

THE AVALANCHE REVIEW

OR JUST LUCKY?

Story page 24

ARE WE GOOD?

On this day on Mount Baker, we plowed up the Coleman Deming Glacier, trudging through unbelievable powder, approximately a foot deep and blower. A short time into our day, the wind gathered force and suddenly we went from t-shirts and sunglasses to goggles and windbreakers. We continued for another 10 minutes hoping the wind would die. This wasn't the case. Conditions worsened with winds increasing to 60 mph. Knowing that moment to turn around or continue based on an uncertain future is always a tricky game. In this case, our decision to continue on, if even for a few minutes, was the wrong one.

Photo by Jason Hummel, alpinestateofmind.com

THE AVALANCHE REVIEW

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Please send submissions to:

Lynne Wolfe — Editor
PO Box 1135
Driggs, Idaho 83422
tel: (208) 709-4073
avalanche.review@avalanche.org

Business and Subscription Office:

Jaime Musnicki — A3 Executive Director
PO Box 248
Victor, ID 83455
tel: (307) 699-2049
jaime@avalanche.org

Advertising:

Jaime Musnicki
PO Box 248
Victor, ID 83455
tel: (307) 699-2049
jaime@avalanche.org

Production:

McKenzie Long
PO Box 1776
Mammoth Lakes, CA 93546
tel: (513) 515-0723
mckenzie@cardinalinnovative.com



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A3 STATEMENT OF PURPOSE

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Layout & Design: McKenzie Long, Cardinal Innovative, (513) 515-0723, mckenzie@cardinalinnovative.com.

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CONTENTS / CROWN PROFILES

- 12 What we SAW: Spotlight on Regional Workshops
- 24 Are We Good or Just Lucky?
Tools for Debriefing

CONTENTS / DEPARTMENTS

- 3 Letters
- 4 From the A3
- 6 News
- 21 Snow Science: Persistent Slab Avalanche Trends
- 22 Decision-Making: Into the Matrix

CONTRIBUTORS



Jim Conway is the owner of Tordrillo North Ski and Snowboard Adventures in Alaska and is the Operations Manager for Cloudveil Mountain Heli in Utah. Jim has 26 years skiing, boarding and guiding experience all over Alaska and parts of Canada. His company Glissemedia provides organizational and graphic solutions for AAI and a number of heli ski operations. Jim is also a AIARE 1 and 2 lead instructor.



Derek DeBruin lives in Ogden, Utah where he teaches at Weber State University and owns Bear House Mountain Guiding with his wife. With climbing as his first passion, Derek is always stoked when a day of skiing includes a summit, too. When he's not climbing, skiing, or otherwise on the trail with his wife and son, he's dreaming of his next foray into the local hills or farther afield in the big ranges.



Joe Stock is an IFMGA-licensed Mountain Guide based in Anchorage, Alaska. His favorite thing ever is skiing in the Southcentral Alaska mountains with friends, clients and his wife Cathy. He also likes teaching people how to avoid avalanches. www.stockalpine.com.



Jake Hutchinson splits time between Utah where he works for the American Avalanche Institute as a Lead Instructor and West Glacier, Montana forecasting for the GTSR in Glacier National Park. Off seasons find him at Gym Jones or in the desert fixing his motorcycles.



Liam Bailey has nearly 20 years of patrol experience and loves skiing and explosives.



Joe Hill is native to Southeast Idaho and lives with his wife and son in Rexburg. He is the owner of Sled Shed Board Shop and has been an adjust instructor for the backcountry snowboarding and mountain bike classes at BYU-Idaho. He enjoys playing in the mountains year round to snowboard or splitboard, ride bikes in nearly every discipline imaginable, camp, fish, hike and snowmobile. Joe is also the team director for the Upper Valley Composite NICA mountain bike team.

FROM THE EDITOR

BY LYNNE WOLFE

Flashback six years to January 2012. Fitz and I are drinking shots of bourbon at Trevor Deighton's counter as images of a huge powder cloud and its roar replay over and over in our memories. Those images provide more than enough inspiration to write up my thoughts and lessons in an article called Taylor Musings for TAR 30.4. A few paragraphs from that article sum up the evolution of my thought process at the time:

Reflections

On January 24, we were granted a rare opportunity to review our actions in the light of the huge slide that swept the face where we were skiing. On close examination, our tracks were still intact; you can see them on the far looker's right of the face. Did this mean that we made good decisions? Well, we thought so, but we also acknowledged that, in many ways, we got away with it that day.

A quote from Karl Birkeland gave me some perspective:

Sounds like you guys ended up on the right side of the line. However, it also sounds like you ended up pretty close to the line. My experience is that if you are too close to that line too often, sooner or later you'll end up on the wrong side of the fracture. The older I get—and the more I learn what I don't know—the further I like to be away from that line!

Sometimes, however, in order to know where that line is, I must turn around and look, saying, "Oho there it is behind me—I have crossed it and now how do I escape this one gracefully?" Taylor Mountain allowed us all to escape

without injuries or casualties, but now we are obligated to put that free ticket to use, to contemplate the lessons of the incident and of this winter of uncertainty.

In the ensuing six years I first revised my question to ask, "did we make good decisions or did we get away with it?" This is a clever sound bite for avalanche classes, but it involves higher self-awareness in order for a person to recognize when they "got away with it." In more recent years I refined it further to ask "where were we most vulnerable?" I am encouraged to hear of many people adapting these questions for greater utility by recreationists and professionals alike.

At WYSAW this year I heard many of the presenters offer their version of post-day or event questions. For example, Knox Williams liked "Git-er done or get away with it?" When I needed a theme for this issue of TAR, debriefing rose naturally to the surface. My aim is to offer backcountry travelers tools for evaluating their days and their systems, with the ideal of incorporating those insights into more effective and streamlined planning processes that are designed to help you make quicker, more accurate, and more efficient decisions. I see this as another iteration of LaChapelle's Ascending Spiral (TAR 24.1), a version of Hegel's Dialectic where thesis and antithesis become synthesis, where we wryly acknowledge our biases and budget for them in the formula for the day, and build on those lessons to turn experience to expertise.

This issue of TAR brings you some great stories from a wide buffet of backcountry travelers: Joe Stock, Joe Hill, Derek DeBruin, Aaron Diamond, and Jake Hutchinson all shine slightly different practitioner lights onto the question of how to critically assess your days and thought

processes. We also have an interesting array of institutional viewpoints: Tom Murphy and Ben Pritchett discuss the birth and evolution of the AIARE debrief questions as part of their decision-making framework, and Colin Zacharias takes it further with his thoughts on debriefing; Liz King presents a NOLS-based perspective on debriefing; and Don Sharaf blends the line between personal and professional as he expands on questions that he explored with us at AAI instructor training in November.

Clarity in communication is a key aspect of effective debriefing; Spencer Storm shares the current version of Valdez Heli-Ski Guides' Operational Communication document, plus some insight and guidelines, while Liam Bailey gives us his quirky and insightful view of how both good and poor operational communication can affect a team's performance.

You'll also find a great tool in the After Action Review (AAR) material on pages 38 to 41, brought to us from John Kanengieter of Zero Point Associates and Todd Henshaw of the Wharton School of Business.

Other useful features include Jason Konigsberg's insight into forecasting for deep persistent slabs, which I've already forwarded to several of my practitioner friends who are trying to operate within the uncertainty that comes with a tricky deep persistent slab problem, and Jim Conway's USAW presentation subsequently became an article about using a Probability/Consequence matrix to determine your desired operational risk profile.

I hope you find some tools in this issue to experiment with as our touchy season progresses. Let me know which ones become most useful for your practice. ▲



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36.2 Correction

Apologies for misquoting my friend Molly in 36.2. Here's what she'd like you to remember:

People grieve in so many different ways; ways unimagined and far outside the paradigm of what one might have imagined grief to look or feel like.

—Molly Loomis

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FROM THE ED

BY JAIME MUSNICKI, EXECUTIVE DIRECTOR

Happy 2018! The 2017/18 winter season is ticking along, and even with variable snow conditions around the United States there has been plenty going on in the world of snow and avalanches. Some recent A3 highlights as we approach mid-winter include:

- Executing a special election to complete the final step of the A3 Governing Board restructure, which was supported by membership-approved bylaw changes this past fall.
- Launching the new A3 Pro Training Program this winter in collaboration with the alliance of Pro Course Providers and welcoming our new permanent Pro Training Coordinator, Kate Koons, to the A3 team.
- Fine tuning Avalanche.org and the A3 website, both of which received major facelifts during summer/fall of 2017.
- Recovering (i.e. catching up on office work) from a busy fall of travel and activity with regional avalanche workshops and events.
- Expanding our network of A3 supporters—individuals and companies—who generously help fund our programs and initiatives.
- Distributing SWAGs, *Snowy Torrents*, and TARs to inquiring minds around the United States and the world.
- Funding three new avalanche researchers and their projects this season through the A3 graduate and practitioner research grant programs.

The work of A3 is inspired by and strives to directly support avalanche professionals (patrollers, guides, forecasters, researchers, SAR personnel, educators) and the people who benefit from the work of avalanche professionals (resort skiers/riders, winter backcountry skiers/riders/climbers/snowshoers/adventurers, mountain communities, snowy mountainous highway drivers, etc) in the United States. We're proud of the progress we've made in recent years to further advance our mission of professional excellence in avalanche safety, education, and research in the United States. The support and engagement of A3 members and friends has been integral to this progress—thank you. At the same time, we recognize there is more to do (always), and we will continue to envision, strategize, and execute on our mission and better connect our avalanche community in 2018.

May your winter continue well, wherever you may be. Thank you for being a part of the A3 and broader avalanche community! ▲

A3 GOVERNING BOARD TRANSITIONS

The A3 Governing Board is pleased to welcome Pete Woodring of Sun Valley, ID, as the new A3 Treasurer. Pete Woodring is a founding partner of Cypress Partners, a wealth management firm devoted to helping individuals and families with comprehensive planning and capital preservation and growth strategies. He started in the business in the late 90s with U.S. Trust Company after playing soccer at the top level in Germany, Denmark, and the U.S. Pete has always had an adventurous spirit and moved to Sun Valley from the Bay Area in 2015 to enjoy the mountain life with his family.

Pete is an outdoor enthusiast and enjoys all of the mountain recreation that Sun Valley has to offer. Pete's energy and athletic past allow him to quickly adapt to some of the new mountain sports he enjoys, such as kayaking and ski touring. As an accomplished skier, coupled with his drive to train and climb mountains, ski touring is at the top of his mountain adventure list. A father of three, Pete is acutely aware of the risks of his newfound passion, and has a keen interest in becoming more knowledgeable about the science of avalanches and the safety of touring. Pete has an enormous appreciation and respect for the great outdoors and an immense appetite for adventure. He is eager to continue to learn more about his new high-altitude surroundings, so that he can be a safe and knowledgeable participant in the many high country activities he enjoys.

Pete is the first new A3 Trustee to join the organization following the Board restructure this past fall. He was appointed by a unanimous vote of the A3 Board in mid-November and participated in his first A3 Board meeting on December 1st. A3 is excited to have Pete join the A3 Board and looks forward to benefiting from his diverse professional experience, his passion for snowy mountain pursuits, and his awareness of the importance of the work of avalanche professionals.

Many Thanks to Outgoing Trustees

As the A3 Board transitions to its new structure, we also want to recognize and thank the individuals who have recently moved on from A3 Governing Board service. Some of these people stepped off of the Board within the last couple years, while others are moving on as part of the Board restructure transition.

A3 would not be the organization it is today without the hard work of these individuals (and the countless others who came before them over the last 30-plus years). Serving on any board is a commitment of personal time and resources. For many years these people brought passion, intellect, insight, experience, and resources to the table for A3. We appreciate and are incredibly grateful for the experience, skills, and connections in the avalanche industry that these individuals have contributed over the years to move the organization forward. Thank you!

Nick Armitage—outgoing SAR Co-Chair
Kirk Bachman—former Education Chair
Ned Bair—outgoing Research Chair
Andy Dietrick—outgoing Alaska Section Rep
Mike Ferrari—outgoing Treasurer
Dave Hendrickson—outgoing Ethics Co-Chair
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Damian Jackson—outgoing Intermountain South Section Rep
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Maura Longden—outgoing SAR Co-Chair
Patty Morrison—outgoing Northwest Section Rep
Mark Renson—outgoing Eastern Section Rep
Scott Savage—former Secretary
Mike Schneider—outgoing Rockies Section Rep
Stuart Thompson—outgoing Membership Chair
Gene Urie—outgoing Sierra Section Rep
Bill Williamson—outgoing Ski Area Rep

While some of these folks are focusing their energy in new directions, others will continue to engage and serve A3 in various non-Trustee capacities, including as committee members and advisors to the organization. Regardless, A3 Board and Staff express huge heartfelt thanks to all of these dedicated outgoing Trustees. Next time you see one of these folks around town or out in snowy mountains, remember to thank them for their A3 service! ▲

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A3 PRO TRAINING COORDINATOR

We are pleased to welcome **Kate Koons** as our new A3 Pro Training Coordinator! Kate grew up in the great state of NJ where she learned the importance of sharp edges and how to bump her sister off of the Poma lift. For 23 years, Kate has worked as an educator, guide and program manager all over the world. For the last 17 years, Kate has worked for NOLS, leading expeditions and managing the winter program in the Teton Valley of Idaho. Other travels and work have taken her to the Himalaya, a place she considers to be her second home. She has also worked for the US Antarctic Program training and supporting scientists at remote field camps across the frozen continent. Currently, Kate ski guides in the Tetons, teaches risk management trainings and still works the occasional NOLS field course. She can be found at home in Victor, ID with her husband and two energetic fur children running, biking, skiing and gardening.

Kate brings a wealth of professional skills and experience to the Pro Training Coordinator position, including:

- depth of experience as an avalanche professional
- an easy-going, personable manner that enables her to listen and connect with varied people and weather adversity/challenges
- a strong background of program management experience
- familiarity with the A3 Pro Training Program
- a clear understanding of the need to build relationships, listen to providers and other stakeholders, and continue to foster a culture of collaboration
- a proven record of success in office-based positions
- strong recommendations from numerous current and former employers about her work ethic, communication skills, leadership, and team-oriented approach

We are excited to bring Kate onto the A3 team in this role. You can reach Kate at kate@avalanche.org or a3protraining@avalanche.org.



FROM KATE KOONS AND THE PROFESSIONAL TRAINER PROGRAM

Greetings from the Pro Training Program! February is upon us and we are full steam ahead with Pro courses being offered by six Course Providers. This is an exciting time for A3, along with the Pro Course Provider Alliance, to be moving forward with a program that has been four years in the making. I am working closely with Course Providers to help support their program as well as gather information, feedback and data to inform refinements we will make in the spring. I am also here to answer general questions about the Pro Training Program.

A common question A3 has been receiving over the last few months is, “what do I do if I currently hold a Level 3 from years past?” This is a great question. When creating the Professional program, a big priority to all involved was not to alienate people who have been working as professionals for years. If you currently have a Level 3 or AVPro certification, you are considered to hold a Pro 2 within the new guidelines. You do not need to do anything as the industry recognizes this equivalency and there is no mandate to hold a “certification.” If you would like or need a recognized equivalency document for the Pro 2, A3 can provide this for you. In most cases, if you do not hold the higher level of training from before 2017, you will need to take a Pro level course. We realize that this change is a big deal for many within the industry.

Please feel free to contact me with any questions you may have. Until then, pray for snow, we all need it! ▲

I was obsessed with Wonder Woman, and she was at the mall (I grew up in Jersey so the mall was a regular part of life) and I could not wait to sit on her lap. My Mom told me that Wonder Woman was only on TV from 75-79, but the re-runs were my favorite. She was my hero!

METAMORPHISM

WSDOT New Hires

WSDOT welcomes Andy Harrington and Tim Rogers to the South Central Region Highway Avalanche Forecast and Control Program

After getting a degree in computer science and working in a cubicle for a few years, **Andy Harrington** decided to ditch the office to pursue his love of the outdoors. He has since shoveled snow in Alaska, worked on multiple farms, been a ski patroller for Crystal Mountain, and been a Wilderness Ranger at Olympic National Park. Now he finds himself forecasting for the I-90 corridor on Snoqualmie Pass. Andy enjoys the backcountry in all seasons, cooking, and exploring new local food sources.

Avalanche Hunter: born by the ultimatum Live Free or Die, **Tim Rogers** has traveled far and wide in an attempt to adhere to this definitive ideology. While his winter roots go back to skinny skis and icy hills, he was schooled by the deep powder and steep slopes of the Central Wasatch, and taught by the people who call Little Cottonwood Canyon home. As an Aries and amateur ecologist, you can often find Tim scrambling to the tops of mountains for a better perspective. Although he maintains many hobbies, music and reading are his main habits of leisure. Tim now spends summers drinking flat whites on the South Island of New Zealand and is excited to join WSDOT on Snoqualmie Pass.

Valdez Heli-Ski Changes

We wanted to take a moment to congratulate **John Fitzgerald** on his new position within WYDOT. John has been an asset to Valdez Heli-Ski Guides as a leader, guide, and weather forecaster for the past several seasons. He will be difficult to replace at VHSG, so difficult in fact, writing a reference letter describing his value to our operation and who he is as a human was a bit of a bittersweet experience. John is one of those rare individuals who thrives during times of high operational tempo, someone who has the ability to reduce stress within a group during stressful times. We will miss Fitz and wish him nothing but the best in his new position.

To fill the hole left by Fitz, Valdez Heli-Ski Guides has hired **Doug Krause** as a full-time heli-ski guide and to assist in creating the weather forecast product for our operation. We believe Doug's vast and varied international guiding and forecasting experience as well as his commitment to efficient operational communication will be of great value to our operation.

Doug has unknowingly committed to daily 5am Grateful Dead Radio and quadruple espresso force feeding from VHSG's Avalanche Forecaster Jed Workman.

Doug adds more news from his varied professional career: "I'm now working as the Director of Professional Development for the Silverton Avalanche School and Curricula Director for the Alaska Avalanche School. We're rolling out Pro 1 and Bridges, continuing to refine and teach the draft Pro AvSAR, updating all our rec curricula, adding legit EMS curricula, and working to refine our snow-machine curricula. Also some custom stuff. Everyone involved seems excited about the collaboration. I'm learning a lot and actually having way more fun than I thought I would."

Bridger Bowl Legend Retires

Jim Humphries has retired from ski patrolling, after 40-some years. This time for good, we think. He patrolled for Bridger Bowl and Big Sky in Montana from the mid-70's to 2017. He started at Bridger, eventually went to Big Sky, retired from there in 2016, and Bridger talked him into a comeback in the 2016-17 season to finish out the year for an injured teammate.

