instructor. These sessions are intended to stimulate learning and engagement, answer questions, and provide guidance for learners with each week of materials. The intent is to make this course more accessible to a greater number of people, especially those in remote areas where travel and accommodation expenses for a weekend course are prohibitive.

ITP launched a new and improved registration process for Level 2 students this spring that is based on feedback from previous students who identified challenges with registration. The objective is to make the process smoother, more efficient, and less stressful for registrants. All Level 2 students were informed of the new process upon acceptance into the program. 📌

# Steve Brushey

## 2022 CAA Service Award

**STEVE BRUSHEY WAS RECOGNIZED** for his work as chair of the CAA's Explosives Advisory Committee by being awarded the 2022 CAA Service Award at May's Spring Conference. Steve is the district avalanche supervisor for the B.C. Ministry of Transportation & Infrastructure's Northwest Avalanche Program and has chaired the EAC for six years.

Steve's colleagues on the committee joined together to nominate him for the award. He was credited for his professionalism, leadership, common-sense approach to difficult issues, commitment to open communication, mentorship, and ability to represent diverse industry sectors.

### How does it feel to receive the CAA Service Award?

Well certainly I was not expecting the Service Award and it caught me off-guard. It means a lot to me to be recognized by my peers from the Explosives Advisory Committee. Several of the guys have a lot more mileage than I do and it's humbling to be nominated by this group.

### How did you get started in the avalanche industry?

Once I had the entry-level requirements, I assisted the late Al Munro with an avalanche contract he had at the time. I also picked up work with Christoph Dietzfelbinger, who graciously took me under his wing and my avalanche career began. Both Al Evenchick and Al Munro were close friends and mentors. Very soon after their unfortunate accident, Tony Moore hired me for the Terrace program in 2001.

### What do you enjoy most about working in highway avalanche control?

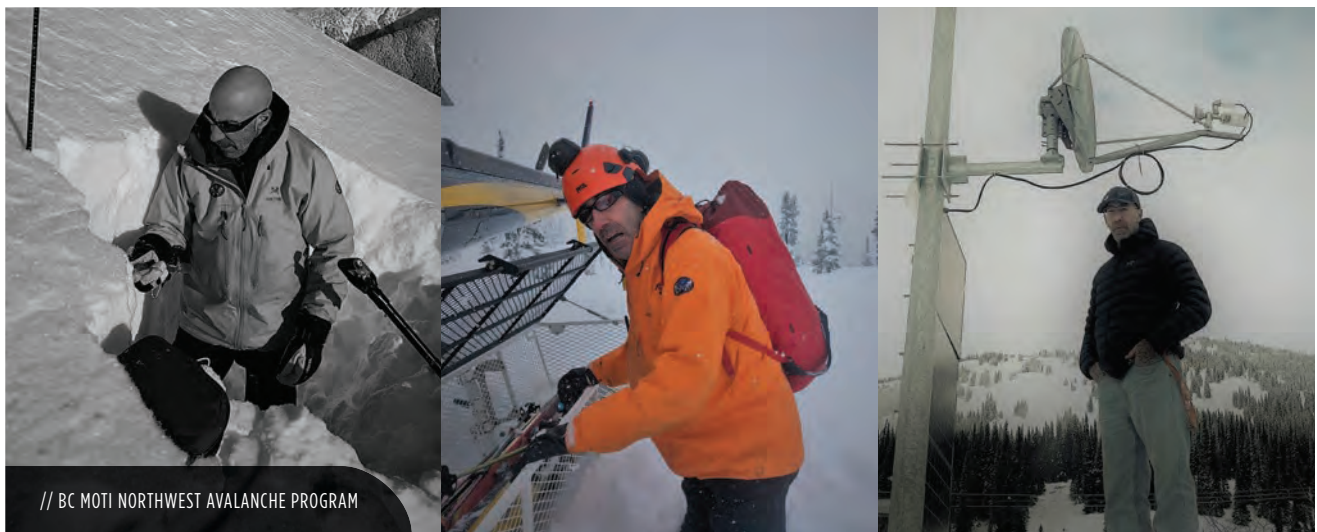
I enjoy the accountability and transparency required by the BC Ministry of Transportation. We are integral to the efficiency and safety of the transportation corridors in the province. I am fortunate to be connected to a large group of talented and experienced people in the avalanche industry, and with various regulators and suppliers. These connections all make the work that I do that much easier, and it ensures our program keeps our bar high.

### What inspired you to take the lead of the explosives committee? Why do you think this portfolio is so important to the industry?

Scotty Aitken was retiring, and I was asked if I was interested in taking over as chair. I saw it as my opportunity to give something back to the CAA. More importantly, I felt it was time for all sectors who handle explosives to work closer together through sector representation on the committee to ensure and promote safety and transparency. Explosive use in our business is a privilege and it is important this portfolio stays abreast of best practices and regulations so the CAA and its membership stay current.

### What's your Number One piece of advice you'd like to share with people new to the industry?

Don't take short cuts, follow your approved procedures with regular training, and never get complacent. 🇨🇦



# Honorary Member Anton Horvath

**ANTON HORVATH** was named the 12th Honorary Member of the Canadian Avalanche Association at this year's annual general meeting. He retired this spring after more than 40 years working for the Whistler Mountain ski patrol.

Anton joined the Whistler patrol team in 1979 and became the avalanche forecaster in 1992, along with Jan Tindle. For over 30 years, he successfully supervised one of North America's biggest avalanche programs. As senior avalanche forecaster, he was a constant mentor and leader for his team. His efforts helped keep them and the public safe throughout his career.

Anton has also been an avalanche rescue dog handler since 1985 and has validated four dogs. He is a past-president of the Canadian Avalanche Rescue Dog Association, a current CARDA instructor, and has been heavily involved with search and rescue. He conducted scene hazard assessments, was involved in the recovery of several avalanche victims, and investigated avalanche fatalities for the coroner and RCMP.

Anton served the broader industry. He made valuable contributions in explosives handling and avalanche mitigation techniques. He served on the CAA Board of Directors as the Chair of the Membership Committee and as Vice President. He was a member of the InfoEx Advisory Committee since its inception and served as an instructor for the Industry Training Program.

## **As an Honorary Member of the CAA, you're in some pretty illustrious company. How does it feel to join this group?**

I'm both honored and humbled to be joining the list of past heavy hitters in the avalanche industry, many of whom I have developed a close relationship with during my career and involvement with the CAA.

## **You joined the Whistler Ski Patrol in 1979. What brought you into the industry?**

I moved to Whistler from Canmore in 1977 to become a ski bum and started working for the Garibaldi Lift Co. two days after my arrival. During my first two seasons I was a lift operator and then became the trail crew supervisor. There was a deep persistent weakness in the basal layers of the snowpack during that period and after seeing the ski patrollers (who included the likes of Chris Stethem, Roger McCarthy, John Hetherington, and Brian Leighton) trigger some massive avalanches, I decided to pursue a career as an avalanche worker and join what was affectionally referred to then as "The God Squad."

## **Looking at the list of Honorary Members, you're the only one whose entire career was at a ski resort. What was it about that work that kept you there for over 40 years?**

Although my primary focus was as an avalanche worker on Whistler Mountain and canine avalanche rescue, I also did some contract work for a few consulting firms and assisted with several accident investigations for the Coroners Service and RCMP. I guess there were three big factors that kept me working for the resort for the length of my career:

- First was the close bonds that were developed with many of my coworkers while working on the mountain day-in and day-out during some pretty heinous weather, and watching each others' backs while

working avalanche terrain and conducting avalanche control. We had very low turnover for several years that led us to become a very tight team.

- Second was having the best job ever once I became an avalanche forecaster and snow safety supervisor.
- Third was probably being able to sleep in my own bed every night.

Now that I have thought about it a bit more, I faced many challenges that kept my career exciting such as managing the expansion brought about by lift access into complex alpine terrain and expanding to include Flute Bowl as inbounds hiking terrain. These opened the door for easy access into some pretty challenging terrain for skiers with limited knowledge and abilities, which brought with it numerous challenges, particularly given Whistler has over six kilometres of easily accessed, heavily corniced ridgelines. These also became some of the biggest changes I experienced over my career.

## **What's the biggest change you've experienced over your career?**

Some of the other big changes I saw were those that came with high-speed lift access into avalanche terrain, which obviously came with various pros and cons; the introduction of the conceptual model of avalanche hazard assessment, and the competency-based assessment of avalanche workers. We successfully applied the latter to our avalanche workers using a version we developed specifically for our operation.

## **What is something that hasn't changed?**

Something that hasn't changed is the ongoing pursuit of maintaining a high level of professionalism with workers in the avalanche industry and being recognized as a legitimate trade. We have made some huge inroads in this respect through the years, but there is still some work to be done here.

## **What words of advice do you have for someone just starting a career in the avalanche industry?**

Becoming an avalanche worker through patrolling is an easy way to start developing the skillsets required to work elsewhere in the industry, but it's not as easy as it used to be given the high cost of living in most ski resorts that have a legitimate avalanche control program. The transition to competency and skills-based assessments for advancement is a steppingstone to eventually achieving better wages. Unfortunately, most workers still need to subsidize their winter jobs with a better paying summer job. The higher cost of living has eventually led to much higher turnover, with staff retention being the biggest challenge the industry in North America is facing today. For those who can find a way to stick around, and with a toolbox filling up with new skills, there is the potential for rapid advancement. 📌



# Critical Incident Stress Management Peer-support Program Launched

Kristin Anthony-Malone and HeliCat Canada

**THE CANADIAN AVALANCHE ASSOCIATION** is proud to be part of a new program that provides support for its members following critical incidents.

The CAA is working with HeliCat Canada, the Association of Canadian Mountain Guides, Canadian Ski Guide Association, Backcountry Lodges of BC Association, and Avalanche Canada to develop a volunteer critical incident stress management (CISM) support network. This network will provide peer-support responders, post-incident debriefing, and resiliency resources to help mountain-community workers deal with incident stress.

## WHAT IS A CRITICAL INCIDENT STRESS MANAGEMENT PROGRAM?

A CISM program is an organized, comprehensive, and thoughtful approach to CISM that deals with preventing, reducing, and controlling harmful stress symptoms resulting from exposure to a critical incident. It is a three-part program that provides:

- a network of trained individuals to organize, facilitate, and participate as peers in a variety of critical incident interventions with the support of mental health professionals when needed;
- education and awareness programs and resource materials delivered by peer-support personnel; and
- follow-up services, including information packages, referrals to professional clinicians, and peer support.

This program and its training follow the protocols and standards as set out by the International Critical Incident Stress Foundation (ICISF). This ensures the program follows a standard of care that is accepted internationally.

## WHY A PEER SUPPORT PROGRAM?

Studies from before and after the 9/11 attacks show peer-based programs are the most effective and accepted by those traumatized by a critical incident. Research and studies under the auspices of the ICISF indicate the same results.

One of the most important parts of such a program are the trained volunteer peers who provide the service. This team of volunteers provide CISM services to fellow workers who may have been exposed to a critical incident. Peers understand the work and issues surrounding on-scene rescue responses much more so than many mental health professionals can. Also, research shows those impacted by a critical incident are more likely to initially talk to a peer than a mental health professional about the event that impacted them.

Typically, CISM peer-support is provided within 24–72 hours of an event. Later, referrals may be made to professional clinicians and other peer programs such as the Mountain Muskox mentoring program.

## WHAT IS A PEER?

A peer is a fellow mountain-industry worker who is a good listener and confidant. Those receiving support following a critical incident must respect the CISM peer-support person as trustworthy and honorable for them to be effective. They must have the capacity to maintain strict confidentiality, work as a team member, and be able to cope with stress as well as recognize their own personal limits.

## WHAT QUALIFICATIONS DO YOU NEED IF YOU WANT TO BE A PEER VOLUNTEER?

To be supported by the CAA, applicants must be members in good standing, have a minimum of two years of experience in the avalanche industry, and possess strong interpersonal communication skills. Peers must be able to respond to CISM requests outside their home base both virtually and in person.

Selection criteria includes previous related training or certification, geographic placement, communication and people skills, past experience, references, and support from their employer.

## TRAINING PROGRAM

Successful applicants will attend a training session at Sun Peaks Resort from Sept. 22–25. The training will include two courses: Assisting Individuals in Crisis and Group Crisis Intervention. Participants in the program will receive International Critical Incident Stress Foundation (ICISF) certification.

The CAA is funding several positions on this course. There is no cost to participants or their employers. Participants must be willing to act as a volunteer peer-supporter for at least two years and have the support of their employer. Other mountain-related associations are funding additional participants from their organizations.


For more information about CISM Peer-Support please visit [icisf.org](http://icisf.org).

## HOW IS THE PROGRAM STRUCTURED AND FUNDED?

This program has a committee that governs day-to-day administration. A central dispatcher will be on call 24/7 to receive calls from mountain operations that request these CISM services. The various mountain associations, with the assistance of WorkSafeBC, are providing the initial funding to support peer training and to conduct education and awareness sessions. Peer-support volunteers will be reimbursed for any direct costs incurred while responding to an incident.

## HOW DO YOU APPLY OR GET MORE INFORMATION?

The application deadline to the program was July 22.

Anyone interested in becoming a peer-support volunteer in the future can contact CAA Membership Services at [membership@avalancheassociation.ca](mailto:membership@avalancheassociation.ca) for more information. 

# Scenes From the Spring Conference



THE CAA SPRING CONFERENCE RETURNED TO PENTICTON FOR THE FIRST TIME SINCE 2019. THE HYBRID CONFERENCE SAW 259 MEMBERS ATTEND IN-PERSON AND MANY MORE WATCH ONLINE. THE EVENT RAN SMOOTHLY AND MEMBERS WERE ABLE TO ENGAGE WITH THE MANY SPEAKERS WHETHER THEY WERE IN PENTICTON OR WATCHING FROM HOME. CLOCKWISE, FROM TOP LEFT: THE CONFERENCE CENTRE HALL WAS ALMOST FULL FOR THE 1.5-DAYS OF PRESENTATIONS.; KIM VINET SPEAKS ABOUT HOW THE TRAUMA SHE EXPERIENCED AFTER A FRIEND DIED IN AN AVALANCHE IMPACTED HER PURSUIT OF GUIDING CERTIFICATION. KIM RECEIVED A STANDING OVATION FOR HER EMOTIONAL AND IMPACTFUL PRESENTATION.; NEW CAA PRESIDENT EIRIK SHARP (LEFT) WITH OUTGOING PRESIDENT WALTER BRUNS DURING THE ANNUAL GENERAL MEETING. WALTER STEPPED DOWN AFTER SIX YEARS AS PRESIDENT.; BRIAN GOULD DELIVERS A PRESENTATION ON AVALANCHE CONTROL FOR RAILWAYS. HE LOOKED AT THE CHALLENGES OF KEEPING RAIL LINES OPEN IN WINTER, AND TOUCHED ON THE STORMY 2021-22 SEASON.; MARY CLAYTON RECEIVES A WARM ROUND OF APPLAUSE AFTER BEING NAMED A CO-RECIPIENT OF AVALANCHE CANADA'S GORDON RITCHE SERVICE AWARD ALONG WITH HER HUSBAND KARL KLASSEN. THE TWO, RECENTLY RETIRED, WERE HONOURED FOR THEIR WORK FOR AVALANCHE CANADA SINCE ITS INCEPTION IN 2004.; CIL'S BRADEN SCHMIDT (RIGHT) PRESENTS A \$17,220.96 DONATION FROM CIL TO JOE OBAD, EXECUTIVE DIRECTOR OF THE CAA. CIL DONATES A PORTION OF ITS SALES OF EXPLOSIVES TO THE AVALANCHE INDUSTRY TO THE CAA EACH YEAR. // ALEX COOPER

# Contributors



**JASON SMITH** is the operations manager and avalanche forecaster for Toby Creek Adventures in the East Kootenays of B.C. He has been a snowmobile guide since 1998 and has also worked as an Avalanche Skills Training instructor and ATV guide. He is a long-standing member of Panorama Fire Rescue and has run a fly-fishing guiding service in the summer months since 2002. He is an Avalanche Professional with the CAA and completed the Avalanche Operations Level 3 course in 2010. More recently, “Smitty” has been working on the board of directors of the Canadian Motorized Backcountry Guide Association.

