

THE AVALANCHE REVIEW



It was a cold and dreary late May afternoon.

Thick fog impeded the evacuation of the body of a snowboarder caught in an avalanche on the east face of Torreys Peak, Colorado, on May 21, 2011. Sadly, he died from internal bleeding during the evacuation.

Photo and story by Dale Atkins

After the
fire

tools for those left behind **page 30**

THE AVALANCHE REVIEW

The *Avalanche Review* is published each fall through spring by the American Avalanche Association, Inc., a nonprofit corporation. The *Avalanche Review* welcomes the submission of articles, photographs and illustrations.

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ASSOCIATION

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Subscription: \$35 per year (4 issues). Subscription is included with membership dues to AAA. For subscription and membership information, see www.AmericanAvalancheAssociation.org.

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CONTRIBUTORS



For more than 30 years **Dale Atkins** has been training and working with avalanche professionals and mountain rescuers around the world. He's an expert in avalanche accidents and rescue, human factors, and prevention with numerous articles, books and films to his credit. He is also a past president of the American Avalanche Association.



Dave Richards was raised in the Wasatch and has worked for the Alta Ski Patrol for 16 years. He has been the director of the Alta avalanche program for three years.



Liz Tuohy serves as NOLS education director, helping people develop skills to navigate and lead through challenge. On the side, she looks to the hills for more lessons.



Elizabeth Lamphere currently lives in Crested Butte, Colorado with her 5-year-old daughter, Madelyn, who just started kindergarten. She co-founded the International Avalanche Nest-egg, and, in her free time, enjoys cooking, eating, and spending as much time in the middle of nowhere as possible.



Aaron Parmet, BSN, RN, CCRN, EMT is about to start his sixteenth winter in Summit County, Colorado where he is an ICU nurse, avalanche educator, volunteer rescuer, and avalanche technician. He is currently studying to become a Psychiatric Mental Health Nurse Practitioner.



Walter F. Ballenger (1925-1983) grew up near Chicago. After serving in WWII and attending University of Chicago, he went west to the California Bay Area where he wrote stories published in *Argosy*, *Prairie Schooner*, *Virginia Quarterly Review* and others. In 1960 he moved to the Sierra where he advanced from lift attendant to director of Squaw Valley's ski patrol and avalanche control.

FROM THE EDITOR

BY LYNNE WOLFE

On a rainy day in June I had lunch with Dave Richards of Alta, who was up in the Tetons for a ski area conference. I asked him if he had any ideas for material or topics for TAR, and he suggested that we focus on tools for victims, rescuers, family, and friends, for after the rescue had concluded. He then proceeded to tell me his story, which is chronicled here on page 38; his expanded presentation on this topic at the Pro session of USAW left many of us with our hearts on our sleeves. It took me a while to phrase the theme, and as I thought about this issue, **this song** ran in a loop through my work and helped me frame my question.

Once I defined my query, authors and contributors lined up to share their messages. Dale Atkins was most emphatic, "I've been waiting for years to be asked this question," as he replied with 5500 words, based in the breadth and depth of his vast experience with rescue. In the middle of preparing this issue, well-known climbers Hayden Kennedy and Inge Perkins died directly from and due to repercussions from an early-season avalanche, and the topic became even more timely and poignant, not to mention challenging and emotional to manage. Heartfelt thanks for sharing their stories goes out to our other authors as well. Liz Tuohy writes of an experience at NOLS in 1996 that I participated in: I am deeply honored to have been helpful in a difficult and challenging situation. Elizabeth Lamphere shares her message of how, after she lost her partner in an avalanche, her friends and family helped her draw on resources to keep going and to found the IAN Fund. Nick Armitage then discusses some of his team's strategies as part of the Jenny Lake Climbing Rangers. Aaron Parmet shares his perspectives and tools from 14 years as an emergency care provider.

In addition to our themed articles, we have an introduction to heli-skiing in Patagonia from Sean Zimmerman-Wall, with enticing photos of huge terrain. Then you'll find Rob Coppelillo's dissection of a near miss; his incisive wit and ruthless self-assessment set an admirable tone for this upcoming season as he poses the question of where and how do we as a community catalog and analyze our recreational near misses? Part two of Mineral King had me entranced by the mysteries of the High Sierra in the huge snow year of 1969; Cy Whiting's illustration gave shape and color to the image in my mind. Then three guides detail how their winter operations attempted to solve the problem of how to share conditions and information throughout communication platforms and across time. Ty Falk uses data to look at how the Wasatch lies in between Intermountain and Continental climate parameters, and how this has changed over time.

Originally I had planned to focus on wet snow and rain on snow for February 2018's TAR, but my snow scientist friends persuaded me to postpone that theme until 37.3, February 2019. Instead, for 36.3 we will focus on **what is new and interesting from our local SAW events. What presentations stood out to you? What would you like TAR to delve more deeply into?** And I am always on the hunt for case studies of near misses and avalanche cycles that tell a story or pose a question. Get them to me by Christmas, please.

Finally, as you read through this material, think of Dave Richards' final words from USAW, "Keep asking each other if you are OK." I'll add one more quote, from my old buddy George Gardner who left us too soon: "Talk about things that matter." ▲



After the Fire: Pete Townshend

**After the fire the fire still burns,
the heart grows older but never
ever learns.**

**The memories smolder and the
soul always yearns,
After the fire the fire still burns.**

FROM THE PREZ

BY JOHN STIMBERIS

Hello and welcome to another edition of winter! I had a wonderful time in Breckenridge at CSAW. The regional events are a great way to get back into the winter mindset, especially when there's little snow on the surrounding mountains.



When I got back to WA we had our first measurable snow of the season on Snoqualmie Pass. I attended two other regional workshops this fall; one in Hood River, OR and my local event in Seattle. The American Avalanche Association (A3) contributed over \$15,000 to the regional workshops this year. I can hardly believe another winter is upon us. There's so

much to do to get ready.

We've been busy at A3 and there are some exciting changes on the way. Another monumental step for our association was realized in October when our membership overwhelmingly passed the revised by-laws and helped create a better defined Governing Board. I feel like the dust is beginning to settle and I can see the path ahead more clearly. With this new board comes a few new roles, some familiar faces, and a few outgoing trustees. Many will stay on as committee members or to assist with the transition. A few temporarily appointed positions will be up for a vote in a special election this winter.

I have to give an enormous thank you to the people who have served as trustees on the board. Your hard work, dedication, and commitment are commendable. Every one of our trustees is a volunteer, so not only is it a time commitment, but there's a personal financial commitment as well. Thank you all so much; you've made this association what it is today!

I have one additional pitch as we head into the darkness of winter: The ISSW 2018 abstract deadline will be here sooner than you think (usually in April). Innsbruck is far from the States, but I would really like all you hard working practitioners to consider a paper or poster. **I can't say enough about the importance of the ISSW and getting more practitioners involved,** plus a trip to Europe can have a significant impact on your personal and professional life. Give it some thought and start saving a little extra for a very unique experience.

Be safe! ▲

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A3 BOARD CHANGES & SPECIAL ELECTION CALL FOR NOMINATIONS

BY ALEPH JOHNSTON-BLOOM, SECRETARY

Have some free time in your schedule? Interested in being involved in the greater avalanche community? A3 is seeking motivated individuals to fill three positions on the A3 Governing Board. You must have interest, passion and time to invest in serving A3 and its mission:

Promoting professional excellence in avalanche safety, education, and research in the United States.

The A3 membership approved recently proposed bylaw changes that support a revised Board structure during a voting period that ran from September 25th through October 6th this fall.

- **303 ballots** were cast by Professional and Affiliate Members.
- **279 votes** (93.9%) to approve changes, 18 votes (6.1%) against changes, 6 abstentions.
- **303 voters** is record voter turnout, surpassing the previous high of 280 ballots cast during the 2014 Governing Board election.

Following this historic vote, the Governing Board met on Saturday, October 7th and formally adopted the new bylaws and identified a transition plan and timeline for implementation of the new Board structure that these bylaw changes support:

October 15, 2017—Governing Board transitions to new structure (*see figure above*)

November 1–December 20, 2017—Nomination period for newly elected Trustees (*see positions below*)

January 15–31, 2018—Special election voting period to fill the above positions through end of 2018

February 1, 2018—Newly elected Trustees join Board

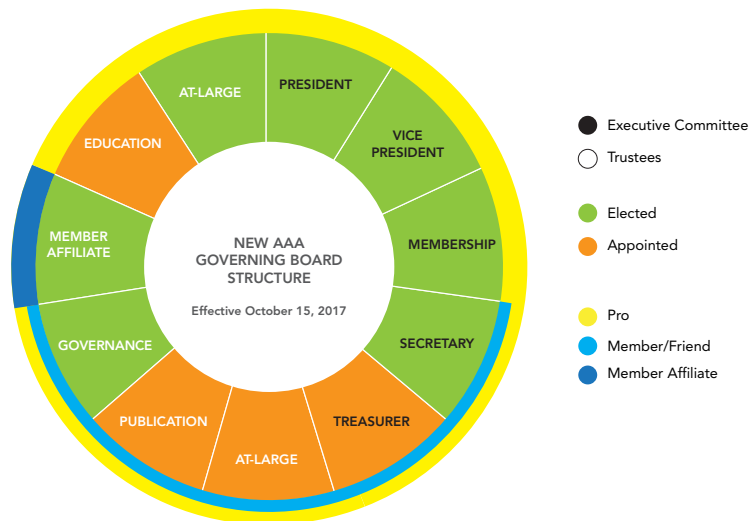
Nominations must be submitted by December 20th, 2017 to A3 Secretary Aleph Johnston-Bloom at a3secretary@avalanche.org. Please describe your experience and reasons why you'd like to join the A3 Board in your nominating letter of interest.

Trustee Openings: (See full description of responsibilities and expectations for each open Trustee position at www.americanavalancheassociation.org/employmentlist/)

Membership Trustee: The A3 Membership Trustee is responsible for leading the membership committee and serving on the A3 Board. The membership committee is primarily responsible for reviewing and vetting prospective members of A3. The membership committee is also a primary conduit for member communication and contact with the A3 Board.

Major responsibilities of the Membership Trustee include:

1. Form a Membership Committee with balanced geographic and professional sectors representation.
2. Accept, review and vet applications for professional membership to A3.
3. Represent member concerns and interests to the Board.
4. Conduct member outreach and recruitment—including presence at SAWs and other industry events.



5. Serve as a member of the A3 Board Executive Committee which includes additional meetings and greater involvement in day-to-day operations and support of ED and staff.

The Membership Trustee must be an A3 Professional Member in good standing.

Governance Trustee: The A3 Governance Trustee is responsible for leading the governance committee and serving on the A3 Board. The governance committee is responsible for ongoing review and recommendations to enhance the quality and future viability of the A3 Board. All committee work is done in partnership with and through the leadership of assigned staff.

Major responsibilities of the Governance Trustee include:

1. Form a Governance Committee to help research, advise, and direct the Board on sound governance practices.
2. Lead regular efforts to review/revise Trustee position descriptions.
3. Monitor Board's due diligence function as it relates to governance, board structure, and/or legal or moral obligations.
4. Monitor effectiveness of governance policies and adherence to governance standards, recommend changes and engage Board in dialogue on these topics as needed.
5. Lead governance committee in Board succession planning and orientation for new Trustees.

The Governance Trustee can be an A3 Professional or Affiliate Member in good standing or a committed friend of the organization.

At-Large Pro Trustee: The A3 At-Large Pro Trustee represents the interests of A3 Professional members and serves the Board in various capacities as need dictates. The A3 Board may, at times, seek individuals with specific perspective, experience, or skillsets to serve in this role. Additional duties and responsibilities will be defined by the A3 Board during the At-Large Pro Trustee's term(s) of service.

The At-Large-Pro Trustee must be an A3 Professional Member in good standing.

NEW Pro Training Courses—They're Happening This Winter!

A Message from A3 & the Pro Course Provider Alliance

We're all excited for the launch of the new Pro Training Program this winter. A3 Pro Training

courses—currently, Pro 1, Pro 1 Bridge, and Pro 2—offer valuable, relevant skill development for avalanche workers at a variety of points in their careers. All A3 Pro Training courses:

- Meet or exceed collaboratively designed, industry-driven skill and proficiency guidelines.
- Are taught by top educators who also have a solid background of operational avalanche experience.
- Teach, coach, and evaluate students to a consistent standard.

Whether you're an aspiring avalanche worker or a seasoned avalanche professional, consider one of these courses this season or in the near future.

Pro 1 is for entry-level avalanche workers as well as seasoned professionals who wish to refresh their skills and get up to speed with current practices. The course covers skills and proficiencies that enable an individual to be a contributing member of an operational avalanche program, including making and documenting relevant observations, managing personal and group risk in avalanche terrain, and contributing informed opinions during risk management discussions.

Pro 1 Bridge is for individuals who recently took a Level 2 course and/or regularly apply snow and avalanche observation skills in an operational setting and wish to demonstrate proficiency at the Pro 1 Level. Students should have their observational skills well-honed prior to this condensed course and be ready for rigorous evaluation. Students who took a Level 2 course a long time ago and/or have not been applying snow and avalanche observation skills in an operational setting are encouraged to consider a full Pro 1 course.

Pro 2 is designed for developing avalanche professionals with several seasons of applied professional experience as well as seasoned professionals who are looking to develop skills applicable to leadership roles within their operation. The course covers skills and proficiencies that enable an individual to step into a leadership role within an operational avalanche program. A focus on operational risk management and decision-making skills such as forecasting, risk mitigation strategies, and professional communication.

Questions? Do not hesitate to reach out to A3 and/or individual Pro Course Providers. ▲

REPORT ON ICAR ANNUAL MEETING: ANDORRA 2017-10-29

BY JIM DONOVAN

The International Commission for Alpine Rescue (ICAR) meets annually and is comprised of special commissions in the topics of avalanche, terrestrial rescue and medical topics. ICAR provides a platform for mountain rescue and related organizations to disseminate knowledge with the prime goal of improving mountain rescue services and their safety. This year, the 69th ICAR congress met in Andorra October 2017.

There were a couple of relevant items that came out of the avalanche commission. Avalanche rescue shovels now have their own equipment standard that was approved from the UIAA (The International Climbing and Mountaineering Federation) in July 2017. The UIAA tests climbing and mountaineering equipment and this is a common stamp of approval. A standard for avalanche probes will be developed in 2018. http://www.theuiaa.org/documents/safety-standards/UIAA_avalanche_rescue_shovels_156_final.pdf

The big advancement was the formalizing of the Mountain Safety Knowledge Base (MSK). This project aims to establish best practices in avalanche rescue based on research and rescue experience. A workgroup with representatives from research, rescue, military and education all participated in a three-day workshop that translated the content into 18 languages. Two new topics "Organized Backcountry Rescue" and "Urban Avalanche Rescue" were developed for the knowledge base. The Mountain Safety Knowledgebase will be formalized into a Swiss based non-profit organization and ICAR, UIAA, IFMGA (International Federation Mountain Guides Association) and SLF (Swiss Snow Institute) will be the founding organizations. The MSK concept will be expanded to other areas of alpine rescue. Look out for more information at the next ISSW in Innsbruck, Austria and ICAR in Chamonix, France in 2018.

Some Exceptional Rescues

Several talks described the January 2017 avalanche incident at Rigopiano, Italy from the snow and avalanche and the rescue, medical perspective. The avalanche was a D4, triggered by an earthquake and killed 29 people. 11 people survived, trapped in a hotel that was physically displaced. Some of the survivors were trapped for 60 hours. Rescuers dealing with structures that are hit by avalanches should take into account these extraordinary survival times.

There are now six US representing organizations at ICAR: the Mountain Rescue Association, Wasatch Backcountry Rescue, Teton County Search and Rescue and Silverton Avalanche School. The University of New Mexico Program in Austere and Mountain Medicine Program was approved as a new member this year. ▲



Jim Donovan is the Director of the Silverton Avalanche School. Reach him at jimd@avyschool.org, 970-903-7039.



36.1 Corrections

Angela Hawse contacted *The Avalanche Review* to set us straight about a point in Jeff Dobronyi's story about decision-making at the Opus hut. She is not Helitrax's snow safety director; Matt Steen wears that hat. Angela is one of the avalanche forecasters with Helitrax and she and Matt have worked together on the Helitrax snow safety team for the last four years.

From the Sawtooth National Forest Avalanche Center: Ethan Davis wrote our SAC season summary which was erroneously attributed to Scott Savage. Thanks Ethan for the hard work. TAR apologizes!

Avalanche center season summary authors, put your names on your summaries please!

“The Avalanche Science program addresses a gap in U.S. avalanche education between recreational courses and professional certification courses. It combines education and mentorship in a structure previously not available to aspiring avalanche workers.”

— Brian Lazar, Deputy Director, Colorado Avalanche Information Center

**▶ ColoradoMtn.edu/Avalanche-Science
Leadville, Colorado | Elevation 10,200 ft.**



HAPPY BIRTHDAY TO PETE PETERS who turned 89 years old on November 9, 2017. He served with American armed forces in Korea in 1952-53 and was a key person in our avalanche industry for 40 years.

In this photo David Sly of Maple Leaf Powder congratulates Pete at his home in Oakland, CA.

METAMORPHISM



Wyoming Department of Transportation Hiring Update

As longtime forecaster Jamie Yount transitions to the CAIC, **Brian Gorsage** shifts into WYDOT's primary avalanche forecaster role. New to WYDOT this year is **John Fitzgerald** who brings years of experience as a guide and educator in northwest Wyoming, with experience working for American Avalanche Institute, Yostmark Backcountry Tours, Togwotee Snowcat Guides, and NOLS. In recent years, Fitz cut his forecasting teeth in the great white north, working for three seasons as a forecaster for the Chugach Nat'l Forest Avalanche Center and more recently two seasons as a forecaster and guide for Valdez Heli Ski Guides. In his spare time Fitz likes to stare at computer models and ride his mountain bike.



Colorado Avalanche Information Center New Hires

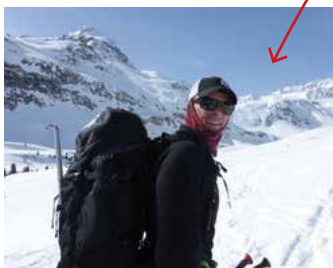
Brandon Levy will be the new CAIC forecaster in the Carbondale office, forecasting for highway corridors on the Western Slope of Colorado. He grew up in the Vail Valley and is excited to work and raise his family in his native mountains. Brandon worked as a highway avalanche forecaster for eight years at the Washington State Department of Transportation on US Highway 2 and Washington State Route 20. He has also worked as a ski patroller in Colorado at Beaver Creek, in France at La Plagne, and in New Zealand at Craigieburn. He has recently relocated to the Roaring Fork Valley with his wife, daughter, and yellow lab.



Jamie Yount joins the CAIC as a new weather and avalanche forecaster in the Boulder office. Jamie is a meteorologist originally from Bozeman MT. He managed the Wyoming Department of Transportation's avalanche forecasting and control program from 2002 to 2017. Jamie is a M101 Master Gunner and current president of the Avalanche Artillery Users of North America Committee (AAUNAC). He likes cold snow, boutique skis, and snow plowing with his kids.



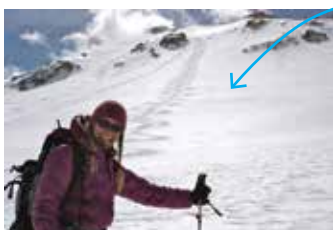
Ryan Zarter is happy to be back in Colorado and joining the CAIC as a forecaster at the Eisenhower Tunnel office. Ryan began working in the snow as a ski patroller, first at Eldora Mountain Resort and then at Arapahoe Basin. Ryan's avalanche experience includes working as an AIARE instructor, a couple of seasons forecasting for a gold mine in Chile, a season at a ski field in New Zealand, and a stint forecasting for an oil company in the Kurdistan Region of Iraq. Most recently, Ryan spent a season forecasting for WSDOT on Snoqualmie and Chinook Passes.



Kreston Rohrig will be the new backcountry avalanche forecaster working out of the Leadville office. He is a Colorado native, who got his professional start working as a ski patroller at Beaver Creek, including an exchange season in France. After a stint patrolling at Big Sky, Montana he returned to Colorado to work as ski guide and avalanche educator. He spent the last three winters heli-ski guiding in Haines, Alaska. When not skiing or digging in the snow, he is still on the end of a shovel working for his landscape company or adventuring with his wife and trusty hound.

Colorado Avalanche Information Center Retirees

Three long-time employees of the Colorado Avalanche Information Center (CAIC) retired in the last year. The CAIC and the Colorado Department of Natural Resources would like to take this opportunity to thank each one of them for their years of service to the people of Colorado.



Susan Hale retired after 12 years as an Avalanche Forecaster for US 550 over Red Mountain, Molas, and Coal Bank Passes. Susan is the longest serving forecaster for this section of highway since the CAIC/CDOT program began in 1992. She has returned to her primary home in Snowmass, Colorado, which is good for all of us because we hope we'll still see her quite often, at least between winter climbing and biking trips in warmer climates.



Stuart Schaefer retired after 18 years as an Avalanche Forecaster for I-70 from Vail to Georgetown, US 40 over Berthoud Pass, US 6 over Loveland Pass, and SH 14 over Cameron Pass. Although Stu is hanging up his ice cleats and packset, he was still guiding on the Arkansas River this summer and has plans to visit rivers across the globe that his winter job never let him see. We hope he enjoys sleeping without the gentle hum of the radio and that he doesn't miss driving the High Rockies at night in snow storms.



Scott Toepfer retired after 26 years as a Weather and Avalanche Forecaster in the Boulder office. Scott covered the backcountry areas of the entire state. He was a mainstay of the CAIC program and trusted voice for many of Colorado's backcountry travelers. According to Knox Williams, he is the longest serving employee of the CAIC. Sightings of Scott continue in the high mountains around Blue River. He made an appearance at CSAW in October where he recommended retirement to the 600 participants. We'll miss his encyclopedic knowledge of Colorado's geography, his work ethic, his early morning good humor and early evening rants. We hope he stays close to Summit County and that we get to share some steep routes with him, both up and down.

Thank you Susan, Stu, and Scott. We appreciate your hard work and years of dedication. You made Colorado a safer place and the CAIC a great place to work. We hope you enjoy a winter with fewer early mornings, but that you come back and play in the snow with us from time to time. ▲

Photo Mike Stoner
Mike Stoner Photography:
mikestonerphotography.com



BOOK REVIEWS

TRACKS IN THE SNOW

By Peter Shelton

Peter Shelton may be one of the widely-read ski writers you know. His stories have graced the pages of *Powder*, *Outside*, and *SKI* magazines, among others. This year saw the publication of “Tracks in the Snow,” a memoir of Shelton’s life as a skier, which is a collection born from a life inspired by mountains and mountain culture.

In 1973 Peter headed to Keystone, Colorado for a job as a ski instructor, where he met his soon-to-be-wife. They soon decamped for Bear Valley, California, in a VW bus, eventually (some years later) ending up in Telluride, Colorado (before it was cool). The first few stories in his book deal with Peter coming up through the ranks as a ski instructor at Keystone and Bear Valley. He waxes philosophical discussing the technique and mechanics of the turn, as it and he evolve from skinny skis to fat boards. Harold Schoenhaar, a friend and ski racer says it all; “You know, Phil Mahre said you have to learn to ski technically, mechanically. But at the top it’s a psychological game.” Excerpts like this from famed skiers of old transform this book from one man’s portrayal of a life on skis to a compendium of ski history.