Bridger Bowl picked Humphries up off waivers in about 1978, a year or two after Bridger's volunteer patrol had booted Jimbo and his future wife Nancy for having too much fun in rust-colored parkas. He served Bridger well through the droughts, big storms, and small crowds of the 80s. People didn't hike so much back then, and he had a key to one of the world's steepest rope tows. It was during that time that Humphries also made a name for himself in the Jackson Powder 8's competitions.

Sometime in the mid 90s he signed on with Big Sky where he was a patrol supervisor for the next 20 years. They had a steeper rope tow, with a turn in it. Read what Buotte says about Humphries' time there on the opposite page.

He still looks pretty good. You can see his smiling face at the hardware store on Main Street in Bozeman, or if you're lucky, floating down the river, another place Jim Humphries is a legend.

Bridger Bowl picked up Humphries in about 1978. At the time, he was one of the few folks willing to hike to ski powder in the steep Ridge terrain. ▲



Montana ski patrol legends Dene Brandt (left) turns 70 this winter- still going strong for Bridger Bowl, and Jim Humphries (right) retired after 40+ years of contributions to Bridger and Big Sky.

JIMBO HUMPHRIES

BY MIKE BUOTTE

I have worked around, for and with Jimbo Humphries for the past 27 years, and it has been quite an experience.

One of the first encounters I remember with Jimbo came in the early nineties when I was a hippy lift operator at Bridger Bowl, and Jimbo was a pro patroller. I had just slid down Pierre's Knob Face on my stomach, superman style, leather tele boots and skinny skis flailing in the air. I was not hurt, somewhat miraculously having missed the trees that dot the slope. Jimbo came down to check on me, apparently at the behest of concerned lift riders who had witnessed my descent. After making sure I was OK, Jimbo proceeded to laugh at me. I might have had it coming, but I was not seeing the big picture in the moment. That humiliation likely precipitated another early memory that came soon later. Jimbo was loading the beginner lift to get out of the base area to go to work, and I was the lift attendant at the moment. Jim was giving me a rash of guff about something, as per usual. I bumped his chair with a smile as I casually stepped on the heelpiece of his binding. I will never forget the joy (and fear!) that I felt as Jimbo sailed up and away, firmly planted in the chair with one of his cherished Rossignols left on the load ramp. Ah, the spitting, apoplectic rage that met my bravery is a thing I still cherish!

It was a few years later that I got to work with and for Jimbo. I had moved on to Big Sky as a pro patroller, having learned from Jimbo's ribbing that "lifties shovel snow while patrollers ski it". The Tram had just gone in at Big Sky, and there was much to be figured out about operating that terrain, and help was needed. Jimbo had decided to leave his beloved Bridger Bowl for the opportunity and challenge that Big Sky offered in 1995. The summit terrain was Jimbo's to run, and from that day forward an evolution began that continues to this day. It was a challenge that suited Jimbo's skill set, and dare I say, ego. He owned it. I have never worked with anyone who has a better intuitive grasp of running complex, high stakes ski terrain as Jimbo Humphries. As a young patroller who worked the summit almost exclusively, I benefitted from learning the limits of acceptable risk, both to myself and the skiing public. Jimbo gave us young guys a sense of confidence to make it happen. We felt privileged and inspired working for Jimbo those first few seasons of the Tram.

In later years, when I had moved on to Snow Safety and worked the South Face, there are a few times that stick in my memory. I would do a route with Jimbo, and he'd be poking the snow with his pole, over and over. I had dug multiple pits in the area- I had my data. I was feeling Ok about the snowpack, and Jimbo would shake his head, and say "I don't like it Bodett" (his name for me, as in, "we'll leave the light on for ya"). A few days later we would trigger a persistent slab on the slope in question. Jimbo's intuitive grasp of snowpack and stability was phenomenal. Over and over, even as I got longer of tooth and grayer of beard, Jimbo would surprise me with a way of looking at something that I had not perceived, and invariably it was instructive. Jimbo's insights have had a profound influence on me as a ski area professional.

Jimbo knows everybody in the ski industry, or so it seems. From Humphries I learned the importance of meeting and learning from fellow professionals, and the meaning of the "ski patrol family". It is something to be cherished, and Jimbo cherishes it, and taught me and others to cherish it.

Those who know Jimbo well, and those who have worked with him, know that it has not always been sunshine and smooth sailing. The man had his moods. When Jimbo was B.S.S.P. Asst. Director and in charge of the patrol one day a week, we jokingly called it "Technicolor Tuesday". Something would usually piss Jimbo off and his face would change colors as his frustration mounted. On balance though, Jimbo's breadth and depth of knowledge and experience trumped the challenges that arose in working with him. And, he always brought a case of beer at the end of the day. My river running friends say that Jimbo on a river trip is an extra special rig- he is far, far away from the frustrations that come with a large ski operation, and there is nobody quite as fun to be around as Humphries on the river...

After a lifetime of patrol and avalanche work, Jimbo has retired from it. I, and the entire ski patrol family, thank Jimbo for his work toward defining what it means to be a ski patroller. And one last thing-back when Jimbo's knees worked better, there was not a smoother, more fluid skier on the mountain. Cheers, Jimbo! ▲



Mike Buotte is the Snow Safety Director at Big Sky Ski Resort. His current primary layer of concern is in the lateral posterior aspect of his right knee.



CONCEPTUAL MODEL LINK

North American Public Avalanche Danger Scale			
Avalanche danger is determined by the likelihood, size and distribution of avalanches.			
Danger Level	Travel Advice	Likelihood of Avalanches	Avalanche Size and Distribution
5 Extreme	1. Avoid all avalanche terrain.	Natural and human-triggered avalanches common.	Large to very large avalanches in many areas.
4 High	2. Very dangerous avalanche conditions. Travel in avalanche terrain not recommended.	Natural avalanches likely; human-triggered avalanches very likely.	Large avalanches in many areas, or very large avalanches in specific areas.
3 Considerable	3. Dangerous avalanche conditions. Careful snowpack evaluation, cautious route-finding and conservative decision-making essential.	Natural avalanches possible; human-triggered avalanches likely.	Small avalanches in many areas, or large avalanches in specific areas, or very large avalanches in isolated areas.
2 Moderate	4. Heightened avalanche conditions on specific terrain features. Evaluate snow and terrain carefully; identify features of interest.	Natural avalanches unlikely; human-triggered avalanches possible.	Small avalanches in specific areas, or large avalanches in isolated areas.
1 Low	5. Generally safe avalanche conditions. Watch for unstable snow on isolated terrain features.	Natural and human-triggered avalanches unlikely.	Small avalanches in isolated areas or extreme terrain.

*Safe backcountry travel requires training and experience. Use central gear and risk by choosing where, when and how you travel.

Most of you who have been around for the last decade know well some of the challenges that came up during the latest revision of the North American Avalanche Danger Scale. A key part of that project was the development of the "Conceptual Model of Avalanche Hazard" (CMAH), which was the framework we used to really provide a foundation for the danger scale.

It's been a long process, but with some leadership (and a lot of work) from Grant Statham we finally successfully published the CMAH in *Natural Hazards*.

Grant Statham purchased "open access" for the article so it's available to all. Here's the link:

link.springer.com/content/pdf/10.1007%2Fs11069-017-3070-5.pdf

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Film series increases avalanche class signups

BY EMILY STIFLER WOLFE

A **carpenter's level**, a bike spoke, and a roller skate spill onto the snow when “avalanche forecaster” Dick Aspen dumps out his backpack. After ducking the rope from Bridger Bowl, Aspen sets up his camera next to the boundary and explains that he's filling in for Doug Chabot, director of the Gallatin National Forest Avalanche Center, who apparently has a lot of s*** to do that day. Aspen is performing an “ECT”—a snowman he beheads with a ski—when Chabot appears.

A local Bozeman skier's alter-ego, Aspen stars in the second episode of “Get Avalanche Smart,” the series of four short videos released this fall by the Friends of the GNFAC. The project goal: Get more high school- and college-age students to take avalanche classes. Missoula-based filmmaker Bobby Jarhig filmed and edited the series, with oversight from several Friends board members, myself included, as well as Chabot.

The project, which rallied a community of Bozeman skiers and avalanche professionals, also features Karl Birkeland, Director of the National Avalanche Center, and pro skier and Bozeman native Ben Goertzen, among others.

“Film is [the best] way to reach certain audiences,” said Ben Nobel, my co-producer on the project. “We wanted to inspire people, especially teenagers. If your goal is to find a way to make something like safety cool to a young audience, film is sort of your only option these days.”

Since 2009, the GNFAC has used YouTube to share videos about specific areas of concern in the snowpack, and has gained a regular following (most videos receive between 500 and 3,000 views). The Get Avalanche Smart films also went up on the center's channels, logging 57,050 total views by December 10. In addition, the Bozeman and Big Sky high school backcountry ski and snowboard clubs have screened them for students, and Bridger Bowl is hosting episode 4 on its website for the duration of the winter.

It worked.

By late November, enrollment for the Introduction to Avalanche course taught in early December at MSU was full, capped at 300 students, according to GNFAC Education Coordinator Dave Zinn. This class and field based course was up 33 percent from a previous high of 200 students. It was the first of three such courses this winter, it includes five hours of classroom time and a field session. Last year, we had 5,134 students over the course of the season. By the beginning of December 2017, we've taught more than 3000 people—with four months of classes to go.

In addition to the films, Chabot credits steady early season snow and an avalanche fatality in October for bumping the numbers.

The education program run by the Friends of the GNFAC and the U.S. Forest Service forecasters primarily consists of classes for local enthusiasts and agency partners in southwest Montana. The forecasters also teach at the national level at professional conferences and workshops such as ISSW and CSAW.

While the films were a success in terms of expanding our class attendance and three of them continue to rack up views, one episode was misunderstood by some viewers, something we're sharing here to help others avoid a similar situation. The narrative was about three friends seeking to climb and ski an iconic couloir near Bozeman, and turning back when they encountered wind loading. The idea was to introduce the human factor and group decision-making, but some viewers saw it as an instructional video on how to climb and ski this particular line. We ended up making the episode unlisted, so the general public no longer sees it among our other videos.

“For some people, it caused confusion,” Chabot said. “As avalanche forecasters, we want to give people really good, relevant, clear information.”

As the media landscape changes and backcountry use grows, avalanche forecast centers and friends groups like ours must explore different ways to communicate—with our constituencies, and with each other. ▲

Emily Stifler Wolfe is a freelance writer based in Bozeman. She has been on the Friends of the Gallatin National Forest Avalanche Center board since 2013 and is currently the secretary.



Dick Aspen “forecasting” for the Gallatin National Forest Avalanche Center in a humorous video for the Get Avalanche Smart series. The Friends of the GNFAC produced the films in an effort to draw more attendees to its avalanche education classes. Photo Bobby Jarhig

Watch the Get Avalanche Smart videos on the GNFAC YouTube channel @AvalancheGuys.

MANUEL GENSWEIN VISITS THE TETONS FOR PRO TRAINING

BY DOUG WORKMAN

Over four days from November 26–30th of 2017, the greater Teton community of professional avalanche workers banded together to participate in an inter-agency professional avalanche rescue workshop led by international avalanche professional Manuel Genswein of Switzerland.

One hundred and twenty five (125) participants from eleven (11) organizations participated. Agencies included Teton County Search and Rescue, Jackson Hole Ski Patrol, Grand Targhee Ski Patrol, Jackson Hole Mountain Resort Guides, Exum Guides, Jackson Hole Mountain Guides, Bridger-Teton Avalanche Center, Tordrillo Mountain Lodge, American Avalanche Institute, GTNP Jenny Lake Rangers, and High Mountain Helicopter Skiing.

“This was a rare opportunity for snow professionals in and around Jackson, WY to work with such an incredible teacher. Coming together for this important and essential work makes our individual teams stronger while solidifying our agencies as a true “community”—truly a gift for the future of snow safety in our valley.” said Stephanie Thomas, TCSAR Foundation Executive Director and TCSAR Volunteer.

The goal of the training was two-fold:

1. To cross-pollinate with other professional avalanche rescue workers within the Greater Teton area. Northwest Wyoming has a high concentration of professional avalanche workers; however, we have limited professional interaction. Having an opportunity to work with Manuel changed this.
2. To receive training from someone outside of our typical sphere of influence. Manuel Genswein, known for his meticulous research into efficient avalanche rescue techniques, has been developing an international avalanche rescue curriculum for several years. Other than seeing some of his presentations at ISSW, few people in the local area have had exposure to this curriculum.

In order to accommodate such a large group, Genswein trained 22 designated “Trainers” (representatives sent by each participating agency) on November 26–27th.

On November 29th, over 100 participants attended a classroom day with Manuel Genswein at the Teton County SAR hangar while Trainers set up field workshops for the following day.

On November 30th all Participants and Trainers met at the Jackson Hole Mountain Resort to work through six different field workshops led by the Trainers.

Field Workshops

- Excavation: Conveyer Belt Shoveling, including new updates to maximize efficiency.
- Probe Line Techniques, including Slalom Probing.
- Group Check and 4 Phases of Transceiver Search
- Transceiver: Multiple Burials with Marking/Mental Mapping
- Advanced Multiple Burials: Alternative Search Methods including Micro-Search Strips and Micro Search Box.
- RECCO

As hoped, we managed to strengthen the relationships between the many professional organizations in the region, while at the same time exposing the professional community to an international avalanche rescue curriculum which has officially been adopted by many national alpine clubs and rescue groups across the globe.

Genswein’s professionalism, teaching skill, and precision with technique were impressive to all who attended. This workshop strengthened our professional community and helped everyone that attended continue to strive for excellence in our respective professions.

Manuel speaks about the curriculum, “The curriculum itself is not a standard, but all the techniques, methods, systems, and strategies which I taught are considered *Best Practice*. The course content consists of elements from the *Best Practice in Avalanche Rescue* workgroup of MountainSafety.info, the new *Best Practice* consensus organization that includes the worldwide associations listed below, representing the world of professional guiding, the world of mountain rescue, the world of recreational mountaineering, and the respective scientific institutes. As of December 2017, in addition to the Tetons, Manuel has presented this curriculum to groups in Revelstoke BC, Bella Coola BC, Switzerland, Hokkaido Japan, and on the main island of Japan. ▲



Doug Workman lives with his wife and daughter in Jackson Hole, Wyoming. He has worked for more than a decade as a ski mountaineering and heli-ski guide in Wyoming and Alaska. At home he guides backcountry skiers at the Jackson Hole Mountain Resort and in Grand Teton National Park. He has also guided skiers in Greenland, Svalbard, Antarctica, the Lyngen Alps, and Iceland. He is a snow and avalanche safety consultant for Mammut North America.



In the bottom photo Manuel manages the troops. Photos from the guide training by Dean Lords.


MountainSafety.info



In collaboration with the International Climbing and Mountaineering Federation 

BRASS NEWS

BY MICHAEL SILITCH AND KATIE JOHNSON



Photo of the class held for the Park City U12 teams this December.



Group photo of the founding BRASS Board Members Steve and Cindy Berlack, Executive Director Michael Silitch, Ambassador/Athlete Jackie Paaso, and Brass Partner Pearson Neal with Blizzard Ski Tecnica Skiboats.

The Bryce and Ronnie Athlete Snow Safety (BRASS) Foundation continues to work hard to develop and deliver avalanche education curriculum to the US Ski and Snowboard coaches and athletes. The nonprofit organization started in April of 2016 and is picking up momentum in the delivery of educational clinics across the country. After just a year, the foundation delivered its first Level 1 AIARE avalanche education course at Snowbird in April 2017 for the US Ski and Snowboard Team.

The foundation had the opportunity to complete six different workshops on the east coast this fall for the following ski academies: Killington Mountain School, Northwood School, Burke Mountain Academy, Stratton Mountain School, Holderness School, and Green Mountain Valley School.

Courses were taught by Michael Silitch, BRASS Foundation Executive Director, and Jackie Paaso, Blizzard Tecnica Free Ride World Tour athlete and ambassador for the BRASS Foundation.

Silitch has been busy teaching workshops on the west coast as well. At the beginning of December, about fifty members of the Park City Ski and Snowboard U12 teams participated in a BRASS 101 Avalanche Awareness Class. These classes teach basic safety precautions and the use of avalanche safety equipment. Rowmark Academy in Salt Lake City held a class for their students as well.

These workshops have been possible with the sponsorship of Blizzard Tecnica, Recco, and Backcountry Access (BCA). All beacons used during these classes have been donated by BCA in order to make the training as effective as possible.

The foundation is currently working on producing a video that should be public soon! This film has been produced in tribute to Bryce and Ronnie, the two young men who lost their lives in an avalanche while training in Solden, Austria. It is both a memorial to these two young men and a strong educational treatise. The video will deliver avalanche education discussing the main points of the recent avalanche education movie "Know Before You Go." In addition, the video will focus on the human aspect present in decision-making around avalanche terrain.

The main goal for the BRASS Foundation is to change avalanche education culture for US Ski and Snowboard teams, starting with the youngest of athletes at the club level all the way up through the elite Olympic division. The United States does a great job at creating the best skiers in the world. BRASS wants to make sure they get the education that will keep them safe for a lifetime.