**19 ROCKIN’ THE PARADISE—**  
**AVALANCHE CONTROL USING**  
**EXPLOSIVES TO OPEN TERRAIN FOR**  
**SNOWMOBILERS**



**KATHRYN FISHER** holds a bachelor’s degree in Integrated Science from the University of British Columbia, and a master’s degree in Resource and Environmental Management from Simon Fraser University. Her master’s research centered on improvements to safety messaging in public avalanche forecasts. She currently works for the Canadian forest service using forest carbon models to estimate the greenhouse gas emissions balance of Canadian forests.

**27 AVALANCHE EDUCATION VIA**  
**LEARNING INTERVENTIONS IN THE**  
**BULLETIN**



**ROBIN SIGGERS** is currently the operations manager at Fernie Alpine Resort. He started there as a ski instructor in 1977 and moved into the snow safety department in 1979 after the Griz Chair avalanche incident. He has been involved in the avalanche patch since then as a ski patroller, avalanche forecaster, instructor, and program manager.

**38 THE DRAGON TAMERS—**  
**LEARNING THROUGH REFELCTION**



**TYSON RETTIE** is an avalanche professional and member of the Canadian Ski Guide Association. Since 2010, he has worked in many different facets of the avalanche industry. He is currently the executive Director of Braille Mountain Initiative and a forecaster at Avalanche Canada.

**21 FORECASTING BLIND—**  
**NAVIGATING A FUTURE IN THE**  
**AVALANCHE INDUSTRY WHILE**  
**LEGALLY BLIND**



**ROBB LARSON** was raised in Bozeman, Montana, and at the Bridger Bowl ski area. After eight years in aerospace, he spent 30 years at Montana State University, retiring as an Associate Professor of Mechanical Engineering in June 2022. Larson’s winter sports acumen and instrumentation expertise supported decades of avalanche-related snow science projects, including explosives measurement work.

**32 RACS TESTING—MEASURING THE**  
**EXPOLOSIVE AIRBLAST OF REMOTE**  
**AVALANCHE CONTROL SYSTEMS**



# front lines

---

## 21

FORECASTING BLIND

### in this section

**18** ESTABLISHING THE CANADIAN  
MOTORIZED BACKCOUNTRY  
GUIDE ASSOCIATION

**19** ROCKIN' THE PARADISE

**23** GROUP SEARCHING—USING  
PEOPLE POWER TO SIMPLIFY  
COMPLEX BURIALS



# Establishing the Canadian Motorized Backcountry Guides Association

Curtis Pawliuk, CMGBA Director and Backcountry Snowmobile Guide

**FOR THE LAST 14 MONTHS**, a dedicated team of volunteers has been working to professionalize the motorized backcountry guiding industry. What began as a high-level conversation amongst peers over several years is now becoming reality.

Through formal discussions, a dedicated group of industry professionals created the Canadian Motorized Backcountry Guide Association (CMBGA), a not-for-profit society incorporated in British Columbia that is led by a volunteer board of directors

The mountain snowmobile industry is growing and it is necessary for those active in the commercial guiding aspect of this sport to match current industry best practices. Building off the initial work of the BC Commercial Snowmobile Operators Association (BCCSOA), the CMBGA is working to establish an industry standard of training and certification for motorized backcountry guides with the goal of enhancing the level of safety and proficiency in this profession.

The distinction between the BCCSOA and CMBGA can be compared to the relationship between HeliCat Canada and the ACMG or CSGA. The role of the guide's association is to work with and represent the guides. It sets standards and qualifications, and provides training, assessment, and, ultimately, certification for those wishing to work within the industry. This increases professionalism, safety, and sustainability within the community.

The goal of the group is to establish the CMBGA as a professional association of trained and certified guides and instructors that are dedicated to protecting the public interest in motorized mountain travel and instruction, while also providing a voice for the motorized guiding industry, tenure holders, and the community.

The group has spent several months working on the establishment of a set of technical standards, guide qualifications,

and lesson plans for motorized backcountry guiding and instructor certification. This past April, the group got together in Revelstoke for a week of face-to-face meetings where ideas, concepts and strategies were discussed and debated. The curriculum was formalized and lesson plans were put to the test in the field.

To date, we have developed draft standards, a code of ethics, qualifications, and assessment strategies that will be further reviewed by industry peers and then ultimately put into practice with a group of current industry professionals in early-winter 2023.

The CMBGA welcomes feedback from participants, industry professionals, and those currently working in the sector. This is a crucial aspect of the development process. Building a guide's association is not an easy task, nor one that will happen quickly. Patience is key as we work through this important and vast undertaking.

The next steps will include more formal information sharing via the CMBGA website and social media channels, where the public and interested industry participants can review the current information and keep up to date on the progress of the group. With an undertaking this large, funding is a crucial aspect to move the association forward in a timely manner. The CMBGA intends to create an option on the website where interested stakeholders and future members can contribute to its development.

The intent of the CMBGA is not to enforce, pressure, or scrutinize existing operations and those working within the industry, but to build a recognizable standard of training,

professionalism, and certification for motorized backcountry guides to protect the recreating public, the industry, and the activity we all love so much. Change will not happen overnight, nor is it expected to. The board of the CMBGA will work away at this monumental task with the goal of professionalizing the winter motorized guiding industry. 🇨🇦



THE CMBGA BOARD OF DIRECTORS. TOP ROW, FROM LEFT: BRIANNA LUKKAR, CURTIS PAWLIUK, MARSHALL DEMPSTER, AND IAIN STEWART-PATTERSON. BOTTOM ROW, FROM LEFT: JASON SMITH, STEVE SCOTT, JASON RIBBI, AND CHRIS GRANTER.

# Rockin' the Paradise

## Avalanche Control using Explosives to Open Terrain for Snowmobilers

Jason Smith

**WE LIKE OUR MUSIC HERE** at Toby Creek Adventures (TCA), and there's no shortage of musical references to Paradise—the incredible alpine basin at the heart of our operations. Pick your song: *Rockin' the...*, *Welcome to...*, *Just Like...*, *Another Day in...*, *Gangsta's...*, *Two Tickets to...*, or, our favourite, *Cheeseburger in...* It seems like just about everyone wants to be here, or at least write a song about the place.

Based just north of Panorama Mountain Resort, B.C., TCA has been running snowmobile tours in the Purcell Mountains since 1996. While we have a vast tenure and load sleds onto trucks and trailers to chase powder with clients in a number of publicly accessible snowmobile play areas, the heart of our operation lies on our own private property located just above our headquarters. A large majority of our guests leave right from our base of operations and head up into the alpine to Paradise Basin.

Why not? It's sled-in, sled-out, we have full control over trails that are groomed meticulously daily, and it features almost 1,000 hectares (570 ha are private) of all the terrain, from beginner to advanced, that any rider could ask for. The snowmobile trail gets up to a tight bowl below Paradise Cabin at the sight of the historic Paradise Mine, which was a productive silver, lead/galena extraction operation until the late-1960s. It has become a perfect little playground for sledding. (The skiing sucks here, so we don't talk much about it.) It is also one of the only sledding areas with an active avalanche control program using explosives.

### EARLY DAYS

It was obvious early on, when initial tours were run up the adjacent Hopeful Creek drainage with the support of Panorama, that to consistently get our guests where we wanted, we'd need to develop some sort of avalanche control program. This was first done by bootpacking trails with snowshoes, skiing, lots of shoveling, and pushing tons of snow by snowcat—the company's fearless founder Scott Barsby at the helm. Some avalanche techs from the Panorama ski patrol were brought on board to help with the program, notable mentors being Jesse Percival and Paul Fossberg.

After moving the operation to its current location in 1997, the avalanche control program began to progressively develop. Licensing and regulatory requirements were met, a site was mapped out, and two small permanent magazines were set up where we stored products typically used for explosives avalanche control—12.5kg bags of ANFO, one-kilogram emulsions, and safety fuse assemblies initiated

with pull-wire igniters. There was enough to get us through a forecasted half-dozen or so missions per season, with up to a dozen shot placements considered per mission. Our budget did not rival that of the Ministry of Transportation or even that of neighbouring Panorama.

Outside of explosives control, avalanche hazard was (and still is) mitigated by road closures, terrain management, sled compaction, and occasional sled cutting. There were a couple of notable avalanche paths that affected the trail: the first on a switchback section halfway up (eventually named Dusty's) and another with a start zone up higher called Roy's Run, which would run out over the road. Bypass roads were constructed to avoid these sections of trail so we could get to the cabin during high avalanche conditions or if we were not able to control start zones for whatever variety of reasons.

Most of the explosives control work in the earlier days was done by hand-thrown or hand-placed charges from skis. Our uptrack routes got a control team to ridgetop start zones or numbered signs strategically placed on trees marking traditional shot placements. A typical control route was a full-day mission on skis. Sections of trail could be closed for a couple weeks until they were cleared and opened. I can remember the sound of naturally occurring avalanches stopping us dead while skinning up a track in a storm, halfway to our destination, only to realize that the bombs we were carrying on our backs had just become pointless. "Guess we're skiing home?"

With advancements in technology, most of these routes can now be accessed by snowmobile, depending on conditions and the ability of the rider. Many stories might be told of those early missions, more appropriately over a pint. For this article, suffice it to say that numerous tobogganing saucers and crazy carpets on the end of rope were disposed of. After all, every avalanche path with a name generally comes with a story behind it. They're kind of like songs that way.

### CONTROLLING PARADISE

Paradise Basin was, and still is, where the numbers are, or, for this concept, where most of our exposure is. For this reason, our explosives control program has been almost exclusively kept to this area. In previous years, we did some control work in different areas of the tenure for special projects—the testing of beta versions of avalanche airbags with dummies on longlines under helicopters comes to



PARADISE AREA OVERVIEW. THE BASE OF OPERATIONS IS LOCATED AT THE RED PIN ON THE RIGHT, PURPLE LINES MARK THE UPPER AND LOWER BYPASS ROADS, COLOUR-CODED “PLAY AREAS” FOR TOURING SLEDS ARE OUTLINED, AND THE LEFT PIN MARKS A NEARBY SNOW PROFILE SITE.

mind—but most work has been done at Paradise. We conduct avalanche control exclusively for the safety of our guided tours, not for other user groups. The fact our Paradise tours operate mostly on private property makes it easier for us to control access, which makes it a lot safer to do avalanche control. Gates are closed, signs put up, guards with radios are set, and access to the area can be completely blocked while explosives control takes place. This isn't something that can be done easily at a public snowmobile area.

These days most of our explosive control is done by hand, case charging, or heli-bombing, which gives us the added safety feature of flying over the entire area to make sure it's clear. We, of course, still use terrain management and closures throughout our tenure to avoid or reduce our exposure to avalanche hazard, but we only mark these closures for the tours in Paradise Basin. Instead of run lists, for example, we use a colour-coded system with bamboo markers in the field to define red, orange, yellow, or green play areas in the basin for our guests. These zones are established in the morning guides meeting and represent the area guests can access—red areas are smaller than green areas.

Incidents, accidents, near-misses, and case studies tend to change things. We've had our share. An incident on March 17, 2012, made us rethink how we approached our avalanche hazard. A busy Saturday on a bluebird spring day brought a group of snowmobilers from Saskatchewan out to Paradise. Back then we offered unguided public access, though we required all guests to carry avalanche safety gear. This group had or were rented the gear but had no avalanche education. After paying a trail fee, they headed up and got into a closed (obvious to us, not to them) section and triggered the start zone of Roy's Run. It slowly but destructively ran, threading the needle between multiple tours as they travelled down the mountain in the afternoon. The flow crossed the trail in sections, which stranded a couple of groups above the debris. Miraculously, no one was hurt, and the slide stopped in a pile eight metres deep among mature timber.

I remember standing wide-eyed in the icy halfpipe of debris with the owner at the time, trying to decide how to prevent anything like this from happening again. We considered purchasing an Avalauncher, but instead a bypass road was put in. It was decided the most cost-effective way to move forward was with more heli-bombing missions when it made sense.

In 2021, we stopped offering unguided access to Paradise Basin. With tours becoming busier, an increase in recreational users, operational constraints (grooming, trail building, logging, roadwork, etc...) and a new insurance company, we now only offer guided tours to Paradise.

After the industry moved to daily digital tracking of explosives magazines and storage, we decommissioned the permanent magazines and switched to renting a Type 9 wheeled magazine that would be on site from November to April. We work together with RK Heli-ski to share the cost of storage and control under a shared licence. Together with Panorama, our three neighbouring operations manage to get explosives into the area as one of the tools used to make it safe for our guests to play in the mountains locally, whether it be on skis, by helicopter, or on snowmobiles.

A few TCA clients have timed their tour with us well enough to be at Paradise Cabin during some avalanche control, and at no extra charge (very punny). The deck at the cabin is not a bad venue for a good show and I've always thought the acoustics in the basin would be perfect to host an outdoor concert. The closest we've come to a rock star was when Kim Mitchell played *Paradise Skies* years ago across the road in the TBar at Panorama.

We're currently working on logistics for here though, reaching out to Green Day, David Lee Roth, Coolio, and Jimmy Buffet for Lollapalooza in Paradise. We missed our chance at Eddie Money, but we've got a real shot at Axl Rose coming up to sing *Paradise City*. I can't wait to see him rip around on an 850 Turbo! We'll try to time it for when it's ripe for a mission. Coupled with heli-fireworks, it could make for some big results to share on the InfoEx.

Everyone will be invited. See you in Paradise. 📍

# Forecasting Blind

## Navigating a Future in the Avalanche Industry While Legally Blind

Tyson Rettie



TYSON RETTIE GETS IN SOME TURNS DURING A BRAILLE MOUNTAIN INITIATIVE TRIP TO SORCERER LODGE. // STEVE SHANNON

**PRIOR TO MY VISION LOSS,** I was working as a ski guide in the mechanized industry. I was first exposed to the concept of guiding on my 18th birthday when my dad took me out with RK Heliski near Invermere, B.C. From there, I was hooked and started my path towards becoming a certified ski guide. I began my career as a tail guide at Big Red Cats when I was 19. Guiding very quickly became much more than just a job—it was a lifestyle.

The Canadian Ski Guide Association best fit my goals within the industry. I first attempted the CSGA Level 3 course at the age of 25. I was initially unsuccessful, but later passed the exam. By this time, I had a full-time job at Great Canadian Heli-skiing and a part-time job guiding snowmobile tours at Toby Creek Adventures. A few seasons prior, I had the privilege of being part of a three-guide team tasked with the opportunity to start a new cat-skiing and heli-skiing operation in China. Around this time, I started to develop a number of health problems—the most significant being vision loss. I guided my final winter blind in one eye and lost the vision in my other one shortly after the season ended.

In the summer of 2019, I was legally blind and was later diagnosed with a rare mitochondrial disease. I have some remaining peripheral vision—enough that I can walk into an unfamiliar room and not bump into furniture, but not enough to know who or how many people are in the room. It was quite obvious I would never be able to ski guide again, but I was determined to continue skiing and find a place for myself within the avalanche industry.

### BACK ON SKIS

Returning to skiing was a bittersweet experience. On one hand, it felt good to be back at it and prove to myself that vision loss wouldn't keep me out of the mountains. On the other hand, it was one of the most frustrating challenges I ever attempted. I was used to being out front and in charge and I struggled to come to terms with the fact I would have to turn over the reigns to someone else. I would be the guided, not the guide, at least at the start.