Shelton writes about his graduation from ski instructing, matriculating into the ranks of ski writer and editor. This process requires some reconnaissance, which for Shelton involved reporting on the sports of speed skiing, covering the Albertville Olympics, and touring the backcountry with the 10th Mountain Division in Colorado. Rubbing shoulders with ski icons like Jean Claude Killy and Richard Bass help enhance the heart of his prose. Quotes like this one from Dick Bass, the founder of Snowbird; “by believing passionately enough in that which does not exist, we create,” are gems that illustrate the validity of Shelton’s work.

Peter Shelton’s literary contributions to skiing are so enormous that they shaped the social space around him. *Tracks in the Snow* suggests that it is no small burden to make a living skiing. That freedom was hard-won, from summers banging nails to scraping by, awaiting bookings for ski school lessons during Telluride’s infancy.

Shelton is a great storyteller but he is also a great teacher. We learn about avalanches, backcountry skiing, and “the human factor” in skiing. Shelton is able to put into words something many of us may have experienced first hand. He calls it “powder shock,” the rational mind succumbing to the lust for deep turns.

Quoting Basho, Shelton describes how he doesn’t want to be a statistic, a resolution which shaped his decision to no longer ski in the backcountry. To the reader this decision is shocking. Shelton emphasizes the importance of family;



spending time with his wife, children, and grandchildren enlarges his central argument in making this decision. This revelation brought me great pride and appreciation, and forced me to take pause when I read it.

Tracks in the Snow is a testament to the tribulations and triumphs of Shelton’s life in skiing. His prose exemplifies the writing that helped develop into hubs of American ski culture. Peter is deliberate and makes no excuses on the page. Shelton takes us on a trip through his life that reaffirms his reputation as one of the best skiing writers of our time. These stories portray the spectrum of a skier’s life, from reckless, wild, and young to old, wise, and satisfied. If ever there were a reference for how to live a life skiing, this is it.

—Billy Cyr

Billy Cyr is a skier who resides in Driggs, Idaho. A native of New York, Bill first headed to the mountains for high school in the Adirondacks. Currently, you’ll find him searching for truth in the music of the universe, one turn at a time.



MOUNTAIN MEDICINE & TECHNICAL RESCUE

Edited by George W. Rodway,

David C. Weber, & Scott E. McIntosh

For as long as people have been going into the mountains for solace, exploration, fame, or “because it’s there,” they have invariably become ill, injured, or worse... thus requiring help (if they were lucky) from their fellow man. This clearly posed problems for friends, family, first responders or good Samaritans. Despite their spirit of beneficence and enthusiasm in heeding the call for help, rescuers lacking medical know-how and mountain savvy step into this dynamic mountain arena with understandable trepidation.

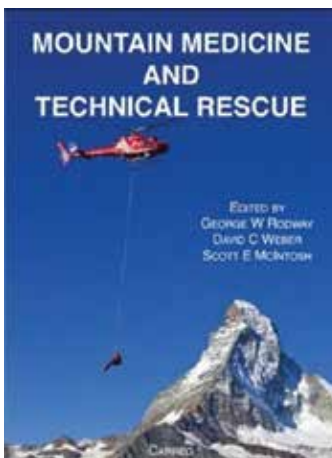
Mountain rescue operations are inherently more complex than urban or valley medical or trauma incidents, thus requiring a whole pantheon of skills to locate, access, and then transport the ill or injured party. Conversely, alpinists and mountaineers may be able to safety locate, access, and transport an individual, but without skills to recognize illness or injury, stabilize, and adequately treat a patient, the rescue effort may quickly turn into a body

recovery. For this reason, rescuers have turned to medical professional leaders for guidance and guidelines on best practices in the wilderness environment. The problem is that many medical practitioners themselves lack the experiential knowledge to understand the mountain context. Some of the best intentioned recommendations are impractical, dangerous, or even futile when put under the duress of high mountain winds, deep snow, and the sun ominously fading on the horizon. Furthermore, wilderness and mountain medicine is a nascent academic field with new evidence-based best practices replacing anecdote at an ever-accelerating rate. Putting it all together is no simple task.

Now comes *Mountain Medicine & Technical Rescue*, a book sure to come to be known as the bible for mountain rescue organizations and their medical advisors. This resource was inspired out of need for a textbook for the international Diploma in Mountain Medicine (DiMM). For those unfamiliar, the DiMM was born in 1997 out of collaborative work between reputable rescue organizations: the Union Internationale des Association d’Alpinisme (UIAA), International Commission for Alpine Rescue (ICAR), and the International Society for Mountain Medicine (ISMM). The goal of the DiMM is to impart the skills and knowledge necessary for health care providers to safely and competently supervise and provide medical care in the austere mountain environment. This curriculum includes not only review of best practices and latest evidence in wilderness care, but also practical experience in the often harsh mountain environment. This is meant to ensure development of how to safely manage one’s own safety and minimize risk to others in a technical rescue effort. For this reason both medical and technical components are emphasized in this text, reflecting this effort to bridge the gap between medical practitioners and rescue technicians.

The succinct medical components of the text are easily accessible to providers ranging from guides and ski patrollers to emergency physicians. The latter gain insights on practical and safe interventions for medical conditions rare in the urban setting, but common in the mountain setting such as acute mountain sickness. Guides and expedition leaders will find useful topics not often reviewed in Wilderness First Responder or even Emergency Medical Technician courses. How do you safely assess the fitness of an individual with pre-existing medical conditions for mountain travel? Are there any evidence-based recommendations on how I should stock my first aid kit? How do I decide if a diabetic emergency requires evacuation? It’s all in there.

Mountain Medicine & Technical Rescue also provides the reader or organization with a holistic view of mountain rescue that goes well beyond





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the basics of the on-site operations in the mountain environment. Owing to the philosophies of the experienced and well-traveled writers and editors, themes of personal and team safety, communication, and reflection permeate the chapters from start to finish. Photos and illustrations complement the simple and straightforward text. Dogma is nowhere to be found; instead the editors promote key concepts, detailing roles and general responsibilities inherently found in technical rescue. The water is never muddied by addressing such hot button topics such as horizontal vs. vertical litter configuration or single-main single belay systems vs two tensioned systems. On the other side of the coin, peripheral chapters that include helicopter operations, the incident command system, and common missteps of teams appropriately supplement the meat-and-potatoes chapters describing the operations.

Note that the title of the text describes mountain rescue, not search and rescue. While the manual well describes the operations of an avalanche rescue, it does not broach glacier rescue techniques, nor does it open Pandora's Box of what it means and how to pull off a successful search. We await such future chapters in the second edition.

Furthermore, it's hard to expect that such a text would be need to be comprehensive review of all wilderness medicine topics, as the seventh edition of a comprehensive 3000-page textbook already fills this niche. The authors themselves, however, reference observational data that the still most commonly encountered conditions include gastrointestinal complaints, athletic strains and

sprains, and soft tissue injuries. Perhaps a deeper dive into musculoskeletal injury evaluation such as the knee exam, a review of waterborne illness prevention and management, or some examples of wound care and field dressing techniques would serve their future audience well.

Regardless, *Mountain Medicine & Technical Rescue* reviews how to deliver the best care possible in the mountains, paints concepts and systems that work, leaving the reader with a coherent picture of how to pull off adequate aid and rescue in technical terrain. If one were to build a technical mountain rescue team from ground up, this would be the manual at its foundation. This is sure to be on the bookshelf of any mountain rescue professional or aspirant.

—Drew Hardesty and Terry O'Connor

Drew Hardesty has been a forecaster at the Utah Avalanche Center since 1999/2000 and nearly that long as a climbing ranger in Grand Teton National Park. When people invariably ask him if the injured or deceased were in over their heads, he often replies that most were just unlucky: a moment of inattention, a quick slip on lichen, loose rock. He received the valor award in 2012.



Dr Terry O'Connor is a practicing emergency physician in Sun Valley Idaho, where he serves as the Sawtooth Regional EMS Director and sits on the State of Idaho EMS Physicians Commission. He provides medical direction for ski patrol, helicopter ski operations and volunteers regu-

larly for the Sawtooth National Forest Avalanche Center. As Adjunct Clinical Professor of Emergency Medicine University of Colorado, he contributes to the Consortium for Climate Change & Health and directs the Diploma in Mountain Medicine course for the Wilderness Medical Society.



MSU EXTENSION GUIDE

MSU Extension has published a new MontGuide—Montana Avalanche Safety as a free pdf download. The intent of the guide is to raise avalanche awareness and encourage taking a level one class. Anyone needing concise introductory material for classes, school programs, etc. are encouraged to make it freely available. All we ask is that you give us credit. If you use it, please let us know.



<http://msuextension.org/publications/Agand-NaturalResources/MT201706AG.pdf>

Montana Avalanche Safety

Jerry Johnson, Professor, Montana State University Department of Political Science

Jordy Hendrikx, Director, Snow and Avalanche Lab, Montana State University

Paul Lachapelle, Associate Professor, Montana State University Extension Community Development Specialist ▲

ADJUSTING TO A DIFFERENT SNOWPACK CLIMATE

BY TY FALK

The 2016/2017 winter season in the Salt Lake area mountains will be remembered by many to have felt overall warmer and wetter than normal. Some might even call it coastal, based on our weather and avalanche activity. I recently looked at all the available data on reported avalanches from the Salt Lake region on the Utah Avalanche Center website back to the 2009/2010 season and on through the present year. I ended up with eight seasons of consistent data. Before the 2009/2010 season there is incomplete data. I recorded all the persistent weak layer avalanches from each year. I included facets, depth hoar and crystal grain (surface hoar) in these numbers.

These three persistent weak layers are typically associated with most of the large unmanageable avalanches that lead to fatalities. Since the 2009/2010 season we have had eight fatalities in the SLC region, seven of those failed on a weak layer which was identified as facets. We typically see a fair amount of these avalanches, especially in the first half of the season. They are commonly found in our intermountain snowpack or even more prevalent in continental snowpacks like Colorado. In the 2016/2017 season we had very few facet-related avalanches, and our snowpack presented many traits of a Coastal region.

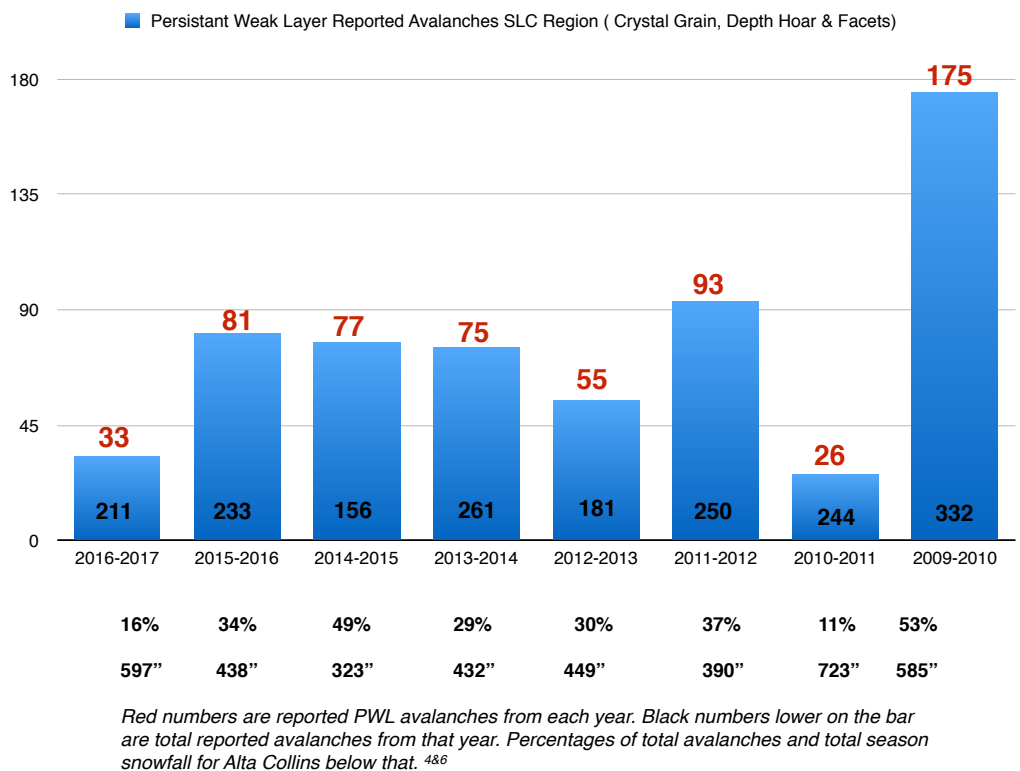
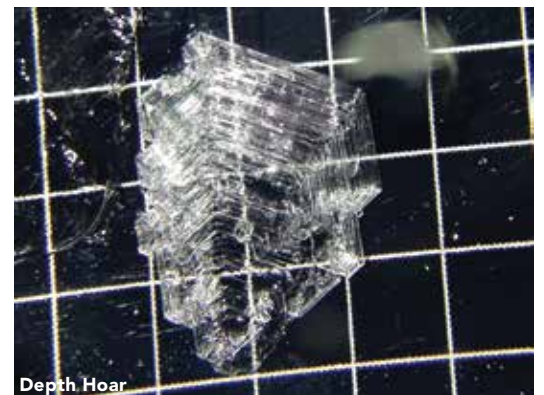
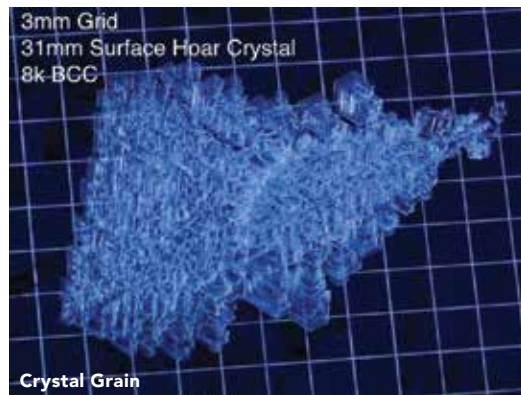


Figure 1



The four most common climate regions in the western United States are:

Coastal: Typical regions are the Cascade Mountains in the Pacific coast states of Washington, Oregon, California. These areas typically have mild temperatures, lots of snow, high snow density and a low temperature gradient in the snowpack. Rain events are common at mountain locations. They typically have lots of direct action avalanches (Wind & Storm Slabs). Cornices triggering loose snow avalanches and Ice fall avalanches are more common in Coastal areas.

These regions can also have larger scale accidents involving more victims, for instance some of the accidents on Rainier over the years. The avalanche fatality records for Oregon and Washington on the CIAC site goes back to the 2008/2009 season. Much of the older data is incomplete but after reading through all the fatalities it showed very few persistent weak layer avalanches. Most of the avalanche fatalities I read about were wet, storm, or wind slabs. However, any region can display different traits from season to season. In 2014 Oregon displayed continental conditions. That season, some areas in Oregon had a layer of depth hoar from early season snow and a period of high pressure which led to a fatality. Later in that year a surface hoar event got buried, causing another fatality.

Continental: This climate region includes most of Colorado, Wyoming, New Mexico and the Uinta Range. These areas see less snowfall than the Coastal regions, have colder temperatures, lower density snow and a higher temperature gradient due to the thinner snowpack. Typically this is where you see the persistent forms most often.

Intermountain: Regions typically include the Wasatch, most of Idaho, Montana, the Blue Mountains of Northeastern Oregon and some of Southwestern Colorado. These areas show climate characteristics of both Coastal and Continental regions.

Coastal Transition: Areas of Northern Idaho, Montana, and isolated locations in Oregon show traits of the coastal transitional zone. This climate zone is similar to the coastal regions but with less rain and snow.

By definition persistent grain types may persist for months or the entire season. "They have low fracture toughness; anisotropic: weak in shear, resistant to bonding under overburden slab."² They can be found in any region but typically are more frequent in Continental or Intermountain locations.

Facets: Facets or squares as they are sometimes referred to are associated with most the avalanche fatalities. They have sharp angles and form from large temperature gradients within the snowpack. Warm days with cold nights promote growth due to the temperature fluctuations. Typically smaller in size than depth hoar, usually around 1-2mm.

Crystal Grain (Surface Hoar): Crystal grain is like the solid form of dew. It develops on the surface of the snowpack during clear calm nights. To grow "a sufficient supply of water vapor must be available in the air, and a high temperature gradient (inversion) must be present above a snow surface that is chilled below the ice point. (the dew-point temperature of sub-freezing air)"² Once it gets buried it can produce avalanches for a long period and pull out on very low slope angles. These grains can grow very large; one I found

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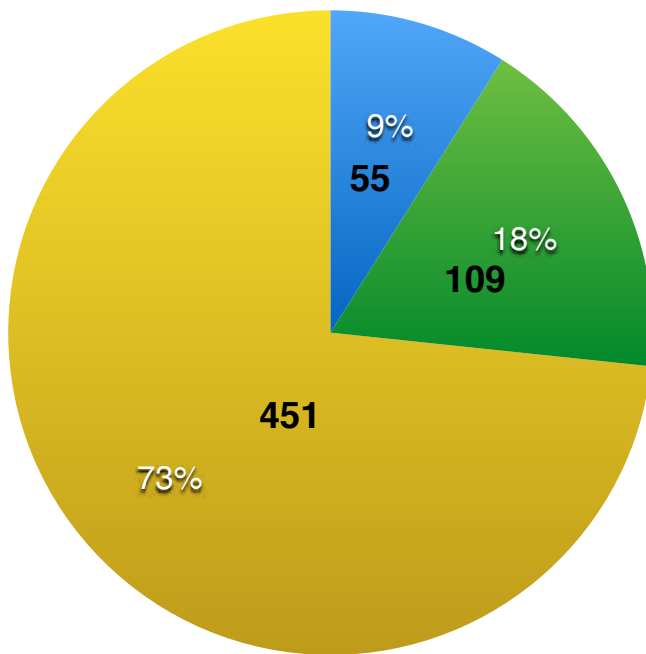


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	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17
Total Avys. all year	332	244	250	181	261	156	233	211
Total PWL Avys. all year	175	26	93	55	75	77	81	33
Fatalites	2	0	3	1	0	0	2	0

Figure 2: SLC Region Reported Persistent Weak Layer Avalanches

● Depth Hoar ● Crystal Grain ● Facets



615 Persistent weak layer avalanches out of **1,833** total reported. This includes natural and human triggered avalanches reported from **2009 to 2017**.

34% were identified as persistent weak layer avalanches.

Figure 3: History of Reported Persistent Weak Layer Avalanches from 2009 to 2017 in the SLC Area Mountains

in BCC near the bottom of God's Lawnmower earlier this year was around 31mm.

Depth Hoar: These grains develop on the bottom of the snowpack. When the pack is shallow, the relatively warm ground and cold snow surface produce a high temperature gradient which promotes growth of depth hoar. They are cup shaped and typically not as prevalent as the first two persistent weak layers in accidents but do cause very deep unmanageable avalanches when they release. This grain type is large, typically at least 4mm.

The data I found for the 2016/2017 season shows a normal amount of total avalanches but far fewer reported persistent weak layer avalanches. We had 249 reported avalanches with 33 of those avalanches failing on persistent weak layers, twenty-two of which were facets, four were depth hoar, and seven surface hoar avalanches. This is the fewest reported persistent weak layer avalanches since the season of 2010/2011. That year we only had 26 total reported persistent weak layer avalanches. In both of those seasons (2016/2017 & 2010/2011) we had no fatalities in the Salt Lake region. The opposite holds true as well. During the seasons with a high amount of PWL avalanches observed, we had the most fatalities.

Some of the seasons that stand out when looking at the data were:

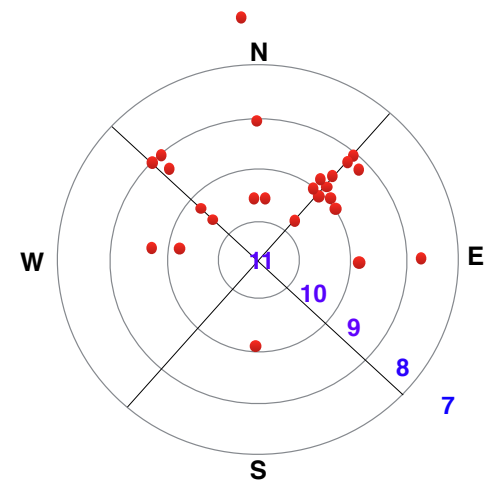
2009-2010 (175 PWL Avalanches)—2 SLC area fatalities: Grandview and Meadows

2011-2012 (93 PWL Avalanches)—3 SLC area fatalities: Snowbird, Kessler, Dutch Draw

2015-2016 (81 PWL Avalanches)—2 SLC area fatalities: Pointy Peak and Gobblers

Each of these fatalities from the respective season were reported as facets being the weak layer the avalanche failed on.

Looking back at the Salt Lake regions history of avalanche fatalities, there appeared to be 57 total dating back to 1965.⁶ There are complete records with weak layers identified for 33 of those 57. Out of those 33, 26 of them failed on persistent weak layers with most failing on facets. (79%) When looking at all of the PWL avalanches it appears to be a trend that most occurred above 9k feet on northwest through northeast aspects. (Figure 4) A number of these areas have seen repeat fatalities through the years. These areas are: Canyons Pe-



*SLC region total history from 1965 to 2017. Includes Facets, Depth Hoar and Crystal Grain. (25 Fatalities listed with full avalanche info including weak layer.)

Figure 4: SLC Area PWL Avalanche Fatalities

Other Western U.S. Snowtel Sites w/ complete data	16/17 Classification
Moose, WY	Continental
Cold Springs, WY	Continental
Elkhart Park, WY	Continental
Adin Mtn, CA	Coastal
Sonora Pass, CA	Coastal
Ebbetts Pass, CA	Coastal
Carson Pass, CA	Coastal
Blue Lakes, CA	Coastal
Mt. Shasta, CA	Coastal
Mt. Hood Test Site, OR	Coastal
Mt. Hood Government Camp, OR	Coastal
Paradise, WA	Coastal
Paradise Ridge, WA	Coastal
Ennis, MT	Coastal
Lone Mtn, MT	Coastal
Shower Falls, MT	Continental
Mancos, CO	Coastal
El Diente Peak, CO	Coastal
Independence Pass, CO	Continental

Utah Snowtel Sites w/ Complete Data	16/17 Classification
Lightning Ridge	Continental
Ben Lomond Trail	Coastal
Ben Lomond Peak	Coastal
Cascade Mtn.	Coastal
Beaver Divide	Coastal
Silver Lk. Brighton	Intermountain
Brighton	Coastal
Thaynes Canyon	Coastal
Snake Creek Powerhouse	Coastal
Mill D North BCC	Coastal
Parleys Summit	Coastal
Alta Guard	Intermountain

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Rene Crawshaw just in Japan, Goto Kogen, Honshu. Photo: Grant Gundersen

riphery (6), Snowbird (5), Gobblers (4), Pioneer Peak (3), Kessler (2), Twin Lakes Pass (2).

The 2016/2017 season in the Salt Lake region has been defined by **large snowfall totals, above average temperatures, higher density snow, lots of direct action avalanches and many rain events in mountain locations.** Many upper elevation north aspects were over 400cm for snow depth at one point this winter. We have had many direct action avalanches like wind and storm slabs. I have counted eight rain events at seven thousand feet in Park City. Our upper elevation snowpacks had low temperature gradient. We also averaged a slightly higher snow density in our storms. In season 2016/2017, Alta has had 40 storms with six or more inches of snow; those storms average out to a density of 9.6%. Snotel sites across the SLC area were well above normal all year for percent of official median especially around late March when they peaked.