Consider following the BRASS Foundation on Facebook and Instagram and show them your support! You can reach out to them via social media if you are interested in getting involved or would like to host a workshop for your community. If you would like to make a donation, please visit livepcgivepc.razoo.com/story/Brassfdn. ▲

SLOPE ANGEL is a durable, lightweight and compact device that helps assess the safety of the terrain when skiers, mountaineers, hikers and rescue teams venture into the mountains. Two of the vital factors in identifying avalanche terrain risk are slope angle and air temperature, so it's important to properly understand the conditions. Slope Angel is a digital inclinometer and thermometer that easily and accurately measures slope gradients between 0-90 degrees and air temperatures in both Celsius and Fahrenheit. Slope Angel comes with a lanyard to attach to your wrist or pack and detachable laminated avalanche safety advice cards. At £21.95 (including shipping from England), it's a great gift for anyone who ventures into the mountains or skis on or off-piste.



www.slopeangel.com
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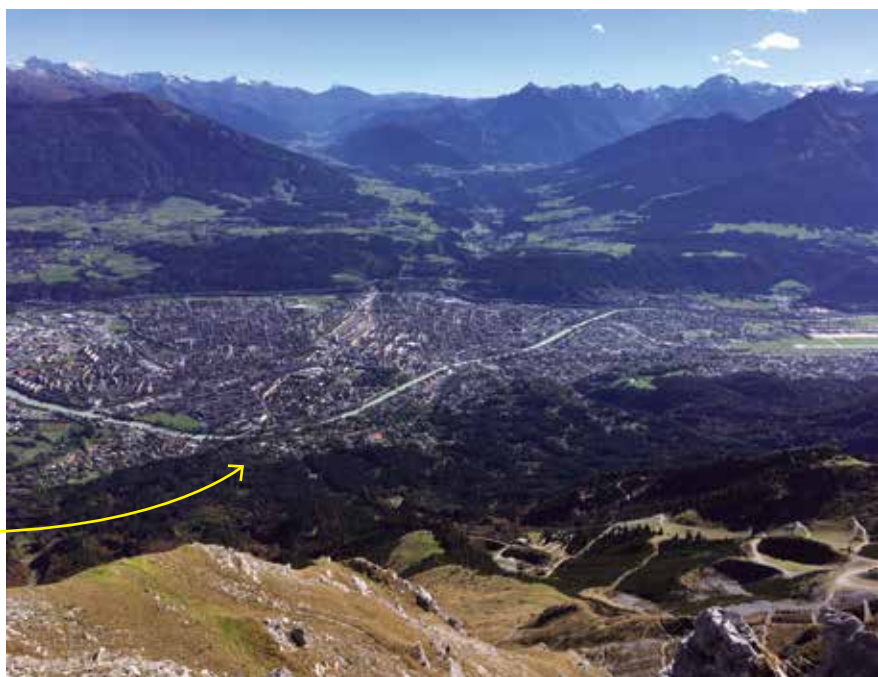
UPDATE FOR THE ISSW 2018 MEETING, INNSBRUCK, AUSTRIA

BY KELLY ELDER AND SUSAN HAIRSINE

In early October, we had the privilege of visiting Innsbruck to participate in a program committee meeting for the upcoming 2018 ISSW. We were pleased to see the level of progress, vision, execution, and commitment of the local organizing committee. The work the organizing committee has achieved will make the ISSW 2018 a great debut for the European ISSWs in the regular two-year-rotation between the US, Canada, and Europe. There will be no major breaks from ISSW tradition and we are confident that this will be an enjoyable, memorable, and successful ISSW. This conference will be a great opportunity to network, collaborate, and to reach out to other professionals in our field. Meetings like ISSW can be life and career changing. To register for information, updates, venue and organization visit the ISSW 2018 website: issw2018.com/en

The City

The ISSW 2018 will take place in Innsbruck, Tirol, in the heart of the Austrian Alps. **Innsbruck** is hard to beat. The river Inn meanders through the city surrounded by mountains. The downtown is filled with multistory buildings that were erected 400-600 years ago. It is amazing to sit and have a beer in a stone-walled pub that has been engaged in quenching people's thirst for 500 years. You enjoy a coffee in the plaza on the same cobblestones that were well worn centuries before Volkswagens were even invented. There are museums surrounding the center and everything, including the meeting center for the ISSW is only a few minutes' walk away. Hiking trails leave the pavement and offer an amazing view of the valley. They are close enough to never use a car or bus, but the local public transit is well configured to reach more distant trailheads. The town ski area's (Nordkette) tramway offers an easy access to high-elevation hiking. A short drive to the south takes you to Italy and the Dolomites—close enough for a day outing.



View of Innsbruck from Nordkette ski area.

The Venue

The Congress meeting center is a centuries-old building that has been preserved on the outside while being functionally restored on the inside. The result is a well-planned, multi-purpose hall with modern amenities, good acoustics, and pleasing architecture offering the perfect venue for ISSW folks who like a great meeting and good beer. The Congress is large enough so the entire event will be contained in one building, including break out sessions, classes, trainings, food service, and the banquet.

The Program

ISSW 2018 will follow a traditional calendar. Monday and Tuesday as well as Thursday and Friday of the conference week include classic oral and poster discussions. On Wednesday a variety of field trips and outings are offered.

Morning oral presentations will be general topics of broad interest to all audiences. They will be held in the main Congress Hall offering four-language, simultaneous translation—English, German, French and Italian. Headsets will allow you to choose your language and your seat. This is a great opportunity to participate in your native language or to test your memory from your high school language requirement.

Afternoon sessions will discuss the state-of-the-art in sessions that are dedicated to cutting-edge topics conducted in English and German. These topics include topics such as *Integral Engineering Solutions*, *25 Years Avalanche Danger Scale*, and *IT in the Field*. Furthermore, it will be possible to attend training courses for educational purposes and possible certifications in the afternoon including topics such as *Mountain Meteorology*, *Weather Forecasting*, *Avalanche Flow Modeling*, *Search and Rescue*, etc.

The optional side program includes a typical Tyrolean Night, the Conference Banquet and the farewell 'Fernie Night.'

An extra effort has been made to include practitioners in the organization and planning of the conference, topics, and sessions. Representatives from avalanche forecasting, guiding, forestry, transportation, and search and rescue are contributing to the success of the ISSW. Stakeholders include practitioners and scientists, forecasting and emergency services, guiding and recreation, education and research, government agencies, search and rescue, transportation, engineering and infrastructure, and ski areas and tourism.

Spectacular field-day activities with technical focus will allow attendees to experience local avalanche-related problems and their solutions (ski areas, roads, mitigations sites, etc.) more cultural field trips offer recreational opportunities in a casual outdoor setting (mountain biking, hiking, museums, etc.)

Transportation and Planning

Many carriers fly right into Innsbruck with major hubs in Munich and Frankfurt. We used the easy option of ground transportation from Munich. The ISSW takes place during off-season for tourism and accommodations can be found at very reasonable rates. We recommend considering a fall vacation on either side of the ISSW. There will be a partners program designed specially for those traveling with you, and Innsbruck is a very user-friendly city, offering many options for everyone of all ages and interests. All of Europe is nearby with excellent public transportation. The committee has worked hard to keep the registration low. Comparable with similar conferences this meeting will not be sky-high in costs and there are many ways to make it more affordable. Check the ISSW 2018 website for low cost options and scholarships for traveling and attendance. We hope to see you at the 2018 ISSW! ▲



2018 ISSW organizing committee.

WHAT WE SAW

A Spotlight on Regional Snow and Avalanche Workshops



CAIC staff at the registration desk at CSAW 2003 at Copper Mountain. From left to right: Andy Gleason, Scott Toepfer, Brad Sawtell, and Halsted Morris.

Why CSAW came to be

BY KNOX WILLIAMS

The Colorado Snow and Avalanche Workshop (CSAW) was created in 2002 out of necessity, and to understand why, we must go back another 20 years. In the fall of 1982, the predecessor to the International Snow Science Workshop (ISSW) was held in Bozeman, MT; two years later in 1984, the Aspen Avalanche Conference was held. For all intents and purposes, that was the first International Snow Science Workshop, but without the formal name. The ISSW title was formalized in 1986 at the meeting at Alpine Meadows/Squaw Valley, CA. The ISSW has been hosted biennially ever since, rotating among venues in the US and Canada (and recently in Europe).

The CAIC was founded in 1983, and its forecasters are employees of the State of Colorado. From 1984 through 2000, CAIC staff had always attended and participated in the ISSWs, and there had not been an issue in 1988 and 1996 of traveling to Canada to attend.

Then came 2002 when the ISSW was held in Penticton, British Columbia. Though the CAIC had funding available, the State of Colorado denied foreign travel for CAIC staff to go to Canada. (We also noted that many Colorado ski resorts were not sending patrollers to that meeting.)

What to do? We decided if we couldn't go to the ISSW, we'd bring a small part of it to us. That meant creating a new workshop, which we would call the Colorado Snow and Avalanche Workshop (CSAW). And we would cherry-pick a few talks from Penticton and have the authors repeat their talks at our meeting—in addition to our own content.

To help ensure the success of this new venture, we piggy-backed CSAW on the Colorado Ski Patrol Directors meeting at Keystone. We advertised with emails to all ski patrols and to recipients of our wintertime weather and avalanche forecasts. (Note the **2002 email notification of CSAW** and the **agenda**.)

To make ends meet, we had to charge a small fee (\$20). Most importantly, we wanted CSAW to be affordable, applicable (with presentations oriented toward practice, rather than theory), and fun. To that end, we promised that attendees would be treated to coffee and donuts in the morning, and pizza and beer in the afternoon.

So the first CSAW was held on October 16, 2002, and about 120 people attended. We considered that a success. Following the workshop, comments from the attendees were very positive, so we decided to make this an annual event, rather than biennial as envisioned in the original proposal.

In the years that followed, the number of SAWs held in western states, New England, and Alaska has grown to about 10. What a great addition this has been for avalanche education (and social contact for practitioners) in the US. ▲

Knox Williams began his avalanche career in 1970 with the US Forest Service. He was a co-founder of the Colorado Avalanche Information Center in 1983 and was its director until retiring from full-time work in 2005. He has co-authored three volumes of *The Snowy Torrents*, and is a past president of the American Avalanche Association.



Colorado Snow and Avalanche Workshop Keystone Resort Conference Center October 16, 2002

Program:

7:00-8:30	Registration & Coffee
8:30-9:00	Welcome and Introduction <i>Knox Williams, CAIC</i>
9:00-9:30	Effects of an Early-Season Rain Crust <i>Dan Moroz, Copper Mountain Ski Patrol</i>
9:30-10:00	Bridging in the Snowpack <i>Art Mears, Engineering Consultant</i>
10:00-10:30	Break
10:30-11:00	Computer/Instrument-Assisted Forecasting for a TG-based Ski Area <i>John Brennan, Snowmass Ski Patrol</i>
11:00-11:30	Bringing Avalanche Awareness to the Ski Area Experience <i>Aaron Brill, Manager/Owner, Silverton Mountain Ski Area</i>
11:30-12:00	Why Risk Management? <i>Chuck Tolton, Vail Resorts</i>
12:00-1:30pm	Lunch (on your own)
1:30-2:00	The CAIC in 2002 <i>Nick Logan, CAIC</i>
2:00-3:45	Workshop: CAIC's Online Data Entry and Database <i>Dale Atkins, CAIC, and Brian Gardel</i>
3:45-4:00	Video: "Check the Risk. Caution Avalanche"
4:00	Beer and Pizza

Colorado Snow and Avalanche Workshop (CSAW) Plan

What: CSAW is planned to be a professional development seminar for avalanche professionals and practitioners in Colorado. It will be a 1-day or 2-day meeting, easily reachable and affordable.

Why: There is only one snow and avalanche seminar in North America (ISSW) and it has gotten too big, too remote, and too expensive. Therefore, many Colorado avalanche professionals do not attend the ISSW, creating a lack of opportunity for professional development.

Who: CSAW is designed for avalanche practitioners and professionals in Colorado, with presentations and workshops on subjects that they need to know about. Management of this workshop will come from the Colorado Avalanche Information Center staff.

When: CSAW will be held biennially, in odd-numbered years, in October. Timing is set so as not to interfere or compete with the ISSW or the National Avalanche School.

Where: CSAW will be held in various mountain communities in Colorado.

BY JAMIE YOUNT

On October 6, 2017, backcountry enthusiasts and industry professionals gathered in Breckenridge for the 16th annual Colorado Snow and Avalanche Workshop. The event was held at the Riverwalk Center with close to 600 attendees.

The agenda was packed with great information on a variety of topics. Presenters discussed innovative strategies for managing avalanche risk with explosive delivery trams, backcountry radio protocols, persistent slab avalanche trends over time, and the avalanche near miss database. We heard some take home messages from the new volume of *Snowy Torrents*, and recent work on human factors, as well as perspectives on managing risk in a professional setting. Attendees were introduced to the new avalanche science program at Colorado Mountain College, and some interesting work on temperature gradients around buried crusts.

Doug Chabot started the day off with expanding upon his recent ISSW talk, “Avalanches every day, all winter” said the Afghan, learning how to survive in the bosom of the highest peaks. Doug and the FOCUS Foundation have embarked on a grassroots effort to provide avalanche awareness and preparedness for the rural villages scattered throughout the Afghan mountains. Doug traveled through region training local villagers how to take weather and snowpack observations. These observations are then relayed to Doug and the FOCUS Foundation by cell and satellite phone to compile an observation network for avalanche forecasting. The dedication of these villagers is incredible as some people walk for two days to attend one of Doug’s training sessions. Hats off to Doug and his team for tackling a complex problem with a cost effective and grassroots solution. It’s a good reminder in a world overwhelmed with technology that critical thinking and basic observations are still the best tools for avalanche forecasting.

The visceral science of human factors and risk was on point several times during the day. Russ Costa, a neuroscientist from Westminster College in Utah, presented two talks on his recent work. *Smarter or Luckier? Human Factors and avalanches during the 2016–2017 winter* looked at human factors in avalanche events during the past winter in Colorado and Utah. Data from these two states over the last few decades shows a decreasing trend in avalanche accidents. Russ’s work is trying to answer some interesting questions. Can we attri-

More stories abound at CSAW this year. Roger Coit, Director of the CMC Leadville avalanche technician program, visits with a local law enforcement delegate.
Photo William Cotton



bute this trend to better education, improvements in forecasting, increasing skill levels, or just plain luck? While the evidence is still inconclusive these questions are worth thinking about and trying to answer. Russ’s gave an encore performance later in the afternoon with his other talk, *Using Rational choice Versus Naturalistic Decision-Making*. In this presentation Russ challenged people to understand decision-making and recognize ways to improve that processes.

Colin Zacharias presented several case studies from helicopter skiing operations in Canada and the improvements he has observed in his career when communicating about avalanches and risk. His talk, *Grace Under Pressure: How we are betting better at “saying what we mean” when talking about risk in the backcountry*, outlined several excellent tools that can be used in a professional operation to improve communication. I’ve outlined some of the highlights below.

- Rules of Engagement, consensus decision-making where everyone has a voice and a veto.
- Using run lists to communicate snowpack and weather concerns, historical knowledge, and where to ski.
- Naming specific weak layers for identification and tracking through a season
- Using the avalanche problems to identify the hazard and size of potential avalanches.
- Identifying uncertainty by rating confidence in the forecast
- Understanding fracture character and propagation propensity are two concepts that have greatly enhanced our ability to understand avalanches.

Roger Coit introduced the group to the new Colorado Mountain College Avalanche Science program. This program at Colorado Mountain College in Leadville will span two winter seasons with 11 courses, 25 field days with instructors, and many more self-driven field days. The goal is to train students for professional avalanche safety jobs. The program is the first of its kind in the county. This is a hybrid program to accommodate working folks or non-Coloradans.

Colorado professionals took the stage with innovative local approaches to managing the avalanche problem. Matt Steen with Telluride Heli Trax shared the details of a radio program in the San Juan Mountains where backcountry users are encouraged to carry radios and monitor designated frequencies. The program is a local effort to enhance communication between backcountry groups to manage risk and coordinate rescue efforts. Matt presented several case studies where radio communication decreased the chaos of a crowded backcountry scene and one case study where radio communication could have prevented an accident.

Ryan Evanczyk from Arapahoe Basin presented a talk on the challenges of expanding the ski area boundary into complex avalanche terrain. Ryan and his team spent the summer installing several stout looking, locally-made explosive delivery trams to conduct mitigation efforts in some impressive looking terrain. Nice work Ryan and Team!

Kevin Hammonds present his work on microscale temperature gradients in his talk *Sun, Wind, Rain, & Snow: How snowpack layering affects temperature gradients, snow metamorphism, and weak layer formation*. Ask anyone who has their head in the snow in the winter and they will tell you that fac-



Ethan Greene of the CAIC introduces speaker Doug Richmond, Ski Patrol Director at Bridger Bowl.
Photo William Cotton

et-crust combinations are the norm. Kevin’s work in the cold lab at Montana State University made measures on a microscopic-scale showing massive temperature gradients at crust boundaries. This gradient would be impossible to measure with a standard thermometer so Kevin suggests using a loupe to identify this process in the field.

Staff from the Colorado Avalanche Information Center (CAIC) took the stage several times during the day to share information on the wide range of avalanche projects going on behind the scenes. Longtime CAIC forecaster Spencer Logan shared his and Knox Williams’s efforts in compiling national accident data into volume 6 of the *Snowy Torrents*, 1996–2004. Additional volumes are planned for the remaining years in the accident database.

CAIC forecaster Jason Konigsberg shared his research, *Trends in Persistent Slab Avalanches after snowfall*. Jason’s work used a database of almost 250 persistent slab avalanches to understand the relationship between the Persistent Slab avalanches and time since the last snowfall. He found a strong correlation between snow fall events and Persistent Slab avalanche release as well as a marked decrease in these avalanches after 7 days of dry weather.

Ethan Greene, the CAIC director, talked about the Avalanche Worker Safety nonprofit and their avalanche near miss database. The avalanche near miss database collects information on workplace near misses and accidents involving avalanche workers. The database is free and anonymous and is intended to help track and understand the challenges facing professionals in the snow and avalanche industry. Anyone can contribute at avalanchenearmiss.org.

Meteorologist and CAIC forecaster Nick Barlow closed out the day with a 2016–2017 Colorado winter recap and a 2017–2018 winter weather forecast. With a weak La Niña developing in the equatorial Pacific the northern half of Colorado is favored for snowfall this winter with the Southern Mountains in a drier pattern.

Huge thanks to the Friends of the CAIC for organizing the event and to the American Avalanche Association and the North Face for their financial support. ▲

Jamie Yount is a meteorologist who worked as an Avalanche Technician for WYDOT for 15 years before relocating to work for the CAIC in 2017. He recently accepted a position with CDOT as their Statewide Avalanche Program Manager. He is the President of the Avalanche Artillery Users of North America Committee (AAUNAC) and is a Master Gunner for the M101 Howitzer.

BY DAVE REICHEL

A brief report on our 2017 CAW lineup is below:

After the multiple atmospheric river assaults that arrived during the winter of 2016-2017, ensuing road closures, resort closures, and endless shoveling, many forgot about the challenging early season 2016 snowpack. Steve Reynaud, Avalanche Forecaster for the Tahoe National Forest-Sierra Avalanche Center, refreshed our memories about the persistent weak layers that factored into an early season fatality. The myth that Tahoe doesn't have persistent weak layers is well persistent. Steve debriefed the fatality and covered the early season PWLs that were ultimately destroyed in a massive warm atmospheric river event.

Jordy Hendrikkx flew in all the way from Montana to let us know that Montanans actually have Kiwi accents. Who knew? He also shared his interesting White Heat project and did his best to recruit Californians to participate. Technology, cell phones, geo-spatial selfies, he found the right audience. Hendrikkx's area of research is a great fit for events like this with a mix of professionals and recreationalists.

The National Weather Service office in Reno, NV does an excellent job providing useful accessible info for winter mountain travelers. It's probably no coincidence that Zach Tolby is a Forecaster at that office and also a backcountry skier and Sierra Avalanche Center Board Member. Zach began by examining the current accuracy of seasonal weather forecasts. Short version: not great. He then transitioned to discussing atmospheric rivers and their associated forecasting challenges. Medium length answer: challenging but getting better.