I also struggled to even ski. I essentially had to learn all over again. I struggled to maintain my balance and lacked the confidence to stick to the fall line. I very clearly remember the first time I skied as though I did not have a visual impairment. It was a short but open and consistent slope in Kootenay Pass. It was a major turning point. I very quickly began to build confidence and speed in open terrain where I had nothing to hit. Later that the season, with the help of some friends, I skied a first blind descent in the Purcells—a 1,700 m run from the summit of Jumbo Mountain to Commander creek.

### BRAILLE MOUNTAIN INITIATIVE

My first foray into the industry as a blind person was in adaptive sport. I founded Braille Mountain Initiative, a non-profit organization focused on providing the opportunity for other blind skiers to participate in backcountry mountain sports. So far, I have run four trips for blind athletes with the help of friends and family.

On our most recent trip, we took a group to Sorcerer Lodge and provided them with one of the first AST 1 courses for the blind and visually impaired. This required modifying the AST curriculum so it could be taught to blind athletes. While doing so, I knew it would be critical to retain the core competencies of the curriculum and only change the way the information was delivered and the expectation of how our participants would use the information. For example, we didn't use the standard slideshows; instead, we looked for real-world examples participants could put their hands on or feel under their skis. Another change was our expectation of how our participants would identify avalanche terrain. Instead of teaching them what to look for, we taught them what to ask of their partners throughout the day to maintain situational awareness and know when they are in avalanche terrain.

This work has been very rewarding, but it is a passion project and not a paying job. I wanted to get back into the industry in a more full-time way.

## PUBLIC AVALANCHE FORECASTING

On November 15, 2021, I started my new career as a public avalanche forecaster with Avalanche Canada. This would be the first time someone with such a significant visual impairment would be in this role. It would be an experiment for everyone involved. I knew going in that a lot of weather forecast resources would not be accessible to me. I use screen reader software on my computer to access the critical data needed to do my job, but this software cannot interpret visualizations—only tables and text. Essentially, the software presents the data that is displayed on the screen in an audio format and I use a variety of shortcut keys to instruct it to read out different elements. This means instead of viewing ensemble meteograms, I listen to weather data in a table format, with time on the Y axis and different weather parameters on the X axis. I listen to point forecasts for several areas within a forecast region to build a mental ensemble and a picture of weather and snowpack over a large area.

This job has required me to forecast for areas of western Canada that I have never been to or seen a map of. I cannot read a map anymore, so I orient myself by looking up the latitude and longitude of a familiar point within the forecast region and build a mental map using the coordinates of various weather stations, forecast points, and important geographical features. This is an ongoing challenge but my ability to remember large numbers is improving. I can listen to a latitude and longitude and have a rough idea where it is within a region.

## FIELD OBSERVATIONS

Field work became the next challenge to conquer. I lack the vision to lead a team in the mountains, but I can still be a functioning member of one. Snow profile work is hands-on and doesn't require a lot of adaptation. I have ditched some of the traditional tools for a talking tape measure. For example, to measure the height of snow, I simply use the talking tape to measure the portion of the probe above the snow surface and subtract from 320. Snow crystal identification is much more challenging. I must go into each pit with good background knowledge of what layers are likely to be found and at what depth. It's not possible to feel the difference between large facets and surface hoar so I need to have a better understanding of the factors that would result


in one layer versus the other developing in a given snowpack.

Of course, field work is so much more than digging profiles. As professionals, we make many ongoing observations throughout the day just by looking around as we travel through the mountains and by feeling the snow under our skis. While my ability to make observations with my remaining vision is quite limited at times, I feel as though my connection with the snowpack through my skis has improved.

In early January, me and fellow ski guide Harry Bolger were touring at Pedley Pass in the Rocky Mountains near Invermere, B.C. We were travelling across a ridge feature just above treeline when the snowpack under my skis began to feel slabby and a bit spooky. I started to think about what I could be feeling. Towards the end of December, there was a period of cold and dry weather followed by easterly winds in the area. I figured the steep, west-facing slope to my left probably had wind slab over facets. Harry was obviously feeling the same thing. Before I could say anything, he commented: "This feels like a great place to start an avalanche."

We continued skinning along the ridge to the summit for lunch, after which we decided to ski back along our skin track to the trees on the skiers left of the bowl that had been on my left when travelling across the ridge. While skiing over the part of the ridge where I had felt slabby conditions, we both heard a loud whumpf and I felt the snowpack settle. We were in a safe place so neither of us were very concerned. My first thought was, "Oh yeah! Wind slab on facets." I realized I was wrong when a few seconds later, Harry exclaimed: "Its still going!"

We actually triggered an avalanche on the December 1 layer that had then stepped down to ground. The average depth of the crown was two metres. Harry later measured the width and length using Gaia—the avalanche was 350 m wide and ran for 1,000 m. While I may not have accurately picked out the weak layer in my head, I certainly wasn't wrong in feeling unsafe snow under my skis. It was an exciting moment and certainly the largest avalanche either of us have triggered.

Ski guiding will likely remain off the table due to my vision loss, but I will continue to seek new opportunities to apply my skills and develop new ones as an avalanche professional. In my spare time with the help of friends, family, and many industry partners, I hope to push the limits of adaptive sport as the director of Braille Mountain Initiative. 





WHEN SEARCHING IN PARALLEL FOR MULTIPLE VICTIMS, IT IS ESSENTIAL TO MAINTAIN LANE DISCIPLINE. LANE WIDTHS SHOULD ROUGHLY EQUAL THE WIDTH OF THE DEBRIS DIVIDED BY THE NUMBER OF AVAILABLE TRANSCIEVER SEARCHERS.

# Group Searching

## Using People Power to Simplify Complex Burials

Bruce Edgerly and Jim Conway

**IT'S A TEMPTATION THAT'S HARD TO RESIST.** You trained for years to pass your guiding exam or pro avalanche course—especially the transceiver test, which requires finding up to four victims in less than seven minutes without turning off any of the victims' beacons. You worked so hard to master this scenario, of course you want to teach it to your team or students!

The ability of a single expert rescuer to find multiple buried beacons is an established standard required to pass both guide and professional avalanche worker training in the U.S. and Canada. This is an incredibly valuable tool for any rescuer to have, whether as a pro or a recreationist. The purpose of this article is not to question its utility, since it's the foundation of any rescuer's skill set. But, is it always appropriate? In many cases, when instructing advanced recreationists, that time might be better spent teaching how to lead a group rescue, sometimes called "searching in parallel."

A seasoned rescuer typically has a range of tools and techniques to expedite the search and the rescue of a victim(s) based on many factors, including the size and accessibility of the avalanche debris, the number of rescuers available, and the skill or experience of available rescuers. While much energy has been expended teaching and testing single searcher/multiple victim rescues, the skill of organizing and managing a group of capable rescuers can easily be overlooked in avalanche search & rescue training and in a real response. Searching in parallel is currently taught on the CAA AvSAR Advanced Skills course, in continuing education, and in Avalanche Canada's Companion Rescue Skills (CRS) public course. It is recommended that searching in parallel be discussed and practiced at all levels of AvSAR training. It will not be used on every search, but it is a great technique to apply when there are adequate search resources.

At our annual BCA ambassador training, held each fall on the sandy expanses of Boulder Reservoir in Colorado,

we teach and practice all these methods, with multiple scenarios set up with two, three, four, and even an unknown number of buried transmitters. It was during one of these training sessions in 2019 that our team became aware that even expert users need additional practice organizing and managing group rescue scenarios. We teach our employees and ambassadors marking, signal suppression, scanning and big-picture functions, micro search strips, the three-circle method, and even micro circles. But how many advanced users get regular training at leading a rescue team in a parallel search? What has come into focus is that the ability to lead a group rescue is as challenging as managing the technical nuances of a complex multiple-victim scenario with a single searcher.

More recently, we've included group searching scenarios in our training, where multiple searchers line up and search in parallel for multiple transmitters. Invariably, all transmitters are located in less than half the time that it takes for a single rescuer to find all the victims consecutively. Canadian avalanche professionals and educators should include searching in parallel in their training sessions and rescuers should consider using it when resources allow.

BCA ambassador and avalanche educator Jim "Sarge" Conway has been piloting course segments that put more emphasis on group rescue techniques using the parallel search method. "My initial observations indicate people are actually pretty capable of managing other people when the challenge is put before them," Jim says. "And the effectiveness of the group after even half a day of intensive training (everyone taking turns leading a team) is remarkable."

Based on Jim's anecdotal observations and BCA's continued commitment to improve all backcountry users' skill sets, we produced a video this year called "Avalanche Group Rescue Techniques: Searching in Parallel." This video was released in December 2021 and can be viewed on BCA's YouTube page (<https://www.youtube.com/BackcountyAccess>).



THE LANE (OR SEARCH STRIP WIDTH) FOR EACH SEARCHER IS DEPENDENT ON THE SCENARIO BUT CAN VARY FROM AS NARROW AS FIVE METRES TO AS WIDE AS 40 METRES, OR EACH MANUFACTURER'S MAXIMUM RECOMMENDED SEARCH STRIP WIDTH.

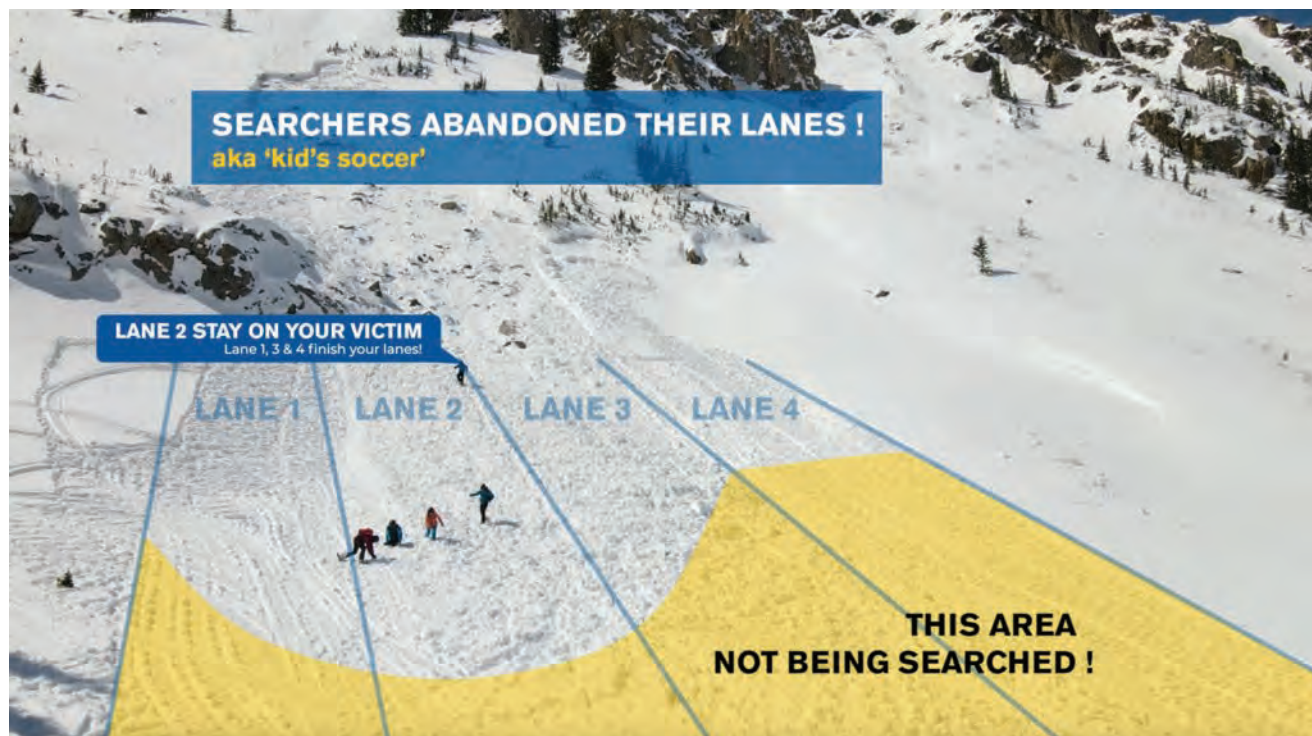
The key concepts of the method are: 1) lane discipline, 2) concise communication, and 3) effective leadership. All three are required for a successful outcome. A leader takes in all the information from the rescuers to think multiple steps ahead to further expedite and streamline the rescue.

Lane discipline is all about spreading the rescuers apart by no wider than 40 metres or each beacon manufacturer's recommended search strip width. The actual width used depends on number of searchers, debris size, and searcher experience. Rescuers stick to those lanes to prevent them from swarming to the closest victim, like six-year-olds playing soccer. The crux move is to abandon your lane only when the distance reading on your transceiver is less than your lane width.

The second key concept, concise communication, is all about relaying critical information to the leader, but not overloading him or her with information. Relay info only at the most crucial stages: initial signal acquisition,

decreasing distance readings in 10-metre increments, lane abandonment, probing, and victim depth. Indeed, very little has been published on what it is relevant to communicate in a rescue. Imagine four or five rescuers all calling out their coarse search distance readings every two metres—this can be overwhelming to a leader. In this video, we present a disciplined communication system that delivers necessary information in a more concise format. This provides the leader with better situational awareness and enables him or her to take the intensity down a notch with a more deliberative communication process.

The third key concept is the importance of an effective leader. The leader's job is to maintain the integrity of the lanes, minimize distracting "rogue" signals from interference or bystanders, and allocate resources to maximize survival chances. Ideally, this is best accomplished by following behind the designated searchers instead of participating in the searching, probing, and shoveling process.



LACK OF LANE DISCIPLINE WILL RESULT IN ALL SEARCHERS FLOCKING TO THE FIRST DETECTED SIGNAL WHILE OTHER AREAS REMAIN UNCHECKED. THIS IS ANALOGOUS TO EARLY CHILDHOOD SOCCER, WHERE PLAYERS OFTEN SWARM THE BALL, LEAVING THE REST OF THE FIELD UNDEFENDED.





IN THIS CASE, THE LEADER SUSPECTED CLOSE PROXIMITY BURIALS AND ENOUGH RESCUERS WERE AVAILABLE SO SEARCH STRIPS COULD BE REDUCED TO 10 METRES. TRANSCIVER SEARCHERS SHOULD STICK TO THEIR LANES AND COMMIT TO THE FINE SEARCH ONLY ONCE THEIR DISTANCE READING IS LESS THAN 10 METRES.