March 6	May 7
Brighton 169%	Brighton 117%
Parleys 136%	Parleys—Bad Data
Snowbird 170%	Snowbird 144%
Thaynes Canyon 157%	Thaynes Canyon 127%

The Alta Collins Snotel plot (9662') reached its highest height of snow depth on April 29, 2017 which was 161" (408cm)⁴ Alta Collins total snow-

fall for the year was 596.5". Our average temperature at Alta this season for December through March was -3.6 C, which is 1.2 degrees warmer than normal. (Average is -4.8 C)⁸

These are all traits of a more Coastal snowpack. Looking back at the older data from the Karl Birkeland and Cary Mock paper on Snow Climatology from 2000 shows that if Alta does not get an Intermountain season, they are two times more likely to get a Coastal or Maritime season over a Continental season.¹ During their study they looked at data from 1946 to 1998 at the Alta UDOT station in upper Little Cottonwood. Out of those 52 years, they came to the conclusion that thirty of those seasons were classified as Intermountain with seventeen Coastal seasons and only five Continental seasons.

I went back to look at the data from the Alta UDOT guard station, then categorized all the seasons since 1998 which was when the Birkeland & Mock paper on Snow Climatology left off. (Figure 5) I used the same flowchart Birkeland & Mock devised for classification of the seasons based on several weather variables—total rainfall, average temperature, December temperature gradient, SWE, and snowfall. Each variable had a specific amount which would trigger the next step on a flowchart. For example, SWE of more than 100cm would trigger a coastal classification. While working on this project, I reached out to Karl Birkeland, who mentioned that the classification system is not perfect and there are limitations. This became apparent when I obtained the classification result from our current 2016/2017 season for Alta Guard. The second variable in the flowchart is average temperature; warmer than -3.5 C

for the average temperature during the winter's four-month period triggers a Coastal classification. This year the Alta UDOT weather station averaged -3.6 C for those months, which is just one-tenth off the cutoff number. After following the flowchart further down, our classification ended up being Intermountain officially for the season at Alta. As mentioned earlier, climates can show traits of other regions at any time, for instance our Intermountain region showed obvious coastal traits all season.

Within the Salt Lake region we can see drastically different snowpacks and weather within very short distances; this illustrates the limitations of only looking at one station. We had different weather than normal in terms of the amount of rain at lower elevations, temperature, and distri-

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bution of the January crystal grain (surface hoar) layer around the region. I took a quick look at the Thaynes Canyon site in Park City for comparison. The Thaynes Snowtel site is at 9230' and the Alta Guard location is around 8700'. I found that the average temperature for the four-month season was -2.5 C. This was within the Coastal classification for the Thaney Canyon location which shows drastically different temperatures within a relatively close proximity of each other.

After looking at the past 19 seasons at the Alta Guard site since the previous study was done, we have only had two Coastal seasons and three Continental seasons; the fourteen others were classified as Intermountain. Looking further back at the data: out of the seventy-one seasons classified since 1946 the total numbers are:

Continental: 8 11.3%
 Coastal: 19 26%
 Intermountain: 44 61.9%

Different avalanche climates in northern Utah means different types of avalanches and in places we might not normally see instabilities or red flags. For example, many of our storms this season have come in with a southern component where southern winds have been loading north and northeast aspects more frequently. Our typical northwest flow that favors upper Little Cottonwood usually gives us windslabs and cornices on southeast aspects. In addition, I have counted eight rain events at the mid elevations this year. At those mid and low elevation sites it seems like we have had more rain and thus more melt freeze

Year	Rain >8cm	Average Temperature > -3.5 C	December Temperature Gradient 10C/m>	SWE=100cm>	Snowfall >560cm	Temperature < -7C	Classification
1998-1999	no	-4.1	8.3	45.7	593.5	-4.1	Intermountain
1999-2000	no	-4.2	6	63	912.9	-4.2	Intermountain
2000-2001	no	-4.2	3.1	35.5	619.8	-4.2	Intermountain
2001-2002	no	-6.3	4.3	39.2	699.3	-6.3	Intermountain
2002-2003	no	-4.3	8.8	25.4	526	-4.3	Intermountain
2003-2004	no	-3.8	3	38.4	877.6	-3.8	Intermountain
2004-2005	no	-3.4	2.6	54.5	798.8	-3.4	Coastal
2005-2006	no	-5.3	3.8	65	1159.5	-5.3	Intermountain
2006-2007	no	-3.8	4.9	34.8	624.3	-3.8	Intermountain
2007-2008	no	-7.6	10.3	102.1	1076.7	-7.6	Continental
2008-2009	no	-5.1	7.8	68.8	699	-5.1	Intermountain
2009-2010	no	-5.6	11.9	39.7	448.3	-5.6	Intermountain
2010-2011	no	-5.4	2.2	83.1	781.6	-5.4	Intermountain
2011-2012	no	-3.7	10.8	51.6	434.3	-3.7	Continental
2012-2013	no	-5.6	6	49.5	555.8	-5.6	Intermountain
2013-2014	no	-4.7	10.9	71.2	561.9	-4.7	Continental
2014-2015	no	-1.5	4.2	43.3	408.4	-1.5	Coastal
2015-2016	no	-3.9	6.4	71.8	724.2	-3.9	Intermountain
2016-2017	no	-3.6	5.2	83.7	902.5	-3.6	Intermountain

Figure 5

crusts than normal. These can lead to avalanches on hardness changes or on a variety of crusts. The melt freeze crusts could also set us up for more wet slab avalanche formation. When the free water moves through the pack and hits a crust it can cause a wet slab avalanche.

Although it's extremely hard to predict and forecast seasonal avalanche conditions and climates ahead of time, hopefully by recognizing current trends and avoiding suspect terrain early

in the season it can make staying on top a little easier. Until weather forecasting can better predict long term temperature as well as snow and weather data, we will be limited to shorter term forecasts. ▲

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Thanks to the following people for helping me put this together:

Karl Birkland, Greg Gagne, Drew Hardesty, Jim Steenburgh, Damian Jackson, Chris Cawlie, Scott House, Colby Stetson, Cindy Grant, Katie Falk, Dave Taylor.

When Tyler Falk moved to Utah he discovered bluebird powder days and alpine granite. He lives in Park City with his wife, two sons, and dog named Powder. He works at White Pine Touring and received his avalanche education at AAI. Working with the observer program at UAC has furthered his lifelong avalanche learning.



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SHARING CONDITIONS

TIPS AND TRICKS: SHARING CONDITIONS IN A GROUP

BY IAN HAVLICK

Despite my reluctant addiction to social media, there seems to be an evolving use of Facebook amongst ski guides and avalanche professionals as a way to share important snow, weather, and avalanche observations informally, but privately, in “closed” Facebook groups. The development of these groups to this point have held a shadowy fringe presence to the standard sources of snow and avalanche information to most professionals, something in addition to the official public avalanche bulletins, NOAA weather forecasts, and the clutter of MountainHub, Avatech, various Google “informalEx” groups, etc. However, these private groups seem to be gathering a devout following as the content tends to be high quality, current, and easy to digest with entries heavy on multi-media, candid thoughts, and SWAG/OGRS filled descriptions.

This examination of social media use amongst avalanche professionals is interesting and filled with benefits and possible downfalls; over time these platforms could change the landscape of traditional avalanche information sharing for professionals and public.

PROS:

- real time sharing of info
- multi media friendly and digestible
- “Catch all” for all information, near misses, powder shots, etc
- bypassing personality and owner conflicts amongst operations
- English speaker friendly, but inclusive to everyone
- Free

CONS:

- it is Facebook after all, so no reliable, long-term database storage
- potentially limiting information sharing with official avalanche forecast centers (users might share only on Facebook and not submit duplicate observation with public centers)
- adding yet another place that forecasters need to check for information, incident details, etc
- Club-y—personality conflicts could limit membership if admin doesn’t like so and so.



After several seasons of limited observation sharing amongst the three helicopter ski operations in northern Iceland, one stormy late spring morning during a weather hold, I created a private group and invited all the guides I knew of in the area to join the “Troll Peninsula Ski Guides Informal Info Exchange”

Prior to this group’s creation, as a guide you would hear through the grapevine and secondhand translation from Icelandic, “one operation had a close call yesterday,” “so and so buried a guest last week,” “big avalanche on Hestfjall today,” all adding to a reliably inaccurate picture of the complicated, subtle, arctic maritime snowpack of northern Iceland. Sprinkle into the mix a clunky national avalanche forecast page of roughly translated Icelandic forecasts, and the multiple languages spoken in the Troll peninsula (the American guides speak English, the Swiss pilots speak German, French, Italian, the Icelandic guides speak Icelandic, one Norwegian pilot, some visiting Russian guides, a few Canadians) and you got yourself a proper multi-lingual shitshow to wade through.

Enter Facebook. A widely adopted, multi-national platform that does not require any training on how to use, because most use it on a daily basis already. Private groups are easy to set up, and because of its widespread use, most guides and forecasters are easy to invite. Using the guide rosters on each heli-ski operation’s websites, I set out and invited all the guides I could find within Facebook, in addition to folks I knew that were backcountry guiding in the area and might be interested in contributing and utilizing this new platform. The early days of the page’s existence had mostly just my own observations on weather and snowpack, with as many relevant photos I could muster. Soon, other guides began to post. The worries of other operations flying into another operation’s secret stashes after seeing their observations became obviously unsubstantiated and the benefit of the observations page outweighed the risk of other operations exploiting stashes. After few weeks, others observations trickled in, and became a genuine resource in a very data-sparse and language difficult place. Existing members began to invite others they knew would use the private page, including the official Icelandic Meteorological forecasters.

Time will tell how this Icelandic snow and weather page will evolve. I suspect it will take another small effort next season to renew interest and keep this informational rollerball growing next season. As it stands now, the Troll Peninsula InformalEx has 40 members, and I would guess that it expands to over 50 next spring.

Ian Havlick lives in Crested Butte, Colorado where he works as Assistant Snow Safety Director for Eleven Experience’s cat ski operation for most of the winter. For the last five years, when spring comes he chases the snow north to Norway and Iceland. He is one exam away from completing his IFMGA Mountain Guide Certification, and has yet to impress anyone with his 2010 SkiDoo 800 skills, though his right throttle thumb has grown significantly over the past three winters. In the summer and fall you can find Ian climbing or fishing across the mountain west. Ian has also been an avalanche forecaster for the Crested Butte Avalanche Center for the last five years.



UTAH MOUNTAIN ADVENTURES: GUIDE SHARING SITE

BY COLBY STETSON

In the winter of 2016, Utah Mountain Adventures (UMA) created our own internal avalanche information exchange. Stemming from a desire for better guide communication and making less work for an already overworked office staff, we began informally with a private Facebook group and eventually built a communication platform on Google Docs.

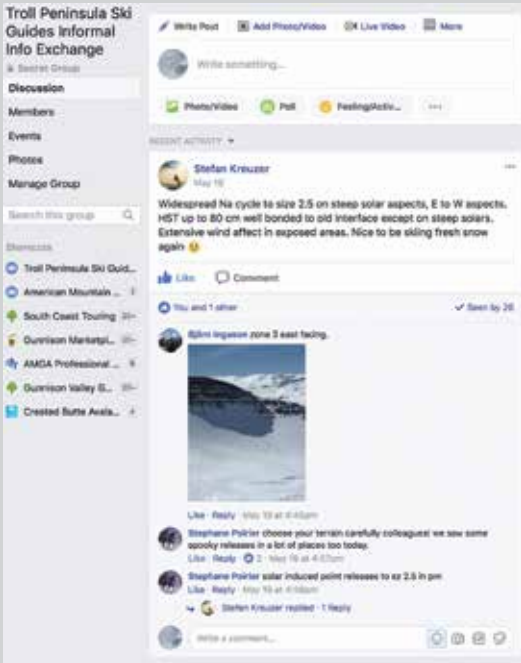
In contrast to other mountain ranges that suffer from a lack of avalanche information, the Central Wasatch has the opposite problem. Seven different ski areas, the best avalanche forecast center in the country, and a large community of backcountry skiers come together to provide a staggering amount of observations and weather data. Because the Wasatch can be so busy, skier traffic and snow quality are also big concerns for our organization. Over the years our office staff had become a clearing-house for that type of information. Part of our daily procedures had involved filling out daily paperwork for the office regarding client information as well as snow and weather observations. This system worked well when only a few guides were out with clients, but on days when there were 15 guides working, most felt that we needed a simpler yet more comprehensive system.

Facebook initially seemed like a practical choice for an information exchange due to its widespread and easy use. While we had fantastic results almost immediately—high rates of participation and high-quality information—by the end of the

winter, UMA had decided that Facebook was not the most appropriate place for formal organizational risk management discussions. (Do you want to say WHY this was not appropriate? Folks might want to know...) Guides also found it tedious to have to access multiple different sources for forecasts, observations, and office paperwork.

In the autumn of 2016 we put together a rough internal information exchange program using Google Docs as a platform. We started by creating two separate spreadsheets: an AM forecasting and risk management assessment form; and a PM post-trip conditions report and office report. Both of these forms are available to all guides, every day, in a shared folder online.

Our AM form is a living document that guides and the office staff can refer to throughout the day. Each evening, the office lists the guides who are working the next day and adds all of them to a group text. Also on the form, those guides fill in a rough tour plan for the next day. In the morning, the assigned lead guide builds an avalanche forecast using information from internal observations, pertinent Utah Avalanche Center (UAC) observations, and the weather stations most appropriate for the various tour plans. The lead guide brings that forecast (usually on an iPhone or other device) to our morning meeting. At the meet, we discuss hazards and refine tour plans using group consensus. If tour plans change in the parking lot, as is often the case, the guide can call the office,



AM Operational Weather and Avalanche Forecast														
Date	20170213		Time/Location	07:30/Phone			Guides Present	WPassy			Lead	Stetson		
Weather Station Observations														
Weather Charts														
LOC		Temperature (F/C)			Snow (inch/cm)			Wind (mph, direction)					RH	
	TIME	Prot	Max	Min	RNSA	RNSAW	HS	Current	dir	12hr Avr	dir	12hr Max	dir	RH
Baldy (11066ft)		23.4	32.2	19.9				14.0	NE	10.0	NE	22.0	NE	4%
Collins Mid. (9662ft)		-4.8	0.1	-6.7	0.0	0.0	108.0							
		23.0	34.0	18.0	0.0	0.0	274.3							
Optional Station		-5.0	1.1	-7.8										
		*C	*C	*C	cm	mm	cm							
Additional Weather Station Links														
LCC	Cardiff Peak (10059ft)	Collins Top (11044ft)	Collins Base (8560ft)	Alta Guard (8799ft)	Snowbird (9640ft)	Whiteline (7688ft)	Powderhouse (6049ft)							
BCC	Reynolds Pk (9190ft)	Crest (9590ft)	Powderhorn (9888ft)	Apex (9961ft)	Sulphide Base (8200ft)	Spines (7492ft)	S-Turns (6232ft)							
Other	Condo (8999ft)	Empire (9570ft)	9999 (9999ft)	Trump Divide (8410ft)	Pravo Canyon (5119ft)	DC Dam (6675ft)	Banckle Ridge (8800ft)							
Weather Forecast														
Area:	Temperature (F/C)	Precip			Wind (mph/gust)					Sky				
	ft	in	inch	in	%	inch	gust	%	9k Speed	9k Gust	dir	11k Speed	11k Gust	dir
Cottonwoods	44.0	40.0	0	100%	0	100%	0-5	>25	ENE	10-20	>25	NNE		CLR
	6.7	4.4												
Weather Remarks:														
High pressure will bring dry weather, light winds, and a gradual warming trend through midweek.														
Snowpack Structures														
UMA Rating	UMA Rating	Link to Structure Chart (if any)												
Above 9500ft	Mod.	Consolidated storm snow sitting on refrozen crusts. Solars will be crusty.												
8000ft-9500ft	Mod.	Possible damp snow beneath newer cold snow. Crust evident beneath storm snow below 8600 in WP												
Below 8000ft	Mod.	Damp snow over crust over (likely) wet snow												
Assessment of the Avalanche Problem														
Conceptual Model of Avalanche Hazard														
Problem	Layer of Interest	Forecast Size	Sensitivity	Spatial Distribution	Elevation/Aspect	Comments								
Loose Dry; Wet Slab; Storm; Wind; Persistent Slab; Deep; Cornices; Glide Slab	Date; Depth; Grain	Destructive Potential	"Un-reactive", "Stubborn", "Tough", "Icey, Sticky"	Isolated; Specific; Widespread	Location; Run Name; Start zone; Shape; Incline	Management Strategy; and Forecast Notes								
Loose Wet/Loose Dry	Storm snow	D2	touchy	specific	Solars; all elevations/Steep northfacing, upper elevations	Stay off solars in the PM. A lot of the LDs have been cleaned out by skiers over the last few days, easily recognizable with sky cuts. A lot of these have been cleaned out by skiers over the last few days, still present in more remote nooks.								
Storm Slabs	storm snow	D1.5	touchy	specific	Mid & Upper elevations, all aspects									
Cornices		D2	stubborn	specific	High ridgelines	avoid the edge								
Recent Observations														
Loose dry has been more active than expected I think, be on the lookout on for this on steep northfacing. A few storm slabs have been pulling out as well, mostly upper elevations. Cornices are huge. TPassy and Haas both observed our buried V layer along the PCRL yesterday.														
Synopsis (Summarize critical snowpack and weather factors, and distribution of avalanche problems)														
Watch for rapid heating/WL around midday. Thinking these WL mostly went off yesterday with the warm up but temps are forecasted almost into the 50s today. Be aware of who is walking the ridgeline above you.														
Strategic Mindset														
Definitions	Strategic Mindset Comments and Terrain Use Strategy													
Stepping Out														
Alpine Conditions Comments and Reports														
Probably deep trail breaking														
Ice Conditions Comments and Reports														
No ice														
Non-Avalanche Hazards/Concerns/Conditions														
Sunburn														
General Notes														
Run List/Terrain Evaluation/Tour Planning														
Guide Group/P of Clients	Zone/Approximate Tour Plan Meeting Time										Equipment Requirements	Down		
Stetson/Goodson, S skii	Red Pine->Upper Maybird not meeting till 930										None	Down		
WPassy/Strickland skii	Elbow->Hidaway->Main Days->BCC										Pack	Down		
Gonzalez/ Macerello rock/2	Reservoir Ridge/Storts Ridge										2x HHBD	Down		
Poliocek/Young skii	Cardiff fork back to Alta										BSP (I already have the gear)	Down		



In spring of 2016, a major heatwave and six to eight non-freezing nights created a massive natural and human triggered wet slab cycle on the Troll Peninsula, Iceland, with several guided skiing near misses (three, all in separate guided parties). *Photo Ian Havlick*

inform fellow guides and the office via our group text, or change the tour plan directly in the AM form from a mobile device. As parties come back at the end of the day, each guide lets the group know via text that they have returned safely, and the office checks all parties back in on the form.

Guides fill out the PM form as soon as possible after they are done for the day. This can be done from anywhere with a mobile device. The PM form contains client information for the office and a thorough section for conditions reporting for the guides. There are separate fields for sky, wind, temp, and precip observations as well as larger boxes for comments on snowpack observations, observed avalanches, and a personal interpretation of the actual hazard. Guides can add photos to their observation as well. While not entirely avalanche-related, the PM form also asks guides to comment on any close calls they may have had, surface conditions, skier traffic, and whether they thought the morning forecast verified or not.

These improvements in information-sharing and internal forecasting have had a very positive effect on our organization. During peak season, guides can access one platform and look at only professional-level observations for the areas we often travel. Our office staff is no longer spending their time disseminating conditions information because it is always available to our entire company. The questions on the PM form and an open atmosphere in our morning meetings have led to a lot of great discussion with a wide range of perspectives. Knowing where all the other guides are operating for the day has been great as well, adding security when there is help in the same cirque or just over the ridge.

As a more informal information exchange tool, Facebook is perhaps an easier-to-use platform than Google Docs. For example, adding photos to an observation in Google Docs is difficult and therefore has been done infrequently. It would be ideal to be able to comment on other guides'

observations. Automatically sharing obs with the UAC would be nice as well. Another drawback is that non-working guides have no way of submitting an observation for the group without causing some confusion for the office regarding who was working. We are spending some time this fall trying to improve and streamline our system to make it simpler and more user-friendly.

Ten years ago, the few people out skiing had little desire to share their avalanche observations. Now skiers are posting their photos on Instagram from the backcountry and we get tweets during a large cycle or a road closure. There are already several informal infoex groups in the Wasatch on various platforms that I expect to be updated this winter. The explosion in information-sharing made possible by social media and the resulting community ownership has been inspiring to witness. I worry that the disparate groups will lead to less exchange over time, as certain user groups may choose one platform or another and use only that one. Regardless, the increased dissemination of information has been beneficial to our organization and, I think, to the broader community in the Wasatch. The only problem here is that your UMA information is NOT going out into the greater community unless you individually/UMA chose to post it separately. Same with all these secret groups; we are taking but not giving back.

Colby Stetson is a mountain guide and avalanche instructor in the Teton and Wasatch mountain ranges. Despite living with copious winter snowfall, he often prefers corn over powder and likes his lines long and steep. When he isn't skiing or climbing throughout the western states, he can usually be found at home in Salt Lake City with his risk-averse wife and oversized dog.



BELOW: This is a great example of the type of information we are trying to share: "Observed mid-storm large, well-connected soft slabs breaking mid slope on E-NE facing terrain at ~10,500' in upper Red Pine Gulch. Another party observed a similar slide in upper White Pine. Likely wind slab failing on graupel layer from yesterday morning's burst, thinking these are rapidly healing. Plenty of tracks above the lake, but still some room in the trees if you want to get creative." *Photo Colby Stetson*

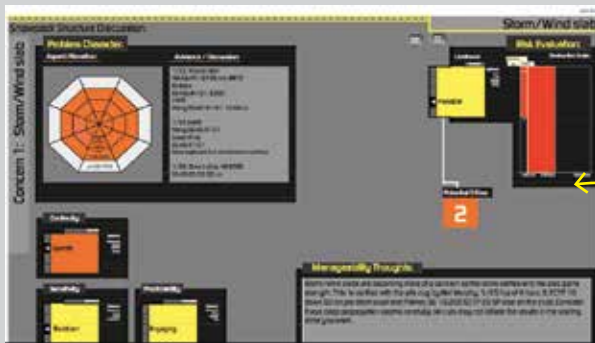


BELOW: Snowmachiners were out pillaging today in Cardiff Fork. My party witnessed and discussed some very poor behavior and decision-making. The bottoms of all the runs are littered with rock-hard sled tracks. While the uppers will still probably ski well tomorrow, I would avoid this drainage until after the next storm. *Photo Colby Stetson*



EXUM MOUNTAIN GUIDES: AVALANCHE FORECAST AND PRIVATE FACEBOOK PAGE

BY ADAM FABRIKANT



Over the past few years winter ski guiding work has increased in the Tetons. Exum Mountain Guides has had an expanding roster with more guides out in the field than ever. Our past system for information sharing was via an online site that we rarely visited. It was used as mandated, but was not a hotbed of information sharing. The largest issue was that we were not creating a dialogue, either in person or electronically. We realized a change needed to occur before we had a problem. Motivation came in the sense of anticipating growth and needing to prepare for that time.

For the winter of 2016 we decided to take action. One of our lead guides, Bill Anderson, had been working on a database that acted as an avalanche forecast. It is a complex, living, very visual spreadsheet that gathers information from local weather resources, with some manual inputs and assessments. The forecast was relatively straightforward for us to produce after much patient training from Bill. Bill developed this program on his own time over a number of years; he had been using the software to conduct in-person morning meetings for Jackson Hole Alpine Guides at Jackson Hole Mountain Resort. A group of us got together and discussed how to change the presentation of the forecast to better suit an online interface.