Celebrating just over a year as E.D. for AIARE, Richard Bothwell, provided an overview of AIARE's current status and future plans. In an emotional moment, Richard shared photos of

three mothers who lost their sons in avalanches. Natalia Dodov, one of these women, was in attendance at the California Avalanche Workshop with her husband, and many of her son's friends. Richard then transitioned to discussing how social media snow safety discussion can most effectively be delivered.

Representing the Eastern Sierra Avalanche Center, Forecaster Josh Feinberg provided an overview of last season's incredible snowfall on the Eastside. Josh also updated everyone on ESAC's current structure and ongoing development. Josh ended his talk by revisiting an avalanche he was caught in and that claimed the life of a friend. His account was emotional, powerful, and sobering. He reminded the crowd to take pride in turning around.

Duncan Lee shared his experiences as a professional snowmobiler working to bring avalanche education to the mechanized community. Duncan serves as an advisor to the Sierra Avalanche Center and sits on the AIARE Board of Directors. Using beautiful photos Duncan discussed how snowmobilers typically travel through the mountains and how this differs from how human powered backcountry users move. These foundational differences strongly inform avalanche education and demonstrate the need for mechanized-specific avalanche instruction.

We were fortunate to have October TAR cover model and Avalanche Forecaster for the Mt. Shasta Avalanche Center, Andrew Kiefer present. In addition to sharing images of enormous crowns, Andrew also shared several informative accounts of near misses on the mountain. One notable account was a family backcountry skiing with essentially zero rescue equipment and then triggering an avalanche.

Andrew McLean rocked the house with his morbidly humorous Mountain Mishaps presentation. Not politically correct, not really modeling the best decision making, definitely picking on former spouses, Andrew's talk was mostly a hit with the crowd.

Delicious beer from South Lake Tahoe's Cold Water Brewery greeted participants at the social



Mammut rep Adam Selby demonstrates the latest airbag pack. Photo Matt Bombino

hour following the workshop. Folks talked about which presentations spoke the most to them, and made plans for winter.

As was appropriately pointed out by observant attendees, one area where this year's California Avalanche Workshop lagged was with regards to gender. Our lineup featured eight dudes, although to be fair, two did rock stylish beards. This year roughly 30% of the audience was female, but zero percent of the presenters were. Over the four years of the California Avalanche Workshop, 16% of the presenters have been female. I don't have a great data about how this compares to avalanche professionals regionwide, but as a rough proxy it compares to 10% female AIARE instructors in CA and NV. To those who pointed out the disparity in speakers, we're working on it.

The California Avalanche Workshop would (again) not have been possible without generous support from the A3. We also received significant support from the Nickolay Dodov Foundation. Mammut, Dynafit, and TahoeLab teased product in the lobby and also supported the Workshop. We were pleased to host representatives from A3, AIARE, the Sierra Avalanche Center, and the Tahoe Backcountry Alliance as well. The tables in the lobby were a popular stopping point between talks. This coming year the California Avalanche Workshop is scheduled a week later on October 20th, 2018 so folks can find us on their way home from Innsbruck. See you then. ▲

David Reichel works for the Sierra Avalanche Center, Lake Tahoe Community College, and multiple guide services. After noticing that California didn't have a pre-season snow and avalanche workshop, he started the California Avalanche Workshop four years ago. Hopefully his backcountry decision-making is smarter.

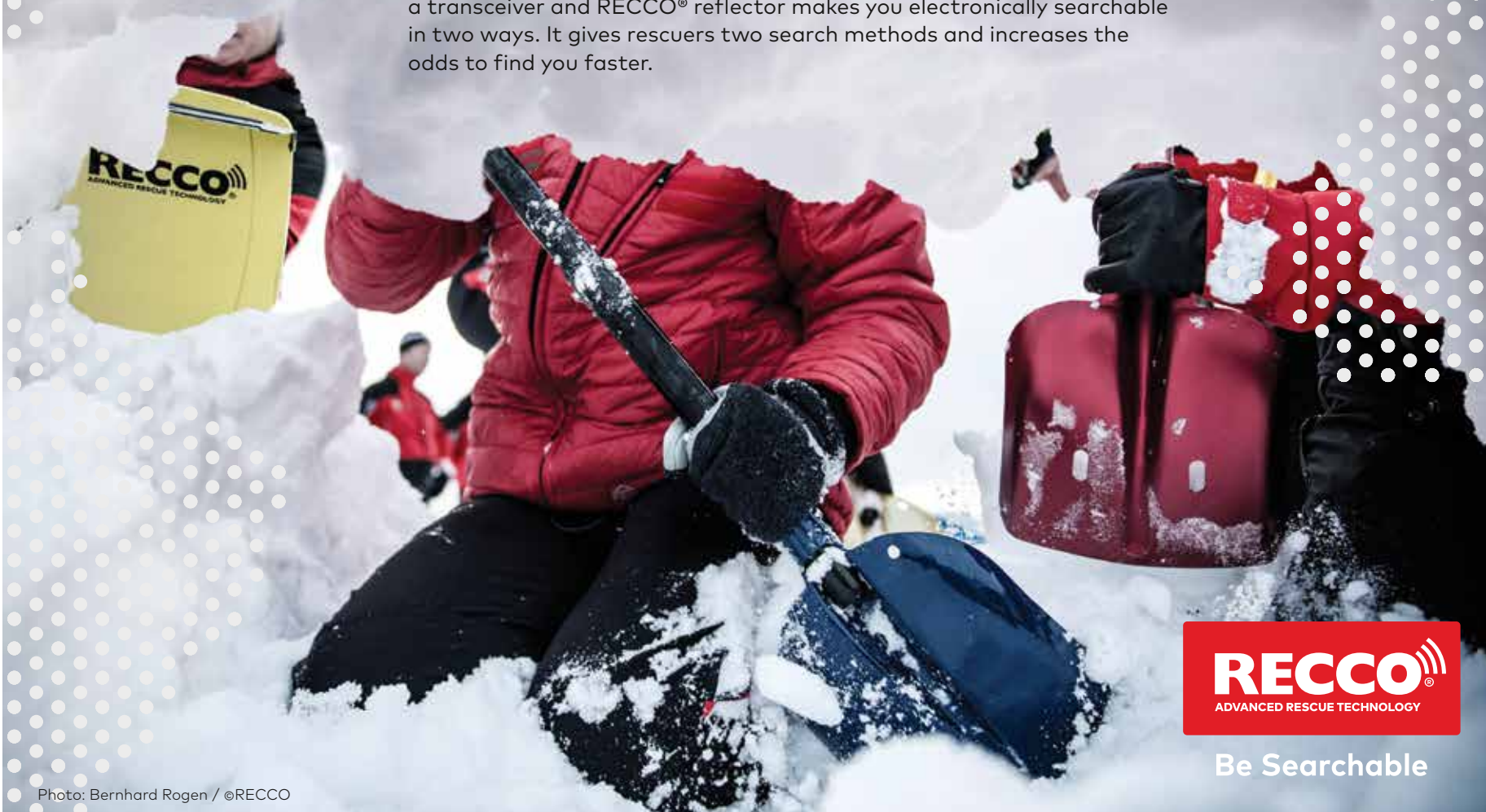


Jordy Hendrikkx of Montana State University makes a point during his presentation about the White Heat project. Photo Matt Bombino



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Photo: Bernhard Rogen / ©RECCO

2017 NRS AW Report

BY ZACH GUY

The 7th annual Northern Rockies Snow and Avalanche Workshop (NRS AW) was another great event with a record turnout of around 250 people. NRS AW was hosted by the Friends of the Flathead Avalanche Center in Whitefish, MT, on November 4, 2017. Cold and snowy weather outside made for favorable indoor learning conditions, and this year, our speakers united on a common theme of “Human Factors and Decision Making.”

As the new guy in town eager to recruit new ski partners, I opened the event by recounting a

series of questionable decisions and a close encounter I had with a large wind slab. I described the human factors and confirmation biases that led me into the exact type of terrain that I had ruled out earlier in the day, and offered a few systematic strategies to combat these human follies. No one has reached out to me about touring in the backcountry since then, but hopefully they learned something.

Ted Steiner, the director of the BNSF Railway Avalanche Program, described the operational challenges and strategies for forecasting for the railway without the use of active avalanche mitigation. Ted gave us a look at their daily operations and we relived the extreme avalanche cycle that buried the railway on several occasions last February.

Scott Savage with the Sawtooth Avalanche Center explored how memory works, how it can fail us when working or playing in avalanche terrain, and how to minimize these impacts. I’ve already forgotten the details of his talk, but I do remember being surprised at how memory can play some remarkable tricks on us with a few of Scott’s exercises.

Erich Peitzsch, Joel Sheehan, and Jen Parsons gave a heavy presentation about the tragic loss of a beloved member of the community, Ben Parsons, to an avalanche last winter. Erich spoke on what it means to be “experienced;” Joel narrated some of the day’s decisions, and Jen left us with a powerful message about how Ben’s life was fulfilled through his love for the mountains.

A group of three local snowmobilers shared their story of an avalanche burial and rescue

in the Swan Range last winter. This talk was a crowd favorite as they walked us through some lessons learned and the resourceful decision-making that ultimately got them back to the trailhead after a long night in the backcountry. My favorite part was their account of their Delorme unit. As they were trying to evacuate the mountains without snowmobiles, they were incessantly bombarded with messages from their wives and significant others. The DeLorme emergency response coordinator was following these messages and decided to call their plus ones and tell them to stop nagging. This perk alone had me immediately buying a few DeLormes for our avalanche center and for my personal life.

Finally, Scott Savage and Andrew Beck presented on the new avalanche accident database, www.avalanchenearmiss.org. They presented on some initial statistics and trends of accidents that professionals make. Hopefully we can all populate this database (from a plethora of past accidents, not future ones).

We at the Flathead Avalanche Center want to thank everyone who sponsored, attended, or presented at the workshop, and we look forward to seeing you at the event next fall! ▲

Zach Guy is the director of the Flathead Avalanche Center. He has managed to convince a few gullible new friends to join him in the backcountry this season.



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BY JONATHAN S. SHEFFTZ

EDITS BY ERIC KNOFF

The seventh annual Eastern Snow & Avalanche Workshop (ESAW) held on November 11th, 2017 in Fryeburg, Maine attracted approximately 175 attendees.

This year's ESAW was a collaborative effort. The organizing partners included the USFS Mount Washington Avalanche Center (MWAC) and the White Mountain Avalanche Education Foundation (WMAEF), with support from the Mount Washington Volunteer Ski Patrol (MWVSP) and others. ESAW once again relied on a grant from our lead sponsor the American Avalanche Association (A3), led here by Eastern Representative Mark Renson and myself as A3 Member Representative. Additional support came from our headline industry sponsors: Outdoor Research and DPS Skis. Registration proceeds above hosting costs went to benefit the White Mountain Avalanche Education Foundation, which provides avalanche education to youth of the Northeast.

ESAW kicked off with a Friday evening social event, hosted by the Friends of Tuckerman Ravine and fueled by Sam Adams and Amoskeag Distributors at the International Mountain Equipment shop (IME). Avalanche presentations took place all day Saturday at Fryeburg Academy.

MC Frank Carus, Director of the Mount Washington Avalanche Center, kicked the workshop off by introducing Jerry Isaak, an Expeditionary Studies Professor at SUNY Plattsburgh. Jerry's presentation on *Organizing Doubt: Asking Questions in Avalanche Terrain*, outlined a university ski touring trip to Kyrgyzstan. Jerry and his students successfully managed a high level of uncertainty by continuously asking the question—"Does our competence match our context?" Context representing environment and terrain. By evaluating competence, environment and terrain on a regular basis, Jerry and his students had a safe and successful trip.

Two years ago, ESAW concluded with a dinner and presentations in memory of Ronnie Berlack and Bryce Astle, U.S. Ski Team alpine racers who died in an avalanche the prior winter in Austria. Since then, the Bryce & Ronnie Athlete Safety & Security (BRASS) Foundation has organized and funded *Know Before You Go* awareness presentations to ski racing academies. This year at ESAW, BRASS debuted its Off Piste video, which combines family remembrances of the two racers, interviews with U.S. Ski Team athletes, and professionally produced recreations of the avalanche rescue.

Our first western presenter, Sarah Carpenter, an American Avalanche Institute co-owner and instructor from Victor, Idaho, schooled us on an issue we frequently deal with in the east in her presentation *Wind Slab: the Broad Spectrum of One Avalanche Problem*. In addition to conceptual approaches of how to deal with wind slab danger, Sarah presented many pictures, videos, and graphical studies of how a prevailing wind direction can produce widely varying micro-scale loading effects when combined with different terrain configurations. Sarah also included a video of risk consultant Gordon Graham on risk level versus frequency and concluded with the example of anarchist riots in Seattle versus Los Angeles, which has a surprisingly significant relevance to wind slab danger.



Jerry Isaak of SUNY Plattsburgh giving a presentation on *Organizing Doubt*, based on his expeditionary program at ESAW. Photo Joe Klementovich

Jerry Isaak then returned to present on *Snow Science Before You Dig: Seven Steps to Maximize the Fun Factor* which included 'play heads-up hockey', revealing his Canadian heritage. Jerry's talk highlighted the importance of planning your trip before leaving home. He emphasized that good decisions are made when we are warm, dry, and fed and that we shouldn't put our bodies where our minds haven't already been. Jerry also advised that it's best to leave your ego at home when heading into the backcountry.

Mount Washington Avalanche Center's Ryan Matz then presented a case study on the February 11th, 2014 Little Eagle avalanche accident in the Wallowa Mountains in eastern Oregon. The incident occurred during a guided trip and resulted in two fatalities, one seriously injured and two others caught. This incident was the subject of an online feature by Powder Magazine on the human factor, but Ryan provided a more detailed assessment as he was working for the guide company at the time. Ryan opened with two quotes from Walter Bruns' talk at the 1996 ISSW: "Linking a sequence of dangerous situations which deliver enjoyment

to the client" and "Where snow science conducts experiments...guides take their clients INTO the experiment." A number of factors led to this incident—newly explored terrain coupled with poor visibility and an active persistent weak layer. Ryan also speculated that pressure to deliver high-quality skiing to clients may also have played a role. He went on to suggest that guides should under promise and be open regarding objectives, risks, observations, and decisions.

Our second western presenter, Eric Knoff from the Gallatin National Forest Avalanche Center in Bozeman, Montana, presented on *Spur of the Moment: Impulse Decision-Making in the Backcountry*. Eric touched on how plans laid prior to heading into the backcountry many times change once actually in the backcountry. Eric also discussed Gordon Graham's concept of 'non-discretionary vs discretionary time' and impulse decision-making. To illustrate this concept, Eric presented a case study on a 2016 incident that involved two professional ski patrollers and two Montana State University graduate students outside of the Yellowstone Club resort. After spending the day performing extended

THOUGHTS FROM JOE KLEMENTOVICH

Thanks for covering ESAW. We've been making strides in the right direction each year. Our big step this past summer was to roll out The White Mountain Avalanche Education Foundation (www.wmaef.org) to better serve our community through grants and funding of schools, teachers, educators here throughout the Northeast. We had our first students in the field last February, probably on the coldest day of the year, but they were fantastic. We are very close to implementing a 3-4 day science curriculum of snow science, data collecting, and avalanche study locally; we just got some snow plot equipment for that program. Lots of exciting things happening out here and having Sarah Carpenter of AAI in town helped tremendously, she jumped right in and will be a huge help moving forward on some of these programs.

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Photo: Fredrik Marmstater

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column tests, which all pointed to a highly unstable snowpack, the four made a group decision to ski low-angle terrain back to the resort. On the way down, one of them impulsively launched off a ten-foot cornice onto a 38- to 40-degree slope. The slope fractured and swept the skier into a stand of trees—he was partially buried and died of trauma. Impulsive decision-making appears to have been a major contributor to this avalanche accident.

After lunch, Frank moderated a roundtable discussion on *Zero Avalanche Fatalities in the United States: Merely a Lofly Goal?* Questions from the audience were directed at four panel members: Jerry Isaak, Sarah Carpenter, Eric Knoff, and Ryan Matz. During this question-and-answer period, an audience member asked Eric what he thought of the fatal incident in early October 2017 near Bozeman. Eric emphasized that it's a reminder to focus on basics every time you head into the backcountry. e.g., do a beacon check, don't expose more than one person at a time on steep slopes, and always watch your partner from a safe location.

We then received an update on the White Mountain Avalanche Education Foundation from Bethann Swartz and Blake Keogh. They provided us with a homework assignment: to bring another person with us next year to ESAW!

After lunch, Eric Knoff presented a case study on an avalanche fatality that occurred during the 2009 Bozeman Ice Festival. The accident occurred during the fourth annual Ice Breaker Climbing Competition and involved professional Ice Climber Guy Lacelle, who perished in an avalanche during the event. The competition was held in Hyalite Canyon on natural ice and teams were comprised of

Bozeman based, 'local' climbers paired with professional climbers. Points were accrued by completing different climbs. Eric described how a competitive atmosphere created a dangerous environment when competition is introduced into avalanche terrain. He then made comparison between the conditions that contributed to the Ice Breaker avalanche and conditions that climbers deal with in the Huntington Ravine area of Mt. Washington, New Hampshire.

Mike Carmon, a meteorologist with the Mount Washington Observatory, shifted our attention back to the Northeast with compare/contrast case studies of snowstorms that occurred on Pi Day (March 14, get it?) and April Fool's Day. Forecasting for upslope snow is especially tricky, and Mike made ample use of data and graphs from the summit observatory staff, automated weather stations located at various elevations and aspects on the mountain, and more typical valley observations.

Sarah Carpenter wrapped up the day with her presentation, *Checklists as a Tool for Decision-Making*, where she encouraged us to be more like Van Halen. Time to rock out to "Panama" and "Hot for Teacher"? Not quite. Instead, Sarah's point was how the band would bury in their concert contracts a provision that their dressing room contain a bowl of M&Ms candies with all the brown ones removed. This was not because the band members were a bunch of capricious brats, but instead because they wanted to check if the venue had actually read the entire contract with its many important safety-related technical issues. Sarah concluded with how her touring partner (who is also the editor of a certain avalanche-related publication) will conduct a post-tour debriefing with

a somewhat accusatory inquiry of, "Did we just make a good decision, or did we merely get away with it?" (haha, accusatory, eh?)