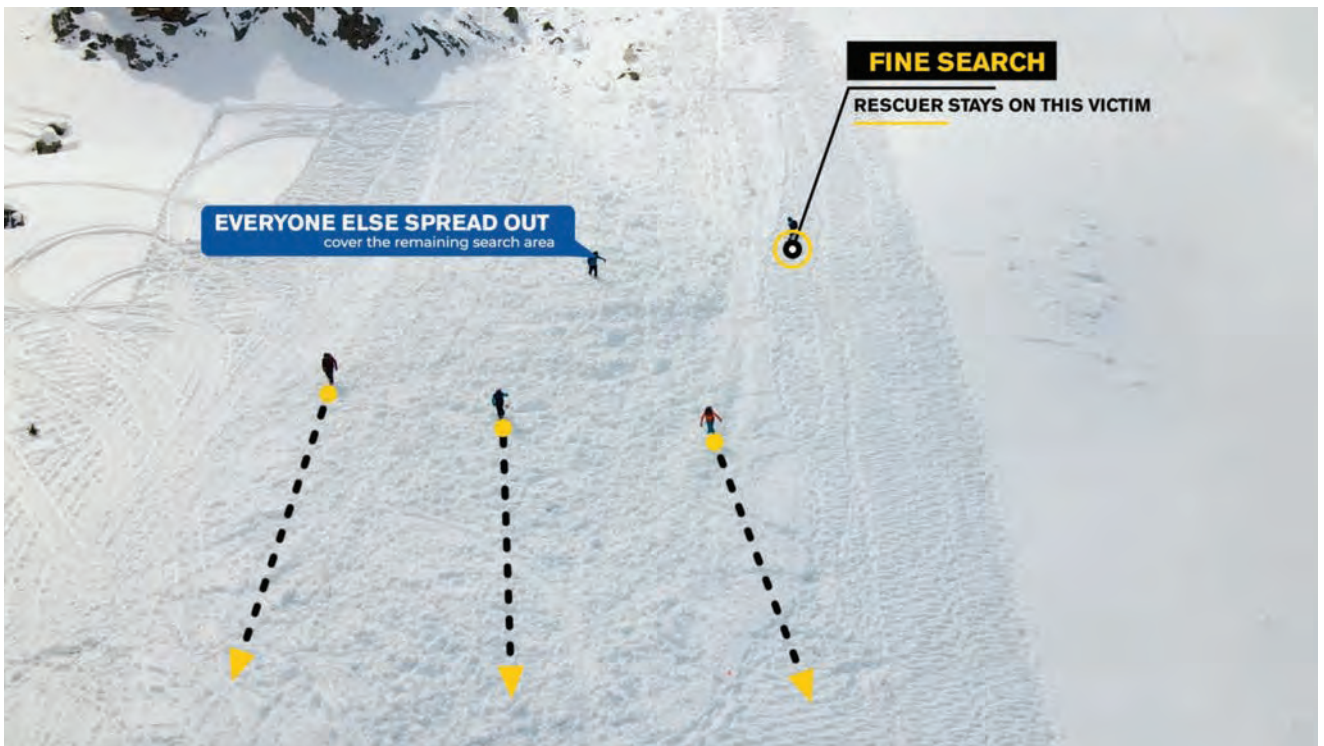
Once a victim is found, the leader has the option to assign probers and shovelers to that victim and have the remaining rescuers continue locating all the victims. In that case, the leader should increase the lane widths below that found victim so no areas are left unchecked. If one or more rescuers reach the end of their lanes without performing a fine search, they can also be re-assigned, most likely to search any remaining unchecked areas in the deposition area.

The use and efficacy of this method is very situationally specific and there are many factors that can make this more or less effective compared to other methods, such as the number and experience of searchers available. The method presented in the video is also a definitive “lead from the back” technique with a dedicated leader. Some situations, such as smaller group searches, may dictate a “lead from the front” strategy where the leader also has a rescue task such as transceiver searching. Leading from the front is obviously a

more complicated task as your brain must multitask. As far as training goes, we feel initially it is best for people to focus primarily on building their leadership skills before taking on a multitask scenario.

Part of the reason this particular skill set does not get the attention it deserves is simple logistics. Beacon training parks and patroller practice fields make it easy for pros or recreationists to practice advanced multiple beacon rescue skills in a self-paced format. Organizing a group search scenario involves more time and commitment from a team to implement. Many organizations and teams are already prioritizing this skill and our hats are off to them. Searching in parallel is another important tool for every pro or advanced recreationist to have in his or her rescue toolbox.

*Acknowledgement: the authors wish to thank Jordy Shepherd for his contributions to this article.* 📌



IF A SEARCHER STOPS TO PROBE AND DIG, AND NO OTHER RESCUERS ARE AVAILABLE, THEN THE LEADER SHOULD READJUST THE LANE WIDTHS TO ENSURE THE ENTIRE DEBRIS PILE IS CHECKED BELOW THE EXCAVATION AREA.



# in the loupe

---

27

AVALANCHE FORECAST  
QUIZ PROJECT

in this **section**

---

32 RACS TESTING

# Avalanche Education Via Learning Interventions in the Bulletin

Kathryn Fisher, Pascal Haegeli, and Patrick Mair

**IN THE WINTER OF 2020**, the Simon Fraser University Avalanche Research Program conducted an online survey to test if incorporating interactive components into the avalanche bulletin could increase its use as an educational tool. We wanted to provide data-driven advice to help avalanche warning services find ways to offer timely and reliable feedback to recreationists planning backcountry travel routes in avalanche terrain. We also wanted to test if characteristics of recreationists, such as their level of avalanche education, would impact how they responded to interactive elements in the bulletin.

This article provides a brief summary of the main results of the study and their implications for avalanche warning services. For a full description of the methods and results, please refer to the open-access publication in the *Journal of Outdoor Recreation and Tourism* (Fisher, Haegeli, and Mair, 2022).

## THE SURVEY

In the survey, we presented users with a hypothetical avalanche bulletin and three potential travel routes on a custom-built terrain map (Fig. 1). We asked participants to study the avalanche bulletin information and then rank the three routes according to their exposure to the avalanche problems in the bulletin. After completing two route-ranking exercises, we divided participants into three groups that received different learning interventions. One group had the opportunity to reflect on the exercises by describing how they ranked the routes. The other two groups viewed one of two levels of feedback on their responses to the exercises. The first feedback level simply showed participants the correct exposure ranking of the routes but gave no details. The second level showed the correct rankings as well as detailed notes explaining the rationale for the rankings. We then asked all participants to complete two more route-ranking exercises to explore the impact of the learning interventions.

As part of the analysis, we determined which participants were actively engaging with the learning interventions. This was important to establish so we could better understand any subsequent trends in how the learning interventions were used. The level of engagement with the learning activities depended on the type of learning intervention and how many mistakes a participant made on the first two route-ranking exercises.

Participants who completed the first two ranking exercises correctly tended to engage more with the reflection intervention, while users who made mistakes tended to engage more with the interventions that provided feedback. These results makes sense as users who were successful at the tasks were able to articulate a coherent thought process, while users who made mistakes had the opportunity to learn about their errors. This key difference in engagement

demonstrates that if feedback is provided, users who need the feedback will be willing to engage with it.

Interestingly, the level of avalanche training and bulletin user type did not predict how engaged participants were with the learning interventions. This shows the activities can be engaging to participants regardless of other factors that typically explain their bulletin use. We interpret this to mean that learning interventions can reach a broad audience of bulletin users.

Next, we determined whether the learning interventions were successful at helping participants to better apply the bulletin information in a route ranking exercise. While the feedback interventions did produce positive change in participants' performance, the reflection exercise did not have an effect. However, the increased success was dependent on participants engaging with the feedback interventions. The more engaged they were, the bigger the improvement.

Taken together, these results show that the feedback options in this study can increase the ability of users to apply the bulletin information under certain conditions. The feedback options are most beneficial for users who were previously applying the information incorrectly and were motivated to engage with both the exercises and the feedback. Providing only the answers resulted in an improvement among participants with a high level of engagement and providing the answers including explanations produced improvements among participants with both medium and high engagements. Curious readers can find the full details of the results in Fisher, Haegeli and Mair (2022).

## RECOMMENDATIONS

Avalanche bulletins are the primary source of avalanche hazard information for winter recreationists and include information that changes daily. Ensuring recreationists understand the presented information in these bulletins is therefore of utmost importance to their backcountry safety. We interpret our results as evidence that recreationists crave additional practice opportunities and feedback on applying bulletin information from trusted professionals. Avalanche warning services should therefore consider integrating application exercises into daily avalanche bulletins to give users a chance to assess their understanding. An optional application exercise with feedback to check user understanding of the daily conditions could be integrated within the homepage of the avalanche bulletin website or included as a link that interested users can follow.

While recreationists typically take one or two avalanche awareness courses in their backcountry career, integrating such exercises directly into the bulletin takes advantage of recreationists' frequent interaction with the product and provides them with just-in-time education when they use the



bulletin for personal trip planning. Enhancing bulletins this way will turn them from pure condition reports into a critical component of the overall avalanche awareness education system.

As this study only represents a one-time intervention, we were unable to determine if repeated interventions would lead to stronger educational benefits over time or, conversely, if participants' familiarity with the exercise would lead them into overconfidence or complacency in attempting the exercises. However, the integration of condition-dependent daily exercises for users to check their understanding of the bulletin could help to answer these questions and provide avalanche warning services with a useful continuous source of information on bulletin users' skill level and how they interpret the bulletin information. The gained insight could

provide valuable information for future bulletin improvements and could also be used to develop target educational initiatives if certain combinations of problem conditions are repeatedly misunderstood.

We believe that these are exciting opportunities for making avalanche bulletins more effective and taking avalanche awareness among our growing and increasingly diverse community to the next level.

### SOURCE

Fisher, Haegeli, and Mair. (2022). Exploring the avalanche bulletin as an avenue for continuing education by including learning interventions. *Journal of Outdoor Recreation and Tourism*, 37, 100472. doi: 10.1016/j.jort.2021.100472. Available at [www.avalancheresearch.ca/pubs/2022\\_fisher\\_learning/](http://www.avalancheresearch.ca/pubs/2022_fisher_learning/)

a) Simple Routes

## Route Ranking Task (1 of 4)

Consider the avalanche hazard information provided to you below and rank the described backcountry routes according to their exposure to the mentioned avalanche problems. Remember that it is not necessary to consider overhead hazard, assume the worst time of day, and flat terrain is not exposed to avalanche hazard.

**AVALANCHE BULLETIN**

Avalanche Danger Rating		Avalanche Problems	
Elevation	Today	Wet Loose	Persistent Slab
Alpine	Moderate	What locations?	What locations?
Treeline	Considerable		
Below treeline	Considerable		

- Please rank the three routes presented on the map below according to their exposure to mentioned avalanche problems from least to most exposed. \* You must rank all routes, and every rank can only have a single route.

**Legend**

- Alpine
- Treeline
- Below treeline

**Your exposure ranking**

Routes
Least exposed - 1 <input type="text" value="Route A"/>
2 <input type="text" value="Route C"/>
Most exposed - 3 <input type="text" value="Route B"/>

b) Complex Routes

## Route Ranking Task (2 of 4)

Consider the avalanche hazard information provided to you below and rank the described backcountry routes according to their exposure to the mentioned avalanche problems. Remember that it is not necessary to consider overhead hazard, assume the worst time of day, and flat terrain is not exposed to avalanche hazard.

**AVALANCHE BULLETIN**

Avalanche Danger Rating		Avalanche Problems	
Elevation	Today	Wet Loose	Persistent Slab
Alpine	Moderate	What locations?	What locations?
Treeline	Considerable		
Below treeline	Considerable		

- Please rank the three routes presented on the map below according to their exposure to mentioned avalanche problems from least to most exposed. \* You must rank all routes, and every rank can only have a single route.

**Legend**

- Alpine
- Treeline
- Below treeline

**Your exposure ranking**

Routes
Least exposed - 1 <input type="text" value="Route A"/>
2 <input type="text" value="Route B"/>
Most exposed - 3 <input type="text" value="Route C"/>

FIG. 1: EXAMPLE OF ROUTE-RANKING EXERCISES WITH AVALANCHE BULLETIN SCENARIOS AND A CUSTOM-BUILT TOPOGRAPHIC MAP WITH SIMPLE ROUTES (LEFT PANEL) AND COMPLEX ROUTES (RIGHT PANEL).

# The Avalanche Forecast Quiz Project—Oregon A New Way to Educate Backcountry Users

Kevin Grove

**IN THE WINTER OF 2020-21**, I worked with the Central Oregon Avalanche Centre (COAC) to embed quizzes in avalanche forecasts with the goal of educating users and propelling them to the next level of critical thinking.

My quizzes consisted of seven demographic questions followed by four questions about the avalanche problems, snowpack, weather, and terrain or slope choice. The quizzes were progressively more difficult each week, testing knowledge in week one, understanding in week two, application in week three, and synthesis in week four. This repeated each month throughout the season. I issued 16 total quizzes from December through March on the COAC website's bottom line as part of a sabbatical project for Central Oregon Community College (COCC).

The Google Form quiz format allowed me to embed videos in both questions and feedback responses. I could also embed images, topo maps, and more (Fig. 1) to make them interactive, interesting, and applicable to tour planning. Quiz-takers obtained immediate feedback, which could include a detailed explanation of the questions, answers, a link to a paper, or a link to a video providing additional educational opportunities when users answered incorrectly.

## RESULTS

An average of 48 people took the quiz each week, with 759 total quizzes taken overall. The majority of respondents were Recreation Level 1 trained, traveled on touring equipment, had two to five years of experience, traveled in the backcountry three times per month or less, and were self-reporting at the D bulletin user classification from St. Clair et. al.

Some of our preliminary statistical analysis is shown in a raincloud plot below (Fig. 2). The upper portion shows a distribution of the data and the box plot below shows the median (dark bar) and 50% quartile (inside the box is half of the data). We were looking for a statistically significant difference between the different demographic information (i.e., years of experience, education level, etc.) and percentage correct from the quiz scores. So far, we have found no significant statistical correlations, but we are working on more sophisticated models. The takeaway message is we cannot use any of the demographic information, taken alone, to predict how well a respondent will perform on a quiz.

Figure 3 shows the median values for how well each group responded. A few interesting trends do stand out. The median increased as frequency of travel increased and median scores for folks with six to 10 years of experience was 73% compared to 50% for all other years.

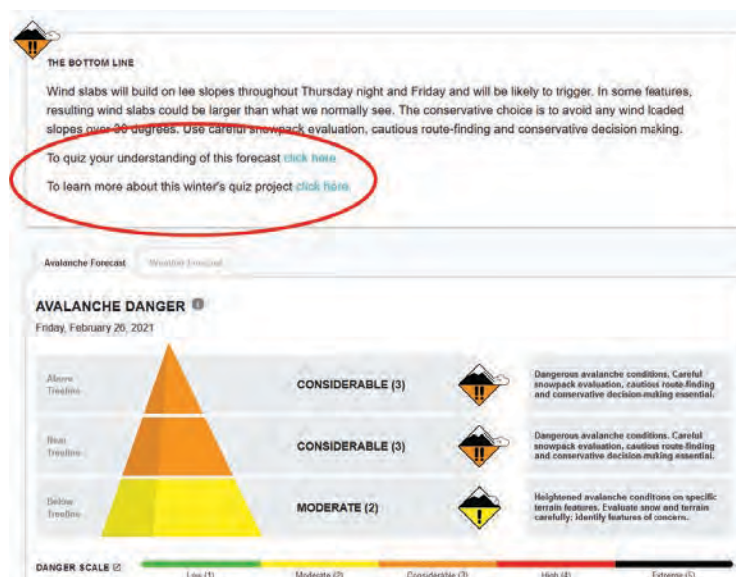


FIG. 1: LINK TO THE GOOGLE FORM QUIZ IN THE AVALANCHE FORECASTS FOR EASY ACCESS TO QUIZZES.

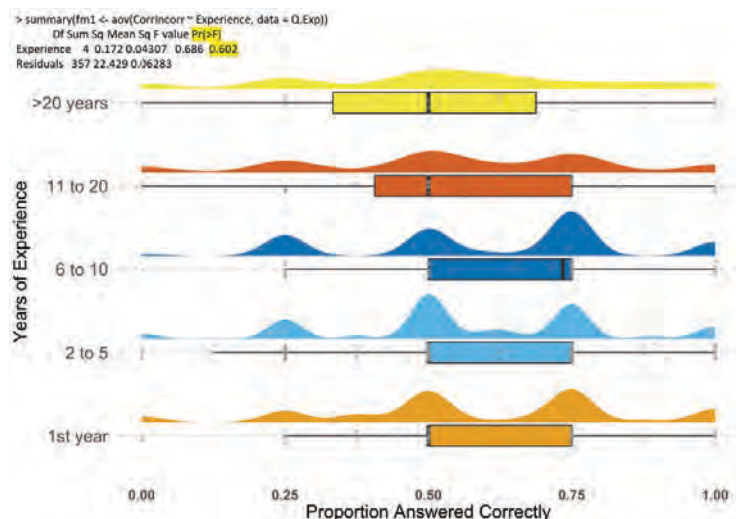


FIG. 2: YEARS OF EXPERIENCE VS CORRECT SCORES.