We decided that a team of five guides would act as forecasters. We already had access to a daily bulletin produced by the Bridger Teton National Forest Avalanche Center as a great local foundation. Our aspiration was to forecast for our guides on a private, Exum-only basis, as well as discuss guiding techniques that are pertinent to the specific avalanche problem. Our forecast is focused on the terrain in Grand Teton National Park where we regularly ski guide, allowing us to target certain ski runs/objectives.

The five of us had a group text message thread going throughout the winter. Being able to communicate easily was imperative. Producing a product that our greater community would see forced us all to put serious thought into our future bulletin. Making a significant change such as updating terrain management considerations or changing an avalanche problem from wind slab to persistent slab required serious discussion. Our product became an enabler for conversation within our community that evolved to become more meaningful than the product itself. Our goal was not to be “right” every day, but rather to admit when we missed something, hence creating thoughtful dialogue.

The most empowering tool for the forecasters in Bill’s program is a text box entitled “Manageability Thoughts,” which allows the forecaster to discuss different tools that may help guides in dealing with different avalanche problems, anything from avoidance to use of different stability assessments (“this wind slab is shallow enough to be detected by stepping off the track.”) or belayed ski cuts.

Of our many objectives we hoped to make a resource that would simplify our guide’s

rouines, both in the AM and PM. We were able to produce a product by 6–7am most days making it a valuable tool for our individual morning meetings. We provided a weather forecast, weather station data, weather bars, in-depth information on avalanche problems, and many other amenities. By putting all of our resources in one place, we knew everyone was looking at the same information, hence we were all literally on the same page.

After much debate we decided to post our daily forecast on a private Facebook page. In an age where there are more options than ever for sharing avalanche observations we did not want to add yet another layer, rather we wanted to replace all other information-gathering requirements of our guides. We chose this platform as it already does everything that we need: easy posting, organization, pictures/videos, and comments. A nice aspect was the lack of learning curve for both forecasters and guides. Obviously Facebook has its drawbacks, but they were overshadowed by how well it worked for our guiding community. Each day they work, all guides are required to post their observations to our Facebook page; by mid-season many guides were sharing information from their recreational outings. Compared to years past both the quality and quantity of observations surpassed what we anticipated. Facebook made it easy to share; we saw great observations from guides on days off and non-winter guides within our community. Many said that they shared information because it was on Facebook and they were already using the platform. Other winter guides would add commentary or ask questions of a particular post; threads were educational and occasionally entertaining. Some threads went beyond risk management and into the ethics of alpine anchors in the Tetons, a heavily debated topic.

As we enter our second season for the Exum Avalanche Forecast and Facebook Page there will be changes; undeniably it’s an evolving process for years to come. We will continue to utilize Facebook even though, as of all social media, it comes with a level of distraction; however, it is still our best and cheapest option. For our forecast this winter Bill Anderson is threatening some new changes such as theoretical/futuristic weather bars and a layer tracking page. With both a daily avalanche forecast and increased information sharing within our guiding community our project was an initial success. We did not foresee that the most significant growth, learning, and benefit to our risk management would be due to the increased quantity and quality of our observations. ▲

Adam Fabrikant lives in Kelly, WY. He spends his winters ski guiding for Exum Mountain Guides and teaching avalanche education for the American Avalanche Institute. He enjoys all aspects of snow sliding.



5 cm of light density new snow was reactive in ski cuts at upper elevations on east aspects. Photo Aaron Diamond



Significant wind effect above 9,000’, we were able to produce size 1s via ridge walking. Photo Adam Fabrikant





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C-1-L Explosives has been able to convince Martin & Shaft LLC of the extensive in-depth knowledge and training of the Avalanche Control practitioners. With that now well established, Martin & Shaft have agreed to remove the use restrictions they had in place regarding avalanche control use. The result has been a new "Instructions for Use of Pull Wire Lighters (PWL)" flyer developed by Martin & Shaft and vetted by NSAA, AAA, C-1-L Explosives, Austin Powder Co and Maple Leaf Powder Co. It is a well written, comprehensive, and educational flyer that everyone in the industry should study carefully. We offer a preview of that flyer here as it goes into production to be inserted in each case.

Any questions or clarifications direct to C-1-L Explosives Attn: Dave Sly at 250 744 8765 or davidgsly@mapleleafpowder.com



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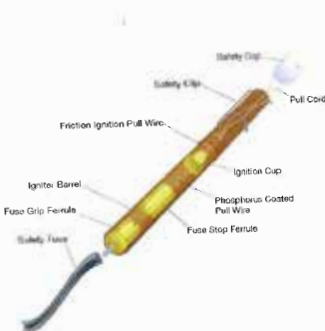
INSTRUCTIONS FOR USE OF PULL WIRE FUSE LIGHTERS (PWL), P/N 2020

WARNING:

Working with explosives is inherently dangerous. Carefully follow these Instructions for Use and your department's safety protocols.

This PWL device is intended to ignite a length of Safety Fuse for the detonation of explosives.

Exploded View of PWL



Note: Diagram is representative only and is not to scale — intended only to familiarize user with internal components of PWL. Safety Clip (which pins Safety Cap in place on end of PWL) is shown in diagram in locked/safe position despite fact that diagram shows Safety Cap off PWL body. In reality, once the Safety Clip is removed, the Safety Cap (which is attached to Pull Cord and Friction Ignition Pull Wire) will drop down away from PWL body and when pulled will activate the PWL (by pulling the Friction Ignition Pull Wire through the Ignition Cup). Component names identified in diagram are underlined in these Instructions for Use.

ALWAYS

1. **ALWAYS** be sure the Safety Fuse is dry and cut squarely with a sharp, clean cutter designed for that purpose. A slant cut is more likely to cause failures to ignite the Safety Fuse.
2. **ALWAYS** insert the Safety Fuse into the open end of the PWL tube, pushing it in slowly and carefully with a twisting motion but never more than 2 1/2 inches (which is depth of Fuse Stop Ferrule from open end of PWL). Be aware it is always possible that the Safety Fuse will light when the PWL is placed on the Safety Fuse.
3. **ALWAYS** remove the Safety Clip only immediately prior to use. After removing the Safety Clip, hold the PWL tightly in one hand and with the other hand give a firm pull on the Safety Cap. Do not hold the Safety Fuse alone or the act of pulling the Safety Cap could separate the PWL from the Safety Fuse and cause a no light. Once you have pulled on the Safety Cap, and assuming you have followed the other Instructions for Use contained herein, the Safety Fuse will be lit. Quickly retreat to a safe place. The safety protocols adopted by different departments may direct the user to "confirm ignition" after pulling the Safety Cap before retreating. This is an acceptable practice as long as the

confirmation process takes only a few seconds. If there is concern that the Safety Fuse is not lit after pulling the Safety Cap, follow your department's safety protocols for this situation - **DO NOT ATTEMPT TO RE-LIGHT!!!**

4. **ALWAYS** confirm weather conditions (snow, wind, etc.) are acceptable for use of the PWL in accordance with your department's safety protocols. If your department requires that the user "confirm ignition" after pulling the Safety Cap before retreating to a safe place, verify that the weather conditions do not inhibit your ability to confirm ignition. When in doubt, delay use of explosives until conditions are conducive to safe use. If that is not feasible, assume the Safety Fuse is lit once the Safety Cap is pulled.
5. **ALWAYS** wear safety glasses and gloves when handling the PWL. The PWL becomes hot to the touch soon after the Safety Fuse is lit.

NEVER

1. **NEVER** re-cut the Safety Fuse and attempt to re-light.
2. **NEVER** insert the Safety Fuse into the PWL until immediately prior to the intended ignition of the Safety Fuse. Again, always assume it is possible that the Safety Fuse will light when the PWL is placed on the Safety Fuse.
3. **NEVER** insert Safety Fuse into the PWL carelessly or rapidly and **NEVER** insert the Safety Fuse more than 2 1/2 inches into the PWL (do not push Safety Fuse into or beyond the Fuse Stop Ferrule). Forcing the Safety Fuse beyond the Fuse Stop Ferrule can force the Friction Ignition Pull Wire into contact with the Ignition Cup (the two act together like a match and scratch surface), thereby causing ignition of the PWL and lighting the Safety Fuse. **PAY CAREFUL ATTENTION!**
4. **NEVER** use less than the legal minimum length of Safety Fuse according to manufacturer's recommendations, your department's safety protocols or governmental regulations, whichever is greater.
5. **NEVER** use Safety Fuse less than 0.18 inches (4.57mm) in diameter.

GENERAL CONDITIONS

1. Safety Fuse must be long enough so that the user has enough time to retreat to a safe place before detonation.
2. Excessive static electricity, which can be generated by wind and blowing snow among other things, might be a factor in effecting a premature detonation of explosives unless using a detonator with a static bleeding shunt. Carefully follow your department's safety protocols relative to use of the PWL in varied weather conditions.
3. While the PWL is not designed to be removed off the end of the Safety Fuse after ignition (i.e., after pulling the Safety Cap), some departments recommend this practice to assist users in confirming ignition of the Safety Fuse. While this practice is not prohibited under these use instructions, it is not recommended as it is contrary to design.
4. The PWL is intended to generate a flame to ignite the Safety Fuse. The PWL must be stored properly and handled with great care and in accordance with these Instructions for Use at all times. The manufacturer will not be responsible for any loss due to improper storage or use of PWLs.
5. **DISCLAIMER OF WARRANTY AND REPRESENTATION:** The manufacturer cannot anticipate every possible procedure or circumstance in the use of PWLs. PWLs are sold without any express or implied warranty or as to the suitability for their intended use.

MARTIN & SHAFT, LLC, Easton, MD (303-567-4801)

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Rev. 06/07/2017



Forging Ahead

A Look At The Beginning of Patagonia Heliski

By Sean Zimmerman-Wall

Creations of the mind are not always spontaneous. Rather, they are a collection of sub-conscious thoughts that meld together until they reach the surface at a moment of definitive action. A snow professional who spends an entire career building a catalog of experiences understands this. Infinite possible combinations are waiting to come to the fore when skill meets opportunity and everything lines up. This may be a snow safety plan for a ski patrol opening a resort, a guide taking his clients onto a new slope, or a highway forecaster closing the road to shoot at just the right time. These moments are what defined the history of our profession and they offer incredible glimpses of what the future holds for the industry. For the team at Patagonia Heliski, this September represented once such defining moment.



One must know the end to be convinced that one can win the end—to know there's no dream that mustn't be dared.

—George Mallory

The series of events leading up to this moment can be traced back well over a decade. A young and aspiring guide named Justin Lozier first laid eyes on the Andes in 2005 while following his girlfriend, Catalina, to her home in Argentina. His journey from Colorado, where he was working part-time for Paragon Guides and Chicago Ridge Snowcat Skiing, to the doorstep of Patagonia sparked an intense desire to explore the great range. Formulating a way to spend as much time in Bariloche as possible, Lozier found a local group of freeskiers to live with and began learning the terrain and language. A chance meeting with some guides in the area further piqued his interest and he realized this region held great potential. At this stage he decided to create a small company called Patagonia Ski Tours; which was little more than Lozier standing in the entrance to the base area of the Cerro Catedral ski resort with an extra beacon, offering to take passersby skiing. Humble as it may seem, it was a start towards an end still in development.

Around the same time Lozier was getting acquainted with the region, a veteran rock climber, ski-mountaineer, and founding member of the Asociación Argentina de Guías de Montaña (AAGM), Gabriel Rapoport, was planning a ski-excursion by helicopter from Bariloche to El Chalten. While the two didn't know it at the time, their paths would soon overlap and lay the foundation for what would become the first organized heliski operation in Patagonia.

Lozier returned to the states and continued pursuing his guide career. After attending the Dean Cummings' North America Mechanized Ski Guide Course in Valdez, he was hooked on the idea of helicopter skiing. Within a year, he took his AIARE 3 on Red Mountain Pass and then packed up all of his belongings and moved to Utah. He was enticed by a job posting for an apprentice program with the Wasatch Powderbird Guides and secured an interview. The team at Powderbird quickly recognized his enthusiasm, passion, and willingness to learn. "I told the owners that I was there for them to make me whatever kind of heli-guide they needed me to be," says Lozier. They hired him for the 2009/2010 season and thus began his tutelage amongst the Little Cottonwood Canyon legends.

Over the next several years, Lozier chased the snow across the equator and back again. His company began to grow and explore more terrain throughout northern Argentine Patagonia, he married Catalina in a magnificent Buenos Aires cathedral packed with visiting gringos, and he eventually had two beautiful daughters. He also met Rapoport through a mutual friend and prolific guide named Pablo "Paul" Cottescu.

Rapoport is a man of few words and will always listen to those around him with genuine intrigue. His compact, yet strong stature reminds you of a gaucho who just came in off the campo (farm) and his signature neckerchief completes the picture. You would never know he has first ascents/descents throughout the Andes, and has crossed the Patagonian Ice Fields multiple times, once with the venerable Reinhold Messner.

"In winter I also worked in the Club Andino Bariloche (CAB) and I dedicated myself to make a union between the mountaineers and the skiers, who in those years were totally separated," says Rapoport.

His status in the community is further elevated by the work he has done to support projects for the CAB and other entities in his home provinces of Chubut and Rio Negro, Argentina. He has also been instrumental in several avalanche rescues over the last quarter century. Rapoport's role in the first helicopter skiing reconnaissance in the area during the prior decade provided insight into how a professionally organized program could create unique experiences for guests. The additional benefit the local communities accrued in terms of accessing remote areas for rescue or research was a top priority as well.

When Lozier and Rapoport shared their dreams openly with others, it was evident that a project could be started that would bridge the interests of many and provide a once-in-a-lifetime opportunity to explore the far reaches of the Patagonian Andes.

Stage 1

The core terrain viewed as feasibly accessible for commercial operations is centered around the small towns of El Hoyo, El Bolsón, Cholila, and Esquel, Argentina. Rapoport and his intimate knowledge of the area are instrumental to the development of an operational plan, which is a function of the years he and Cottescu spent surveying the area. Lozier's knowledge of the internal workings of a professional heliski operation and his keen business sense augment Rapoport's technical background and vast repertoire of contacts to local governments, landowners, and mountain guides. Since Cottescu's passing in 2016, Rapoport and Lozier have doubled their efforts to get the operation off the ground and strive to exemplify the spirit of a great man and irreplaceable colleague.

"One of the most difficult aspects of setting up a business like this is because it is in Argentina," says Lozier, only half-joking. The reality is that the country is still considered "developing", especially when you head into the interior. The government and economy are constantly in turmoil and there are few national resources dedicated to supporting advancement of recreation and public safety in the mountains. Adimistración Parques Nacionales is their only true governing body, and looks

ABOVE: A sample of the terrain in the Cholilla Circuit.
Photo Justin Lozier

BELOW: Heli at the pickup below Cerro CABA.
Photo Gabriel Rapoport





Client Drew Searl drops a knee deep in the Andes.
Photo Paul Cottescu

out for millions of acres of federal land, but can't even finance a dedicated avalanche center.

Securing a helicopter contract is not exactly that simple either. Five years ago there was one, maybe two, private aircraft available that could be seriously considered for heli-skiing. The others were government/state police and seldom used for anything but the most serious of rescues. Today, that number has grown slightly and Lozier engaged several operators to negotiate contracts for the nascent stages of this project. He found what he was looking for in two separate entities that held a Bell 407 GXP and a Eurocopter AS350 B3 (Airbus H125) in their inventories. Both ships had

The A-team- (L-R) Pilot Ricardo Cermesoni in the ship, Julian, Gabriel, Justin, and Patricio return from the first day of commercial operations at Estancia Mallin Cume.
Photo Catalina Lalor



been outfitted with the necessary equipment and had experienced mountain pilots behind the controls. As many know, helicopters don't run on fuel, they run on money. This meant the team needed capital and insurance. Fortunately, Lozier's contacts in North America led him to an avid skier and philanthropic investor named Kent Nielson. Through a strategic partnership amongst the three men, Patagonia Heliski was born.

Stage 2

With the helicopter guaranteed, the team could now focus efforts on assembling the correct group of people and gear to safely access the mountains. Several estancias (small farmsteads) and lodges were secured by Rapoport and the operation had a home base depending on which circuit they would fly. Lozier, led by the guidelines of Heliski US, compiled all the safety and rescue equipment, as well as weather instrumentation. Powderbird, Black Diamond, and Campbell Scientific all came up huge in the procurement of the necessary pieces to add to this enormous puzzle. Human capital was the next investment. Patricio Graziosi, an influential avalanche educator, forecaster, rescuer, and local legend was brought on board to serve as Director of Safety. His level of experience in the Andes is a major contributor to the operation's success and the security of clients. Rapoport's son and local ski patroller/firefighter, Julian, joined to supervise ground operations and act as back up. It is a family affair combined with the experience of

local figures who have a strong tie to the region; much like many esteemed heliski-operations in North America.

Stage 3

With a massive tenure and several bases to choose from, getting an aerial view was crucial to moving forward. A fixed-wing recon mission was organized and local photographer Nir Ekdesman joined in to capture stunning imagery to be used for run mapping and organization.

"To this point I had obsessed over Google Earth and topographical maps to get a sense of the area and be able to create an operating plan with flight paths. It was amazing to see it from the air," says Lozier.

The sheer scale of the Andes is jaw-dropping and the thought of operating within approximately 2,100 square miles is a formidable task. Getting a handle on the state of the snowpack and creating a network of weather stations is no mean feat in a region that has no infrastructure and few resources. MeteoBlue, WindGuru, and various computer-modeling software allows the team to generally forecast for their area.

"We are able to get some info from ski resorts, but it is extremely limited and not always relevant to our zone. For that reason we have installed a Campbell Scientific ridge top station in between circuits to pair with our base weather stations," says Lozier.

The meager baseline data set leaves a lot to be desired and a great deal of uncertainty still remains

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Dean Collins and Adam U formulate their plan. North Cascades, WA. Photo: Kevin McHugh

about the snowpack. Common avalanche issues in this area often revolve around windslab, but it is not unheard of to find persistent weak layers in the outlying terrain. This set up requires the guide staff to really focus on developing a clear risk management plan and cultivate a strategic mindset. The complex terrain dictates a conservative approach before “stepping-out” into new zones. Lozier admits they are still in assessment mode and daily guide meetings provide an outline for coordinating field movements based on continued information gathering. Real-time flight following and GPS tracking of guides are additional safety measures employed by the team.

Stage 4

On a crisp, clear day in early September the team boarded the ship with their first clients in tow. Launching from Estancia Mallin Cume into the mountains there was a palpable sense of excitement tempered with nervous anticipation. Hard work, timing, and a bit of luck had coalesced to form a perfect moment that becomes the highlight of a career. More days followed and exploratory trips into different drainages punctuated the remainder of the season. A variety of other missions were conducted in conjunction with the Club Andinos to ferry materials for the restoration of a backcountry refuge destroyed by arson and to replant native tree species in delicate areas. Despite the success of the inaugural year, Lozier is cautiously optimistic about the seasons to come.

“It is still setting in and with that comes a lot of emotions both personally and professionally. I could not do it without my family's support. I feel

a great sense of accomplishment, but at the same time there is a feeling that we can't celebrate just yet because there is so much more to do. This is a long road and now we're on it.”

Check out www.PatagoniaHeliski.com for more info or to inquire about guiding trips. The team welcomes input from other operators and understands there is a lot more that can be achieved. ▲

Walls and big lines worthy of TGR in the Lago Esperanza Circuit. Photo Nir Ekdesman



Sean Zimmerman-Wall is excited about the coming winter in the Wasatch and will be back at Snowbird working as a patroller, guide, and AIARE instructor. He is also continuing to develop more exploratory trips with his company Patagonia Ski Tours.



This is part two of a two-part story by Walter Ballenger that takes place during the winter of 1969 in the Mineral King valley. At the time, Mineral King, which remained Forest Service (not National Park Service) land due to its mining heritage and remaining infrastructure, was under consideration for development into a large-scale ski area and amusement park by the Walt Disney corporation. Between Walt Disney's death in 1966, vocal environmental opposition and subsequent litigation by the Sierra Club, and the implementation of NEPA, the project failed and was abandoned in the early 70s. The Mineral King valley was incorporated into surrounding Sequoia National Park in 1978.

Thanks to Amanda Ballenger and her brother Jeff for sharing their family stories and photos with *The Avalanche Review*.

MINERAL KING

A World of Avalanches: Part 2

By Walter Ballenger

Transcription help by Ginny Newsom

Illustration by Cy Whitting

From the Mineral King daily log:

Tuesday, February 18, 1969

Temperature: Low 25 – High 30

Barometer: 29.51 and falling

Precipitation: 13 inches of new snow

AM. I inform Hicks of my views by phone. (The service had been repaired on the 10th.) He agrees, stating that, under the circumstances, all of us – Dave, Susan, and myself – should leave Mineral King at least until the heavy snow storm period is over. I tell him that I plan on leaving sometime during the last week of February, but that I am speaking for myself only. (Dave's views differ. HE does not want to leave. Mineral King has been his home for three years now.)

Wednesday, February 19, 1969

Temperature: Low 12 – High 30

Barometer: 29.44 and steady

Cloud Cover: Full low overcast, storming

Precipitation: 7.5 inches of new snow. (Cold lights powder; excellent for skiing.)

8:00 AM. The total valley snow depth reaches 12 feet.

PM. General sluffing and minor loose snow avalanches are observed, but no major ones. The snowfall is stable except as it adds to the already overloaded slopes.

Thursday, February 20, 1969

Temperature: Low 12 – High 30

Barometer: 20.60 and rising

Precipitation: Trace of snow

Forecast: (Fresno) Clearing in the afternoon, Fair and colder tomorrow. Storm, Saturday.

7:00 AM. We pound Empire and Juniper with the rifle. No results. We didn't expect anything because of the low temperature, but very disappointed anyways.

4:00 PM. Dave informs me that Hicks has called again to reaffirm that the survey should be terminated and that we should all get out. I ask Dave what his plans are. He says that he and Susan are going to leave Mineral King Friday afternoon before the predicted storm moves in, and that they will stay in Visalia through Monday for a dentist appointment and return to Mineral King either Monday night or Tuesday morning. Gary and Will Kirk will



go with them – one to Badger Pass; the other, home to Los Angeles. Randy will stay in. He's too broke for a weekend in town, he tells us. Besides he must look after the pets – his dog and Susan's cat, bitch and pups. I tell Dave that I'll stay in also and then leave when he returns. My only reason for this decision is that I want to keep the survey records current through the month of February and cut them off at that point. I also tell that if the predicted storm is severe enough that I'll shoot the Empire/Juniper slide paths before he comes back in.

It's decided that Randy and I will drive the others to the Disney truck which is parked below snow level and then return to Mineral King with the Thiokol. However, later in the evening, this plan is changed. Dave will drive the Thiokol himself, leaving it parked at snow level (about 1,000 feet) for his return trip. The reason for this is that I'm going a long ways out and we're short of gas in Mineral King. Dave seems surprised that I'm staying.

Friday, February 21, 1969

Temperature: Low 9 – High 27
Barometer: 20.60 and rising
Cloud Cover: Clear, AM. Increasing overcast, PM

3:00 PM. Dave, Susan, Gary and Will leave for Visalia.

5:00 PM. Snow flurries begin.

It snows 8 inches.

Saturday, February 22, 1969

Temperature: Low 17 – High 27
Barometer: 20.60 and rising
Wind: Gusts to 45 mph NNW
Cloud Cover: Full low overcast

10:00 AM. Hicks calls. He is quite evidently surprised and disturbed when I answer the phone. He expected us all gone. I tell him that the only reason I'm in is stubbornness on my part, that I want to complete the records for February. I also inform him that Dave and Susan plan to return after the storm and that I will leave then. He accepts this reluctantly.