ESAW would like to thank the following sponsors, all of whom either contributed to our raffle throughout the day, our silent auction, and/or hosted rep displays at our expo: AAA, Acadia Mountain Guides, AIARE, Arc'Teryx, Backcountry Access, Black Diamond / Pieps, BRASS Foundation, Catamount Trail Association, DPS Skis, Equinox Guiding Service, Friends of Tuckerman Ravine, Granite Backcountry Alliance, Hyperlite Mountain Gear, Julbo, Marmut / Barryvox, MWVSP, Mount Washington Weather Observatory, Ortovox / Deuter, Outdoor Research, SheJumps, Sterling Rope, Synnott Mountain Guides, and Toko.▲

Jonathan Shefftz patrols at Northfield Mountain and Mount Greylock in Western Massachusetts, where he lives with his wife and daughter (who notched her first seven-month ski streak this past season). He is an AIARE-qualified instructor, NSP avalanche instructor, and AAA governing board member. When he is not searching out elusive freshies in Southern New England or explaining to his daughter that to go sledding instead of skiing we have to ski to the sledding hill first, he works as a financial economics consultant. He can be reached at JShefftz@post.harvard.edu or just look for the lycra-clad skinner training for his NE Rando Race Series.



BY PAUL DIEGEL

The 10th annual Utah Snow and Avalanche Workshop was held on Nov 4 and 5 and was a great success. About 900 people filled the Snowbird Cliff ballroom for our first time at that venue. Separate program tracks were widely applauded by about 370 pros, 100 motorized users, and 430 backcountry skiers and snowboarders. Attendance was about 30% more than we've ever had before and strained our registration and lunch capabilities—we are grateful to Snowbird Resort for their tireless and cheery work to meet our expanded needs. The wet and unsettled weather was perfect for the event (who wants to be inside on the last warm sunny weekend of the fall?). We received great support from our brand and resort sponsors. After doing this for 10 years, we continue to learn a lot about putting on successful SAW events.

We have tried a number of strategies over the last 10 years to best present a mix of topics relevant to both pros and recreationists. Key factors for us have been that there is a big overlap in the level of avalanche knowledge and desire to learn in these two groups and there are some topics that are either of limited interest to recreationists (eg. workplace safety) or too sensitive for pros to comfortably discuss in an open environment (eg. lessons learned from an incident with litigation in process). In 2016, the program was entirely open to the public and about half the attendees were recreationists. Feedback from our pro community was that the topics we focused on— snow science and human factors— were great, but they wanted more content focused on training and refreshing pros on the basics of their job activities. We also heard from our motorized users that our program was still too skier- and snowboarder-oriented to meet their needs.

In response, we went to a one and one-half day format. We started Saturday with two parallel two-hour sessions. One was limited to those working in the avalanche field; bringing back the historic Blasters Clinic focused on explosives issues. The second specifically addressed motorized snowmobile and snowbike issues. We then held the main seven-hour session open to everyone followed by a happy hour. On Sunday morning, we held a four-hour session focused on managing organizational risk.

We have gotten great feedback and feel that USAW 2017 exceeded our expectations for bringing in more people and meeting more needs. Key lessons learned:

- A familiar mountain location is more comfortable than a sterile industrial meeting space
- Grouping topics into easily relatable themes help to promote the workshop and allow attendees to better understand the benefits of attending
- Multiple sessions addressing the needs of different user groups are effective
- Bringing those groups together for a joint session with topics of interest to both and creating the opportunity for groups that don't always mix creates an environment for effective learning and community building
- Lots of social media marketing and outreach to key individuals in the community, like resort directors, snowmobile clubs, and



This year's new locale at Snowbird quickly filled to capacity. A snowy rainy day made USAW the place to be.

pro athletes, is an effective way to get the word out

- Repeated and focused requests to potential sponsors for support is effective at bringing in gear displays and offsetting costs
- SAW events provide a great format for training new patrollers and snow safety personnel, providing an inexpensive and concentrated presentation of the basics and fostering cross-resort networking
- It's important to get copies of presentations to the AV tech team in advance to minimize presentation issues.
- Careful attention to the program can make SAWs attractive to a wide range of user levels. They are not just for pros and highly experienced recreationists any more. Marketing the event needs to convey that.

Special thanks to the American Avalanche Association for their generous financial and advertising support and for joining us!

2017 USAW Agenda:

Saturday Morning Blasters Clinic

- *NSAA Guidelines*: Peter Schory, Snowbird Snow Safety
- *No Lights/Duds/Malfunctions*: Andy VanHouten, Vail Resorts Park City Snow Safety
- *Explosives Handling*: Steve Shelley, US Bureau of Alcohol Tobacco, Firearms, and Explosives
- *Heli Explosive Guidelines*: Snowbird/Powderbirds
- *Wyssen Tower*: Matt McKee, UDOT
- *Ridge Route Safety*: Frank Waikart, Snowbasin Ski Patrol

Saturday Morning Motorized Session

- *The Changing Face of Backcountry Riding*: Randy Sugihara
- *Snowbike Avalanche Considerations*: Brett Kobernik, Utah Avalanche Center
- *The Evolution of Avalanche Education for Snowmobilers*: Kim Reid & Craig Gordon, Utah Avalanche Center
- *Highmarking, Boondocking, Hill Climbing... Should We Dig Snowpits?*: Mark Staples, Utah Avalanche Center

Saturday Open Session

Morning Session: Changing Climate... Changing Snowpack

- *Utah Winter Review 2016-17*: Craig Gordon and Trent Meisenheimer, Utah Avalanche Center
- *Birthday Chutes Avalanche*: Sam Kapacinskas

- *Adjusting to a Different Snowpack in the Salt Lake Mountains*: Ty Falk
- *Peruvian Lodge Protection at Snowbird*: Chris Bremmer- Snowbird
- *UDOT Highway Avalanche Safety Program*: Bill Nalli, UDOT

Afternoon Session 1: Recreate Like a Professional

- *Do Backcountry Travelers Really Need Checklists?*: Sarah Carpenter, AAI
- *Looking at Snow Patterns Like a Pro*: Ben Reuter, Montana State University
- *Thinking About the Snow Like a Pro*: Karl Birkeland, Forest Service National Avalanche Center
- *Being Human: Going Deeper, Finding the Goods and Building Our Own Mountain Ethic*: Nancy Bockino, Teton County Search & Rescue, Exum Mountain Guides, and Jackson Hole Outdoor Leadership Institute
- *Where's Your Partner?*: Evelyn Lees, Utah Avalanche Center

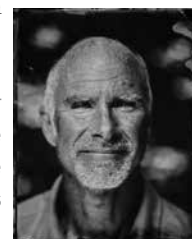
Afternoon Session 2: Decision-Making... For the Past, Present and Future

- *Fast Times and Big Lines, a La Sal Mountain Primer*: Eric Trenbeath, Utah Avalanche Center
- *The Dogma of the Forecast*: Jimmy Tart, Vail Resorts Park City Snow Safety
- *The White Heat Project*: Jerry Johnson, Montana State University
- *Advice to My Younger Self*: Liam Fitzgerald, UDOT (Emeritus)

Sunday Morning Pro Risk Assessment Session

- *Risk Management for Risk Takers*: Jim Conway, Glisse Media
- *Preparing for a Potential Subpoena, Deposition, and Testimony*: Adam Strachan- Strachan Strachan & Simon
- *The Other Victim: How PTSD Affects Avy Workers*: Dave Richards, Alta Snow Safety
- *Risk Management From a Pilot Perspective*: Bret Hutchings, UT Dept. of Public Safety
- *Midday Avalanche Activity Above Highway 210 & Superior Parking Lot*: UDOT/Snowbird.
- *Flake News: Making the Ski Industry Great Again in an Era of Negative Media*: Brian Rosser, Mountain Guard. ▲

Paul Diegel is the former director of the Friends of the Utah Avalanche Center. He now works on special projects for the UAC and skis powder.



2017 SAAW Report

BY HEATHER THAMM

The 2017 Southcentral Alaska Avalanche workshop was hosted at Alaska Pacific University with around 120 people in attendance. The day was divided into two parts with the morning topics geared towards professionals with subjects that included: changes to pro-avalanche certifications, terrain decision-making biases, lessons learned from 16/17 season on the Chugach National Forest, and an intro to the professional near miss database. The afternoon was open to recreational users and included a talk about weather resources for Alaska by the National Weather Service, and two talks on the most neglected rescue skills: strategic shoveling and medical response for an avalanche victim.

Ethan Greene, the featured guest speaker, gave several presentations including a thorough discussion on deep slab problems and a case study of the 2013 Sheep Creek accident in Colorado. A huge thanks to our speakers: Ethan Greene, Jamie Musnicki, Wendy Wagner, Henry Munter, Kyle Van Peurse, Jaime Andersen, and Melis Coady. Instead of hearing from the organizers of the event, here's some highlights from a handful of the participants.

Peter Wadsworth, local observer/backcountry skier

"The theme that ran through many of the talks, and resonated for me, was how insidious a deep persistent slab is; especially in terms of the lack of positive feedback from the snow pack. DPS problems provide even less feedback than normal. It made me rethink several decisions I made last season where "nothing happened". The day led to several long talks with my main ski partner about how our terrain selection should vary more widely with different problems.

I also enjoyed Jaime Andersen's talk on strategic shoveling. It's a topic I enjoy discussing because it shares many of the same issues as the avalanche puzzle overall: Proper assessment of a situation and execution of a plan often run counter to "common" sense or intuition. All the usual human factors we talk about when evaluating avalanche terrain can also ruin an extraction, even after a successful search. My friends and I went out to Hatcher Pass the next day and ran four practice searches and shovel scenarios. The searching was easy, group dynamics and communication in the shoveling went pretty poorly however."

Sarah Carter, Valdez Avalanche Center

"I relate to Henry Munter's musings on terrain bias. He makes two points that stand out to me. First, the lowers (elevation bands) can be what get us in the Chugach. We often focus our analysis on the steeps above the glaciers, but rollovers into rugged ravines and lateral moraines can prove more complex, especially with groups of varying ski ability. Second, the smaller slopes that run less frequently lure us onto them during poor vis or when we're time constrained. While our guard is down, they can vomit up a size two that injures or kills. Henry reminds me to ask: where will it go if I trigger it? How big will it be? Is terrain bias at play here? Do I have another option?"

Rich Peterson, Head Guide for Chugach Powder Guides

"I enjoy this event for both the chance to network and review previous season happenings. I really



CLOCKWISE FROM TOP LEFT: Ethan Greene, guest speaker, discusses the challenges of the Deep Persistent Slab problem. Melis Coady gives a presentation titled 'Caring for the Avalanche Victim.' Henry Munter examines some of the decision-making traps involved with assessing terrain. Jaime Andersen inventories his audience's rescue skills in a talk about strategic shoveling. Photos Heather Thamm

feel like the case studies and decision-making talks are where I get the most out this event."

Mike Welch, Snow Safety Director for Chugach Powder Guides/Alta Ski Patroller

"I appreciated how this conference was geared towards practitioners vs. deeper science. We need deeper scientific study of snow to make advances in this field, but I think that basic bare bones practical skills and knowledge are what will save lives out there. That is what interests me more, so thanks to the organizers!"

Blaine Smith, Alaska Avalanche School

"The primary benefit of the SAAW has been to see and talk to all the various folks in the Alaska avalanche world in one room. I thought that this SAAW was the most congenial and united that I've seen. There truly is more that unites us than divides us. It's really a great group of folks. It was good to see Jaime Musnicki up here representing A3. I think we should be pleased to see A3 in a strong leadership role to bring all parties together to provide higher quality avalanche education in the States. I can really appreciate the difficulties of negotiating this new system and the diplomacy required to assert A3 leadership. Ethan was a great addition to the SAAW! Knowledgeable, easy going, and entertaining are the words I'd use to describe him. I especially enjoyed his deep slab instability talk. It re-acquainted me with the importance of slab density as an important variable in fracture propagation, and spurred questions that we don't have answers to yet. What a great profession; where there is still so much to discover. Jaime Andersen did a good job talking about shoveling. He's a very engaging and entertaining speaker. The talk was practical and useful and further sharpened our understanding of what the main goal is." ▲

Heather Thamm has been an avalanche forecaster since the winter of 2014/15 for the Chugach National Forest Avalanche Information Center based

in Girdwood, Alaska. Previously she was the Assistant Ski Patrol Director for Alyeska Ski Resort where she continues to patrol part-time. In the summers she splits her time photographing weddings and battling invasive weeds across Southcentral, AK.



2017 MSU-SAW Report

BY JERRY JOHNSON

The tragedy of the first avalanche fatality of the year was fresh on our minds as we kicked off the third Montana State University SAW in Bozeman. The harsh reality of the theme—Risk and Reward, was driven home with our keynote presentation by Mary Clayton of Avalanche Canada. Mary presented an excellent and engaging multi-media presentation about the avalanche that buried three in Cherry Bowl in the BC Coast Range (www.avalanche.ca/cherry-bowl/#/intro). Three backcountry skiers, deeply buried by a large avalanche, were dug out alive in less than 20 minutes by a group that had recently taken a companion rescue course. Mary provided not only the background details of the accident, she helped the crowd of mostly MSU students understand the snowpack conditions and decisions that led up to the event. Mary is an engaging and thoughtful speaker and used very nicely crafted videos and animations to present a clear and convincing story—I would urge other SAWs to consider inviting her to present the incident and lessons.

We bookended Mary's presentation with Karl Birkeland's revisit of a local accident that took place near Bozeman in 2005. If you have not viewed "A Dozen More Turns" for some time it is a story worth hearing again



Mary Clayton of Avalanche Canada presenting her "Rescue at Cherry Creek" to a record attendance.

(www.youtube.com/watch?v=w7Pye9f602s). Of course the discussion came back around to the recent accident and Karl fielded several questions with grace and professionalism. There were many lessons laid bare by the two incident reports and recent events.

In between the two main talks we had presentations from MSU snow science graduate student John Sykes on his work documenting terrain use on Saddle Peak near Bridger Bowl. John handed out GPS units to hikers on the ridge and conducted a short survey on the way back up the lift. In past SAWs we have focused on Saddle Peak as a local area of concern and will continue to do so. No MSU SAW would be complete without a presentation from the Gallatin National Forest Avalanche Center and this year Eric Knoff didn't disappoint. He spoke to the when and how of using the GN-FAC avalanche advisory to get the goods when the snowpack is marginal. When snowpack is the problem, terrain is your friend and he explained how to use the advisory to find terrain that is appropriate to the conditions, and sprinkled in a few misadventures along the way. Kevin Hammond, new faculty in the MSU College of Engineering, took us to the Pacific Northwest with his presentation *Avalanche Forecasting for an Untouchable Snowpack: A Case Study from Mount Rainier*. His take-home was that just because we can't dig and wallow in the snow doesn't mean we can't make some assumptions about a snowpack we can observe from afar.

The MSU SAW is organized by myself, Jordy Hendrikx—Director of the MSU Snow and Avalanche Lab, Dave Zinn of GN-FAC Friends, and Ty Atwater, the new director of MSU Outdoor Recreation. Ty was able to announce that MSU now has a new BCA wireless beacon park operational on campus. It is near a new dorm and is expected to get a lot of use from the huge number of students who ski and recreate in Bozeman's quality backcountry. Our university administration is doing their utmost to recognize their responsibility to students and the larger Bozeman community and we receive outstanding financial support from the MSU Dean of Students and the Dean of the MSU College of Letters and Science. There is already talk of a second beacon park in the works.

This year's crowd was a record—nearly 500 people attended—apparently they were hungry for both food and good information. Dave Zinn filled every table around the room with vendors, avalanche course providers, and nonprofits all of whom help make our sport a good reason to live in Bozeman. Thanks to Black Diamond, BCA, Marmot, and Blue Ice packs for helping us with our raffle to support student avalanche

and snow science research. And of course to AAA for their support. ▲

Jerry Johnson is professor of political science at MSU where he teaches natural resource policy. He also works as a research affiliate faculty with Jordy in the Snow and Avalanche lab where their work focuses on the human dimensions of risk and decision-making. He's also working on a new book on grizzly bears and other large predators.



2017 NSAW Report

BY FOREST MCBRIAN

On an unexpectedly clear October day, the eleventh annual Northwest Snow and Avalanche Workshop took place at the Mountaineers Program Center on Lake Washington in Seattle. As in years past, this SAW presented a broad range of topics for both recreational and professional audiences, uniting ski patrollers, mountain rescue volunteers, park rangers, guides, forecasters, and researchers for a day of ongoing education.

NWAC Executive Director Scott Schell moderated our second-ever Pro Panel. Our panelists grappled with difficult questions of mentorship with the theme "Growing the Professional's Skill and Experience in Avalanche Terrain." Panelists included John Stimberis of WSDOT's I-90 and A3 Board of Trustees President; Angela Seidling is Assistant Ski Patrol Manager at Stevens Pass; Colin Zacharias is a Tofino-based consultant; Kim Kircher



NWAC 2017 panel: from L to R: NWAC ED Scott Schell, Colin Zacharias, Angela Seidling, Kim Kircher, Seth Waterfall, John Stimberis. Photo Gloria Goni-McAteer

er is Patrol Director at Crystal Mountain; and Seth Waterfall is a climbing ranger at Mount Rainier National Park. Compelling discussion points included formal mentorship as compared with informal; the difficulty of quantifying experience with specific job tasks; and the challenge of identifying those with the experience, ability, and desire to mentor newer team members.

Local ski mountaineer legend and historian Lowell Skoog began the general session with a history of professional avalanche work in Washington state, a topic that to our knowledge has not been extensively documented. Also on the historical theme was Matt Schonwald's fantastical story of Phantom Slide path in Alpental valley, and the storm that created it.

A delegation of four from the Montana State University Snow and Avalanche Lab brought their latest work. Jerry Johnson presented on the White Heat Project, a smartphone GPS-based study of backcountry terrain use undertaken by Johnson and Jordy Hendrikx of MSU in partnership with UiT in Tromsø, Norway and Umeå University in Umeå, Sweden. On a smaller and finer scale, John Sykes presented his work analyzing the decision-making of lift access backcountry skiers on Saddle Peak near Bridger Bowl in Montana using GPS trackers and surveys. Diana Saly shared her compelling work using a DSLR to monitor high use backcountry avalanche terrain, which produced some startling visuals.

Armchair and professional meteorologists enjoyed presentations on the latest on automated weather products by new NWAC forecaster Robert Hahn; an exploration of the ENSO cycle and its relationship to avalanche activity by Bret Shandro from Simon Fraser University; and our annual soothsaying by Washington State Climatologist Nick Bond, who forecast a pretty average year.

Colin Zacharias shared a retrospective on the key concepts and principles that have made us better at managing avalanche risk over the last ten years.

A new theme emerged at NSAW this year in the form of two ecologically-oriented presentations. Ski guide and wildlife biologist Steph Williams shared the newest findings and questions being taken on by the North Cascades Wolverine Project. WWU microbiologist Robin Kodner presented her work genetically mapping microbial communities in mountain snowpack. Both of these projects use high technology paired with citizen-scientists to gather data on species who call the seasonal snowpack home.