Level of Education	None	Rec 1	Rec 2		
Median Quiz Scores	50%	50%	63%		
Frequency of Travel	3x/mnth or less	1x/week	2x/week	3x/week	
Median Quiz Scores	50%	50%	60%	75%	
Years of Experience	1	2--5	6--10	11--20	>20
Median Quiz Scores	50%	50%	73%	50%	50%
St. Clair User Typology	A	B	C	D	E
Median Quiz Scores	25%	50%	54%	50%	63%

FIG. 3: MEDIAN QUIZ SCORES FOR DIFFERENT INDIVIDUAL POPULATION GROUPS.



There is interesting research from Peitzsch et. al. showing that between 1950–2018 the median age of fatalities has risen to 34.3 from 27.6. Also, Birkeland et. al reported that in winter 2020-21, there was a linear progression comparing ages and numbers of backcountry fatalities, suggesting older, more experienced people are dying more frequently than folks just entering the backcountry. This could suggest experience in the backcountry is not necessarily resulting in expertise. Perhaps we need to consider bolstering the continuing education of recreational users over 30, who may be at the top of their game in their early years and then taper off in terms of knowledge, understanding, and their ability to apply these concepts in the field later in their career. Embedding quizzes and other interacting, engaging, and educational components into forecasts could help educate this population.

**CONCLUSION**

When teaching engineering mechanics courses at COCC, I need to assess how well my students are learning. This comes in the form of questions in class, homework, quizzes, and exams. Feedback is a huge part of this assessment as it lets me see how well the content is absorbed, understood, and applied by my students. This is, of course, an iterative and circular process that works well.

Folks traveling in the backcountry can learn knowledge, develop understanding, and begin to apply these concepts in entry-level avalanche courses. Feedback is an incredibly

valuable component and I am grateful for the feedback I received in courses from folks like Don Sharaf, Sarah Carpenter, Margaret Wheeler, and Christian Santelices. We believe avalanche education should be a lifelong pursuit with feedback to help users cement knowledge and develop mental models of avalanche character. They can then implement those models into how to best use terrain to avoid avalanches given the current hazard. Embedding quizzes into avalanche forecasts can be one way to provide this continuing education.

I would like to offer a special thanks to COCC for funding this project, Erich Peitzsch for helping with the data analysis, Pascal Haegeli for providing much insight and guidance, Paul Diegel for collaborating on the project, and the COAC for helping facilitate this project.

**REFERENCES:**

St. Clair, A. Exploring the Effectiveness of Avalanche Risk Communication, Simon Fraser University, 2019  
Finn, H. Do Recreationists Have the Skills they need to use Avalanche Bulletins Effectively? TAR 39.2 December 2020, AAA.  
Peitzsch E. et.al. How Old are People Who Die in Avalanches? Journal of Outdoor Recreation and Tourism, Issue 29, 2019.  
Birkland, K et.al. NAC Season Summary. TAR 40.1, October 2021, p 34.

---

# The Avalanche Forecast Quiz Project—Utah Examining a New Addition to Our Avalanche Education Quiver

Paul Diegel

**THE UTAH AVALANCHE CENTER** attached quizzes to daily forecasts during the 2020-21 winter to allow users to test and get feedback on what they learned from the forecast. The quiz gathered demographic data and tested the user’s interpretation and recall of the forecast and how they used that information to plan their day. We hoped to:

- learn how well users understood and retained the information we intended to convey;
- provide micro avalanche education by giving users a chance to repeat back what they thought they learned, use that learning to plan, and get feedback on how well they did;
- provide our forecasters feedback on the effectiveness of their style, language, graphics, examples, and overall messaging;
- entice our users to put more thought and focus on the forecast message for the day; and
- develop a tool for testing the effectiveness of forecasting

products, (e.g., quantify the effectiveness of alternative danger rose configurations).

We issued eight quizzes, with 20,969 total forecast page views, plus opened (and presumably read) forecast emails that included quizzes. We received 1,867 responses (9% response rate). A profile of the respondents is shown in Figure 1.

A UAC staff member who wasn’t forecasting prepared the quiz answers and feedback, which were then vetted by the forecaster on duty that day. Typical preparation time was one to two hours for the non-forecaster and 10–15 minutes for the forecaster. The quizzes were prepared the evening before the early morning forecast release and we avoided issuing a quiz during periods of rapidly changing or highly complex conditions. The time required to set up and administer the quizzes decreased greatly by the end of the season.

We mostly kept the questions simple, with objectively right or wrong answers to minimize judgment calls. We provided

feedback to the respondents and most quizzes included a bonus question that required a little more thought and basic avalanche knowledge, the forecast for the day, and some judgment.

## RESULTS

The following are some of the key lessons we learned:

- We received positive feedback on the quiz concept. Our users appeared to like the ability to be tested and get feedback on their answers.
- About three-quarters of respondents recalled the avalanche danger correctly. Interestingly, of those that selected the wrong danger level, those that did so on upper elevation NE slopes mostly overestimated the danger level, yet those who answered incorrectly on mid-elevation NW slopes mostly underestimated the danger level (Fig. 1). Are we teaching people to assume that higher NE slopes are always more dangerous than mid-elevation NW slopes?
- About 40% of the respondents correctly identified the avalanche problems listed for the day. Cornices emerged as a source of confusion (Fig. 2). In three forecasts, cornices were mentioned as a sub-category under wind drifted snow, but they were not listed as a formal avalanche problem. If we mentioned the presence of cornices without listing them among the avalanche problems but then allowed cornice fall as a correct answer, the number of respondents listing the correct combination of avalanche problems increased from about 40% to 60%. Users recognized we used the term “cornices,” but didn’t recognize the difference between cornices as indicators of recent wind and snow versus cornices as stand-alone avalanche problems.
- The results indicate users remember the avalanche danger more than the avalanche problems, suggesting that more emphasis on avalanche problems, why they are important, and how we deal with them in different ways could be an effective education strategy.
- There was a consistent small percentage of users that believed the danger rating is based at least in part on slope steepness.
- About three-quarters of respondents reported looking at the observations for the region they were interested in, confirming our belief that user observations are a valuable part of the forecasts.
- More experience did not correlate well with better quiz performance, as shown in Figure 3.
- Some of the responses to, “What else would you like to see in the forecasts?” suggested users were not familiar with all the products we offer. There could be some benefit to periodically mentioning other avalanche products in the forecast. For example, there were several suggestions we release the forecast earlier than 7:30 a.m., presumably from people who were unaware we offer a pre-recorded phone dawn patrol hotline.

## CONCLUSION

Public avalanche forecasters have a unique opportunity to reach thousands of backcountry users with small doses of daily avalanche education. We concluded including a self-directed quiz with feedback in the forecast is an effective educational tool and something our users appreciate and benefit from. It tells us more about our users, what they are looking for, and how we can better serve them. 📌

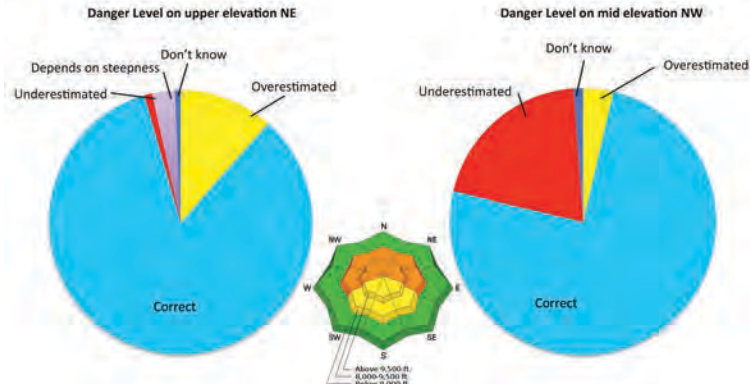


FIG. 1: DANGER LEVEL BY ELEVATION AND ASPECT

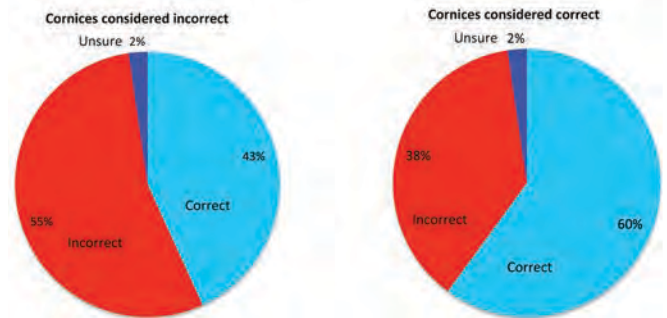


FIG. 2: AVALANCHE PROBLEMS CORRECTLY RECALLED (CORNICES MENTIONED BUT NOT LISTED AS A PROBLEM).

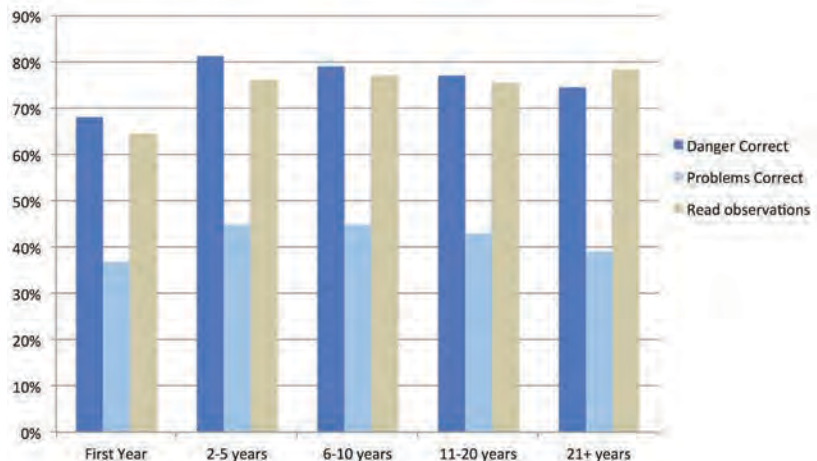


FIG. 3: CORRECT DANGER AND AVALANCHE PROBLEM AND “READ THE OBSERVATIONS” BY EXPERIENCE LEVEL.



# RACS Testing

## Measuring the Explosive Airblast of Remote Avalanche Control Systems

Robb Larson

### INTRODUCTION TO RACS

Remote Avalanche Control Systems (RACS) are widely deployed in Europe and installations are becoming more and more common in North America. Systems have been installed by departments of transportation, industrial operations, and ski areas to enable avalanches to be explosively triggered remotely, thus avoiding the need to put avalanche control workers in harm's way. In some situations, RACS are taking the place of artillery rounds to remotely initiate avalanches without the hazards of shrapnel or potential for trajectory mishaps.

RACS can be based on either explosive gaseous mixtures or solid explosives. The Gazex system, from the French corporation TAS, uses a mixture of oxygen and propane that is metred into a reinforced steel tube and then remotely ignited. The tubes are permanently installed on concrete supports in an avalanche starting zone, while oxygen and propane tanks are housed in a separate on-mountain storage location and gas lines are run to one or more units. The number of firings is limited only by the local gas supply. Numerous installations of three sizes (0.8, 1.5, and 3.0 cubic meter gas capacities) are present in the western U.S. and Canada.

The O'bellx, also from TAS, uses a mixture of oxygen and hydrogen. Gas storage cylinders are held around the perimeter of a bell-shaped explosion chamber. The O'bellx unit is delivered by helicopter to a tower permanently installed in an avalanche starting zone. On remote command, the metred gas charge is released into the bell and ignited. The gas supply lasts for approximately 30 firings. When it is depleted, a helicopter retrieves the bell and flies to a location where the gas can be replenished. A similar but non-fixed system called the Daisy Bell is dangled under the helicopter where the gaseous mixture is released into the bell and ignited over the target starting zone.

The Wyssen Tower from Swiss manufacturer Wyssen Avalanche Control uses gel or solid explosive charges instead of gas. A tower permanently installed in the starting zone is specially designed to receive and hold a helicopter-delivered magazine containing 12 charges. Upon remote command, a tethered charge is released from the magazine. An igniter is activated when the charge hits the end of its lanyard, where it hangs and detonates at a predetermined height above the snow surface. The first Wyssen Tower in Canada was installed by the BC Ministry of Transportation in Three Valley Gap in 2016.

Another player in the field is the Avalanche Guard by Swiss manufacturer Inauen-Schatti AG. It uses a remotely actuated pre-loaded mortar to launch solid-explosive charges from a permanently installed tower. The charges land in the predetermined target starting zone up to 200 meters from the tower and detonate within the snowpack.

Despite different designs, all RACS effectively address the need to perform avalanche control activities without endangering workers. However, each system has unique characteristics, various explosive effects, and operational advantages and challenges.

### STUDY ORIGINS

Many organizations worldwide are interested in RACS performance. Among these, the Transportation Avalanche Research Pool (TARP) is a partnership of entities whose mission is to improve the safety and effectiveness of avalanche mitigation operations in mountain transportation corridors. TARP was established through the United States Department of Transportation state planning and research pooled fund program and is currently administered by the Colorado Department of Transportation. Members contribute funds, develop ideas for projects, and vote on how to spend money in the pool. Currently, the membership includes groups from the western United States, Alaska, and New Zealand.

Since much of the performance data on RACS has been compiled by the manufacturers themselves or by researchers collaborating with device manufacturers, the TARP group saw a need for an independent study to evaluate RACS performance and to enable comparisons between systems. A request for proposal was issued in summer 2019 and TARP awarded the contract to Montana State University (MSU) researchers in November 2019.

I served as project lead. I was an Associate Professor in MSU's Mechanical Engineering department and had worked on projects involving avalanches and snow dynamics for over 20 years. My background in the design, development, and implementation of instrumentation and remote sensing systems aligned well with the needs of the project. Researcher Brandt Seitz became an indispensable team member and used the project as the focus of his mechanical engineering master's degree research. Professor Daniel Miller from MSU contributed expertise to the project, especially in early planning stages. Invaluable field support was provided



by Pete Maleski from the Bridger Bowl ski patrol, David Richards and his Alta ski patrol crew, Damian Jackson and the avalanche control team from the Utah Department of Transportation, Jamie Yount and team from the Colorado Department of Transportation, and members of the Colorado Avalanche Information Center.

### MSU RACS PROJECT

The fundamental goal of this effort was to evaluate the blast characteristics from operational RACS and then publish results for use by practitioners. The basic task was to record accurate air pressure measurements of the blast wave, or “overpressures”, for each of several RACS. The data would need to be logged at different distances and in different directions from the RACS shot to allow calculation of the peak pressure, the rate of pressure rise, the energy at a given distance, and the shape and distance of the blast effect.

A thorough review of prior research was conducted first. Foundational snow science work from Atwater, LaChapelle, Gubler, Schweitzer, and others helped to clarify the big picture. The relatively few RACS-specific efforts—especially those documented by Stephan Simioni et. al. at the WSL Institute for Snow and Avalanche Research in Davos, Switzerland—provided some helpful clues on measurement methodology and procedures. Simioni’s work on early Gazex system development also provided data useful for comparison with MSU’s project results. However, relatively little documented research was found, confirming the need for our work.

One of the daunting challenges was the environment and location of the RACS, which are invariably placed in steep avalanche starting zones, with typical slope angles from 30–45 degrees. Researchers needed to access many different sites to haul in and place sensitive measurement equipment and conduct testing in safety, while dealing with winter weather, variable snow conditions, high elevations, and other challenges. Most of the RACS in this study were accessed on skis. Since everything needed to perform the tests had to be hauled in a backpack to the sites, efficient equipment selection was critical for success.