10:15 AM. The wind increases and the snowfall continues heavy. Intensity reaches 2 inches per hour. I consider the avalanche hazard to be high, but hear nothing over the roar of the storm.

12:00 PM. Randy and I keep a path packed between our cabins by running the ski-doo back and forth. It's getting quite hard to move about, even on skis; and we are constantly shoveling our cabin entrances which fill in almost as fast as we dig them out. I am unable to keep up with my front entrance and so abandon it to concentrate on the back one.

1:00 PM. The snowfall eases slightly but there is no evidence of a break in the storm. The wind remains gale force, the visibility zero. The snow plot is so wind scoured that the stakes there are valueless for measurements. I depend on two-hour storm stake behind my cabin.



Mineral King valley is surrounded by huge peaks with overlapping avalanche paths. *Topozone*.

4:00 PM. The Ski-Doo breaks down outside my cabin and we abandon it. There is no question about firing the rifle now, as we need the Ski-Doo to haul the ammunition to the gun platform. We dig out the generator shack and clean the plugs. It's good to have light for an hour. The cabin is damp and cold.

6:00 PM. The phone is still operating and we talk to Dave in Visalia. It's raining hard in the Central Valley. I think, though I'm not positive, that I tell him about the rifle, that under no circumstances should he come in under the Empire/Juniper slide paths until well after the storm is over. We're both worried, but neither of us say so aloud.

8:00 PM. I estimate that 25-28 inches of new snow has fallen since daybreak and that the avalanche hazard must now be extremely high.

Monday February 24, 1969

Temperature: Low 22
Barometer: 29.54
Wind: 30 MPH NW with gale force gusts
Snow Surface: Damp wind-blown powder.
 Heavy drifting.

8:00 AM. I estimate 10 inches of new snow since midnight. Probably on the low side.

10:00 AM. Storm increases in intensity 2.5 inches per hour. I pace the cabin. It's warm now because the wind can't get at it. There's nothing to do but wait. Mineral King is beating on us and I wish I were in Squaw with Faith.

12:00 PM. Getting worse if that's possible. Snow intensity is up to 3 inches per hour I decide we must evacuate at the first possible moment.

1:00 PM. We dig out the generator shack and get it started. I tell Randy to dig into his cabin and pack up what belongings he wants to take out and move them into Dave's cabin. We all call for an evacuation in the evening when the radio reception is better. Meanwhile we'll keep the generator going in case of an emergency. I help him dig out the entrance to Dave's cabin and then go back to mine. The back entrance to mine has filled incompletely during the hour I was gone, and I have to dig myself in.

2:00 PM. Still heavy. Can't see a thing outside. It's getting so difficult to move to move through the snow that we have to carry snow shovels with us whenever we go out into the open up a path. I decide to move into Dave's cabin with Randy. In theory, it's considered the safest in the area. Besides its closer to where the helicopter will land if it can ever get in. I pack a duffel and fill a box with as many records as I can fit in. Then I place a call to the Lamp Liter Motel in Visalia where Dave is staying. I want him to set up the evacuation. The desk clerk informs us that he has already checked out; but I suspect that because of the storm he will check back in as soon as his dentist appointment is over. I leave a message for him to return my call.

4:00 PM. The snow intensity is now up to 4 inches per hour. I decide I had better make my move. I call Randy by radio (I have a handset with me) and ask him to bring the sled over to help haul my gear.

4:10 PM. Randy hasn't arrived. I can't raise him on the radio either. I'm worried.

4:20 PM. I take a shovel and begin digging my way to his cabin. I meet him halfway. He tells me he lost the sled. That it was too buried too deeply for him to find. I think perhaps a slide has covered it. Randy also tells us that the wind has blown open the one exposed window in the lee of Dave's cabin and that a pile of snow has fallen in on top of the day bed under the window. From his description, I know it was an avalanche. Back at Dave's cabin I trace the outline of the slide's debris. It had hit the cabin in front of Dave's (the cabin in which Randy and the Kirk brothers had lived and where the sled had been stored) and a finger of it had burst through the window of Dave's cabin. During a moment's lull in the storm I spot another pile of avalanche debris just over the upper row of cabins between Dave's and mine. Nothing though above or near mine. I feel some relief that Miner's Nose has come down, because now we have a little breathing room to move my belongings. But I don't know how much of the slope has slid. I'm spooked, but I don't tell Randy this. We return to my cabin as quickly as possible and carry the duffel and box back to Dave's. Exhausted, we sit down for a cup of coffee. The room's warm, a little smoky. Susan's bitch is nursing her pups under the table, and her cat is curled up under the Franklin stove.

6:00 PM. For some reason which I will never understand—something instinctual, I think—I decide to go back to my cabin and wait out the storm there.

Rationally, this appears to be the wrong move to make. There is much evidence to believe that my cabin is threatened more from the Miner's Nose slide paths than Dave's cabin, which is threatened by the Potato Patch across the creek to the southeast, but there is no evidence that slides from that direction have ever come this far. The Potato Patch is simply too steep to hold a buildup large enough.

I ask Randy if he would like to move into my cabin with me. He says he will stay where he is, that an avalanche has already tried to get him once and missed and that he didn't think he would try again. Besides he has the animals to take care of. We also rationalize the fact that we are splitting up by saying that one could help the other shovel out if either entrance became so filled in that one couldn't cope with it himself. We agree to keep in hourly contact by radio throughout the night. I return to my cabin.

7:00 PM. I have estimated that there is now some 200 inches of snow on the valley floor. Approximately 17 feet. Over 80 inches fallen since the storm began. The wind continuous. I enter these facts in the Daily Log book and note underneath that this will be my last official entry. It is now much too dangerous for either Randy or myself to leave our cabins.

7:15 PM. I attempt to call Dave in Visalia again but the phone is now dead. I crank the handle for a long time anyways. Randy, hearing the ring in Dave's cabin picks up the receiver and answers. For some reason, the line between to two cabins is still up. I tell him to radio the Forest Service in Porterville immediately.

7:45 PM. It has taken Randy a half hour to raise the base station in Porterville. I monitor the call with my hand unit. Randy asks the Forest Service to contact Hicks and arrange for a helicopter evacuation for us the moment there's a break in the storm. I tell Randy to stress that this is an emergency. He does so and the message is apparently received, though the reception is poor.

8:00 PM. No let up. If anything, it's worse than ever. From forecasts received at noon, I know that the earliest we can hope for evacuation will be Wednesday. I want Randy to contact the Forest Service again, so that they can get hold of Dave somehow and make certain he doesn't attempt to return to Mineral King in the Thiokol. But the generator is going bad now and Randy is unable to raise the base station at all. We decide to change our check in calls from the radio to the telephone. We wait.

9:00 PM. Randy calls and asks if we can in every 15 minutes or so. He sounds frightened. I can't help much, I am too.

9:15 PM. Check in. Both OK.

9:30 PM. I hear an avalanche come down in the vicinity of the Point Cabin or just beyond, high off Miner's Ridge. From the sound of it, it's a big one. I call Randy, He's already on the phone, says he's all right. The lights grow dimmer and I get a Coleman lantern ready.

9:45 PM. Randy calls on the dot. We talk for a moment trying to reassure each other. Suddenly Randy says, "What the..." and phone is cut off. At the same time the lights in my cabin go out and I hear the slide coming at me. I remember thinking that it sounds as if it's coming off Miner's Nose. The noise is tremendous—like a

freight train. Then it hit the cabin with unbelievable force and I hear glass breaking in the darkness. I think Randy is dead. I am completely buried.

Weeks afterwards, I remembered something. By four o'clock that afternoon, the 24th, at the time when the snow intensity reached 4 inches an hour, perhaps more, I knew somehow, with unmistakable certainty, that we were going to be hit by an avalanche. All the evidence was there—everything we had studied throughout the winter pointed to it. For hours, I had lived with the thought that we weren't going to get out of this alive. Remembering the excitement I had felt as far back as August, I now saw my dreams for Mineral King, the future for myself, for Faith and myself, rapidly going up in smoke. And there was nothing I could do about it. The feeling of dread, and worse of helplessness—seem incurable. Yet somehow, I must have shunted these feelings aside, at least, for the most part, because when the slide did hit, my panic, the terror of it, lasted no more than a few minutes.

I stood in the corner of the cabin still holding the telephone receiver and listened to the slide settle. It creaked and groaned for what seemed hours, a deep penetrating grating sound which I can't describe. Several times I shouted into the phone for Randy, cranked the handle as hard as I could. There was no answer of course. Every so often a rafter would creak and each time I thought the roof would collapse. I was ready to dive under the desk in the corner if it had. I looked at my watch. Only ten minutes had passed.

Feeling my way in the darkness, I turned off the propane heater and checked for leaks. The I found my flashlight and inspected the damage. The slide had only broken the panes in the window next to the front door, but it had smashed through the back door which I had kept shoveled and through the rear windows as well. And had filled up the kitchen area to the top of the stove. Some of the slide had overflowed the room divider into the living room. The sleeping alcove was alright.

Still thinking that I had been hit by Miner's Nose and the wave motion of the avalanche had caused it to break into the back of the cabin, I decided the best place to begin digging out was through the back door. I lit the Coleman despite the fact that I knew it would consume oxygen. The light gives off courage. I dug through the doorway (the door itself was somewhere on the kitchen floor) and started a vertical tunnel next to the outside wall of the cabin.

It was hard going even that early. The slide had set up quickly and I could only chip at it as if it had already turned to glacial ice. It took a long time to progress even a few inches, but I seemed calm enough, even patient now. I had only one thought—to get out and get back to Faith. Nothing else. Nothing else mattered at all. Just that I loved her much too much to give her up.

Around midnight, aching from my cramped position in the shaft and soaking wet from the snow dripping on me (the cabin was very warm; I was sweating too.) I stopped to clean off the stove and heated a pot of coffee. I drank it slowly, worrying about the oxygen I'd lose, but thinking that the rest, the normalcy of the act, would outweigh the loss. Perhaps. But sometime later I sensed I was slowing down. That I was breathing too fast and with some difficulty. The air, I knew, was going bad. I opened the emergency medical kit which hung next to the alcove and gave myself an injection of Demerol. I had no qualms about it at all. It eased the panic, slowed my breathing, almost immediately. I went back up the shaft.

It was 3:00 am when I finally opened an air hole. For some ungodly reason (perhaps I was panicky enough to

still believe I was conducting the survey) I measured the distance with a carpenter's tape. The opening was twelve feet above the roof of the cabin.

I enlarged the shaft and hacked steps in the side so I could climb out. I had been under for six hours.

It was pitch dark and still snowing. I went back into the cabin and waited for it to get light.

Tuesday, February 25th, 1969

6:00 AM. I leave the cabin on skis to look for Randy. It is still snowing though less intensely and the wind has eased. But the visibility is poor and movement difficult, even on the hardened surface of the avalanche. My legs are like water; I have to force them. I pass under the Miner's Nose and Potato Patch slide paths, know full well that they have built up again. I will have to stay under them while I search. About halfway I trip over the power line which had connected my cabin to the generator. A section of it is stretched along the snow surface at right angles to the direction it should have been. I assume it has been dragged downhill by the slide. For this reason I follow it uphill for fifty yards or so, then cross over it and continue on to where I think Dave's cabin must be.

There isn't a familiar landmark in sight. No cabins, no roofs, not even a chimney. Just a flat expanse of snow as far as I can see. I remember thinking that this is what the North Pole must be like. Behind me even the trees look strange, some them missing.

I orient myself the best I can and begin probing. I use the full probe, twelve feet in length. It hits nothing, just snow as far as it will reach. I don't remember how long I was there. It might have been a matter of minutes, or longer than an hour. I don't remember going back to my cabin at all.

Noontime, I keep myself occupied by laying plans. I decide to wait for the snow to stop and then attempt to ski out for help. I mean to stay on the west side of the creek until I'm clear of the Empire/Juniper slide paths. Then cross the creek to avoid the path above the Ranger Station. There's nothing I can do about the High Bridge path. I'll have to cross. It. I hope to reach the phone company's relay station, some four miles down the road, before dark. If the service is out there too, I'll have to continue down until I reach the first ranch above Three Rivers. I pack a change of clothes to put on after I cross the creek.

2:00 PM. The snowfall has stopped and I start out. Despite the fact that there is some twelve to fifteen inches of new snow on top of the avalanche debris, I seem to be able to move easily enough. But after several hundred yards the debris ends and I sink into the pack up to my chest. It's as far as I can go. I have to take off my skis to climb back onto the debris. I return to my cabin. It begins to flurry. I can hardly believe it. I decide to wait for the evening's temperature to drop and then risk the slide paths to look for Randy again. I leave my skis and poles next to the entrance of the shaft, upright in the snow.

4:00 PM. (Approximately) I think I hear Dave called Mineral King's hand unit. There's a great deal of static, his voice is very faint. I think he must be somewhere along the road, just close enough to make contact. I shout into my unit that we have been hit by an avalanche and I can't find Randy. Dave says he will be there to help by 10:00 o'clock that night. I try to tell him not to go under Empire, but the signal has broken up by then.

I wait, keeping myself awake as much as I can, because I still fear the roof might cave in. I change my clothes several times, thinking that I want to look my best when

I go out. I feel that this is important, but the thought seems to amuse me nevertheless. The air in the cabin is getting bad and I go into the tunnel several times to clear my head.

10:00 PM. No one has come. I think that I must have imagined the radio contact. Or dreamt it. I think too that I must tie myself high in a tree for the night but I can no longer leave the cabin, bring myself to go outside. Randy will have to wait for daylight. I keep nodding off, waking with a start. The night is endless.

Early the next morning, Wednesday, February 26th, Dave and Pete Wycoff arrive with a helicopter and I am flown out. I remember how bright the sun was on the snow. It hurt my eyes.

The aftermath came quickly. Bob Hicks and Susan were at the Three Rivers airport when I landed. There were men from the Forest Service and the Sheriff's department too, standing by to be flown in. And reporters. From Susan, I learned that the Forest Service had contacted Dave after receiving our first radio message on Monday evening. The second message—the urgent distress call—had not been received. In his first message, Randy had mentioned the slide which had hit Dave's cabin earlier in the afternoon. Dave, like myself, took this as a sign that the avalanche danger was over for us. But on Tuesday, as the storm continued, he became worried again. When the base station in Porterville was unable to reach us, he took action. He notified Hicks in Burbank that there was trouble. Since no helicopter could make it into Mineral King that afternoon because of the weather, he located a Cessna pilot who was willing to try. He's been directly overhead, high in the cloudbank, when we talked. I hadn't imagined it after all, except to misunderstand the time sequence. Dave organized the rescue teams that night and moved in the moment it was light.

It was several hours before the helicopter returned carrying Randy's body wrapped in canvas. Dave was with him. Despite our hopes I had known all along that it couldn't have been otherwise.

Dave had found his cabin with a probe quickly enough, but they had to sink two shafts before they could get to him. The second shaft, the one into the kitchen where the phone was, was twenty-three feet deep. The slide had burst through the living room roof and overturned the stove. The cabin has caught fire and had burned until the air gave out. Randy hadn't had a chance. Working at the beginnings of a tunnel through the kitchen door, he had been suffocated by the smoke. Susan's pets had been buried.

Standing to one side away from the others, Dave told me that he thought Chihuahua Bowl (some distance up the Valley) had come out and had triggered the Potato Patch and the part of Miner's Ridge that hadn't slid earlier. We had been hit from both sides at the same time. The Potato Patch slide, reaching the generator shack first, had dragged the power line uphill out of the path of Miner's Ridge slide which was coming down. Because of this, I had been far high of Dave's cabin in my attempt to find Randy. From the amount of debris found in the slides—entire trees, brush, rocks, patches of dirt, even tin cans—there was no doubt at all that they had been climax avalanches. Huge ones. Beyond comprehension. What saved my life had been the depth of the new snow around my cabin, the fact that the pack had been higher than the roof. The slide has simply run over it and then settled down on the existing surface.

There wasn't anything else to say. Dave and I stood behind a row of parked cars at the air strip, looking at the ground and thinking about Randy. Silently we

asked ourselves all sorts of questions for which there didn't seem to be any answers. The others left us alone for alone. Later, Susan drove me into Three Rivers and I called Faith in Squaw. I told her Hicks would fly me home in the morning.

Postscript.

In all, as our records show, some 93.5 inches of new snow fell on Mineral King during that 100-hour period between February 20th and 25th. Further evidence, such as the age of several trees uprooted by the slides, a mature aspen grove completely destroyed, established the fact that this had been the worst, the most severe, avalanche cycle in the past 200 years.

Thus, some questions were answered after all. We knew with unmistakable certainty what Mineral King could do at its worst. We were able to chart slide paths and establish their range. We could define the safe zones. We could even state with some confidence (as indicated by the rifle work on Empire) that it might be possible to control the avalanche hazard, given the manpower and the equipment available, though the cost would be staggering.

But these were answers to technical questions. Others remained, the personal ones, deep inside, like the scars

left on the land by the slides. No snow survey could explain them away. Why hadn't I stayed in Dave's cabin with Randy that afternoon, instead of going back to mine? Would both of us had gotten out if I had? Why hadn't we left with Dave and Susan that Friday in the first place? What kept me from doing more to find Randy after the avalanche? A sense of self-preservation so strong as to exclude everything else? Disorientation? Confusion, too much stress, from the long night of digging out? Fear...?

For a long time, back at Squaw, I was afraid of the mountains. My legs shook on avalanche routes and there were times I could barely ski. I hid this the best I could, hoping it wouldn't be noticed. But if it was, no one ever said anything. Eventually it passed.

Yet even then, I seldom spoke of Mineral King to anyone other than Faith. I have no doubt whatsoever, that she was there that night to help me dig out. And I know too, with equal certainty that our marriage has done more than anything else to sustain me through the weeks and months, even years, that followed. On some days now I realize how exceptionally bright the sun is.

But there are other times still, in the late fall mostly, when the weather finally turns, that it comes back. I see Randy, huddled tight into his bulky parka, head down against the storm, carrying my duffle on his shoulders through the chest-high snow drifts to Dave's cabin, and I wonder at my luck. ▲

From Jeff Ballenger to his sister Amanda:

In the beginning of July 1969 Dad and I drove down to Mineral King to retrieve all his stuff out of his cabin. Even though it was July the 23-mile road had just recently been cleared enough for us to get all the way to the cabins. The first 20 miles was just snail slow and full of beauty.

The last couple of miles I remember like it was yesterday. There was one clump of snow about 100 feet up from the road that was easily the size of a boxcar. There was an aspen grove the size of a couple football fields that had been snapped in half. I mean the whole grove, not one tree left upright. It was freaking awesome to see and along with the massive damage to so many other trees it is a scene that was like no other I have ever seen.

What was really unusual is that the cabins were just standing there looking very deserted, kind of haunting but not damaged in the least. So much snow had fallen by the time the huge avalanches came down that they literally went right over the top of all the cabins. Hence Dad being buried up to his proverbial armpits.

Dad was pretty loose and easy on the drive in but when we got to the cabins he grew kind of quiet. I don't know if he was sad but it seemed to me that sad didn't really cover what was going on in Dad's beautiful brain. So I took off and hiked way up into the bowl above the cabins. There was still a ton of snow up there and I had a grand old time foot skiing on the best springtime snow I had ever experienced. If nothing else Mineral King would have been a ski resort as incredible as any in the world. You know Mandy, the one big bowl that overshadowed all the cabins was as big on its own as Squaw Valley proper.

I'm not sure if Dad even knew I was gone. When I walked into the cabin it seemed for a minute he might have forgot I was there with him. We loaded up and headed out and I'm not sure if Dad spoke all the way back to Squaw. I believe his mind was fraught with visions that were going to be haunting and plaguing him for many, many days to come.



Left to Right: Wally Ballenger, Amie Allen, and Joe Spofford at Squaw Valley.
Photo courtesy Amanda Ballenger

After the *fire*

tools for those left behind

The rest of the story: (Continued from the cover.) The unlucky rider hit a rock in the path, and we knew that he was bleeding internally but we couldn't get him down fast enough because of the weather. Though it was impossible to fly we actually set up a pseudo-emergency room in a dug out Forest Service outhouse, staffed with an ER doc (with blood), a flight nurse, and a flight paramedic. We just couldn't get him there in time. From where I took this photo there was about another half mile before we could meet snowmobiles, and then it was another 1.5 miles to the outhouse. We knew the subject needed a hospital and a surgeon, so our hope was to stabilize him at the outhouse, and then take him by snowmobile another 3 miles to a waiting ambulance. The avalanche was a small SS-AR-R2/D2-I. The slab was only about 30x30 feet and a foot deep, but it ran 1000 vertical feet in terrain with some exposed rocks.

Ironically, in a twisted sort of way, the year before on the same day, a climber was swept down a nearby gully (about 100m away) by a WL-AF-R2/D3-O. He was completely shattered, but it was a sunny afternoon and we were able to land a helicopter 200m away. After three months in the hospital and 13 surgeries, he healed and walked away.



Photo Dale Atkins

After The Rescue

Those left behind—rescuers, family, and friends

Dale Atkins

In the profession of avalanches and of mountain sports, death is the metaphorical elephant in the room—the consequence that no one wants to talk about. Uncertainty lurks and so too can death, yet we don't address it other than to say it is an outcome no one wants to experience. Though we do not talk about it, it is a consequence that many in our profession have been exposed to. Back in 2004 Ian McCammon and I surveyed avalanche professionals and recreationalists. One of our findings that really stood out was that 83% of pros and 47% of recreationalists knew someone who had died in an avalanche. Think about that for a moment. Certainly, we work and play in a small community, but who do you know that died selling skis or ski boots, creating websites, painting houses, or playing golf, tennis, or biking? There are likely very few other professions and sports where deaths are so prevalent. Yet we don't talk death. Ask a group of people participating in an avalanche course about what is the worst outcome of an avalanche encounter. Almost immediately some will reply "death" or "you can die," but these remarks are often accompanied with a few laughs or at least a snicker or two.

Formal avalanche training typically ends with rescue—finding the buried person. This makes sense. In a profession and sport where things can and will go wrong; avalanche rescue is the last layer of defense. But when an accident ends badly, the effects can be broad and deep. Certainly a sudden and unexpected death is promptly terminal to the victim, the aftermath for companions, family, and friends is chronic. The impact can last a lifetime for those left behind. There is no "closure." Even rescuers are not immune.

Why what happens after the rescue matters

What happens after a rescue matters because avalanche accidents are a too-frequent activity within our profession and sports, and too often avalanche accidents end in death or with severe life-changing injury; therefore, there is a reasonable chance that you as an avalanche professional will have to directly or indirectly deal with a death. Too often our well-meaning ways and caring words of dealing with grief or traumatic stress are not helpful, sometimes they are wrong, and for a few it can be deadly. According to a 2015 article published in the *Journal of Emergency Medical Services* the rate of emergency medical service responders (basically ambulance workers) contemplating and attempting suicide was 10 times greater than the national average.

Grief and acute stress and post-traumatic stress disorders (ASD and PTSD) are not simple emotional responses to a loss. Rather they are complex response involving cognitive, behavioral, and social elements. Grief and stress disorders can affect those directly involved in an accident like companions and rescuers, or even those indirectly involved like family, friends, and rescuers who did not even participate in the recovery. For rescuers it is important to know that what may be a minor experience for one rescuer can be a traumatic for another. And no matter how many bad things one has experienced, something about a particular event can—for that rescuer—turn it into a major traumatic experience, regardless of previous events that seemed or actually were much worse.