Although NSAW is still looking for a venue to call its permanent home, the event is alive and thriving. The snow and avalanche community of the Pacific Northwest is full of brilliant thinkers and innovators, and it was a pleasure to enjoy their company around a common love for snow, for these mountains, and for the hard work and play that they demand. Those who were unable to attend will be able to enjoy the 2017 NSAW presentations available for viewing on the NWAC Youtube channel. ▲

As the Education and Operations Manager, **Forest McBrian** oversees a range of education projects from free awareness talks across the region to our Going Deep lecture series for experienced backcountry users. He also directs the Professional Observer team. Forest has worked in mountain safety for 13 years and holds IFMGA certification as a mountain guide.



TRENDS OF PERSISTENT SLAB AVALANCHES AFTER SNOWFALL

BY JASON KONIGSBERG

We've had ten days of high pressure and no one has reported an avalanche in a week. The snow structure is bad, cracks are propagating in snowpack tests, and the snowpack still seems scary. Triggering an avalanche is now unlikely, but the expected size is still in the D2 to D3 range. The weather forecast describes more of the same, clear skies, light winds, and no precipitation. What should a regional scale backcountry forecast center tell the public about backcountry recreation tomorrow and what is the avalanche danger under these circumstances?

I work at the Colorado Avalanche Information Center (CAIC) as an Avalanche Forecaster, covering the Steamboat/Flat Tops and Vail/Summit County zones. These are big areas in a continental snow climate. I am faced with the dilemma of poor snow structure, little or no avalanche activity, and mild weather a few times a year; and this was the scenario we faced at our monthly staff meeting in January 2016. With similar conditions around the state we took a poll of the 20 professional avalanche forecasters in the room. Half of the forecasters thought the backcountry avalanche danger should remain at Moderate (Level 2), where it had been for the last week. The other half thought that it was time to drop the danger to Low (Level 1). I was in the Moderate camp. I felt that while stability had certainly improved, we did not have a low-danger snowpack. I wanted more data to support dropping the avalanche danger to Low. This is a hard call to make and I figured other people must have struggled with the same decision. So I went hunting to see if I could get some help working through these situations.

We learn in our first avalanche classes that people can trigger avalanches long after a persistent weak layer is buried. But how long? Can you trigger a persistent slab avalanche after a week without additional loading? I searched through the ISSW proceedings and other published papers, but didn't find any direct answers. So I dove into our rich CAIC avalanche database to begin compiling my own dataset. I wanted to know the likelihood of triggering an avalanche that breaks on a persistent weak layer more than seven days from a loading event.

I pulled data from the Vail and Summit County forecast zone. There is a lot of backcountry recreation in this zone and a lot of avalanche terrain, so there are a lot of avalanches reported. I filtered through all of the avalanches from 2011 to 2016 and identified the ones that slid within old snow or on the ground. I eliminated explosive-triggered avalanches and wet avalanches. I came up with 248 Persistent Slab avalanches over the six years.

I compared each avalanche to weather data from a nearby SNOTEL site. For the purposes of this study, I defined a "storm event" two ways. The first type of storm was a day where the snow height increased by at least four inches. The second type of storm was a series of days, each with at least one inch of new snow, and totaling at least six inches. Once I identified storm events in the weather data, I calculated the number of days between each avalanche and the previous loading event.

As you would expect, a large percentage of avalanches occurred within a few days of a storm. Avalanche activity then rapidly decreased as the number of days since a storm increased. Somewhat

surprising was the amount of avalanches that occurred more than seven days after a storm. **Ninety avalanches out of 248 (36%) occurred more than seven days after a storm** (Figure 1). Clearly, persistent slab avalanches can occur long after a weak layer is buried and long after a storm.

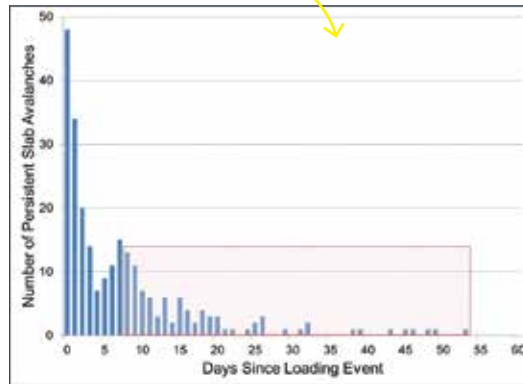


Figure 1. Persistent slab avalanches (n = 248) and the number of days since the last storm when they released. The red rectangle shows a group of 90 persistent slab avalanches that released after a period with no new snow of seven days or more. This group accounts for 36% of the persistent slab avalanches recorded over six years (2011 to 2016).

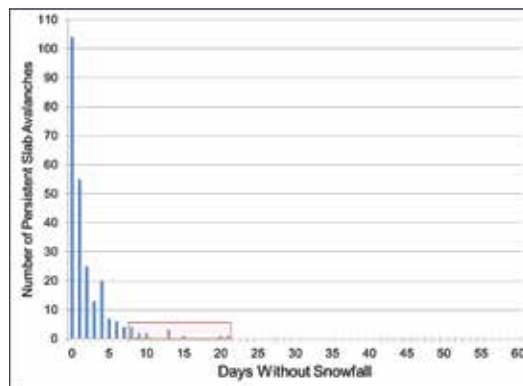


Figure 2. Persistent slab avalanches (n = 248) and the number of days since the last recorded snowfall when they released. The red rectangle shows a group of 14 persistent slab avalanches that released after a period with no new snow of seven days or more. This group accounts for 6% of the persistent slab avalanches recorded over six years (2011 to 2016).

Instead of ending the research here, I analyzed the weather surrounding this subset of avalanches that occurred more than seven days from a storm. I found that in most circumstances these avalanches occurred after a series of small snow events, each less than four inches, and with at least one day without any new snow. For example—two inches on Monday, no snow on Tuesday, two inches on Wednesday, and three inches on Thursday would produce avalanches on Friday. Several small snow events are important for interpreting the avalanche activity, but did not register as a storm in my analysis.

How many persistent slab avalanches release after seven days with no snowfall? I returned to the data and searched for dry weather and days with no new snow, and then for avalanches that occurred during the same time period. The results were very different. Over six winters there were only 14 persistent slab avalanches after periods of more than 7 days with no new snow (Figure 2).

So what does this tell us? Digging through the data I found 248 persistent slab avalanches that released over a six year period. Of those 248, 90 (36%) happen more than 7 days after a storm. Many of these avalanches were preceded by several, small, non-consecutive days with measurable snowfall. Of

these 90 avalanches, only 14 (6%) released after 7 days without any new snow. The data shows that avalanches can happen long after a storm and these avalanches are usually preceded by a string of days with small amounts of snowfall. Without any snowfall, avalanches are much less common.

The weather data I used came from Snotel sites. These sites are typically near or below treeline in Colorado. They are good places to measure snow, but well below the start zone of large avalanche paths. This probably explains why my dataset has a lot of avalanches after four inch snow events. Four inches at a Snotel site probably equates to much larger amounts in adjacent alpine areas. Another thing to consider when you're looking at these results is that I looked at snow events and not wind events. In Colorado the snow and wind often come together, but I can't rule out that some of the avalanches released after wind events without snow.

I wanted to see if the trend was any different for avalanches that caused a fatal accident. I applied the same criteria to determine if the accident involved a persistent slab avalanche and found 20 cases in the six years (2011 to 2016). Of these 20 avalanche accidents, 19 (95%) of them occurred within seven days of a storm (as defined above). The remaining accident occurred after a combination of wind and snow loading events. The accident investigator noted that "...approximately 15 cms of soft storm snow had fallen and been drifted onto the slope in the several days prior to the accident."

Now back to the original question—“Can persistent slab avalanches occur for a long time after a loading event?” This dataset suggests they can and will. They also suggest that persistent slab avalanches are much more likely after a loading event, even a small one. In the dataset I compiled for this study, persistent slab avalanches were uncommon after more than seven days without snowfall.

So, what about the danger rating under these circumstances? It is generally accepted that Low (Level 1) danger allows for unlikely to very unlikely large and very large avalanches in isolated areas. So we can have Low avalanche danger even when there is poor snowpack structure and persistent weak layers. Looking at the graph of avalanches that occur after more than seven days without snowfall (Figure 2), the tail shows a period without any snowfall where avalanches happen but are infrequent. This time period is a good example of when we see Low avalanche danger with persistent weak layers. It's hard for forecasters to go to Low when faced with a poor snowpack structure and propagating results in snowpack tests. However, this exploration into the weather and avalanche data in northern Colorado suggests that after a week of no avalanches and no snowfall, it might be time to consider it. ▲

Thanks to Ethan Greene and all of my co-forecasters and my wife Katie, who all helped with input, guidance, and editing...lots of editing.



Jason Konigsberg is a forecaster for the CAIC for the Vail/Summit County and Steamboat/Flat Tops zones. Prior to the CAIC, Jason ski patrolled mostly in Utah with stints in New Zealand and Montana. He also taught avalanche classes with AAI.

Pro rider Rob Kingwell and his support team balance considerations of current avalanche conditions, his ability to successfully complete the chosen line, with the consequences of athlete error or avalanche.



Into

THE MATRIX

Knowing Your Acceptable Risk Profile

BY JIM CONWAY

As avalanche professionals, one of our critical assessments when traveling in avalanche terrain is to determine the risk (avalanche, terrain, rider ability, and other factors) to ourselves and our team members; and to make informed decisions based on these risks. The cold reality is that IF we travel in the backcountry, we assume risk. The way we mitigate these risks is by identifying them to the best of our ability, and coming up with a plan to: actively control them, passively avoid them, or limit our exposure to them. This is followed by a cycle of continuous review and reassessment as we travel. The purpose of this paper is to review the critical steps in how we determine risk, then how that risk relates to what we individually, or as a team, deem acceptable.

Guides and forecasters have many well-defined systems for determining avalanche hazard or risk. One of the best tools we use is the Probability/Consequence Matrix. This engineered path to common sense and rational thinking is also used throughout industry and the military to come up with reliable risk assessments. Whether you are determining risks for a Recon Team in the Marines, or to determine the amount of exposure an investment fund may be exposed to in the market, the Risk/Consequence Matrix is the fundamental tool for performing formal risk analysis.

Forecasters use the Probability/Consequence Matrix in a very well-defined format: What is the likelihood of an avalanche happening versus what destructive size it could be. This is done for each avalanche problem to develop an overall forecast.

Most forecasters for guide and resort operations have added a step analyzing other factors that backcountry travelers face that can worsen an avalanche occurrence such as exposure or terrain traps describing it as “Exposure and Vulnerability”¹ to determine overall risk. Another method is to apply all the factors onto the Probability/Consequence Matrix for a more holistic assessment of the traveler risk. These factors are analyzed as to actual terrain to be traveled, or at the ‘Run’ level: these include but are not limited to:

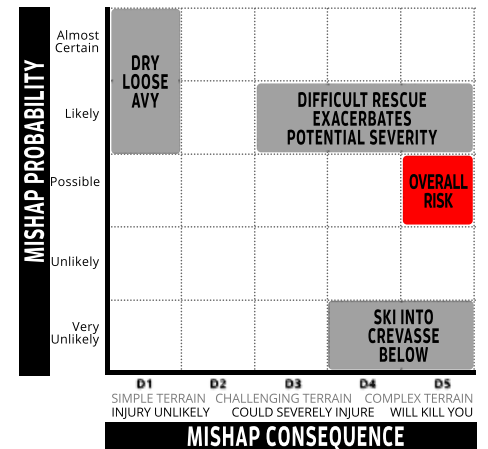
PROBABILITY

- Avalanche likelihood
- Control results
- Type of Avalanche problem
- Snowpit observations
- Red flags
- Avy history
- Terrain type
- Weather & trend
- Probability skier will fall (ability)
- Probability team will make bad decisions (team’s mountain sense)
- Probability for communication mix-up

CONSEQUENCE

- Size of avalanche
- Cliffs/exposure
- Length of run
- Terrain traps
- Trees or structures below
- Can rescuers handle potential mishaps?
- Will difficult evaluation reduce victim survivability?
- Are helicopters available to expedite evacuation?
- Is advanced medical care available nearby?
- Will the age & fitness of team members exacerbate injuries?

As you can see, this list includes not only avalanche factors, but terrain, traveler, and rescue factors. Once you have this list, the analysis process allows you to determine overall risk using the Probability/Consequence Matrix. When it comes to “Run” level decision-making (terrain you are going to actually travel) you can use the Matrix to evaluate all the risk factors. The important thing is you assess the risk for the ENTIRE undertaking. This will allow you to develop an analytical process to help you define your risk in an organized manner.



In the above scenario, a pro skier in Alaska my face likely dry loose activity (sluffs) with little D Scale consequence but the line may be over death exposure. Is this acceptable risk?

The tricky part in this phase of risk determination is how the numerous individual factors and their potential impacts balance each other in the final assessment. In the above example we have a professional skier with little likelihood of falling or making a skiing error, but there likely will be sluffs that can sweep even the best skier off their feet AND there is death exposure from a large crevasse below. Additionally, rescue in Alaska is difficult, advanced medical care is far away, resulting in potentially higher consequence for otherwise treatable conditions. In the example above, the responsible decision is to back off the run (and that is exactly what we have done many times in the TGR crew). The reason for this is threefold: Although a pro skier could likely negotiate this type of slope with a good sluff management plan without in-

1. Grant Statham, “Avalanche Essentials”, 2013, Mountaineers Books

cident, the added hazard of dry loose avalanches, though normally inconsequential, simply presents an unacceptable risk due to the death exposure below; and should the skier survive a fall, rescue is complicated by the remoteness and distance to advanced medical care, making favorable outcomes less certain. In this example the skier MIGHT be able to beat his sluff, but a conservative analysis would rate the overall assessed risk in this example to be a possibility of the skier having a high consequence mishap. Few informed backcountry users, pro or otherwise, would view this as acceptable risk. While this is a simplified example showing how various risk factors can interact with each other, some evaluations can be rather complex and require experience and unbiased assessment to be able to sort through.

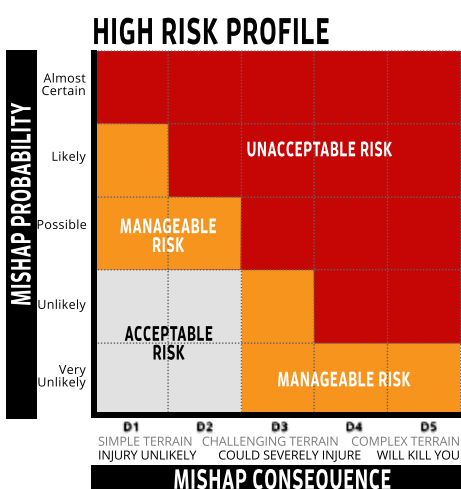
Acceptable Risk

Having reviewed how we determine our overall or anticipated risk using the matrix, we can now look at the concept of Acceptable Risk. For the purposes of this discussion let's define Acceptable Risk for a backcountry user or professional as a condition where travel is generally unrestricted. Manageable Risk on the other hand allows for travel but with mitigations steps such as 'off limit' areas, active control work, or limiting access to certain personnel. Is this acceptable risk the same for all users? Would you have the same acceptable risk for a group of school kids on a field trip as you would for a pro skier in Alaska, or a ski resort or guide operation. A key technique to using the Probability/Consequence Matrix to make operational or travel decisions knowing the limits of your team's acceptable and/or manageable risk. These limits may be imposed specifically, or inferred by management, or the travel team may set their limits. Let's call this the Acceptable/Manageable Risk Profile. The difference between acceptable and manageable is seen in the level of mitigation required in areas deemed "Manageable" (Control work, terrain avoidance, limiting who may use the terrain, etc.). This profile will vary depending on the team's: Goals, tolerance for risk, legal exposure, and ethical considerations. This interpretation is identified independently by the team's tolerance for risk, not in the risk determination process.

Let's look at three different potential Acceptable Risk Profiles for three uniquely different operations.

Scenario 1: Film Crew With Professional Athletes

Assume for this scenario there is a very experienced film team that conducts intense annual training in their mountain skills, first aid and rescue (i.e. TGR). The Acceptable Risk Profile may look something like this:

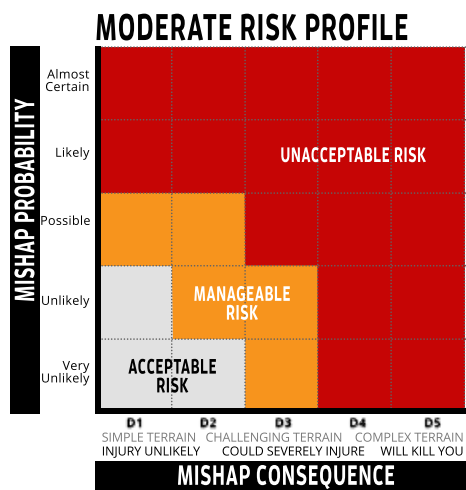


In this example the tolerance for risk is high. The team is willing to manage risk when probability of a mishap is very unlikely, and the consequences could be fatal; or when probability is likely but serious injury is unlikely. This profile is based on the team's experience and mitigation tools such as the athlete's ability to recognize potential hazards statically and on the fly; and their ability to 'ski out' of potentially dangerous situations (i.e. straight running to outrun sluffs or small pockets). In addition, the team's training and a well-equipped helicopter with first aid and rescue gear helps reduce consequence in the event of a mishap.

As guides, forecasters, and patrollers we are ALL risk managers. As a tape measure is to a carpenter, the Probability/Consequence Matrix is to a risk manager.

Scenario 2: Backcountry Guiding Operation

Assume in this scenario that that a guide is managing risk for his client team and that the clients have some backcountry experience and an awareness of the risks involved. For this group the Acceptable Risk Profile may look something like this:

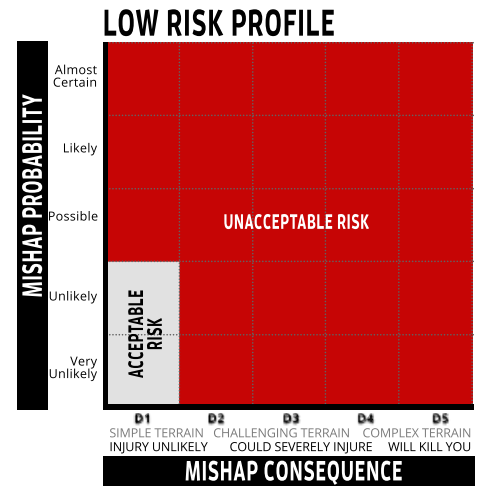


In this case there is a moderate level of risk tolerance. The team would find it acceptable to enter terrain where injury or avalanche is unlikely in terrain whose consequences are relatively minor. They would also be willing to manage terrain that could result in a serious avalanche or could injure a person when probability is Unlikely or less. Note that in this scenario the guide/client team decided that their Acceptable/Manageable Risk Profile precludes entering terrain that that could cause severe injury or produce a serious avalanche (D3) when the probability of a mishap is "possible."