Existing computerized data loggers or data acquisition systems were too bulky, too expensive, too power-hungry, or otherwise unsuited for the need. Luckily, recent advances in micro-computer technology allowed the team to create a miniaturized portable radio-controlled data acquisition system (DAQ) to take the pressure measurements. Five identical Raspberry Pi micro-computer-based systems were built to gather high sample-rate pressure data. The DAQ systems were sized to fit in a waterproof Pelican case. Remote control was accomplished using a small custom battery-powered radio communication module, also based on a Raspberry Pi micro-computer, and housed in a 3-D printed



TOP TO BOTTOM: A SOLID EXPLOSIVE-BASED WYSSTEN TOWER SYSTEM IN LITTLE COTTONWOOD CANYON, UTAH.; AN O'BELLX SYSTEM AT ALTA, UTAH.; A GAZEX 1.5 USED BY THE UTAH DEPARTMENT OF TRANSPORTATION ABOVE HIGHWAY 210 IN LITTLE COTTONWOOD CANYON, UTAH. // ALL PHOTOS CONTRIBUTED BY ROBB LARSON



case. Ten pressure sensors, essentially high-capacity microphones capable of surviving the pressures of the blast, were designed specifically for the project by Larcor, Inc.

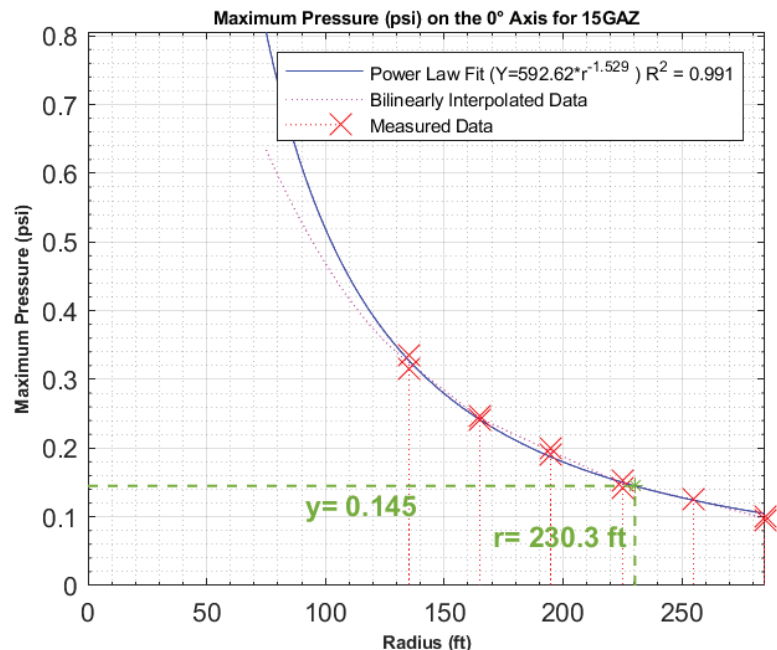
These new DAQ systems allowed the team to accurately record explosive blast pressures at a sample rate of 50,000 per second—fast enough to see precise details as the pressure wave blasted past each of the microphones positioned at various angles and distances around the source.

### TESTING

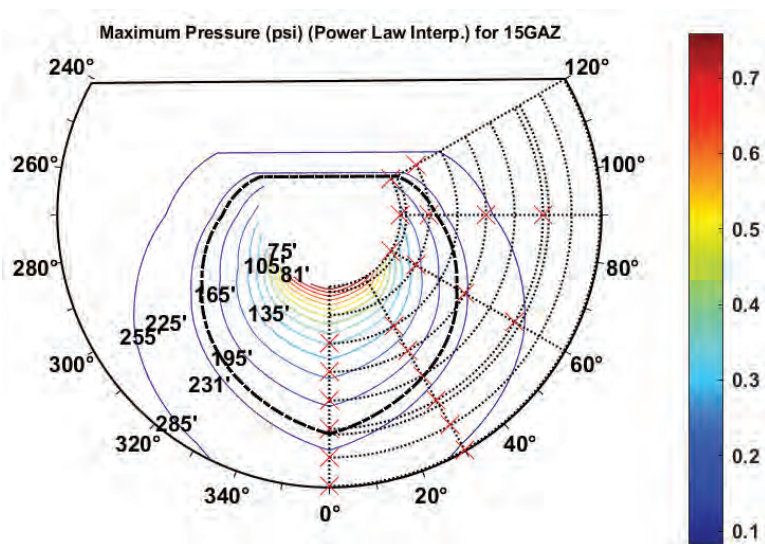
With equipment needs addressed, a phased test plan was developed and approved by the sponsor. Phase 1, validation of the equipment, was accomplished in December 2020 with assistance from Bridger Bowl ski patrol. In that testing sequence, the pressure sensors were set out in an array to record blast effects from elevated two-pound pentolite charges. Phase 1 also included measuring pressures at various heights above the snow surface to establish the six inch (15cm) standard sensor height that was used in subsequent testing. The portable system proved highly effective in this test sequence and was ready for the next phase.

Phase 2 was the crux of the project and involved multiple trips to Utah and Colorado for testing actual Gazex, Wyssen, and O’Bellx exploders, plus a few other tests using different types of explosive charges to simulate exploder performance and Avalanche Guard rounds. With help from the Alta ski patrol and Utah Department of Transportation personnel, most of the Phase 2 testing took place in Little Cottonwood Canyon, Utah. A follow-on set of tests in Colorado was recently completed thanks to great help from the Colorado Department of Transportation and Colorado Avalanche Information Center.

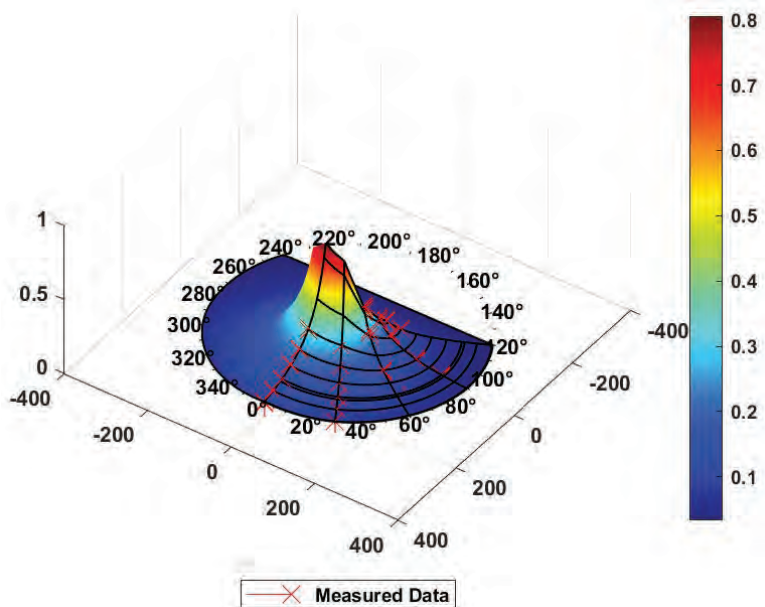
For Phase 3, the team investigated some of the effects of RACS placed near terrain features such as cliffs or gullies. Testing was performed with installed systems and representative explosives to begin to explore how the terrain affects the blast intensity and distribution. Results indicated enhanced directionality of the blast effect due to certain terrain features, but since an infinite number of terrain variations are possible, development of definitive conclusions that could be applied universally to proposed installations are not really possible. A good practice might involve the mapping of blast effect patterns at proposed installation sites to quantify site-specific terrain effects before an actual RACS is installed.



DATA PROCESSING EXAMPLE 1: PRESSURE DECAY PLOT FOR SENSORS ALONG ONE AXIS.



DATA PROCESSING EXAMPLE 2: CONTOUR PLOT OF GAZEX 1.5 PEAK PRESSURES. THE UNIT OF THE SCALE ON THE RIGHT IS IN PSI. NOTE: THE DATA WAS TAKEN ON ONE SIDE OF THE ZERO AXIS ONLY AND MIRRORRED SYMMETRICALLY.



DATA PROCESSING EXAMPLE 3: SURFACE PLOT OF GAZEX PEAK PRESSURES. THE UNIT OF THE SCALE ON THE RIGHT IS IN PSI.

## DATA PROCESSING AND PRESENTATION

The final project challenge was to process and present the mountain of results in an understandable, useful format that could be applied to both future research and RACS implementation. Multiple days of testing in Montana, Utah, and Colorado resulted in a lot of data! The team recorded data from two-pound pentolite charges, Wyssen systems using both gel and pentolite charges, two sizes of Gazex systems, O'Bellx operational systems, simulated Avalanche Guard rounds, and other configurations. During each test, about three million discrete data points were collected by each of the 10 pressure sensors. All told, approximately 375 pressure records with about 1.125 billion discrete data points were collected and processed. Completing that processing task was perfect for a graduate student proficient in programming using MATLAB computer code.

The complete record of all data is available in table form for researchers to use, but fortunately many of the project results can be represented graphically. One type of graph created from the data is a plot of the maximum pressure seen by each of several pressure sensors located on a common axis at various distances from the explosion.

The graph includes a dashed line marking 0.145 PSI, or one kilopascal (KPa.) That pressure value has been proposed by some researchers as the minimum pressure needed to collapse a weak layer, initiate fracture, and induce an avalanche. Importantly, not all agree on this value, and the 1 KPa pressure value is not an absolute indication of effective system range, but identifying the distance where this value occurs provides a standard to compare the relative performance and blast patterns of different RACS.

Pressure decay plots from several angles can be plotted together, with lines of equal pressure added to resemble a topographical map. The resulting 'map' of the blast characteristics—as shown in Example 2—makes intuitive sense. The Gazex mouth aims downhill, resulting in higher pressure downhill of the system than uphill. Intensity of the blast (psi) is indicated by colour. (Different tests had more or fewer data points and testing axes depending on conditions, but this is a representative chart.) Note the thick dashed line at the 1 KPa distance.

The contour plot can also be shown as a 3D volcano plot, as seen in Data Processing Example 3. Colour-coded blast intensity appears as height, mapped against distances from the explosion. Angle orientations are also marked with the 0° axis being straight downhill. This format provides a good visual indication of blast intensity and radial decay. These three plots showing the relationship of peak pressures to distance and orientation are representative of results that were compiled for every test scenario. Similar plots were created to show pressure rise rates versus location and another set describes energy equivalent versus location for each of the tested systems.

## RESULTS AND CONCLUSIONS

The study was designed to provide avalanche control experts with useful information on operational RACS so they could make more informed decisions on using these modern technologies. In general, the project results successfully addressed that need, but it is important to note the results are not all-encompassing, nor do they address every conceivable RACS implementation.

The numerous challenges of field-based research and relying on in-situ testing of actual installations meant only a limited number of installations were examined. Distant test sites necessitated a planned travel schedule for the project team, which meant test day snowpack characteristics and weather conditions were out of the team's control. And, with any project involving advanced instrumentation and data processing, there are uncertainties present that affect data accuracy. The Seitz master's thesis addresses some of these issues.

Further, the economics and operational decisions that could drive RACS implementation were outside the scope of the project. It is important to recognize that in certain snowpacks, a localized failure in a weak layer can propagate widely and affect a large area. In that situation, the size of the RACS overpressure zone may be relatively less critical. With those caveats, a few general observations can be made.

Of the systems tested in Phase 2, results indicate the peak pressures, energy equivalents, and pressure rise rates were highest for the pentolite-based explosives (Wyssen, Avalanche Guard), followed by the gel emulsion charge (Wyssen), 1.5 m<sup>3</sup> Gazex, 0.8 m<sup>3</sup> Gazex, and, lastly, the O'Bellx. Where these parameters are deemed the most important for inducing avalanches, a practitioner could draw some conclusions on system applicability:

- Due to its large charge mass and mostly symmetric blast wave profile, the Wyssen Tower, with either the gel emulsion or pentolite-based charge, affected the largest areas of avalanche terrain. A practitioner might select one of these systems for installation where the downslope, across-slope, and upslope directions are all equally important for avalanche initiation.
- Due to their directionality, individual Gazex systems are perhaps best suited for locations where the potential avalanche starting zones are relatively narrow and elongated downslope of the installation site, and the uphill direction is not seen as an equally likely starting zone. Placing multiple Gazex systems in an array above a broader target area is a common way to expand that area of influence.
- The O'Bellx system, due to its relatively small combustion chamber volume and more limited effective area, might be best used in a relatively small zone where a localized and reliable weak spot or trigger point is known.

Phase 3 testing confirmed terrain can meaningfully alter the blast wave effects of an explosive and that current



avalanche control practices making use of unique terrain features have merit. For example, data from a simulated Wyssen pentolite test shot detonated on a bamboo pole in a gully feature showed that pressure rise rates directly down the gully (the 0° axis) were approximately double those recorded in flat field testing with the same explosive. However, relatively lower peak pressures and pressure rise rates were observed in a lateral direction (on the 45° axis.) This showed that the gully terrain feature increased the directionality of the blast.

A simulated Wyssen pentolite shot detonated on a bamboo pole near a cliff displayed a slight increase in both peak pressure and energy equivalent directly downslope of the blast (along the 0° axis) when compared to flat field testing. As with the gully test, the pressure and energy equivalent values measured on the 45° axis and at 90° to the blast were relatively lower than those measured in a flat field situation. The cliff clearly enhanced the downslope directionality of the blast.

<sup>1</sup><https://scholarworks.montana.edu/xmlui/handle/1/16418>

As stated earlier, however, the terrain effect portion of this study was necessarily limited to a few cases. More thorough investigations at individual sites are needed to flesh out the Phase 3 results.

The general results of this study have already been shared in numerous ways, including presentations at the Utah and Colorado avalanche workshops, meetings with device manufacturers, and communications with researchers and practitioners in the U.S., Canada, and Europe. Much of the project is well-documented in the master's thesis compiled by Brandt Seitz, now available through the Montana State University library<sup>1</sup>. The final report was provided to the TARP team in June 2022, and equipment has already been passed along to TARP to enable additional testing.

The information gleaned will benefit avalanche control practitioners and others in understanding the capabilities, limitations, and possibilities for implementing these interesting devices. 📌



RACS UTAH FIELD TESTING TEAM NEAR O'BELLY EXPLODERS AT ALTA, UTAH. FROM RIGHT: PROJECT LEAD ROBB LARSON, GRAD STUDENT BRANDT SEITZ (YELLOW PANTS), AND VOLUNTEERS JAMES LESSER (WITH A LOAD OF PRESSURE SENSOR CABLES) AND SAM VERPLANCK (ORANGE PANTS.) // PHOTO CONTRIBUTED BY ROBB LARSON

A close-up photograph of a person's hands holding a snow-covered grid ruler. The person is wearing a yellow and black jacket. The background is a snowy, mountainous landscape.

# snow globe

---

40

REMEMBERING  
PETER SHAERER

in this **section**

**38** THE DRAGON TAMERS



# The Dragon Tamers Learning Through Reflection

Robin Siggers

**THE DRAGON TAMERS** is an exhibit that chronicles Fernie Alpine Resort's snow safety program since its inception in the mid 1970's, through photographs, stories, and words. The exhibit is a collaborative effort put together by Fernie Ski



TOP TO BOTTOM: THE 2014 FERNIE SKI PATROL.; DAVE AIKENS SHOOTS THE LIZARD AVALAUNCHER IN 1983.; STEVE MORRISON SETS THE PRESSURE GAUGE ON THE AVALAUNCHER. // ALL PHOTOS CONTRIBUTED BY ROBIN SIGGERS

Patrollers that provides a perspective on the past through to the present, and creates lasting value by way of reflection.