I am not a psychologist, psychiatrist, or sociologist, but I am a **lawinologist** who has investigated hundreds of avalanche accidents, and I am a mountain rescuer who has participated in hundreds of searches and rescue. Over the years I have spoken to many survivors—those left behind—of all sorts of mountain accidents ranging from avalanches and airplane crashes to climbing, hiking, and hunting accidents. I have also experienced firsthand sudden and unexpected deaths directly and indirectly. From my experiences, along with some formal and informal learning, I will define some terms, describe how the brain works with experiences and memories, dispel “closure,” and offer some suggestions for dealing with death, grief, and stress disorders.

lawinologist:

a person who studies or has knowledge of avalanches, *lawinen*—German for avalanches

The Terms

Trauma has two different meanings. Medically, trauma means a serious bodily injury or wound. Trauma also has a psychiatric meaning that refers to an experience that is emotionally painful, shocking, or distressing. In psychologist Frank Gallo’s 2017 book *Bouncing Back From Trauma*, he writes that trauma can be caused by extraordinary experiences as well as ordinary experiences. He also adds that even hearing about something horrible that happened to someone else may also be traumatic. Within this essay trauma’s psychiatric meaning is generally implied.

Grief is the natural response to a loss and is typically identified with bereavement, or the death of a loved one. Many think of grief—thanks to Sigmund Freud—as a single instance or short event that one needs to move on from. It is not. **Grieving** is a complex process, and it is not the five-stages ingrained in the consciousness of Americans that Elisabeth Kübler-Ross identified nearly 50 years ago. (She wrote about the terminally-ill dying—not grieving—and her work has not been validated.) While grief is a multifaceted response to a loss, it is really only a feeling, like any other feeling. It may begin as disruptive and painful, but it does not have to be so. It may endure for days, weeks, months and even years. It may even endure a lifetime, and that can be okay too. For many, maybe most, grief is resilience. It is the ability to recover quickly, but it does not imply an end or closure. While companions and colleagues can feel grief, so too can rescuers.

People grieve in so many different ways. Respect them even if you might not understand them.
— Molly Tyson

Acute Stress Disorder (ASD) and **Post-Traumatic Stress Disorder (PTSD)** are afflictions, according to the National Institute of Mental Health, that some people experience after a shocking, scary, or dangerous event. PTSD and ASD can also affect people who did not directly experience the dangerous event. The difference between the two is basically about the length of time that the symptoms last. According to the American Psychiatric Association’s *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)* ASD/PTSD can affect people who were exposed to death threatened death, actual or threatened serious injury by way of:

- Direct exposure
- Witnessing, in person
- Indirectly, by learning that a close relative or close friend was exposed to trauma (violent or accidental)
- Repeated or extreme indirect exposure...

While the DSM-5 defines specific criterion, symptoms of ASD/PTSD fall into six additional categories:

- Event is persistently re-experienced (involuntary and intrusive distressing memories of the trauma or recurrent distressing dreams)
- Avoidance of trauma-related stimuli after the trauma (avoidance of memories, thoughts, feelings, people, or places associated with the trauma)
- Negative thoughts or feelings that began or worsened after the trauma (overly negative thoughts, exaggerated blame, negative affect, feeling isolated after the trauma)
- Arousal and reactivity increase after the trauma (difficulty concentrating, falling or staying asleep, irritability, aggression)
- Distress and functional impairment after the trauma (social and occupational settings)
- Cannot be other causes (medication, substance use, or other illness)

Experiencing trauma is relatively common. According the US Department of Veteran Affairs, about 5 to 6 out of every 10 Americans will experience at least one trauma in their lives. Of the general public about 7 to 8 out every 100 Americans will have PTSD at some point in their lives. For military members the incidence runs about 11–20%, however, Vietnam Veterans were about 30%. A recent, 2016, report by the International Association of Fire Fighters (IAFF) found that first responders experience PTSD rates similar to combat veterans.

The symptoms of ASD/PTSD can start immediately or days, weeks, months or even years later. While relatively few people experience sufficient symptoms to met the diagnostic criteria for ASD/PTSD, experiencing some of the symptoms is not unusual and can be considered part of grieving. However, when the symptoms change one’s normal routine or behavior, then it is time to consider seeking professional help.

Suffering from ASD/PTSD is not a sign of weakness and can happen to anyone. And as described in the DSM-5, not everyone with ASD/PTSD has to go through a dangerous event. Some people develop symptoms after a friend or family member experiences the harm or danger. Likewise, rescuers, even ones not on site can also develop symptoms.



Photo Dale Atkins

Rescuers do strategic shoveling to recover the body of a backcountry snowboarder (and his dog) on Berthoud Pass (Colorado) two days after the avalanche. The accident occurred on a Monday morning (19 January 2011) as a powerful storm settled over the region. His companion was riding just ahead and while he noticed a “small” avalanche behind, he dismissed the possibility that his friend could have been caught. The rider reached US 40 and decided to wait for his friend. After waiting awhile he felt the two had become separated by the nasty weather. He hitched rides up the pass, including one from a CAIC forecaster (but the rider never mentioned an avalanche) and made two more runs through the area looking for his missing friend. By now CDOT had closed the pass, and the rider was met again by the CAIC forecaster. This time the rider mentioned the “small avalanche,” and the forecaster advised him to immediately call 911. CDOT plowed a single lane to the pass so Grand County SAR could access the site. They searched well into the night doing an immediate search (transceivers and spot probing) and probed many trees for the possibility of a tree well accident. The next day the pass remained closed, but CDOT again plowed access to the summit so rescuers could continue searching. The SAR team also accepted the help from a small group of the victim’s friends. Rescuers used Recco and probe lines searched for most of the day without success. On Wednesday morning, the storm had eased enough for CDOT to open the pass. Rescuers from other teams came to help and nearly 50 locals showed up to help too. Probe lines were started and by mid morning the snowboarder and his dog had been found.

OK, here’s a little back story. The avalanche turned out to be much larger than expected—200’ across and 300’ vertical—and so too was the turnout of the victim’s friends who came to help. I was assisting the site leader who was a bit overwhelmed by this huge turnout. By now all the debris had completely disappeared under the new snow. In an effort to get things going and keep people busy—and to let us rescuers get our act together—I told the site leader “to start 2 big probe lines down and out of the way.” I figured this would give us time to figure out where the debris was hiding. And darn it, within 20 minutes of probing one of the lines hit the victim.

The avalanche fell sort of across the slope, say 2 to 8, if using the hands on a clock to describe the slide. The rider who escaped saw the moving snow but cut back to his left, say at 5, and quickly and easily rode out or away from the avalanche. The victim, however, seemed to have tried to outrun by going to his right, which put him right in the flow. The slide pushed him over from behind and buried him. He was on his forearms in a prone position with his back and head arched backwards as if he was trying to keep his head above the flow. Sadly, it didn’t work and he was buried about 18” to the top of his helmet. If he had made it another 50 feet, he probably would have been ok. Neither man had rescue gear. The victim had left his transceiver in his car because his buddy didn’t have a transceiver. The victim also had Recco reflectors in pair of snowboard boots, but that morning he left them at home and wore a different pair of boots.

Closure means bringing an end, conclusion, finality, resolution, etc. to a problem. Depending upon the context closure can mean different things. In the legal world closure is an end to uncertainty. In social psychology, according to Arie Kruglanski at the University of Maryland, closure is to seek an answer to an ambiguous situation. But when it comes to grieving, closure is an incorrect concept and action.

Heal according to Merriam-Webster Dictionary is to cause an undesirable condition to be overcome.

Closure is a myth and an illusion

Depending upon context—who we are describing—closure is a myth or an illusion. A typical dictionary definition of myth defines it as a widespread but untrue or erroneous story or belief. An illusion is more deceptive or misleading. Clinicians and researchers who deal with grief and stress disorders like Fran Ochberg at Michigan State University, who is a pioneer in trauma and PTSD, or Pauline Boss, an emeritus professor at the University of Minnesota, Nancy Berns from Drake University, Joseph Melnick, editor of the *Gestalt Review*, say that closure is a myth. Berns calls it a made-up concept people use to talk about loss and grief. Berns, Boss and others also report that seeking closure can do more harm than good. While closure may be a very good word for business and real estate deals, Boss says it is a terrible word in human relationships, but we hear it used—especially rescuers—all the time.

Here is a typical and recent example of closure posted in social media by a well-meaning EMS service after a 2016 avalanche death: “It is a difficult task that our Search and Rescue colleagues take on. They go into the wild, hoping that their efforts will result in the finding of a lost soul who walks away with a harrowing story. But they go, knowing that sometimes the best outcome may be that they are able to find someone after they have passed. They give closure to the family....”

For families and friends, closure is a myth; it is untrue. For rescuers, closure is an illusion. We mislead ourselves into believing that we can close out our cognitive and emotional selves when end a difficult rescue or recovery. The experiences, memories and feelings remain forever.

Though Sigmund Freud did not use the word closure, he pushed the concept of closure in his writing of “grief work” in his 1917 essay *Mourning and Melancholia*. Freud’s approach to dealing with grief was to cut the bonds that tied the survivor to the deceased. He treated grief as an event that should “come to an end” quickly, and he also stressed the importance of “moving on” and returning to “normal.” This misguided approach that grief must be resolved guided clinicians for most of the last 100 years and is still used by well-meaning but poorly informed laypeople, like rescuers. It was not until the 1990s that clinicians recognized that Freud’s “grief work” did not work, and other theories of grief arose.

Unfortunately, most in western societies think of closure as an event. It is about moving on, leaving the past behind, returning to normal, and that this event happens at some point, say, a few weeks or months after the loss. For rescuers with an outside view, it is easy to rationalize the use of closure. However, the view from the inside is very different. There is no door that a family walks through and leaves the past—that episode—behind. For the family (and closest friends) there is never closure. Writing a rent check, attending a school play, sleeping alone, holidays, walking down a familiar sidewalk, hearing the rustle of leaves can all be powerful reminders of what was one had but now is gone. For those left behind there is no return to normal, it is the beginning of a new normal and a new reality. They never forget. The same can happen for rescuers, too.

As rescuers we have to be very mindful that the family and friends cannot forget, especially since we have the luxury and ability (most of the time) to conclude an event and move on. Rescuers can do this (most of the time) because rescuers do not have a deep investment or connection with that person. After the unfortunate event we don’t spend weeks or months, (or for some unlucky people) years just waiting and hoping that their loved one will walk back through the door and return home.

Usually, there is a point when the realization (when the brain and heart resync) that someone will never come back. But that point is not closure; it is healing. When one can start looking forward, there’s healing. But the memories (sights, feeling, smells, and tastes) will always remain, and they will remain remarkably strong and vivid for 10, 30, 50+ years, basically forever. When you have a conversation with someone who unexpectedly lost a husband, wife, father, mother, brother or sister, and when your chat veers to their loss—even years or decades later—you will hear words like these: “A day doesn’t go by that I don’t think about....” “I still think about her all the time.” Or “I think of him almost every day.” A lost loved one is forever part of one’s life. Memories remain.

In mountain rescue, we don’t provide closure, but we can—and do—play an important part in the role of initiating healing.

Rescuers initiate healing

Rescuers provide information to the whats, whens, wheres and hows of an accident. Healing starts and gets improved with that information. In the case of a loss, perhaps the best piece of information we provide is the finding and returning the body of the love one. The return of the body not only gives psychological support and answers, it also provides societal and legal support and answers. For example, in law there is no immediate recognizable death, without a body. There are no life insurance payouts, no dissolution of marriage or of contracts, no unfreezing of assets and estate, no inheritances, etc. (Eventually, a person can be declared dead in absentia, which typically takes about seven years but this depends on the circumstances and the balance of probabilities). For rescuers a missing and unrecovered person is a disappointment—even when rescuers are sure the person is dead. However, for a family that same missing person—in addition to the emotional and social distress—creates a financial limbo that sometimes can financial devastate the family.

Recovery of an avalanche victim is critical to the well-being of those left behind. Obviously, a transceiver and Recco reflector are vital devices to possibly save a life, but they are also vital devices to ensure someone always comes home, even if deceased, to help those others, namely family and loved-ones heal. An acquaintance of mine directed the mountain rescue service in Zermatt, Switzerland for decades. Toward the end of every summer he would start to get phone calls, usually from mothers or other family

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Photo Dale Atkins Collection

Shovellers are freeing a buried hut keeper above Verbier, Switzerland, on 22 January 2005. Late that day the man was caught and buried while retrieving a shovel that had fallen from the deck of the Mont-Fort hut. The search effort involved two helicopters, five dog teams, one Recco team, and a total of 120 people who searched for nearly three hours and found nothing. The hut keeper, buried in a quasi-upright, fetal position, was eventually able to use his cell phone and called the hut. The person who answered thought it was a prank call, and almost hung up on the buried man. Once convinced that the caller was the buried man, he was able to direct rescuers to his general location—outside the debris area [sic]—and by a combination of yelling and probing he was soon found, three hours after the avalanche. The avalanche fell down a steep slope with an abrupt terrain trap at the bottom. Instead of being buried in the terrain trap, the maelstrom of moving snow literally tossed (or pushed) the man up and out into very soft and undisturbed snow about 10m beyond the edge of the obvious debris. The man was buried about 1.5 to 2 feet with very soft debris, and then the small powder cloud settled out hiding any evidence of the debris and the buried man.

In effort to make some sense of this, here's a couple more photos. In the first picture you can see the hut. In the second picture I added the location of the buried man. This photo was taken before he was found. If you look carefully at the debris to the looker's right—hindsight is so wonderful—you can see the flow pattern of the very soft debris spilling out to the looker's right. I suspect that at the time, the rescuers did not notice this subtle feature. They thought he had been picked up and tossed by the avalanche, which has happened before (very, very rare) beyond the obvious debris. I don't think this was the case because the man was really buried.



members, enquiring if their loved-one had melted out of the glaciers. Some of those victims have been missing for more than 40 years.

Trying to bring closure is not helpful, and George Bonanno at Columbia University, who is perhaps the most renowned grief researcher in the US, has found that, the harder that one *tried* to cope with grief, the harder it is to cope with grief and not just in the first weeks but also the first years. In a 2013 *Atlantic Monthly* article he mentions three basic tracks in the journey of grief. Most people, 50 to 60 percent, are resilient and while they may suffer early and have day-to-day fluctuations, they quickly appear to be fine and are fine. About another third suffer great sadness and have a gradual road to recovery that may take a couple of years. The other 10 percent suffer chronic and relentless grief. These people, he points out, need counseling. Bonanno points out that if one thinks they are doing okay, then they are doing okay.

Experiences and memories, why you don't have to be present to be affected

Since a mix of experiences and memories are important elements in grieving and the development of stress disorders, a little review of both and about the brain will be helpful. The way the brain works also explains why someone like a loved-one or even a rescuer who was not involved in the accident, rescue or recovery can also be affected.

Psychologist and Nobel laureate Daniel Kahneman says memory is storage of our personal experiences, but that memories and experiences are not the same. To understand the difference we need a quick review of how our brain works. Our brains are filled with about 100 billion neurons, a specialized cell that transmits, receives and processes electrical and chemical impulses. Each neuron is connected to about 1000 other neurons. This is the wiring, so to speak, that creates vast and complex neural networks within our brains. Eric Kandel, a neuroscientist (and another Nobel prize winner) showed how that wiring changes when people learn something. As one experiences or perceives an event the brain splits what information from the how information and processes it and stores the memory in different places in the brain. When memories are retrieved, however, the brain does not work like a computer's hard drive. Rather the memory, according to psychologist Karim Nader of McGill University, is reformed or "reconsolidated." For decades, it had been well known that memories are very malleable. As Kahneman said in an NPR interview in 2013, when it comes to memories, we cannot tell what's real and what is not, only that some reconstructed better than others.

There is also one additional implication about the brain that is potentially important to ASD and PTSD, and that is in the role of mirror neurons. Discovered in monkeys by neuroscientist Giacomo Rizzolatti, a mirror neuron is a neuron that fires both when one monkey acts and when the other simply watches. Two decades of additional research shows that mirror neurons also allow people to simulate not just the action but also the emotions of those actions. Basically, sensing what others have told you can activate the same brain circuits the doers experienced. UCLA's Maro Iacoboni, known as Mr. Mirror Neuron, also calls mirror neurons empathy neurons. This may explain why one does not have to be present to also experience stress, grief and perhaps even ASD and PTSD.

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Life-changing, catastrophic injury

For families and friends left behind, a loss is exceptionally painful, but let's consider another situation of serious loss sometimes caused from avalanches. There are some victims who suffer catastrophic, life-changing injuries. Typically, these injuries include traumatic brain, spinal cord injuries, or even amputations. Their situation, and for those immediately around them, can be very complex. Grieving is part of their life. Research on people who suffered catastrophic injuries shows that some heal and adapt well, and some struggle. The injuries change peoples' lives in positive and negative ways. The same applies to their families and friends. For some they can realize new opportunities, but others cannot. A friend with a very bad spinal cord injury describes his situation as similar to the movie "Groundhog Day." He and his caregivers face the same challenges day after day; a loop that is very difficult or perhaps impossible to break from.

Dealing with stress

As I mentioned at the beginning I am not a trained therapist or clinician, so I am not qualified to diagnose and give specific recommendations. This essay is not psychological or behavioral advice. There are professionals who do that. I am an observer who has seen and experienced a lot. In my review of literature, talking and listening to professionals, and from my own experiences I have learned that most people are resilient, and trying to hold, control, or repress painful emotions and experiences can lead to more distress. It can even be harmful too.

A good way to deal with potential traumatic stress—and it is not practiced in the avalanche profession—is to be proactive with pre-incident education or training. Pre-incident stress training has been shown to be effective not only with paramedics, nurses, and police officers, but also in the general workplace. In Wilson and Raphael's 2013 book the *International Handbook of Traumatic Stress Syndromes*, they cite a 1981 paper by Hemenway that a large life insurance company estimated a return of five dollars on every one dollar spent on stress-management training.

Since accidents and traumatic experiences are inevitable, maintaining mental and emotional health of those left behind well means post-event action, but I use the term action very loosely. The general advice of having a strong support network of friends, family, and co-workers, eat well, and stay physically fit works well for most.

Most of the formal and anecdotal information about efficacy of stress interventions of emergency responders comes from domains of police, fire, and ambulance. While ski patrollers and mountain rescuers work in a different realm, they can share some similar experiences. Before introducing interventions that are helpful, some words need to be said about a disproven but still widely used method of psychological debriefings also known as critical incident stress debriefings (CISD).

Introduced in the early 1980s CISD (and later known as management [CISM]) became popular in the late 1980s and continues to be widely used, especially by emergency services programs, despite a lack of documented efficacy in randomized controlled trials. More troubling is the evidence that CISD/M adds to trauma and complicates recovery in the general public. In fact, the US Institutes of Mental Health and the World Health Organization strongly recommend not using psychological debriefing on adults exposed recently to a traumatic event. The British National Public Health Service goes even a step further and lists CISD as “contraindicated.”

Most damaging research about CISD comes from the esteemed Cochrane Collaboration, an international non-profit organization dedicated to making evidence-based reviews of healthcare interventions. The reviews rely on the results of randomized controlled trials. Cochrane recommends that CISD should not be used for the public. For emergency services personnel Cochrane found the benefit to be neutral to negative.

Oddly, while the scientific community all but dismissed CISD/M more than a dozen years ago, CISD/M thrives. Why? Because it is big business, and because many who go through it perceive it to be beneficial. Participants feel satisfied because they think they are getting support from their organization and because they did not suffer PTSD. Remember, however, that relatively few will suffer even if there is no intervention, and that satisfaction has no relationship to CISD’s effectiveness to preventing problems or promoting recovery. The claim of big business is easy to discover with a simple online search, and the suggestion that CISD was more business than intervention goes back to 1996 when senior editor Laura Ostrow in the *Journal of Emergency Medical Services* questioned if CISM was “worth it” and that “EMS should know what it is buying.”

If CISM does not work, what does? The answer is relatively simple for most people. Remember, Bonanno pointed out that most people deal with grief and stress quite well and quickly. Simply talking with colleagues works very well and has likely worked very well for millennia. In a 1989 Norwegian study of 115 volunteer and professional firefighters involved in a major hotel fire, 47% described the experience as the worst they had ever seen. Firefighters who went through formal debriefing did no better than firefighters who simply talked to their colleagues.

When simply talking with colleagues is not helping, there are more structured techniques of psychotherapy (“talk” therapy). Psychological first aid (PFA) was developed about ten years ago by the National Center for Post-Traumatic Stress Disorder. PFA is evidence-based, and today is practiced by the International Red Cross and the World Health Organization for disaster workers to reduce the incidence of ASD and PTSD. People known as helpers who have received special training provide PFA, and the helpers can be laypeople. One does not need to have a psychosocial or mental health background to offer PFA. The training is structured but short and can even be taken online. PFA allows people to cope in their own way on their own terms. PFA seems to overcome the shortcomings of CISM, but its efficacy has not yet been tested with rigorous research.

For people who are still struggling, cognitive behavioral therapy, including acceptance and commitment therapy (and numerous other related techniques), have demonstrated to help people in deep grief, or with ASD or PTSD. These methods are not about closure, but are about making room for the painful thoughts and feelings and improving coping skills. For some who suffer significantly from PTSD, medications may be used along with psychotherapy.

Final words

Avalanche accidents and rescues are inevitable, and while most people get away with a harrowing story to tell, some don’t escape. Those left behind are the ones who have the memories and stories. Perhaps they were directly involved in the accident or rescue, or perhaps they were indirectly involved and only heard the distressing news and stories. Their trauma is just as real as those that were there. Fortunately, most people cope quickly and just fine; some support and even lending an ear, so to speak, from a colleague or friend is all that is needed. A few who struggle may need the guidance from a professional.

Our profession is not proactive in recognizing and discussing the very real and all too-frequent consequence of death or catastrophic injury and what that means for those left behind. We can do more. Something I do at the start of my avalanche talks is to have participants remember or imagine their best powder day ever. If they are not skiers or riders, asking them to remember a recent pleasant day in the snow works, too. After confirming that memory, I then ask them to think of and imagine the faces of two or three people who are most important in their life. These special people are typically spouses, children, best friends, or work colleagues. Again, I pause and confirm that they have those images in their minds. Then I drop the bomb (metaphorically speaking), and say that you have just been caught and killed or have suffered a catastrophic injury in an avalanche. This news is followed up by a simple question. I ask them to consider how their death and loss will affect those most-important people.

This little exercise really changes people’s perspective and not just on their own risk-taking, but also on the consequences of their loss to others. It is worth some time to listen to, at least, a few comments from the group. The exercise can be a buzz-kill, but a simple quip, say about changing topics from avalanches to tropical beach vacations, warms participants and lightens the mood and lets me get back to the topic of avalanches.

After a rescue, if you want to console, you do not have to say much—and please never say anything about closure. As Frank Ochberg said in an interview about the first anniversary of 9/11, “Closure is a myth but progress is not.” To that hurting person, a simple, “I am so sorry” is an expression of empathy or sympathy and lets them know that you know they are hurting, and as Pauline Boss says, it is okay to hurt. If you are the one hurting, talk to a colleague or friend on your terms. You should never be forced into talking or sharing feeling about the event.

If you ever find yourself in that difficult and unfortunate position of having to tell someone their loved-one died, try very hard not to do this solo. Many cities and counties have advocates who are specially trained to guide families. They know the challenges and uncertainties a family or close friend

TAR to Dale: Thanks so much for all your work on this issue, both on the article and today. Powerful and humbling, in my opinion. How have you kept it from being overwhelming, having seen everything you have seen in your career? Such important work.

Dale: Thanks for your kind words. Hmm... sometimes it is overwhelming. Perhaps I have been lucky, as I have only lost a night of sleep after some incidents. I have learned that when the memories return I let them in. Then I'll think/reflect about the memory for a moment or two (sometimes longer) and usually they slip back into my brain until another time.