Scenario 3: Children's Backcountry Fieldtrip

Assume that the backcountry team in this scenario is a group of children under the supervision of an experienced guide. Can children even make an informed decision as to their level of

acceptable risk? In this case the Acceptable Risk Profile may look like:



When dealing with minors, or other groups that simply do not understand the risk and are therefore unable to assume it, a more conservative approach would typically be taken. In this scenario you may only be willing to freely enter very low consequence terrain in terms of personal injury or D Size when the probability of avalanche or accident is unlikely or very unlikely. You may not even want to get into a situation where you manage or mitigate risks but simply avoid them altogether.


Looking at these three examples we can clearly see a unique distinction in how different user groups may approach their risk management in terms of what risk they deem acceptable. The importance of this as avalanche professions is that we use this knowledge to ensure our fellow team members and/or clients are on the same page when we enter the backcountry environment. Be that a patrol team on routes, or a guide making decisions for the group, it is important to understand where everyone's acceptable risk lies. As an organization it is even more important that all team members understand the operation's levels of Acceptable/Manageable Risk.

Conclusion

As guides, forecasters, and patrollers we are ALL risk managers. As a tape measure is to a carpenter, the Probability/Consequence Matrix is to a risk manager. Already in use as tool to identify levels of risk in avalanche forecasting, it is also a tool ideally suited to evaluating all risk factors in the backcountry, and helping us to analyze the "overall" risk at the "Run" level. This tool also allows us to determine where "we" are in terms of what we consider acceptable or allowable risk.

To help us in this process new tools have been developed in Canada to help us both define risk factors such as the Avalanche Terrain Exposure Scale (ATES), and to define acceptable risk profiles; such as the Parks Canada Custodial Groups policy that developed rules governing youth groups access to the backcountry using the ATES scale (consequence) and forecasted avalanche hazard (probability).

Whether you sit down and draw out a matrix to organize your thoughts, or complete the process in your head out in the field; familiarity with the parameters and analytical process involved in using the Probability/Consequence Matrix helps to generate sound and hopefully unbiased assessments of where your risk is. Applying the overall risk assessment to your Acceptable Risk Profile helps determine if travel decisions fit into your group or organization's tolerance for risk. ▲



While skiing this line, named Little AK, there's an added risk of bergschrunds and terrain traps. Moreover, there's a rollover where instabilities (caused by wind) can be perpetuated at the very top of the route, more so than on the main portion of the face. In the photo you can see a few smaller turns taken at this point, before ripping into the steeper part of the face. It's a small safety measure, but still a benefit as a last check before dropping into the meat of a line. This was a satisfying line and a spectacular moment to capture. As a photographer and skier, my greatest happiness comes when we all return home with smiles and, if fortune favors, great imagery. This day had both.

—Jason Hummel
alpinestateofmind.com

**ARE WE
GOOD?**

OR JUST LUCKY?



Cracks and avalanches in Prince William Sound, Alaska. The avalanche occurred in the previous days.
Photo by Joe Stock
www.stockalpine.com

WERE WE GOOD OR LUCKY?

It started like any other day of touring. Ben and I exchanged a series of haphazard text messages until we finally found a date we were both free to do a little powder hunting. Being cautious back-country travelers, we solicited a few others to join our party, which had soon swollen to seven. We traveled Millennium Falcon-style to the trailhead, headlights illuminating streaks of snowfall in the pre-dawn darkness. Last-minute skin adjustments, a final gulp of coffee, and a beacon check put us on the skin track.

As we ascended into the storm for a day of free refills, we met yet another friend heading the same direction who was grateful for some traveling companions. Our group size bulged to eight and included everyone from an off-piste first-timer to seasoned guides. The storm continued. The wind and snowfall rate increased as we climbed higher into the growing whiteout, salivating over freshies that we would have all to ourselves that day in what was normally a popular zone.

We stopped in a familiar flat for some snacks and a quick pit that did not inspire confidence in the snow stability. Two test slopes showed us shooting cracks, leading to wide eyes from the less-experienced in our cohort. We decided lower elevation and lower angle snow would be the way to go. We ripped skins and headed for the safety of an exit ridge.

Ben and I were fully in “guide mode” at this point, assuming leadership of the group as the storm worsened and slopes grew ever more loaded. We started down the ridge, one at a time, putting in tight turns between a bowl on either side. Ben threaded the needle to a safe zone. A second party member followed. The third caused a sympathetic release in the left bowl but made it to the safe zone. The fourth caused a sympathetic release in the right bowl but was similarly unscathed. The fifth person made it down without incident. I waited to bring up the rear.

I carefully made my turns and that was it. Soon, we were safely back at the cars. We shared excitement and parting hugs over a great day skiing powder that we had all to ourselves. But as we drove back to town together, I wondered aloud to Ben, “How’d we do today? Did we just get lucky out there?”

A similar situation is bound to happen to us at least once during our career in avalanche terrain, and likely multiple times. At the end of the day, when nothing seemingly went wrong, how do we know we actually made the right calls? How do we know we didn’t just get lucky?

Unfortunately, when we venture out to do battle with the white dragon, we are often missing a key component needed for the kind of experience that breeds expertise — clear feedback.

BY DEREK DEBRUIN

Short answer: we don’t.

There’s a familiar maxim that “Good judgment comes from experience, and experience comes from bad judgment.” Alternately, this might be expressed in Burch’s conscious competence model. The Dunning-Kruger effect highlights a similar idea. Regardless which flavor you prefer, the fundamental point is the same. When you lack expertise, you simply don’t know what you don’t know. This can complicate things considerably when debriefing a day in avalanche terrain. How can we expect to debrief a day effectively and learn from it if we don’t have access to an expert to guide our constructive feedback?

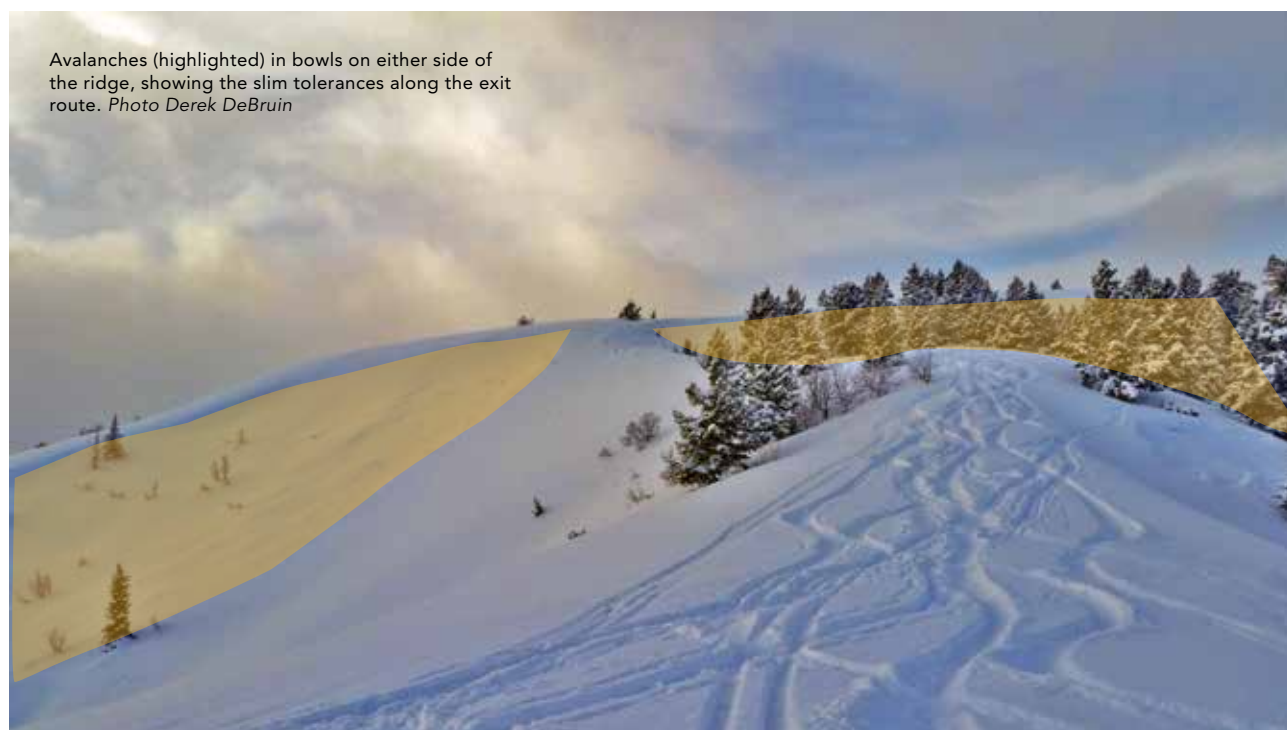
The daily debrief is further complicated by the very idea of expertise. A cursory treatment of the notion of expertise in the avalanche literature reminds us of the dangers of expertise as a human factor. Who gets to be considered an “expert?” How does one even become an expert?

When considering expertise, it’s tempting to think of the “10,000 hours” rule popularized by Malcom Gladwell’s book *Outliers*. An expert is someone how has accrued 10,000 hours of experience in a domain. This idea is itself based on K. Anders Ericsson’s research on deliberate practice—that is, simple experience is insufficient. Methodical, careful practice with clear feedback is needed. However, Gladwell and Ericsson both agree that 10,000 hours of experience does not guarantee expertise, but rather that this experience is simply a pre-condition for expertise to be possible. In other words, experience does not make an expert, but it’s hard to be an expert without experience. For those doing the math, this comes out to about 10 years of experience if spending 8 hours a day in avalanche terrain, 5 days a week, assuming a generous 6-month winter season.

Unfortunately, when we venture out to do battle with the white dragon, we are often missing a key component needed for the kind



of experience that breeds expertise—clear feedback. Shooting cracks, whumping, and an ECT2 that pops and drops are all pretty clear indicators that the snow is unstable. But that’s about all we know for sure. Lack of these things doesn’t necessarily indicate stability, hence the deep-seated unease and back-of-the-mind anxieties over that deep slab instability buried 1.2 meters down. Riding a slope dozens of times might lead to nothing but a face full of powder and matching sets of figure eights. This leads us to believe we’ve done everything correctly simply because the slope didn’t slide. The cruel truth is



Avalanches (highlighted) in bowls on either side of the ridge, showing the slim tolerances along the exit route. Photo Derek DeBruin



Azissa Singh finishes a quick boot uphill after the initial exit route proved to be too unstable. Photo Derek DeBruin

that the moment you finally get clear feedback might be the same moment you go for the ride and find yourself in a cold, dark, and scary place.

How can we compensate for this blind spot when reviewing our day's decision-making? Fundamentally, we want to address what happened, why it happened, and how we can do better the next time. Consider the following key points to help evaluate a field day, expert or not:

1. **Stick to the basics.** Hopefully these are the things that have been drilled home after repeated work days, professional development, course work, trainings, and personal outings. Did you make a tour plan? Did you check the weather forecast? Did you check the avalanche advisory? Were you carrying avalanche rescue equipment? Did you perform a beacon check? Did you make it a point to take observations in the field? Did you use safe travel techniques? While these questions might seem unquestionably basic to seasoned professionals, they can be easy to overlook in familiar terrain, with familiar partners, or when we're just trying to squeeze in a quick lap.
2. **Consider terrain.** Did you identify avalanche terrain in advance as part of your tour plan? What were the "no-go" or "closed" zones? Did you stay out of these zones? What avalanche terrain was "open" based on your plan? Did you travel in it? If so, how did you know it was safe to go in that avalanche terrain?
3. **Use decision-making tools.** Snowpack lemons, the 3x3 method, the reduction method, the Avaluator, red flags. There are a host of tools to help identify avalanche hazard and avoid it. Did you plan to use any? If so, did you actually use them? Did you apply them in their entirety and as designed/intended?
4. **Consider consequence.** Risk depends on three factors: exposure, probability, and consequence. On any given day, our exposure is usually fixed—we are in the field for whatever amount of time we will be in the field, with however many people are in our party. The probability that a slope will avalanche is often unknown and is, at best, an estimate. This leaves consequence as the only factor within our control. Ask: what would happen if it slides? How big would it be? How wide? How deep? Would it catch and/or bury me? How far would it run? What would I hit if I got caught? What would I fall off if I got caught? Where would I get buried? How deeply would I be buried? Would we have enough resources to rescue me? Consider this for all the avalanche terrain traveled.
5. **Identify vulnerability.** Ask: when and where were we most vulnerable today as a group? As individuals? How

COMPETENCE VS. CONFIDENCE

In an ideal world, our confidence in our skills would increase at the same rate as our competence in the relevant domain. For example, better avalanche forecasting skills should yield greater confidence in the forecast. Noel Burch proposed a four-stage competence model in the 1970s that outlines how we build competence. This has since been adapted to include a reflective component.

1. **Unaware incompetence.** We don't know what we don't know, and we also don't know a whole lot in general about a particular domain.
2. **Aware incompetence.** We know enough to know we are in over our heads. Mistakes are common, but with reflection can lead to rapid learning.
3. **Deliberate competence.** We know what we are doing, but it takes a lot of concentration. This is the difference in effortlessly carving down a line and consciously focusing on your technique to ensure you don't fall.
4. **Automatic competence.** The skill is second nature and requires very little direct focus. For experts at the highest level, thinking about performing a skill too much can actually have a negative impact on performance. Failure to reflect on and continue learning from experiences can lead to complacency, which is effectively a reversion to unaware incompetence. However, those willing to accept and incorporate feedback can continue to grow and refine skills.

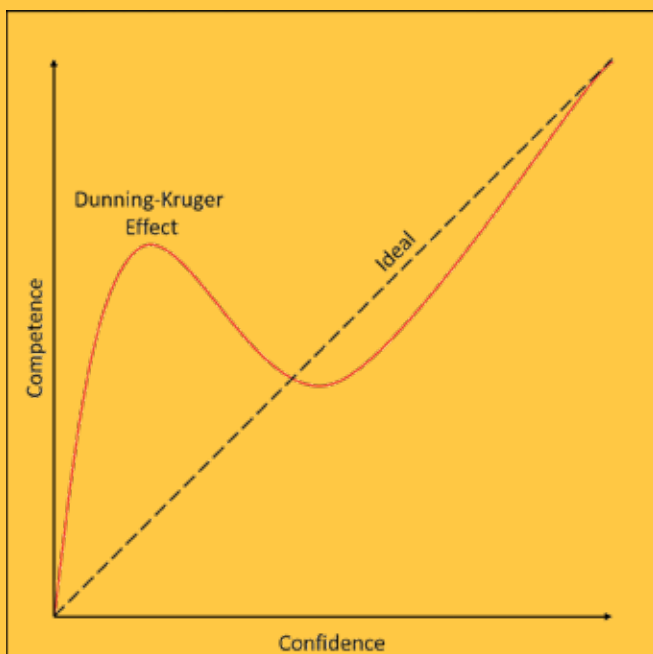


DUNNING-KRUGER

Justin Kruger and David Dunning expanded on the potential mismatch between competence and confidence in their seminal 1999 paper "Unskilled and Unaware of It: How Difficulties in Recognizing One's Own Incompetence Lead to Inflated Self-Assessments." The key addition from this study was a measure of the participants' confidence in their abilities. In general, those who performed well recognized their strong performance, though they tended to perform slightly better than they thought they had. Think of these people as professional forecasters, patrollers, or guides who hedge against being over-confident. Those who performed the absolute worst also tended to recognize this. These folks are the casual weekend snowshoer or Nordic skier who just stays home when the hazard goes up. However, those who performed just a bit better than the very poorest thought they had performed above average. This might be the person ducking the ropes at your local resort to hit that sweet line because the forecast for the day was Moderate, neglecting to read or comprehend the deep slab problem mentioned in the forecast.

There have been a number of arguments against the validity or strength of this effect (a few of them statistical and convincing; further reading: www.talyarkoni.org/blog/2010/07/07/what-the-dunning-kruger-effect-is-and-isnt/), but further studies do support the idea that those with lower levels of competence overrate their own performance to some degree. The Dunning-Kruger effect is often misinterpreted to mean that those with lower competence think they perform better than others who are highly competent. The data do not support this generally; those with lower competence simply think they perform better than they actually do.

This effect can cause headache, and perhaps heartache, for avalanche educators. There's a not uncommon refrain that Level 1 avalanche courses teach just enough to really get students into trouble. This is because students typically leave the course on the cusp of unaware incompetence and aware incompetence. They may recognize their previous lack of knowledge but fail to recognize the large discrepancy between the relatively small amount of knowledge they just gained and true expertise. This makes them ripe for the Dunning-Kruger effect, which can have devastating consequences in the face of deadly mistakes.



could we avoid that next time? Be as honest as possible. If the only response to reducing vulnerability the next time is "don't go out at all," you probably did everything right (or you did it really wrong).

- 6. Check your gut.** We're often warned against the dangers of human factors. Those familiar with Kahneman and Tversky will be familiar with "fast" and "slow" thinking systems. Identify when you made gut-level ("fast") decisions during the day. Aim to avoid times when the gut says "Go for it!" and heed the warning those times when the gut yells, "Stop!"
- 7. Check public observations.** Others' observations can be a useful post-mortem tool as well. Did others report avalanches in your zone you didn't see? What were the results of others' stability tests? Did these match your own experience in the field? Were there significant disparities? Why?
- 8. Be conservative and humble.** Using this list requires humility and the assumption that we always have more to learn. All too often, our confidence outpaces our competence. If you're not sure, just assume you don't know. If you're ever 100% sure, then you definitely don't know. And if you don't know, back off. When a backcountry traveler gets caught in an avalanche, it's always pilot error. There is no way around this. Humility is way cooler than being dead.

Using this list is not a guarantee, and to be frank, I don't have any data to support it. In my experience, using it means that more often than not I don't ski that slope or climb that line when there's too much uncertainty. That can be a serious bummer. On the other hand, it makes the daily debrief easy. If I come home to my wife and son at the end of the day in one piece, there's no question in my mind about whether I got lucky—I know I made the right call. ▲

The high mountains demand a complex combination of competence, confidence, humility, and willingness to change your mind and run away.
Photo Aaron Diamond





DID WE MAKE THE RIGHT CALL?

It was mid-winter and our group of three left the trailhead with ambitions of linking a few routes in the Tetons. We skinned for a few hours before reaching our first objective, a steep 1500', north facing couloir ending at 9000'. As we ascended the couloir the unconsolidated snow turned slabby and we bailed less than 500' up the couloir. Instead we opted for our second objective, a 3000', north facing couloir starting at 9000' that we would approach by rappelling in from the top. We rappelled in, felt right-side up snow, pulled the rope and committed to the couloir.