The Fernie snow safety program began in 1976 and was set up by Rod Pendlebury, who built a strong foundation. However, Rod had limited funding and resources to properly control the Lizard and Cedar Bowls that the Bear T-Bar accessed. Above the lifts are 300 m of steep leeward headwall capable of producing size four avalanches.

On Feb. 13, 1979, the newly constructed Griz Chair was struck down by a size four avalanche from the Dancer slidepath in Lizard Bowl. Three towers were destroyed. This watershed moment put Fernie on the ski area avalanche program map. Federal regulators imposed conditions that avalanche control must be done on the Lizard Headwall by an avalanche safety team that held decision making authority over the lift opening.

Rod was unfortunately dismissed and David Aikens came in from Rogers Pass to head up the program. With Dave's experience, an excellent system of recording and observation was created. However, as far as how to control this "Beast," that was up to the newly hired team of four young patrollers to figure out. For context there are now two forecasters and 23 technicians per day and a staff of almost 50. From a single small sign in a tree that could be pulled to say "Bowls Closed", the program has grown to include over eight kilometres of roped closure sign lines.

The Avalauncher has been used as a primary tool to test and control the overhead slopes since 1976. Use increased over the years to shooting up to 700 rounds per year. I remember doing a shoot and was up to about 12 shots when the owner called me on the radio.

"Uhhhhh Robin, how many shots do you plan on taking today?"

"Oh, a few more Hieko," I replied.

It was a constant challenge to be cost conscious. One reason the Griz Chair was destroyed was that Rod, although he had the launcher, did not have the budget to buy rounds and the model he had was unable to reach the critical Dancer path—a 1,000 m distant target.

A big problem for Fernie are the cornices that form along the ridge. It was an inaccessible place back in the day as helicopter use was out of the question due to costs. The entire two-kilometre ridge would at times feature cornices the size of boxcars. Failures seemed rare. We had no idea that a bird landing on one could trigger them—something we learned as we began to heli bomb.

There was an event in the early 80s where two entire ski runs in the Lizard Bowl were covered by a size 3.5 natural



CLOCKWISE FROM TOP LEFT: THE DANCER CORNICE WAS A REAL PROBLEM FOR FERNIE'S AVALANCHE CONTROL PROGRAM. // ROBIN SIGGERS; THE BOMBS GOING OFF DURING A CORNICE CONTROL MISSION. // ROBIN SIGGERS; THE SAFETY LINE ALONG LIZARD RIDGE. // BEN JACKMAN; FERNIE PATROLLERS PLANT EXPLOSIVES INTO A CORNICE. // BRUCE JAMIESON

avalanche in poor visibility. During the search, most of the locals helping said they had skied the runs earlier in the day, but no one was in the area when the slide came down. The following day it appeared as though a relatively small piece of cornice had been the trigger.


Cornice control began gradually, at first by hiking, later flying up a box or two of powder to the peak and drilling and blasting, as recommended in *The Avalanche Handbook*. It was effective, but time consuming and dangerous. Once, Scotty Atkiens was drilling a cornice on belay when it collapsed at his toes. The borrowed ice auger went into the void that he was left staring into. Then, with no auger, we learned that just throwing a couple kilograms of explosives out onto the roof had the same effect and was way faster and safer. We tried to streamline the process by setting a safe working line with wands, but had to re-think that when the wand triggered a boxcar. Incidents like these gave us a healthy respect for worker safety.

Incidents and near-misses—these are the mechanisms that drive learning and change. Sharing the past experiences and reflecting on our history helps keep us from making

the same mistakes or falling back into self-made traps.

While many things have stayed the same, the program has made significant progress in workers health and safety, both physical and mental, through comprehensive and thoughtful risk assessment, inclusive team decision-making, and conscious reduction of operational pressure.

We have changed our mindset from: "We must open it so make it safe," to: "Make it safe so we can open it." The American philosopher John Dewey once said, "We don't learn from experience, we learn from reflecting on experience." Working on *The Dragon Tamers* has provided an opportunity for reflection on what has come before and given some insight into how we will proceed into the future. We work in an industry with an incredibly wicked learning environment. I hope you all have an opportunity to reflect and learn from not just your last season or the season before, but to draw on the well of experience and knowledge from years and decades past.

A virtual display of *The Dragon Tamers* is available through the Fernie Museum website at [ferniemuseum.com/collections-research/virtual-exhibits](http://ferniemuseum.com/collections-research/virtual-exhibits). 



LEFT: AVALANCHE RESCUE TRAINING WITH ONE OF THE TEAM'S RESCUE DOGS.; RIGHT: AN AVALANCHE RELEASE ON THE LIZARD HEADWALL, WITH THE AVALAUNCHER TOWER IN THE FOREGROUND. // ALL PHOTOS CONTRIBUTED BY ROBIN SIGGERS



# PETER SCHAEERER

## The Patriarch

Alex Cooper

The task in front of Peter was to determine the active and static defenses that would keep the road open as much as possible as it crossed under 130 avalanche paths. “My job was simply to do the engineering work and decide for each avalanche path what type of control would be most feasible,” he said with Swiss workmanlike modesty.

From 1957 until the spring of 1961, Peter, working with Noel Gardner and several others, advised the Canadian Department of Public Works during highway construction. He suggested changes to the highway alignment to avoid the worst avalanche paths and set out the locations of the snow sheds, mounds, and deflector dikes. He established snow study plots and devised the avalanche control program using a howitzer. He also enjoyed skiing and mountaineering in the Pass, claiming the first ski descent of Mount Rogers during these years.

In 1961, his work in Rogers Pass complete, Peter returned to Switzerland to work as a highway engineer. Three years later, he was offered a new position with the NRCC developing snow removal and ice control techniques for highways. He returned to Canada, this time for good. In 1966, his directive changed. Instead of looking at snow removal, he would research avalanches.

Based in Vancouver but often working out of Rogers Pass, Peter studied avalanches for the NRCC until 1991, when he retired. He published over 90 papers, reports, and book chapters on topics such as snow stability tests, avalanche impact forces, avalanche speeds and runout distances, avalanche zoning, snow loads for buildings, and avalanche accidents.

Peter became the pre-eminent subject matter expert on avalanches in Canada and was asked to provide his expertise after several notable incidents. In the winter of 1972–73, he advised the Whistler ski patrol following a serious avalanche incident the previous season. He was also appointed to the Avalanche Task Force that was formed after seven people died in the North Route Café avalanche on Jan. 22, 1974. The task force’s recommendations led to the establishment of the BC Ministry of Transportation’s Avalanche Control Program.

In 1970, as the demand for skilled avalanche professionals grew, Peter developed and taught the country’s first avalanche courses. He wrote the original student manual and training materials and helped train other instructors. These courses were attended by workers from mines, highways, and railways, ski guides, ski patrollers, and national park staff. The first courses were run through the NRCC but as their popularity grew, the administration was assumed by BCIT. This work formed the foundation for the CAA’s Industry Training Program.

Peter was instrumental in building Canada’s avalanche community. In 1975, he was a founding member of the Canadian Avalanche Committee, which was established to

**IN 2007**, when the Canadian Avalanche Association presented its 25th Anniversary Outstanding Achievement Award, Peter Schaerer was honoured as the “Patriarch.” It is a fitting title for the Swiss-born engineer whose lengthy career impacted all aspects of the Canadian avalanche industry.

Peter passed away on May 16, 2022, in North Vancouver at the age of 95. This article provides a summary of his career. On the following pages, Bruce Jamieson, David McClung, and Chris Stethem, three of our industry stalwarts who knew him best, share their own memories.

Peter Albrecht Schaerer was born Sept. 21, 1926, in Berne, Switzerland. Growing up, his father Max would take him skiing and hiking. He and his brother Marcus developed a passion for mountaineering together.

In 1950, Peter graduated with a diploma in civil engineering from the Federal Institute of Technology (FIT) in Zurich. As part of his education, he learned about snow mechanics and avalanche control from Dr. Robert Haefeli, one of the world’s leading snow scientists at the time. He went to work as a research assistant with the FIT, where he studied snow removal and ice control on roads. Peter worked out of the Institute of Snow and Avalanche Research in Davos, where he further developed his understanding of snow science.

In 1956, Peter was working for the Neutral Nations Supervisory Commission in Korea (through the Swiss army) when he heard from Marcus, who was living in Toronto, that the National Research Council of Canada (NRCC) was looking for researchers in its snow and ice section. “Because I had snow research and did snow work and snow removal work in Switzerland, I jumped at the opportunity and simply applied for it,” he said in a 2006 interview.

On his way back from Korea, he stopped for a tour of western Canada before traveling to Ottawa for his interview. He was offered one of two projects. One was to look at the weight-bearing properties of ice to see if trucks could drive over frozen lakes. The other was designing avalanche control defences for the new Trans-Canada Highway over Rogers Pass. The decision was an easy one. In 1957, he moved to Canada to begin his work.





LEFT: PETER AT HIS DESK IN OTTAWA IN APRIL 1961. RIGHT: PETER OBSERVES THE PATH INCLINE OF AN AVALANCHE IN APRIL 1957. // FROM THE PETER SCHAEFER ARCHIVES, COURTESY REVELSTOKE MUSEUM & ARCHIVES

foster information sharing within the fledgling avalanche industry. This grew into the Canadian Avalanche Association, which formed in 1981. Peter was the CAA's first president. He led the creation of the first edition of the *Guidelines for Weather, Snowpack and Avalanche Observations* and developed the CAA Code of Ethics.

Following his retirement in 1991, Peter continued working part-time as a consultant for Chris Stethem & Associates and as an ITP instructor for many years. In 1994, he and David McClung co-authored *The Avalanche Handbook*. The second edition was published in 2006 and a third edition is due out this fall. It remains the definitive textbook for avalanche professionals and has sold over 50,000 copies worldwide.

Peter was married for almost 40 years. He met his wife Jean in the fall of 1957 when he was hospitalized with the flu in Revelstoke, where she worked as a nurse. They fell in love and got married in Switzerland in 1960. Together they had three children, Martin, Gillian, and Yvonne. Peter and Jean remained together until her death in 1999. He was an avid skier into his late-80s and was hiking up to his death. He also enjoyed kayaking and gardening.

Peter is an Honorary Member of the CAA and American Avalanche Association. In 1999, he received the ultimate recognition for his leadership and accomplishments when he was made a Member of the Order of Canada. The

announcement heralded his many contributions to Canada's avalanche industry.

"Of particular note, perhaps the most enduring contribution of Peter's long involvement in the avalanche safety profession in Canada, was his continual fostering of the collective and co-operative spirit of all persons engaged in the avalanche field," proclaimed his nomination. "Peter never missed emphasising the importance of promoting and recognising everyone's collective contributions in the avalanche safety community, and in encouraging the high standards of practice that are followed today."

## REFERENCES

- Schaefer, Peter. *Canadian Avalanche Association Industry Training Program—Early History*. January 2007. <https://snowavalanchearchive.com/peter-schaefer>
- Schaefer, Peter. *Avalanche Studies at Rogers Pass, 1956-1961*. March 1995. <https://www.revelstokemuseum.ca/peter-schaefer-collection>.
- The Order of Canada for Peter Schaefer*. April 15, 1999. <https://snowavalanchearchive.com/peter-schaefer>
- Schaefer, Peter. Interview. Conducted by Michael Morris, 2006. <https://snowavalanchearchive.com/peter-schaefer>



PETER INSTRUCTING AN EARLY PROFESSIONAL AVALANCHE COURSE IN THE 1970S (LEFT) AND A MORE RECENT CAA ITP COURSE (RIGHT). // CAA ARCHIVES



# Grand Mentor

Bruce Jamieson

Peter: “Your column is too wide for the shovel test.”

Bruce: “But my shovel is wider than most.”

Peter: “Doesn’t matter. The column should be about 25 cm wide.”

This was at the Fernie ski area in 1981. Think about it. The senior avalanche researcher for the National Research Council of Canada was visiting a ski area! (Peter somehow visited many avalanche operations.) And coaching the newbie on the ski patrol! Peter was committed to mentoring avalanche practitioners and had time for the greenest practitioners.

## PLAIN LANGUAGE

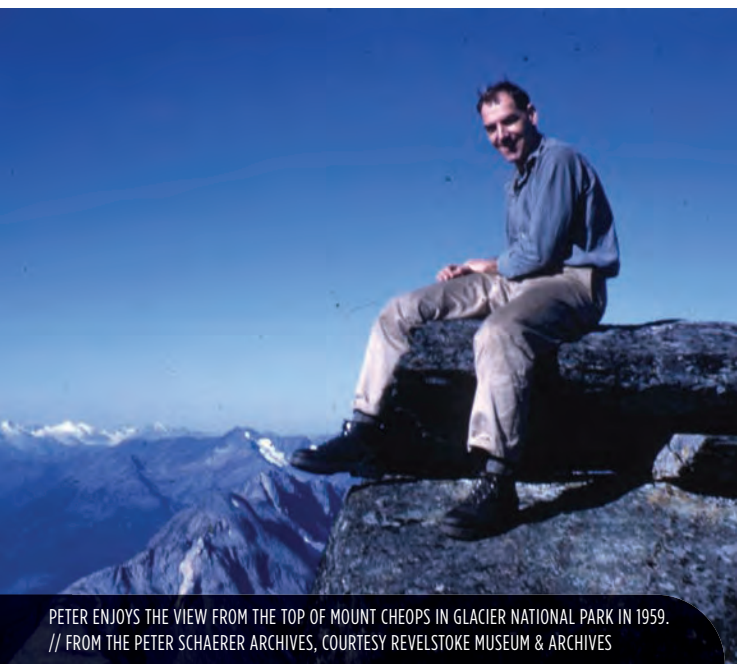
Decades later, at the afternoon guides meeting at Mike Wiegele Heliskiing, one guide questioned whether the crust in another’s snow profile was a melt-freeze crust or a rain crust. Peter stood up and said: “A crust is a crust is a crust.” He memorably simplified the four types of melt forms and five types of ice formations into plain language that met the needs of ski guides.

## HUMOUR

Around 1996 when Peter, my wife Julie, and I were starting to pack our sea kayaks for a trip in the Discovery Islands, Peter asked me: “Bruce, do you know why the bow of a sea kayak is pointed?”

I hesitated and noticed the twinkle in Peter’s eyes. “It is for storing a bottle of wine!” he exclaimed. He then leaned into the bow and stashed a bottle of wine.

Peter loved to laugh, and he laughed a lot!



PETER ENJOYS THE VIEW FROM THE TOP OF MOUNT CHEOPS IN GLACIER NATIONAL PARK IN 1959. // FROM THE PETER SCHAEERER ARCHIVES, COURTESY REVELSTOKE MUSEUM & ARCHIVES



PETER (RIGHT) AND BRUCE ENJOYING A LAUGH AT THE CAA SPRING CONFERENCE IN 2013. // CAA ARCHIVES

## HUMBLE

I’m guessing Peter could have had any role he wanted at the 1988 ISSW in Whistler. Instead, he chose to check that people entering the main room had name badges.

He considered declining the Order of Canada because he didn’t feel he deserved it. Considering his vast contributions, that’s off the end of the humility scale!

## PRACTICAL

In a 1991 paper entitled “In-situ investigations for shear strength of snow,” Peter reviewed the shovel test, rutschblock test, and shear frame test, comparing the information they provided about instability and *the time required to gather that information*. (This and some of Peter’s other unpublished contributions are available at [www.snowavalanchearchive.com/peter-schaerer](http://www.snowavalanchearchive.com/peter-schaerer)). Nineteen years later, when Jürg Schweizer and I reported on test efficiency versus information about instability, readers thought it was new ground, but we had simply updated Peter’s results.