Avalanche training at Big Red, BC in 2016. Photo Dale Atkins

will face. You know avalanches, and together you make an effective team. Be ready to answer questions. The person or persons before you will likely want to know how it happened and why, and maybe if their loved-one suffered or was alone. Answer their questions truthfully and be fair. The hurting do not need to know that their loved-one actually ripped their finger nails off clawing at the snow. When they start asking questions, their grieving is starting. Also be ready to listen. There is a good chance they may want to talk about the person they just lost. If so, be a good and active listener. This is a very personal time and the experience will be enigmatic; a mixture of pain and tears combined with occasional smiles and short periods of joy as they remember things about the person they just lost. These are the good encounters, but every situation and person is different. Sometimes the person may be incapacitated with grief, sorrow, dread, or any combination of all sorts of painful emotions. At some point in the future they may want to talk, and do not be shy. However, if the accident happened within a commercial or organized activity, lawyers get involved and their interest and job is to protect the company or organization.

Julia Samuel's recent book, *GriefWorks: Stories of Life, Death and Surviving*, shows how to live with and learn from loss. The UK website *Sudden* (www.suddendeath.org) is aimed at professional care givers and therapists; however, it is a source of information for anyone who wants to know more about bereavement after a sudden death. Another resource is the *American Foundation for Suicide Prevention* (www.afsp.org) that offers all sorts of information for those struggling with suicide and for those left behind. When the thoughts and memories are not manageable, or even if you just would like some support sorting through the experience, please seek assistance from a professional.

To most people, saying "I am sorry," is simply a message of sympathy or concern, however, in law an utterance to express remorse with the hope of diminishing pain and suffering can be seen as an admission of guilt with legal consequences. There are ways to express regret that are not an admission of guilt, and most states have "I am sorry" laws to protect health care providers. If you are involved in commercial or organized ventures, you should contact your organization's attorney for the correct interpretation of both state and federal statutes. Preplanning what can be said can be protection for the organization and enable healing for the hurt.

Rescuers help people by initiating healing, and sometimes even rescuers need rescuing. Rescuers do not give closure. No matter how one got left behind, it is possible to live with grief, to heal and find joy, and still remember what happened. That is a good message. ▲



Simulated CPR during the staged rescue scene in the 1992 video *Avalanche Rescue: Not A Second To Waste*. Photo Halsted Morris

After The Rescue

Dave Richards

AS I rolled the young man over out of the snow that day in 2006 I would never have suspected that the vision of his broken body would haunt me some eleven years later. Avalanche rescue can be a very rewarding job. However, like all first responders, avalanche workers can and likely will be affected in some way by the things which they may see during these rescues. Particularly gruesome damage to the human body incurred during avalanche accidents will frequently leave lasting images imprinted in the mind. This is simply human nature.

During the early part of my career as an avalanche worker I felt as though the death and dying that I was seeing was easily dealt with. In fact, only once was I asked after a recovery if I myself was ok. I would simply shrug off accidents and their victims through dark humor and beer-fueled informal debriefings with the crew. For some this is enough and they will not be negatively affected by accidents as they move into the future.

In my case however, something was building within me that would eventually cause my brain to explode. In hindsight, I was not actually dealing with these visions so much as I was simply shutting them out temporarily. Little did I know that in the fall of 2016 these memories would rush back and manifest themselves in a manner which would result in my brain nearing total overload.

Post-Traumatic Stress Disorder or PTSD is real; and is now very much on the tip of Americans tongues due to the fact that many American soldiers are returning from the field of combat with very

troubled minds. Traumatic stress however is not limited to those who have dealt with battlefield experience. PTSD can manifest itself in anyone; from the victims of car accidents, to those who have lost loved ones and certainly to first responders such as avalanche rescue workers.

In the fall of 2016 I responded to a construction accident which involved an outside contractor working on our hill. When I arrived, I found the body of a man who had been crushed by a multi ton excavator rolling over his body. My only statement over the radio was that I had one deceased victim with “injuries non-compatible with life.” It would be the second time in my career that I had used this statement.

For a couple of days, the vision of that body haunted me but did not seem to affect my mood or work. Soon though my mind switched. I was no longer simply seeing the aftermath of the recent event but also visions of avalanche accidents over my career. It started with the image of a young man who had lost the back half of his skull during a two-thousand-foot ride down a narrow chute and over cliffs. This was soon followed by the memory of another victim who had grabbed a tree, but unfortunately had done so at eighty plus miles an hour. His body was crushed. This continued until my mind was literally becoming overloaded by horrible memories of unfortunate and preventable avalanche deaths.

For two weeks, I sat and stared at the wall of my office. I accomplished nothing. People noticed. Eventually I was approached by a concerned coworker, then directly by our company’s general manager. I was not asked if, but instead told that I needed to deal with whatever was going on. I agreed; I needed help.

Soon I was introduced to a therapist who specialized in treating PTSD, which had become my diagnosis. There are many approaches to treating PTSD. These span from medication and talk therapy to newer and less known (but equally successful) treatments such as EMDR or Eye-movement Desensitization and Reprocessing. The most basic way to describe EMDR involves following a light or sound from side to side while discussing a traumatic event and working to process that memory.

It was decided that I was a good candidate for all types of treatment but it was the EMDR which proved to work. Over the course of weeks, I was treated twice a week and slowly worked my way through a whole myriad of haunting memories. I learned that images cannot ever be completely driven from the mind, but that they need not dominate my thoughts. I can now openly discuss my experiences and the deadly results without becoming overloaded and shutting down. That treatment was the greatest gift that I have ever been given.

Avalanche work can have sad and at times very ugly results. I love my job as an avalanche worker and recognize that avalanche rescue is part of that job. I will continue to enjoy the work but will inevitably be forced to deal with more unfortunate deaths in my career. Now however, I recognize that the human which you are working to recover is not the only victim of the accident. I now use the tools which I have learned to better cope with these events and eventually process them in a healthy way, as well as to help coworkers to do the same.

I plead with my fellow rescuers to be open with themselves and others regarding the mental scars that our work can leave. There is an undeniable stigma around admitting that you are struggling with the effects of a traumatic experience.

Be willing to fight that stigma. In my experience, it will not be held against you, nor should it be. Be open to treatment should you need it. Help is there for you without judgment or question. Remember that your patient may not be the only one in pain. ▲



Jake the dog digging out an avalanche victim in the Wasatch. Just the head and hand are becoming visible. The image of the victim once recovered would haunt me for years. *Photo Dave Richards*

Psychological First Aid

Liz Tuohy

When I was 25, my supervisor, Lynne Wolfe, hitched a ride on a sheriff's helicopter into the Absaroka Mountains to help my NOLS course. Upon landing she gave me a hug and said something like, "We are here to help you. You are still in charge. You can tell us what to do, you can give over any responsibility or decision-making to us, but you are still the leader."

Internally, I paused. The river was vocal behind us, the slope before us too steep for the tent camp pitched there, and people circulated around us in groups, moving to a rhythm of tasks assigned or volunteered for. The night before a helicopter had picked up the body of Katy Brain, our student and travel mate for the previous 24 days. She died of a head injury after losing her footing in the South Buffalo Fork of the Snake River. The sheriff had flown in to take statements. He was generous enough to offer to bring Lynne and another NOLS employee to join us for the two-day hike out.

Looking back after 21 years, I wonder with compassion and concern how at that age I possibly managed such an intense and heartbreaking situation. I think of my young students and co-instructors and wonder the same. But by now I have talked to enough people to realize how capable humans are of stepping into situations they really haven't the capacity yet to manage.

While I paused internally, in reality, I kept moving quickly. "Thank you for coming." I gave her a briefing on what we had been doing, how our students were, and our plans. She told me what would happen once we were picked up at the trailhead. Then she started doing some of the same things we had been doing intuitively to support our students. Multiple quick check ins and updates, regular reassuring brushes on a shoulder. Simple positive feedback, reaffirming things I was doing to help our situation. Things we never would normally congratulate each other for, like moving a tent, or making a clear announcement. But in a situation in which planning a final crossing of the Buffalo Fork felt like climbing Mount Everest, these small gestures reminded us that bit by bit, we were getting closer to home, and we were doing it ourselves, with familiar work in which we were practiced.

Since Katy Brain's death, I have continued to work for NOLS. I have deep gratitude for the way the NOLS administration and community supported me and my group. And despite the good support, I worked through seven years of post-traumatic stress injury. As responders we can't prevent trauma in others, but we can help them in meaningful ways.

The methods are simple and don't require a mental health degree. Below I will outline Psychological First Aid treatment principles, illustrated with examples from my fatality experience in the Absarokas. These principles are well-regarded concepts in the mental health community and are taught by NOLS Wilderness Medicine. While the specific language of the treatment principles is more recent than the incident, they give definition to what I and my students found to be helpful. You can use these principles when working with victims and rescuers immediately after an avalanche fatality or serious incident—you will just adjust the examples to the people and situation. My intent is to give you a toolkit that you can employ with compassion and confidence.

Stress Injury

Stress occurs whenever the mind/body has to adjust to a change. Substantial increases in stress typically result in heightened physiological and emotional states. Acute Stress Disorder is a set of specific physiological and psychological trauma symptoms that are limited to one-month duration. Post-Traumatic Stress Disorder (PTSD) is diagnosed when these symptoms last more than one month. There is an association between unrelieved early symptoms (acute stress) and long-term effects or Post-Traumatic Stress Disorder (PTSD). Between 10 and 30% of people with acute stress fail to recover and develop PTSD.

Treatment Principles of Psychological First Aid

Psychological first aid (PFA) is a non-therapeutic response to a person who may need physical and emotional support immediately following an extremely stressful incident, mass violence or natural disaster. It focuses on simple pragmatic interventions that we good caregivers already do: listening, assuring safety and basic needs are met, reducing stress and helping the victim to engage with support groups.

Create a sense of safety by

- Mitigating the scene by reducing chaos and removing patients from perceived threats.
- Reflecting evidence of safety.

Examples: Lots of short updates and check-ins made the situation feel more predictable and orderly. We still needed to cross the Buffalo Fork to get home, and we did multiple briefings for the group about our plans and contingencies, in order to minimize surprises. We also showed the group on maps that our route out had no additional river crossings. Sending in additional NOLS personnel provide an extra layer of security for both students and instructors.

Create calm by

- Calming yourself first.
- Emphasizing the present, the practical, and the possible.

Examples: We ascribed to the "one hour at a time" model. Thinking forward even a full day contained too much unknown, so we focused on what we would need to do for the next hour. We used kind voices and eye contact, said please and thank you, and took deep breaths together. We gave each other hugs and stopped to cry when we needed to, validating every feeling as it came up. And then we calmly continued the task at hand.



This photograph of the course practicing river crossing in the Absarokas first appeared in an article entitled "Going Back In," by Andrew McCarthy, in *Adventure Magazine* August/September 2009. Photo Liz Tuohy

Create self and collective efficacy by

- Involving the person in problem-solving, self-care, and rescue—Asking people what else they can do and what they should not do.
- Recognizing and reminding people of existing strengths.

Examples: Our students moved our camp to Katy’s body while we waited for evacuation support, and proceeded to cook and make hot drinks seemingly nonstop for the next two days. In doing so they were able to stay busy and provide both comfort and nourishment to our group. It can be an easy mistake to “help” people by doing basic tasks for them while they sit and watch. Don’t rob them of small, meaningful distractions. If needed, help them break the tasks down into smaller steps. Similarly, one of the most powerful gifts Lynne gave me was continued leadership – with the option for help. On the way out, we had to decide between two route options. I asked her to decide. She chose, the route worked well, and I was able to let go of one more responsibility.

Create connection by

- Building an on-scene relationship.
- Helping people contact friends, family, loved ones (including pets).

Examples: On our hike out, Lynne led our students in deciding that we would best honor Katy by giving remembrance to the entire month-long experience. We stopped regularly to voice memories—funny pooping stories, frustrating post-holing stories, beautiful moments, regretful disagreements, and in doing so shared our emotions and solidified relationships in new ways.

Create hope by

- Reflecting specific, accurate, positive facts and predictable, realistic steps.
- Personally maintaining and communicating hope

Examples: Hope doesn’t mean saying that things will be okay, but might look like taking a pause to notice a small thing that disrupts the notion that nothing is okay. We stopped to watch sunsets and bears. We kept using the same funny voices we had used throughout our expedition, learning that somehow laughing and tragedy can exist at the same time.

In summary, psychological first aid is a set of simple interventions that any wilderness recreationist can use. Thanks for watching out for each other. I write this with empathy for people whose lives have been thrown by stress injuries, and appreciation for the people who have been helpful along the way. I hope this curriculum helps.

Thank you to the following people who have provided expertise to this curriculum:

Laura McGladrey, PMHNP, FNP, MSN, R.N, FAWM, Cynthia Stevens, MD, and Will Marling, former Executive Director, National Organization of Victims Assistance. ▲

Hope doesn't mean saying that things will be okay, but might look like taking a pause to notice a small thing that disrupts the notion that nothing is okay.

Any Given Day

Elizabeth Lamphere

Ian: Hey, Bubbee: I think we should start a foundation to benefit the children of avalanche victims.

Me (shifting uneasily): That's a great idea.

Ian: Yeah....

An unexpected death is never met without resistance. We spend our time making hopefully good decisions about our health and well-being so we may live longer, and attempt to put off the inevitable. When an untimely death occurs, a tragic death, a death way too soon, we take pause. This pause can come on any given day. As recent events already this season have shown, the aftereffects of an avalanche trauma are relentless and can lead to the worst of outcomes.

My partner, like so many other fathers, brothers, husbands, and wives before him, was taken in an avalanche in 2013. He was an avid skier and backcountry enthusiast. Our business together was selling glueless climbing skins. His passing when our daughter was nearly nine months old was my worst nightmare come true. The short-term shocks and long term issues precipitated by his death for me are simply magnified over time when reflected in my daughter’s eyes.

Initially the focus was on survival. How do I keep my breast milk flowing, make money, and take care of this tiny creature? How do I put the image of Ian suffocating out of my head? How do I attempt to keep myself healthy for my daughter? How many times can I run through my last week with Ian? How do I hold Madelyn and not sob? How do I get rid of the sinking feeling in my soul? There was not a lot of conscious thought that I can recall during this initial time period of six months. As time passes, I remember a few more tidbits of conversations and faces during that time. The mind does a brilliant job of protecting you from yourself when it has to. Within three days of the avalanche, family and friends had arrived into Denver and we took over a hotel. It was as if once the confirmation of death happened, a chain of events began that was unstoppable and never ending.

From the coroner's phone call, to making the arrangements to get Ian home, each step of each day became like groundhog day. The pesky news stations were trying to get ahold of me and friends would call in disbelief only to sit silently and say nothing as nothing could really be said. The early days were of course the most shocking but not the most difficult. So many people were in my space wanting to help and making sure I maintained my cool when I had to. I felt Ian's energy still present, which helped me immensely.

As time went on and the funeral had passed, the safe bubble of friends and family dissipated. Thankfully, I was still so busy maintaining Madelyn that my own thoughts often took a back seat. Until of course, nighttime. The best time of the day was the few seconds in the morning when I first woke up. Those blissful few seconds where I barely knew where I was, and my story was still slightly too faded into the background to be apparent. The rest of the time, I attempted to practice "mind over matter" and the "fake it till you make it" methodology to live my life. I could not have this happen to someone else without me trying to do something to prevent it, even if it meant telling my story over and over again. By making friends with the story, I could speak about it comfortably and hopefully with real impact.

I knew of no other young widows except for the other widows affected by their husbands' demise in the Sheep Creek Avalanche with Ian. We stayed connected for a little while and still reach out from time to time but my experience felt so different with Madelyn centered in my world. I did not feel like I had many tools to deal with what I was going through. It was partly the need to keep busy but mostly the desire to connect with other families impacted by a similar tragedy that led to the founding of the IAN fund, or International Avalanche Nest-egg.

Through my work with the IAN fund I could try to mitigate the devastation of some of the sobering realities of becoming a single parent. By helping another family in the same circumstance as my own, I could see progress in another's life even when I could see none in my own. This became so gratifying. Most of the help provided by the IAN fund was and still is in monetary form. We also try to educate the aspiring enthusiast by donating money for the purpose of enrolling students in avalanche safety courses. This year, we gave two thousand dollars to the South Burlington Back Country Ski Club. Additionally, I have spent many hours speaking with recent widows and hoping I could help them see beyond what they were experiencing in that moment.

Apart from the IAN fund, there are not many other avalanche event-specific tools (that I can find) for coping that are readily available for a victim or their family. PTSD is seen not only in the victim's family but friends and colleagues alike. It can come at any time and be largely unprovoked. One tool, however, is the Facebook group, "The Club That No-one Wants to Join: Teton Chapter," where we discuss our fears, our issues, our sadness, and sometimes our successes. I would guess that most of us likely seek outside help as well. But, apart from the fundraising sites where sympathizers can send cash, there is no ski community infrastructure set up specifically to serve the families and friends of avalanche victims. Had I not lived in the utopic community of Crested Butte, I would surely be processing this tragedy much slower and would struggle harder without the amount of support that I have grown to rely on here. As Vivien Bowers writes in her book *In the Path of an Avalanche: A True Story*, "confronting a violent death is significantly different from dealing with a normal death, around which our society has built a comforting regulation and ritual. In an accidental death, there is no regulation or ritual. There is terrifying disorder."

Madelyn's upbringing in Crested Butte has ensured her sense of community and family bigger than what I could have provided on my own. As a ski community, both local and global, I see a need for more focus on the aftermath beyond the technical details of an event. The sense of community support I feel here would ideally be mimicked in the broader ski community. The IAN fund is attempting to do just that. I would like to see more of a focus on helping connect professionals to the traumatized. I would like to see more peer monitoring and self-checking without looking through the tricky lens of the ego.

I always urge friends who partakes in the sport to talk amongst his/her friends and share not just the powder shots of your tour, but the hard yards, and the fears. By painting a more real picture to others, a better understanding comes to the individual as well. I would like to see more real life accounts being shared in the safety courses and avalanche seminars around the world.

The IAN fund is very much a family run operation. We fundraise with goods donated by our industry sponsors and try to help as much as we can when a request comes in. As time goes on, we would like to be able to maintain support. This can be done in the form of goods, money, gear branding and much more.

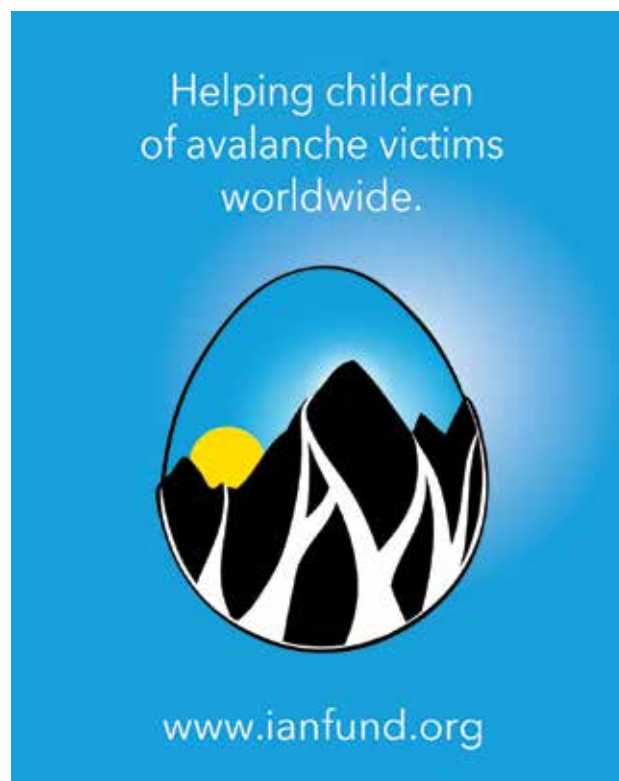
Because, on any given day, a circumstance, a smell, a word, a song can transport even the most stoic soul into a state of discombobulation and disturbance. I would love to start the conversation where we support our fallen friends instead of trying to fool ourselves by internally repeating the mantra "I would have never done that." Or "it won't happen to me."

I assure you, on any given day, it could.

Four and half years on, I have a beautiful, feisty five-year-old girl who looks just like her dad. I live in paradise and am able to support her myself. I know that Ian's death has been an opportunity to grow as a woman and as a mother. It has offered a perspective on life mainly bestowed on an older, more learned human being. This transformative event will always be a part of our story, and it has defined a chapter in our lives. My hope is that I am able to impart a sense of confidence in my daughter that will allow her to know that she can triumph over any circumstance that life presents to her. Most importantly, she will know how fleeting life can be and she will act accordingly.

I hope that the IAN fund will be an even more valuable resource for our community as a whole as some of us are forced to confront unforeseen tragedy. ▲

Initially the focus was on survival. How do I keep my breast milk flowing, make money, and take care of this tiny creature? How do I put the image of Ian suffocating out of my head? How do I attempt to keep myself healthy for my daughter? How many times can I run through my last week with Ian? How do I hold Madelyn and not sob? How do I get rid of the sinking feeling in my soul?



Handling Rescue Stress for Avalanche Professionals

Aaron Parmet

“Where are you!?” The girl screamed into the frozen dawn. We staggered past her with our gear, bleary-eyed, having ‘slept’ in the rescue truck after the previous day’s unsuccessful search.

Do you have a forever-moment like that? If you do not already have several, stay tuned: avalanche professionals are emergency responders. How do/will you deal with it? Immersion in traumatic situations is an often unaddressed cause of turnover, suffering, and death in emergency professionals. This problem can manifest in severe forms including acute stress disorder (ASD), post-traumatic stress disorder (PTSD), and their sequelae (e.g., suicide). Understanding the problem, building resiliency, and having a professional mindset are three ways to lessen the consequences of these experiences. I am no expert, but I have studied this topic during my 14 years as a healthcare provider in mountain rescue, critical care, EMS, and water rescue. I will share some evidence-based recommendations and personal anecdotes that I think will help the avalanche profession stay healthy during an emergency response career.



Summit County Rescue Group extricates an avalanche victim out of the debris field. Photo Aaron Parmet

Prevalence and Exposure

ASD and PTSD are marked by symptoms like intrusive memories (including flashbacks), negative moods, attempts to avoid memories, disrupted sleep, concentration problems, and exaggerated reactions (DSM-5, 2013). ASD presents quickly and lasts 3-30 days while PTSD can present later and lasts longer (DSM-5, 2013). They are common problems in some fields of healthcare. Emergency personnel around the world experience clinical PTSD at rates of 10-21% (Carmassi et al, 2016) and moderate symptoms at rates up to 94% (Iranmanesh et al, 2013). US EMS providers may suffer suicidal ideation at 1000% and suicide attempts at 1100% of the national average (Newland et al, 2015).

In the avalanche profession, we do not typically deal with loss on a daily or weekly basis. Infrequent exposure does not abate risk if it leaves us less prepared to cope (Wieskal, 2015). Nobody looks forward to events like losing a patient, terminating resuscitation, or exhausting extrication of bodies. In mountain communities there is a complicating stressor; rescuers are likely to know their patients.

Rescue Stress Pearls

Misconceptions reinforce dangerous stigmas. Most first responders are lucky to have had a short lecture on traumatic stress. I will skip the fascinating psychopathology and leave the detailed definitions to Atkins’ excellent “After the Rescue.” Here are some pearls I’ve learned about rescuer traumatic stress:

- We all process trauma differently. There is no one ‘right’ reaction, but there are harmful reactions.
- An individual can react differently to similar traumatic experiences.
- Healthcare providers can form meaningful relationships with a patient in a short time. (Wieskal, 2015)
- Grief is about adjusting to loss, not death.
- The ‘five stages of grief’ is dated; there are many paths.
- Rescuers do not have to be “in the thick of it” to be affected.
- ASD/PTSD are complex combinations of biochemistry, neuroanatomy, and psychology, NOT character flaws or ‘weakness’ (Falconer et al, 2008).
- Use caution with conventional wisdom – most of the research about PTSD studies populations exposed to combat, major disasters, or abuse.
- Tincture of time heals some wounds, but allows others to fester.