Peter was the lead instructor on my Level 2 course at Lake Louise in 1982 and when I first instructed a Level 1 course in Blue River in 1992. On the first field day of that course, when we could hear the helicopter approaching, the other instructor, Bob Sayer, pointed out we had not yet assigned students into groups. Peter paused, then said: “Everyone with mostly rented or borrowed gear move over here. Everyone with all their own gear move over there.” Including the students who had not moved, we had three groups of eight as the helicopter landed for the first lift.

Peter taught on CAA courses, including Avalanche Mapping, until 2005, when he was in his late-70s.

## WORK-LIFE BALANCE

For a decade or two, I was a stressed-out road warrior. Peter advised me to keep cross country skis in my car so I could break up the long drives with a lap on skinny skis.

## MY HAZARD MAPPING APPRENTICESHIP.

Peter was my primary mentor for hazard mapping in the 1990s. Although some of the analytical methods have improved, the experience that Peter shared has stood the test of time. On an early project after the helicopter dropped us off in the runout zone, Peter asked me: “What should we do first?” Eager to impress, I said: “Locate the beta point on the ground.” Peter (patiently): “No, try again.”

Me (still eager): “Locate the trim line we saw on the air photos and take core samples to date the trees.” Peter (smiling,

still patient): “No, we should sit on this rock, drink tea and visualize what large avalanches would do in the path.”

Starting with the big picture in the field is still important advice but it was crucial at the time because the avalanche dynamics models were one-dimensional and of limited value for complex terrain.

### **PETER'S GEMS**

During several hazard mapping projects in the 1990s, I was wowed by the gems of unpublished ideas Peter was sharing with me. I wrote these down in a file called “Peter’s Gems.” Later, when I was the lead hazard mapper on projects, I repeated Peter’s advice to younger hazard mappers. Peter was the mentor to the mentor—really, the grand mentor to many avalanche practitioners today.

Peter also passed his expertise on to the next generation through Brian Gould and Alan Jones.

In addition to being both a student and co-instructor with Peter on the CAA mapping courses, Brian would visit Peter in North Vancouver occasionally. Peter was always more than generous with his thoughts and opinions on new projects, handing Brian copies of his notes and passing on old

avalanche dynamics textbooks from the early days. “I’m glad to have had a bit of time later in Peter’s life to soak up some of those gems, and certainly pass those on to both my staff as well as the up-and-comers on the CAA mapping courses,” said Brian, “The methods he developed and passed on to our community over the years put us into the top tier of alpine nations in terms of avalanche know-how. I look forward to remembering him as I sit on a rock in an avalanche path somewhere this summer.”

Alan Jones worked closely with Peter in the early-2000s on a number of projects with Chris Stethem, as well as teaching CAA mapping courses. This was during Peter’s transition from consulting to full retirement, which took almost a decade before he could truly focus on gardening and skiing. Alan continues to apply Peter’s practical, judgement, and experienced-based approach to modern avalanche problems, and to pass along Peter’s gems to developing avalanche practitioners and engineers.

Perhaps in the years to come, we should all take the time to sit on a rock in the mountains and reflect on what we have learned from our mentors. I’ll be remembering Peter Schaefer, his humour, and the practical wisdom he humbly shared. ❧



LEFT: PETER DOING AN INCREMENT BORE ON A TREE DURING A HAZARD MAPPING COURSE. // BRUCE JAMIESON; RIGHT: PETER IN A STUDY PLOT IN ROGERS PASS. // CAA ARCHIVES



# The Researcher & Engineer

Dave McClung

**PETER SCHAERER WAS A FRIEND** and professional colleague of mine for 50 years. I first met him at an avalanche workshop in 1972. In those days, there were small, intermittent workshops of researchers that eventually melded into the large, successful International Snow Science Workshops of today.

Peter came to Canada from Switzerland shortly after a stint with the Neutral Nations Supervisory Commission in Korea. Before coming here, he had experience with snow avalanches gained from a stay at the Swiss Federal Institute for Snow and Avalanche Research. He was educated as a professional engineer and held an advanced degree in engineering from the ETH in Zürich.

His training in engineering stayed with him all his long career. His first position in Canada was with the National Research Council (NRC). Later, about 1967, he moved to the Vancouver area to form a small avalanche research unit within the NRC. I joined the unit in 1979 and worked alongside him until 1991, when the Conservative government closed the avalanche research centre. Peter entered retirement (well, sort of), and I entered the University of British Columbia. Peter continued to work with Chris Stethem as an engineering consultant for many years after his “retirement.”

Professionally, Peter published about 100 technical papers and reports. They mostly dealt with the engineering (practical) aspects of avalanche technology, including avalanche dynamics. He was involved in technical consulting all through his service with the NRC. Peter and I published a number of papers together on avalanche runout distance prediction, avalanche impact pressures, and avalanche dynamics. However, our greatest collaboration came in 1994 with the co-authorship of *The Avalanche Handbook*. The second edition was published in 2006 and a new one is slated for publication

this fall. The book has been translated into Spanish, Italian, Japanese, and Persian, and it has sold 50,000 copies. It is used in training and university courses around the world.

Peter started the avalanche courses in Canada in the early 70s. He not only taught them, but he also worked hard on their organization. A friend, Bob Sawyer, told me he took a weeklong course in the 1970s and the cost was then a modest \$100. Peter was absolutely an essential person in the founding of the Canadian Avalanche Association (CAA) in 1981. He served as the association's first president—no surprise there! When the NRC avalanche research center was disbanded in 1991, he continued to aid the CAA.

Peter's engineering work included the design of avalanche defences for the Trans Canada Highway through Rogers Pass in the 1950s. He was also involved in the placement and design of avalanche defences for the Coquihalla Highway, which opened in 1986. The latter has only one snowshed and Peter initially designed it to minimize cost by proposing placement of “wings” on top to minimize the length needed. The BC Ministry of Transportation rejected that design, so the snowshed is longer than needed.

When I think back on Peter's professional career, it was really his professional engineering training that was always guiding him. When we worked together at the NRC, Peter engaged in all sorts of activities that were not directly associated with research, which was supposed to be the mandate (and NRC management mentioned that). Instead, he did everything he possibly could to promote avalanche safety and stop the deaths. The instinct of an engineer when there is a problem is not to just study it, but to do something about it. Peter took that very seriously.

Aside from his professional life, Peter was a family man and a mountain man. He was an avid skier and mountain hiker all his life. I spent some very fine days heli-skiing with him up into his late 80s and he was hiking right up to his passing. In 1974, we, along with some Norwegians, skied down the Great Aletsch Glacier—the largest in Switzerland. The problem there is that you end up in a different valley from where you started, so there might be a problem in getting back. However, within 10 minutes, Peter, with his Swiss-German dialect, found a guy with an empty bus to take us to the train station for the return. There are other stories.

Peter was the kind of person who showed by example that one person can make a big difference in this world. He always did the right thing and, for me, he was a superb colleague and friend.

There is one more thing, you might not know: Peter was quite the dancer. Yup, we're talking rock n' roll! 🎸



# Father of the CAA

Chris Stethem

**LONG BEFORE THE CAA CAME TO BE**, Canadian avalanche professionals had a unifying force in the person of Peter Schaefer. His roll with the National Research Council of Canada (NRC) influenced all the avalanche-related operations in the country and his organized, diplomatic personality provided the foundation for technical excellence and civil discourse in our profession. Many of us met Peter through NRC/BCIT avalanche courses, where he inspired. These were the precursor of today's CAA Industry Training Program.

I first saw Peter at Whistler in the winter of 72-73. There had been a serious accident the previous season and a concerted effort was underway to upgrade the technical skills in the avalanche control program. Patrollers with avalanche experience were hired and an avalanche safety plan was prepared and implemented. From time to time during the winter, Peter would visit to lend his expertise. He struck me as a quiet and organized man who treated most everybody with respect—a rare human trait that Peter held on to throughout his life. He also had a distinctive red toque and an infectious smile that remained throughout his career.

Peter organized what you might call the first open avalanche course in Whistler in early December, 1973. Several of the handouts had been prepared by Peter and Fred Schleiss for in-house training programs at Rogers Pass. Fifty-four people from all sorts of backgrounds attended.

Managing the large groups was a challenge, especially in the field, but one which Peter embraced. I was a field assistant doing a hand charge demonstration with Albert Eggen, another Whistler ski patroller. Half the group was with us, lined up facing the trees. I lit the charge and handed it to a student who threw it up into the air, only for it to land right in front of the group. A moment of panic ensued as many people tried to turn around and escape. Albert calmly picked up the charge and threw it into the woods. Many lessons were learned for the future in that course. Peter took it all in stride.

In the mid-to-late 1970s the NRC/BCIT avalanche schools, under Peter's leadership and BCIT's Gary Walton administration, became more popular. Their personalities could not have been further apart, but it worked. Peter encouraged a small group of instructors to develop their skills and grow the program. I remember when I was moving from the role of assistant instructor into a full instructor position, something of a rite of passage. I was digging a profile in preparation for the course and describing what I saw to the group. Peter jumped in the pit. He was somewhat skeptical. But he agreed with the observations and I was in!

Each year, Peter would organize a meeting of the avalanche course instructors to discuss content, delivery, and potential instructors. In the late 1970s, the list of people he invited grew and these meetings evolved into a spring meeting for avalanche

safety operations. Topics included the past winter conditions, avalanche accidents, observation standards, rescue techniques, and avalanche control methods. Peter chaired the meetings, kept the notes, and wrote most of the correspondence. One of the outcomes of these discussions led by Peter was the NRC's publication of the *Guidelines for Weather, Snowpack, and Avalanche Observations* in 1980.

At the spring meetings in 1980, the idea of an organized body for avalanche workers was proposed. That fall, the name Canadian Avalanche Association was selected and in May of 1981 a formal steering committee was created to draft a constitution and bylaws. In the summer of 1981, the CAA was registered under the Societies Act in British Columbia. At the first AGM in May 1982, Peter was elected as the first President. At the AGM in 1983, Geoff Freer, the secretary-treasurer, presented the first year's financial statement. We had \$2,724 in the bank. Walter Schleiss was elected the new president. He proposed we amass \$100,000 before we took on further

new ventures. It seemed like a lot of money then, but Peter, with his trademark enthusiasm, said, "That's a good idea."

Over the next few years Peter became secretary-treasurer and once again took on the task of keeping us all together and encouraging people with another favourite: "You can do it." In 1984, Peter drafted the CAA Code of Ethics, another testament to his

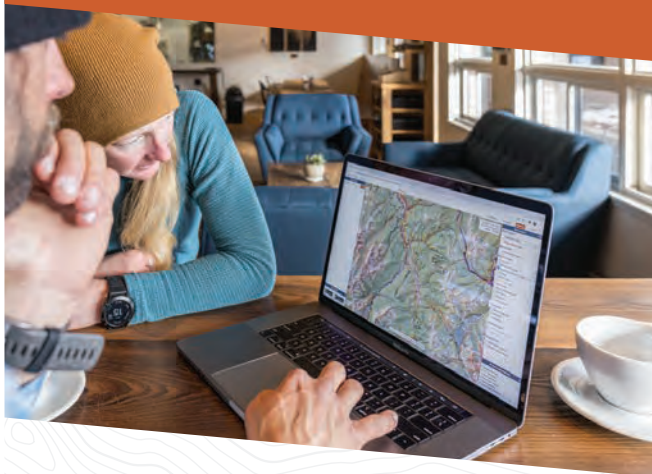
ethical nature that he demonstrated throughout his life.

I was fortunate to work with Peter on consulting projects over many years. One particularly memorable field trip was in 1998 to the proposed Pascua Lama mine in Chile. Peter had never worked on projects in Chile because he did not agree with the politics of the Pinochet era so this was his first time at altitude in the Andes. We travelled early to Santiago to look around a bit and get settled. The day before the field trip was to begin we met with the project team. Peter was 72 at the time and the other engineers were very concerned about his age. Our worksites were in the 4,000–5,000m range. They suggested he remain in Santiago while we went into the field, but Peter thought it would be OK and convinced them he would be fine.

The day after flying up, we set out on horses and mules to assess a possible conveyor location down the Tres Quebradas drainage. Peter was doing OK with the altitude but still cautious. After a while, we left the horses to hike around in the terrain. Peter left the younger engineers holding the horses while he took off over a moraine with me on his heels. After a short while he picked up the pace and I looked ahead for the signature red toque as he disappeared over the rise. Peter was in his element, and he knew it.

Peter's years of inspiration and leadership are a reminder to all of us to live well, treat others with respect and never lose your sense of humour. 🍷

**Peter's years of inspiration and leadership are a reminder to all of us to live well, treat others with respect and never lose your sense of humour.**



## PLAN

With cutting-edge mapping tools

## COLLABORATE

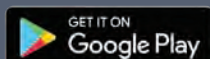
With others on the same map

## RECORD

Tracks and obs with the mobile app



GET STARTED AT  
**CALTOPO.COM**



**Celebrating 160  
Years of Safety.**

Shop New Airbags on Mammut.com



**WHAT'S YOUR  
FAVOURITE?**

**ORDER ONLINE  
AVALANCHEASSOCIATION.CA**

**WINTER'S COMING.**

**BE PREPARED WITH CIL EXPLOSIVES PRODUCTS:**

- HAND CHARGES : CAST BOOSTERS (1 LB, 2 LB, 5 LB) SNOWPRO 1 KG EMULSION
- ANFO IN 12.5 KG AND 25 KG BAGS AND SUREFOOT HELICOPTER ANTI-SKID SACS
- SNOWLAUNCHER AVALANCHER ROUDS : 1 KG CLASSIC, 2 KG SLUGGER
- MILDET - USA MADE MILITARY SPEC SAFETY FUSE 1M, 2M, 3M LENGTHS
- INDUSTRY STANDARD M&S PUL-WIRE LIGHTERS
- CIL IMPERIAL AVALAUNCHER GUN SYSTEM
- ELECTRIC AVALAUNCHER REMOTES
- EXPLOSIVES COMPONENTS FOR ALL RACS SYSTEMS AVAILABLE IN CANADA
- CUSTOM TRAINING

ALL PRODUCTS ARE MADE IN NORTH AMERICA AND SUPPORTED BY THE ONLY EXPLOSIVES COMPANY THAT SPECIALIZES IN AVALANCHE CONTROL. CONVENIENT LOCATION'S SERVING BRITISH COLUMBIA, ALBERTA AND YUKON.

WHEN YOU REQUEST CIL EXPLOSIVES YOU ARE SUPPORTING YOUR INDUSTRY, 3% OF PROFITS GOES BACK TO THE CANADIAN AVALANCHE ASSOCIATION FOR TRAINING PURPOSES.

CONTACT : BRADEN SCHMIDT 250 423 3302 BRADEN.SCHMIDT@CILEXPLOSIVES.COM

# Remote Avalanche Control Systems

Proven gas-blast technology used worldwide



Parks Canada - Banff - Bourgeau Gazex Avalanche Path Control



Synchronized Control Systems - O'bellx by MND Safety



## SAFETY • SECURITY • RELIABILITY



daisybell®



gazex®



Remotely controlled hazard reduction devices using powerful gas airblast technology.

- Fixed and mobile solutions for every need
- Combines ease of use with 24/7 reliability
- No residue or unexploded duds to manage
- No explosive storage or transportation issues
- **Daisybell** – mobility and efficiency – 50+ shot capacity
- **Gazex** – powerful and permanent – shot supply for season
- **O'bellx Options+** classic model and new innovations, removable
- **2,800+** Gazex/Gas-blast exploders in use worldwide



**AvaTek Mountain Systems Inc.**

250.344.2122 [www.avateksystems.ca](http://www.avateksystems.ca)

Golden, British Columbia, Canada

[info@avateksystems.ca](mailto:info@avateksystems.ca)

Canadian Distributor for MND Safety - Avalanche Control Technology