Resilience and Mindset

“Stop CPR.” 36 hours into a no-sleep 72-hour shift is when I responded to a five-patient wreck that included a critical six-year-old girl and her dead pregnant mother. For weeks following, anytime I saw a young girl, visions of the patient invaded my mind. It was strange and distressing. I can now remember it clearly, but without distress. After that, I never worked longer than a 48.

Exhaustion and lack of sleep makes us more prone to error. They also heighten our emotional response and lowers our resilience. This is especially true of the vivid multi-sensorial experiences in rescues. Crew rest is important after a call to destress, process and contextualize experiences.

Resilience relies on self-care, outlook, and support. Self-care includes rest, relaxation, good nutrition, and exercise. An extra snack in your pocket that you can quickly shove in your face while dressing the probe line hours into the search can really make a difference.

“Don’t burn out on us, OK? I’m here if you ever need. I get it.”

We have all probably received ‘that look’ after telling stories to someone unfamiliar with emergency response. Finding someone you can talk to informally is important for some. They do not have to be in your agency. You can help others too! If you do not want to fill the role, you can certainly keep your eyes open. Some organizations offer resiliency training and peer support training. If yours does not, start it up! A variety resources and trainings aimed at first responders can be found at www.CodeGreenCampaign.org.

"An empty vessel," I remember thinking about my first avalanche victim laying on the snow bare chested except for AED pads. I was unaffected since we did all we could. Seeing the family at the trailhead is what affected me.

Realistic perspective and expectations about our roles and goals are the key to healthy reactions in tragic situations. For emergency responders, this means internalizing the mantra, "it is not my emergency; I am here to make things better." Adopting this view facilitates the cool professionalism and emotional detachment needed to perform in a crisis. "Make things better," can mean wildly different things depending on the situation. Understanding this point is needed to see realistic goals. 'Better' does not always mean a life is saved. Terminating resuscitation can be the 'better' you achieve... so can hauling a body. Failure to achieve the unachievable is not true failure.

A prepared mind with a healthy mindset is resilient, though not invincible. It is also important to reflect on what gets to you and why. It is different for everyone and it changes over time. You can adapt. After years of ICU practice, I became better at helping families during loss and I found more peace with losing patients.

Avalanche Professional, Mitigate Thyself?

"They are reluctant. Share a story so that others will know it's okay that they have stories." This PTSD researcher's request made me ponder barriers for avalanche professionals.

What is stopping you from getting help? Underneath our gruff veneer (thicker for some) avalanche professionals usually live to help others. We guard the lives of our teammates and clients. We expect each other to be self-sufficient and focused on each other's safety. We don't want to be seen as distracted or 'weak.' If there is a problem, we often stay silent due to stigma or a lack of options.

If, when, and how you get help is very dependent on you. Time, self-care, and relaxation might do it. Maybe a little talk with your mentor or peer support are what you need. What's next if your life is being disrupted?

Do not bottle it up (or crawl in the bottle). Also avoid the psychological debrief. Critical Incident Stress Management (CISM) was the prevalent, now discredited, form of preemptively mitigating trauma. The evidence suggests that CISM offers no net benefit and likely causes harm in some (Roberts et al, 2009). However, CISM persists in many areas like a sacred relic. CISM is supposed to be like an inoculation against PTSD and ASD. Persons with different coping mechanisms, experiences, personalities, and at different points in their process are placed in theoretically therapeutic environment where they may be exposed to more trauma (Bledsoe, 2003). (Note: a psychological debrief is not the same thing as an operational debrief, AAR, etc.).

Most rescuers do not suffer clinical disorders after a traumatic event; who does suffer is not predictable. This fact supports individual assistance as needed. Where to get it? There are many specialized professionals with deep education: psychiatric nurse practitioners (PMHNP), psychologists (PsyD), psychiatrists (MD/DO), counselors (LPC), social workers (LCSW), and clergy. How does one afford a healthy serving of this delicious acronym soup? Your agency may offer free and confidential access to professionals through an Employee Assistance Program (EAP). Your health plan, community mental health center, or religious organization can direct you. There are a variety of effective treatments such as CBT, EMDR, and medication.

Whether emergency response is a regular or rare part of your avalanche career, it is worth your building your resilience. Practice self-care. Reflect on your perspective. Build and be support. Fight stigma. Do not be afraid to seek help if needed. ▲

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Notes from Teton County Victim Services

By Tracy Trefren

We are a branch of the Police Department and the Sheriff's Department here in Jackson. We work with all victims of reported crime in Teton County. We are funded by five different state and federal grants as well as local government (town and county). Our time on SAR and similar cases, as it is not normally linked to a specific crime, is funded through the local government portion of our funding.

TAR: What is the role of victim advocates during and after rescues?

TCVS: Victim advocates in Teton County are called when needed to assist with family and friends during a SAR event. The advocates role is to support the friends/family during the crisis. Support is often keeping them informed as to what is happening within law enforcement on the search, assisting to locate resources such as places to stay and things to eat, networking to plug in relevant supports to them such as counseling, clergy, or other areas that are identified as necessary.

TAR: How do you ensure coverage and continuity for victims and their companions, families, both during and after an incident, for the long and short term?

TCVS: When we are called to respond by law enforcement, generally one of our two and a half staff members respond to the location. That responder becomes the go to advocate. We strive to not change an advocate mid event to provide the continuity of the go to person for the family. In the event that a volunteer is covering on call when an incident begins, the volunteer works closely with a paid staff to ensure the transition to a TCVS advocate is as seamless as possible. Our volunteers are in communication with staff while on scene as well through text and phone calls and often times a staff member responds immediately to the location with the volunteer. The advocate often will gather contact information for family and friends and will follow up with them after an event. It is not uncommon for family and friends to reach out to their advocate a year or more after the incident to provide updates on how they are doing.

Some of our staff is currently certified for Critical Incident Debriefing/ Stress Management. We are working with local groups to bring more CISM training to the area so all of our staff are trained in this skill and can assist the first responders to an incident with debriefing afterwards. ▲

Tracey Trefren has been the Victim Services Coordinator in breathtaking Teton County, Wyoming for five years, though she has been with Teton County Victim Services since 2005. She and her husband are raising their children to love the outdoor life and spend their free time in the mountains of western Wyoming. Tracey's hobbies include fishing, horseback riding, and teaching a monthly paint class.



Post-Event Tools for Rescuers

A Conversation with Nick Armitage

TAR: Let's talk about post-event debriefing systems for a bit. What types have you been part of?

NA: Some of the best stress management techniques have developed organically. With the Jenny Lake Rangers, we use an informal small group and peer to peer method. Initially it seemed too informal but it allows for a casual environment where the bigger issues rise to the top. Over time, I realized that this ritual mirrored more structured systems, where we start with identifying those with the greatest impact, later checking on each other, using a proactive buddy system. This can work well within a tight team that looks out for one another, even checking back with people many years after an incident.

My National Park Service training introduced me to CISM (critical incident stress management) which is a more formal system with multiple tools to help deal with stress.

1. *CISD (critical incident stress debrief)*. This CAN work well if the group is small and intimate enough to inspire the trust needed to truly relive the experience. If the group is too large and the guidance less than professional, it can perpetuate trauma.
2. *Town Hall Meeting (Diffusion)*. Anyone involved in the incident gathers to review timeline, dispel rumors, and discuss normal stress reactions. This is a good opportunity to assess the audience, see who might need further help.
3. *Small Group (Debrief)*. This can involve the people most directly affected by an incident and identify further need for follow up.
4. *Peer to Peer (Follow Up)*. Once someone is identified as needing more assistance, a peer or friend is assigned to connect with them.
5. *Mental or Psychological First Aid*. This technique allows people more space in their lives and to normalize a stress response. Examples for avalanche workers might include moving from field to administrative duty, taking a morning off of control route work, sorting gear rather than guiding clients, but not taking a financial penalty. This applies moderation to all the stressful aspects of life.

With any technique it is important to explain it is normal to have symptoms of traumatic stress like anxiety, difficulty sleeping, change in appetite, nightmares, and depression. Although many of these techniques are helpful in post-traumatic stress they are not always the cure. These tools are used to create understanding with traumatic stress, recognize symptoms, dispel myths, allow natural coping mechanisms to gain traction, and identify a need for further help.

The next line of defense is professional help, which can take the form of cognitive behavioral therapy, counseling, medication, or bihemispheric therapy. Some theorize that crossing hemispheres and using both sides of the brain and body can increase the body's coping mechanism. This may be as simple as walking and talking, or like the EDMR therapy discussed in Dave Richards' article on page 38. Many psychotherapists have resources of this caliber, especially those who work with returning military personnel.

TAR: Tell us about what kinds of briefings you've received or given over the years that deal with preparing for potential stressful or upsetting circumstances?

NA: Stories around the campfire of rescues or recoveries serve to counteract any romantic notions that a rookie might initially own about the job. By the third or fourth season, I began to realize that nothing made me immune from the decisions or circumstances that caused other people to be in accidents. We were often rescuing skilled climbers and skiers who didn't have huge risk tolerance, just bad luck or timing. This caused me to think about my family and realize that as a ski patroller or ranger I didn't have a silver bullet that kept me from harm. This has changed my planning for greater margins on my backcountry endeavors. ▲


I began to realize that nothing made me immune from the decisions or circumstances that caused other people to be in accidents. We were often rescuing skilled climbers and skiers who didn't have huge risk tolerance, just bad luck or timing.

A few useful links:


- www.ptsd.va.gov/public/treatment/therapy-med/index.asp
- www.nytimes.com/2014/05/25/magazine/a-revolutionary-approach-to-treating-ptsd.html
- www.apa.org/monitor/jan08/ptsd.aspx

Nick Armitage has worked as ski patroller at Big Sky, MT and as an educator with AAI . He is now completing his law enforcement training and soon to return working year round in Grand Teton National Park as a ranger where he lives with his wife and their two kids.






For more info:
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SNOOPY'S

NEAR

MISS

Celebrating the Near Miss

BY ROB COPPOLILLO

I roll cigs while belaying in a beret. I find the deepest untracked snow, even on the days you're diving tips into sastrugi and flailing like a newb. I know all the hutkeepers, shortcuts, and local dialects. And I am never, ever, even just a teeny-tiny bit—wrong.

You see, I am an IFMGA mountain god, oops, guide. Damn autocorrect, even my smartphone thinks I'm awesome.



Fieldbook.

Joking aside, we've all been there—running a route, pulling off a hard climb, or sending a burly ski line, we attribute the success to our limitless skill. Rarely do we pause and say, “I’m only alive because of dumb luck!”

Truth is, the avalanche game does involve luck and sometimes in greater quantities than we'd like to believe. On those days when we “got away with it,” we should probably be asking ourselves, “Was that skill or just a near miss?”

Celebrating the near miss gives us the opportunity to learn from an accident—one that didn't happen—without incurring any of the carnage. It's wisdom minus the hard-earned element. I'm writing to encourage all of us to begin sharing our near misses, so to get this thing started I'll share one of mine.

November 21, 2015

Colorado's Front Range received its usual mixed bag of weather that fall—bit of precip, lots of sun, and finally a crust in the snowpack during the second week of November—what we were calling the Veteran's Day crust. Lingering snow from stingy early storms became 10 cm of 2mm depth hoar on north-northeast-northwest aspects, with the Vet's Day crust above, then a gong show of different layers depending upon aspect and elevation.

Avalanche danger on the Front Range had notched down from considerable in the alpine and at treeline to moderate in the alpine on the 19th, and then moderate at treeline on the 20th. By the time

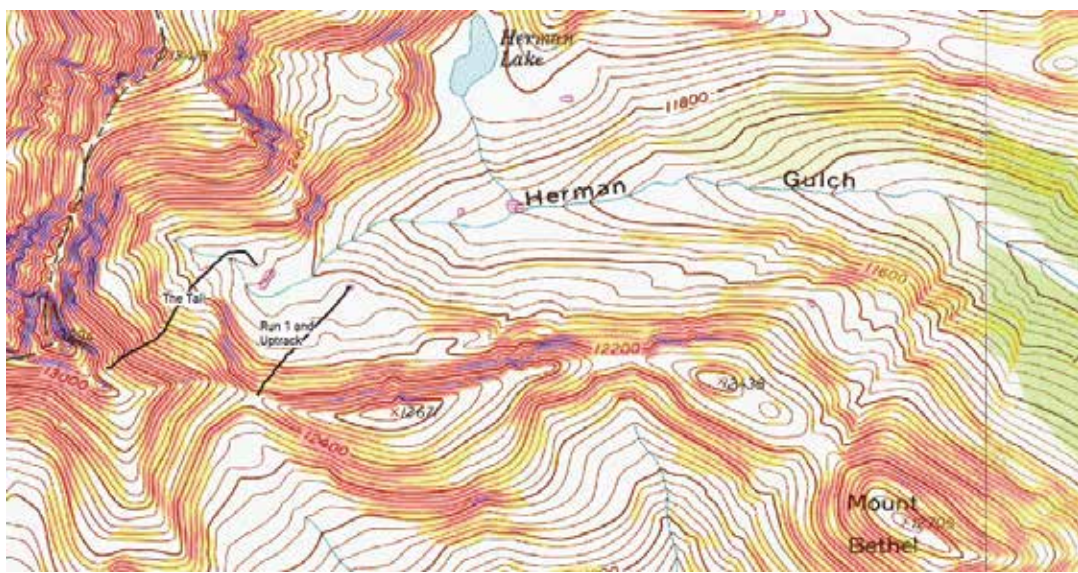
we parked at the trailhead at Herman Gulch on November 21, the forecast was moderate in the alpine and at treeline, and low below treeline—and strong winds forecasted so I'd jotted “WS (wind slab) distribution?” in my fieldbook.

We hadn't toured more than once or twice on the year, but the trend was decreasing danger. Winds had had been strong all week, with gusts into the 50s and much of the snow available for transport had indeed transported—onto NW, N, NE aspects, or out to the land of trickle-down economics and low taxes, Kansas.

The Tour

We left the Herman Gulch trailhead, two less-experienced but super-strong friends and me, in the morning and by 10 a.m. we were starting up the slopes on the east ridge of “Snoopy,” or Citadel Peak (13,294ft.). Leaving the valley bottom (on

The Tour.





Coppolillo, left, and his touring partner, with The Tail pictured directly above and behind them. Photo courtesy Rob Coppolillo



Snoopy's Tail.

what is boggy, willowy terrain in summer), we got a large rumbling collapse, roughly 150 feet square. We discussed it briefly, and discounted it, as we tend to get these collapses over shrubby meadowy terrain. We traveled to ridgeline, got in a run on low-angled (less than 30-degree; see photo) terrain without incident.

Winds at ridgeline indeed howled into the 50s, with some effect, but the local topography pushed them around to the S/SW, rather than W/NW as had been forecast. We recycled our skin track, hit the ridgeline again, noticing a few small cracks

around our skis, but no more whumpfs, no shooting cracks, no avalanches. Indeed, on the uptrack most of the snowpack was minimally layered and pretty consistent. Could we sneak onto slightly more interesting terrain? My mindset quietly bent from “status quo” to “stepping out,” and in hindsight without me consciously acknowledging it.

We toured up the ridge and eyeballed “The Tail,” a run that drops NE off Snoopy into Herman Gulch (see map and photo), with a slope angle approaching 35 degrees in spots. The Tail starts gently, in the mid-20s, though, affording us a safe look into it and the opportunity to poke and test the snowpack a bit.

Probing into the feature we found surprisingly right-side-up snow, down approximately a meter to the Vet’s Day crust. I slid into the feature a bit further and dug on 26-degree terrain: CTN and ECTN. No obvious signs, save for the collapse in the meadow. Snowpack tests negative. If we skied the “gut,” we’d have little chance of initiating the layer on low-30-degree terrain, right? I returned to the ridge and we discussed.

One at a time, regroup in a safe spot below and to the side, I’d stomp on the gradually steepening slope as I entered—and just like we’d suspected, a great run, nothing happened. Man, we killed it. Did I mention I’m a mountain guide? Of course I did, because, you know, I’m a mountain guide.

That Night

Ah, the happy afterglow of having nailed it ... and then the phone rang.

“Were you comfortable all being on that slope?” a longtime mentor asked.

“Yeah, we were off to the side of The Tail when we regrouped.”

He responded, “We got a few avalanche observations from that zone today. Two skier-triggered on Berthoud, a natural on Loveland, and an unknown on Jones Pass.”

My afterglow dimmed to fidgety self-doubt. Four avalanches peppered around our tour (one a remote-triggered, size 2.5), all within five miles as the crow flies. The ego barked justifications and snowpack test results. The smarter, quieter chunk of my brain raised its eyebrows: mountain god, eh?

We chatted and decided to head back to the zone the day after next, where we dug several pits (goo.gl/HLzKz4 for video of our results), performed tests, and then observed a skier-triggered persistent slab on Mt. Trelease, immediately to the south. Another avalanche and a full propagation result from a modified ECT—not exactly a ringing vindication of our decision to ski The Tail two days prior.

Near Miss

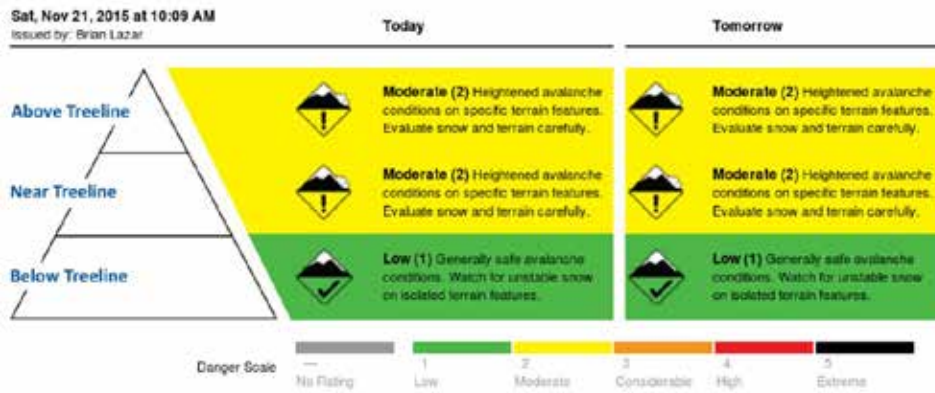
I had to be honest with myself and my partners: we’d had an event during which nothing went wrong, but somebody could’ve gotten hurt or killed—the definition of a “near miss.”

My buddies weren’t as convinced we’d blown it, but I had to shelve the ego and take the opportunity. I’d be a fool to pass on free wisdom and opportunity for insight. I debriefed with my mentor and tried to glean what I could from the experience.

Many of us read accident reports, as in *The Snowy Torrents*, but if only there were a forum or database where I and others could share our moments of dumb-assery that conceal future nuggets of wisdom! Turns out there is.



Backcountry Avalanche Forecast
Front Range



Summary Triggering a Persistent Slab avalanche large enough to injure or bury you is possible today. The most suspect slopes are those where the most recent storm snow drifted and built slabs on top of weak layers of old snow. The most likely place to find this combination are on slopes steeper than 30 degrees near and above treeline that face northwest to northeast through southeast. Pay careful attention to areas that have been recently wind-loaded by the northwest winds. The increased load from wind-drifted snow may be enough to tip the balance and overload the buried weak layers.

A secondary concern for today is Wind Slab avalanches on slopes lee to the northwest winds. Strong winds can redistribute the 8 to 10 inches of snow that fell since yesterday further down slope than expected. Look for evidence of wind loading in the normal places such as along ridgelines, in cross-loaded gullies, downwind of prominent terrain features. The wind has been loading the same slopes that have the worrisome structure for Persistent Slab avalanches. A triggered Wind Slab avalanche can lead to a more dangerous avalanche if it steps down to older snow.

Below treeline the snowpack does not have much in the way of weak layers or slab. The biggest hazard is hitting an obstacle blanketed and hidden by the recent snow.

Weather Forecast for 11,000ft Issued Saturday, Nov 21, 2015 at 10:09 AM by Brian Lazar

	Saturday Night	Sunday	Sunday Night
Temperature (°F)	15 to 20	25 to 30	15 to 20
Wind Speed (mph)	20-30 G50	20-30 G50+	15 to 25
Wind Direction	WNW	WNW	WNW
Sky Cover	Overcast	Mostly Cloudy	Mostly Cloudy
Snow (in)	0 to 2	0 to 2	0 to 1

Avalanche conditions can change rapidly during snow storms, wind storms, or rapid temperature change. For the most current information, go to www.colorado.gov/avalanche.

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CAIC Forecast.

Avalanchenearmiss.org

Firefighters and law-enforcement personnel have long reported near misses on anonymized databases and now we, as avalanche professionals, have the same resource—avalanchenearmiss.org. A project of Avalanche Worker Safety, a 501 (c)3 not-for-profit group, avalanchenearmiss.org is the first step in a broad campaign to make avy professionals safer in the workplace.

Editor's note: For more on Avalanchenearmiss.org, please see announcement in TAR 36.1, and in sidebar to the right.

Submissions delete place names, individuals, and names of organizations, so there's no shame in contributing. (Those of us working within organizations, however, are reminded to get permission from the higher ups before submitting.) As we amass more near misses, we'll be able to glean stats and insights from the results. A search function will allow us to filter cases, too.

Luckily, most days we blow it we get away with it—remember, ours is a “low-validity” environment, meaning the feedback we get is sometimes not the feedback we should get. In the absence of reliable and accurate feedback, we need to debrief our process as much or more than the outcome. I actively discounted a rumbling collapse, failed to repeat my ECT, nor did I modify it to better access the weak layer. Taken at face value, the day yielded great turns with great friends—but if I'm honest and debrief my process, I had some holes in my method. Did I “talk myself into it?” Succumb to bias?

One of my favorite debrief questions is, “Knowing what we know now, what would we do differently?” On this day and considering the process more than the outcome, I have to look back and wish I'd done that modified ECT; that is, cutting off the top 40cm of the slab and then performing the test. I don't recall if I rechecked my mindset during the day, either, but a glance at my notebook and a reminder that I'd written “status quo” instead of “stepping out” might've persuaded me to err on the side of caution. Ruling out terrain described in the bulletin—no matter what I found in the field—would've kept me off the Tail, too.

As Daniel Kahneman writes in *Thinking, Fast and Slow*, “If repeated exposure of a stimulus is followed by nothing bad, such a stimulus will eventually become a safety signal.” Recreating in the snow often doesn't teach us what we need to learn, so start celebrating your near misses with me and maybe we'll learn a thing or two. I promise to ditch the beret and attitude, mes amis. ▲

Rob Coppelillo co-owns Vetta Mountain Guides in Boulder, Colorado, and is the co-author of *The Mountain Guide Manual* (Falcon Guides, \$24.95).



AVALANCHE WORKER SAFETY
www.avalancheworkersafety.org
 Helping avalanche workers come home at the end of each day.

The AWS near miss project (www.avalanchenearmiss.org) focuses on worker safety, collecting data only on events that happen in the workplace. Causes of workplace accidents and near misses may differ from causes of recreational close calls (different motivated reasoning promoters, pressure to perform or please clients, operational constraints, a lack of ability to choose terrain, etc). At this time, AWS is not collecting data on events that occur outside the workplace.

From AWS founders Scott Savage, Ethan Greene, and Bill Williamson

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