Almost immediately after we started skiing the snow turned slabby, fractured at our skis and poured down the couloir. This happened a few more times as we encountered small pockets that the previous avalanches hadn't triggered. Luckily, no one was caught, and we returned to the car physically fine but pretty shaken up. We all knew without saying that a ride in any one of the slides would have killed us.

As we motored back towards town and our respective cars we debriefed the day. We had made an abundance of mistakes across the board from terrain and stability assessment to decision-making, and communication. In our team debrief most of our mistakes stood out like a sore thumb.

When we returned to town we ran into Lynne Wolfe (a mentor to almost everyone in the group). After a bit of prying (we were embarrassed by how badly we had botched it) we told her about our day and our thoughts on where and how we went wrong. She gave some feedback and advice, but one bit stood out as something I had not thought of doing.

"Write it down. Write it down in as much detail as you can and set it aside for a while before revisiting it"

So that's what I did. I wrote it down with as much detail as I could remember (including my takeaways from the debrief) and set it aside. I didn't reread any of it until the start of following season. Most of the takeaways from the story stayed the same but a few more came to light that I had missed when I had first debriefed our near miss.

This got me thinking, near misses and accidents provide the best feedback in the wicked learning environment of snow and avalanches. Good debriefs of these events show us the holes in our (in) stability assessment and decision-making. Hopefully we take this information and move forward a little bit wiser. My partners and I

Write it down. Write it down in as much detail as you can and set it aside for a while before revisiting it.

BY AARON DIAMOND

agree on the importance of taking lessons from accidents and near misses into our practice; we're experimenting with ways to expand our debriefs of every touring day to head off those incipient behaviors before they become close calls.

The following season I began to write down narratives and debrief takeaways of days where things didn't seem to go according to plan. These were the days that I would put into the "nothing bad happened but maybe we just got away with it" category. Then, after I had written these narratives down I put them on the shelf until the summer when I picked them back up and reread them.

Once again, I stumbled on a few things from each that I had missed or overlooked. I also noticed recurring habits that a few of the days shared. I missed these previously because I had not revisited my old field books other than when an uncommon snowpack or weather pattern showed up in town. These were the blind spots I didn't know I had. For example, when I used to think about my blind spots, some of my steep, goal-orientated ski days came to mind. I assumed that while trying to achieve a goal I would tend towards an irrational decision process. However, I found that very few of the days where #nothingbadhappened occurred in extreme terrain; more commonly they occurred on relatively small slopes (think D2-3/R5) and while recreating with peers.

Since that season I have continued to write down the details of days where #nothingbadhappened; I review them before the start of each season and try to put a system in place to guard against these blind spots. Needless to say, it's not a perfect system and as I grow as an avalanche professional, recreationist, and person my blind spots, both known and unknown, change. Hopefully this personal debrief strategy will help me stay a little more on top of them. ▲



Aaron Diamond is a guide and educator based in Jackson, WY. He works for Exum Mountain Guides, The American Avalanche Institute, and Yostmark Backcountry Tours and Mountain Trip. In his free time Aaron enjoys skiing or climbing with friends and eating a little bit too much dessert.



With the above average snowpack in the Tetons last winter, a few buildings at the Exum summer office needed to be cleaned off. Luck for Adam and I as we approached this one we remotely triggered the slab as we walked towards it and sent 1-2m thick chunks flying off the roof! Pretty wild! Photo Aaron Diamond

THE DAY END DEBRIEF

A daily summary and debrief is a critical component of avalanche risk management. Individual and group debriefs should be encouraged at all levels, from the recreational level avalanche course to the avalanche worker.

The importance of a day end debrief becomes clear when identifying the objectives:

1. document and summarize today's conditions
2. review today's decision and improve today's plan for next time

These objectives provide closure to the day's decision-making process and ensure that our daily hazard and risk forecast isn't left hanging as speculation. The debrief provides opportunity for feedback on whether the risk was effectively and safely managed, and identifies a strategy for improvement.

1. Summarize Conditions

What did we see?

How was it different than what we thought we'd see?

Are things getting better or worse?

Documentation allows us to remember and reference; and to identify trends and assess the accuracy of our forecast.

Questions promote group discussion and individual reflection. Identifying what we know, what we thought we knew, and concluding with what we still don't know (targeting uncertainty) helps us gain wisdom.

Feedback informs opinion. Our perspective is informed by observations that "ground truth" our hazard assessment. However, our observations may add up to a few data points, and experience and extrapolation are required to form an accurate analysis. It is not uncommon for two experienced observers to travel in the same drainage and come home with a different hazard assessment. In the context of providing feedback, the snowpack can be notoriously silent, and an informed perspective from experienced colleagues is essential to a well formed opinion. We know that "recognition primed decision or response" (from Klein and others) is integral to our decision-making process. The Catch 22 is that "our intuition is only correct to the extent that the historical reference connects the right facts to the right reference" (Antonio DeMasio, UCLA Brain and Creativity Institute. Also, from Klein, Hogarth and others).

Reaching consensus during a group discussion of how the weather is affecting the hazard, what are the distribution and sensitivity of the primary problem, what are the sources of uncertainty, and how the hazard is trending, helps both the worker and recreationalist connect the right facts to the right circumstance and properly inform our future decisions.

2. Review Today's Decisions: Improve Today's Plan

What were the strengths and shortcomings of today's plan?

Where were we most at risk?

What could we have done better?

Whereas part one's summary involves observation, analysis, and learned interpretation, part two's risk evaluation asks face to face questions that beg for honest appraisal and self-evaluation.

BY COLIN ZACHARIAS

"If we went back to the same slope in the same conditions tomorrow, what would we do differently?" is a more specific and potentially more valuable rewording of the broad question "What could we have done better?"

As professionals we plan to limit our exposure and deliberately build in margins of safety (usually by ensuring that our terrain use strategy reflects our uncertainty). One way to identify whether we are operating consistently within an acceptable level of risk is through a daily review of our decisions.

Providing honest feedback to colleagues or ski touring partners is never easy. A few suggestions can help:

1. Feedback carries more weight when delivered soon after observation (Peter Renner, "The Art of Teaching Adults"). Debrief as soon as you are back in the office, post control route, or post ski touring trip, and before folks are distracted by other tasks.
2. Formalize the debrief into a standard post trip event (i.e. follow a debriefing format). Ensure everyone buys in, expects it, and verbalizes that they are willing to engage. Ensure the group is in a comfortable setting without distractions (no smart phones).
3. Rotate the role of facilitator. Participants are less likely to take feedback personally when they understand that the formal questions are not personalized. The pre-written questions are directed at the group process, not at the individual.
4. Ensure first that each individual wants and requests any personal feedback on their decisions or actions. No one appreciates unsolicited feedback, especially when it's personal.
5. Comment only on what was observed or what happened. Stick to the facts. (For example, "during the ascent, more than one person was exposed to the slope"). Leave the speculation on "reasons why" to the professional psychiatrist and their couch. (For example, "you were quite fatigued which may have affected your ability to make good decisions or come up with a better option"). Inferences or hunches can be interpreted as a personal attack.
6. Take "near misses" seriously and document and debrief near misses as you would an accident—employing a professional to provide counsel if necessary. The result can be due as much to chance as any deliberate action. Operation supervisors and trip leaders alike should not underestimate the possibility of post event stress that can affect worker relationships, job satisfaction, and friendships.

Lessons learned stick when they can be immediately applied or visualized. "If we went back to the same slope in the same conditions tomorrow, what would we do differently?" is a more specific and potentially more valuable rewording of the broad question "What could we have done better?" ▲

Colin Zacharias is self-employed as a consultant in both the avalanche and mountain guiding industries. His contribution to education includes operations staff training, pro courses (CAA and AAA programs), CPD seminars, public awareness workshops, and occasional articles in *The Avalanche Journal* and *The Avalanche Review*.



TRANSITIONS

BY DON SHARAF

This article threatens to be one that I wouldn't have read five years ago, but as time marches along I have become as intrigued as much by the decision-making process as the actual data that helps make that decision. Talk of the different brain functions and psychology still have short residence time between my ears, but how we can make the pasta stick to the ceiling really challenges me to think through both the problem and the solution.

There are three major questions that have been bouncing around in my head for the last year.

How can we facilitate the transition of knowledge into wisdom?

What do we get from studying a subject? Knowledge, perhaps skills, but very seldom do we get a lot of practice of where and when to apply them. A roadmap of where to go from here is a useful end to avalanche courses, but equally as important for learning on the job or self-study. Colin Zacharias' article in a previous TAR issue (27.2 December 2008, pages 26, 28) is a good start for creating this roadmap.

How do we convert experience into expertise?

There are hundreds of quotes about acquiring experience, yet experience alone doesn't lead to better practice. We need to be able to recognize when our past experiences are relevant, and when they are not.

How do we teach humility?

Doug Krause posed this question to me, and I have then passed that question on to many of our instructors. The usual response is deafening silence followed by the need for instructors and mentors to role-model humility. True dat, but can we do more? Part of the answer may lie in letting students experience controlled failure (incorrect decisions with low consequences). Case studies and scenarios where students feel empathy with the accident victims (presented in a way that they would make similar decisions) can illustrate how capable we are of making an incorrect decision even with newly acquired skills and knowledge.

While these three questions are quite different, I believe the solutions are interrelated and best solved through reflection. Easy to say—harder to do. For several years we have been focusing on the question “did we make good decisions today or did we get away

Fun doesn't have to go away to apply the lessons that we learn, but self-discipline needs to be part of our program.

PROFESSIONAL PERSPECTIVE: AAI

with it?” I find it hard to answer that question without breaking it down into questions that tease out the answer with more specificity. Some of the questions that I will ask myself, and my students, are:

- Did we get surprised today by snowpack, weather, terrain, or our own actions?
- Where were we most vulnerable today? Did we anticipate arriving at that point and did we exit from that point thoughtfully/safely or was it an unplanned hasty retreat?
- Did we go off script? If so, why and was that ultimately a good thing?

Avalanche accidents often are traced back to inadequate, or totally absent, pre-trip/pre-route planning. The avalanche industry and avalanche educators have pushed for more thoughtful starts to the day, and I think professionals are quite good about doing their homework.

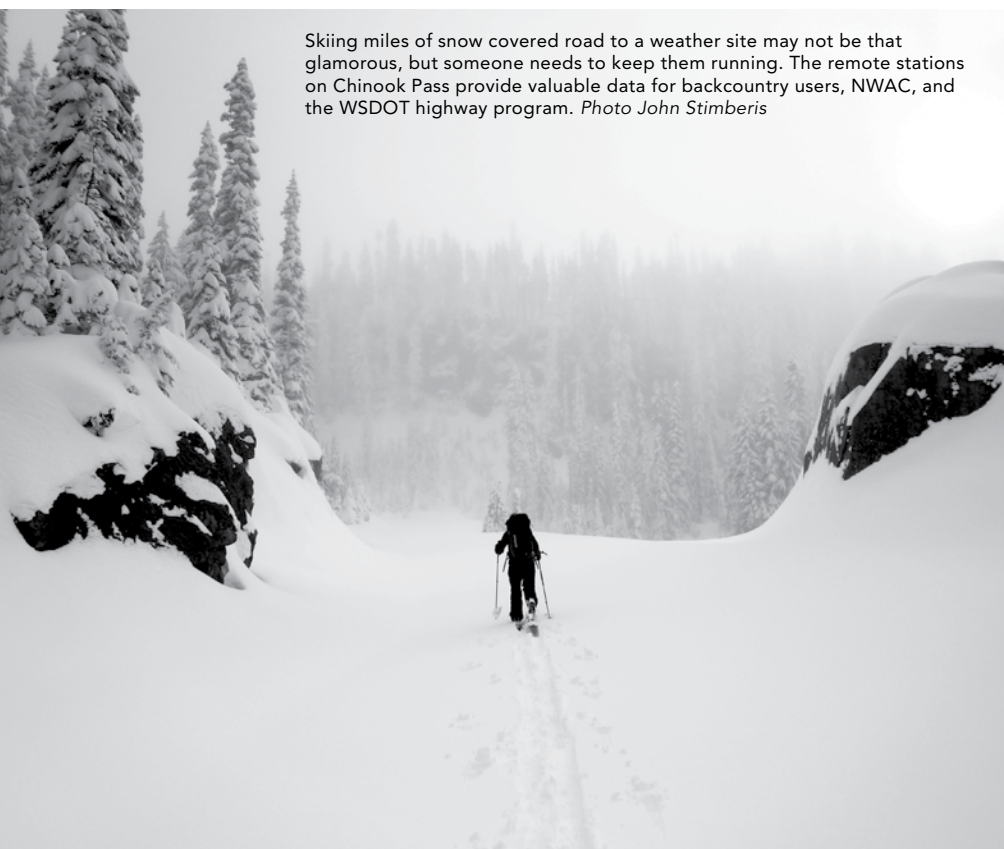
Often the problems arise when conditions are different from what we anticipated AND when they aren't different but we make changes to our travel plan based on the spur of the moment decisions without due consideration of why we made the plan to start with. Powder fever and innate curiosity often drive us to ski a little further that we thought would be smart moments before. Two of my students who I thought were very smart, high mileage (very experienced), and conservative decision-makers were killed by a spontaneous drive to take one more turn downslope or go slightly off-route. I am guilty of the same decisions, but have not paid as dearly for my actions. Ultimately, a life spent in avalanche terrain where the exposure time grows day by day is a high risk one. Discipline is one of the tools that we have to fight back.

Does reflection answer my three nagging questions about converting knowledge into wisdom, experience into expertise, and converting unsupported confidence into humility? I believe so. Through reflection on our travel/work days we can start assessing whether our experience is pertinent to the problems at hand, are we applying the right tools at the right time, and are we behaving more confidently than we should for the current conditions.

Arguably the hardest part of the learning process is taking your hard-won insights and translating them into practice. Playing by rules, even if self-created, is not what drew everyone to the avalanche profession. I hear the calls for freedom, independence, and cowboy wisdom as loudly as the cries of the families and friends who have lost someone to an avalanche. Fun doesn't have to go away to apply the lessons that we learn, but self-discipline needs to be part of our program. If you know it is unstable and consequences are high, then don't take it to the very edge of what you think is safe. Allowing enough margin for more than one thing to go wrong at once is a great way to approach uncertain situations. When uncertainty is high, you need more arrows for your quiver, more shots for your pack, or more low consequence options for you and your clients. Sometimes you may not have all the self-discipline you need and a good partner may be able to remind of where you have fallen before. Often, reflection won't necessarily lead to new practices, but will load the 'hard drive' with more experiences that are valid and pertinent. Without reflection, we may fall into the trap of cataloging a non-event day along with a bunch of truly safe days, where that may not have been the case at all.

So with some measure of wisdom, expertise, and humility do I make good decisions all the time? Hell no, but I tend not to make the same dumb decisions over and over again. Perhaps that is as good a starting point as any... ▲

Don Sharaf is co-owner of American Avalanche Institute. He is grateful for the people he calls friends and mentors and ungrateful for long periods between winter storms and mid-winter thaws.



Skiing miles of snow covered road to a weather site may not be that glamorous, but someone needs to keep them running. The remote stations on Chinook Pass provide valuable data for backcountry users, NWAC, and the WSDOT highway program. Photo John Stimberis

FROM NEW ZEALAND

When we return from a backcountry day in the field, we routinely discuss:

How close was your call on the snow stability (yes, this still gets taught here as some operations still discuss it along with the specifics of the avalanche problems) and danger rating specifics from your morning call? What were the inconsistencies, if any? What may have been missed and why?

How well did we manage the risk today? When were we most exposed, if at all?

What human factors may have been present (positive and negative) and how well did we mitigate them (i.e. what strategies were used)?

What are the top three things you took away from today (i.e. what did you learn)?

This process is done in the small group that they toured in (usually up to seven all up with instructor) over 30 min, all are expected to contribute. I also have them record on a separate page in their field notebook the day's takeaway points, allowing a quick end-of-course reflection to be found in one place.

—Pete Bilous, Wanaka NZ

Peter has over 25 years of experience as a guide, forecaster, and educator working in Alaska, Canada, Asia, and home in New Zealand. He has been managing the pro avalanche program for Otago Polytechnic since 2004 and chairs the NZ Snow and Avalanche Committee. Peter uses a highly developed powder-sniffer to find the goods and enabled sphincter-tightener to bring everybody home again —when not relying on good friends like Lynne and Dan to do the same for him.



HISTORY OF AIARE DEBRIEF QUESTIONS

BY TOM MURPHY

Hi Lynne, thanks for your inquiry regarding the Debrief. I'm including Ben and Colin so they can comment, as they, along with others on our Ed Comm, are responsible for the most recent iteration of the questions. I can speak to what I recall were some of the original ideas for including it, allowing Ben and Colin to correct that record as well.

Going way, way back, some of our ideas centered around the concept of building a curriculum that was constructed around a decision-making process (in part) that professionals used, and distill it in a fashion that we could represent to our students at all levels (understanding that our students had limited trend recognition capabilities and inadequate experience to perform stability assessment without professional input). To that end we asked ourselves, what do we do, as professionals traveling in the backcountry?

A morning Planning Meeting/Guides Meeting along with an Evening Guides Meeting is considered professional best practice. As I recall, that was the genesis of the inclusion of the 'Review the Day'/'Debrief' portion of the curriculum and eventual inclusion of this process into the Field Book.

We know that it's mostly high fives and beers at the end of a day of a successful and fun backcountry tour (accidents were always debriefed in full) however we knew that if we introduce this concept it potentially would be a positive influence on the tour participants, giving them an opportunity to share their thoughts and feelings experienced during the day with their tour partners and learn from each other (this would always be practiced in our courses). Much like Evening Guides Meetings allowed guides to share insights on their day.

So far as the individual questions in the debrief, they are developed in part to emphasize some of the most important considerations for managing risk and reinforce lessons learned over their course time. While I did not take part in crafting the most recent questions, I know in the past that there would be significant back and forth within the Ed Comm along with outside vetting of the questions. I'm sure Colin and Ben are either laughing or cringing at the amount of time it took them to come to agreement on each and every word that eventually went to print in this most recent iteration. They could likely add some insight into the process and your questions. ▲

Tom Murphy is a co-founder and former Executive Director of AIARE.



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AIARE FOUR DEBRIEF QUESTIONS

BY BEN PRITCHETT

PROFESSIONAL PERSPECTIVE: AIARE

These four questions below were designed to be concise and clear, but intentionally loaded to promote deep discussion. Murf's right, Colin and I can laugh and cringe at the amount of time and number of revisions invested to select these exact words.

Were our choices in line w/ our forecast / plan?

To begin to answer this question, one has to reflect on the plan, and one's expectations going into the day. After a moment of reflection, on day's when a group anticipated the conditions well, the dialogue tends to probe into group communication and how well decisions were implemented or not. In contrast, on days when the plan failed to account for the conditions in the field or tactics required to manage the problem, sources of forecast uncertainty tend to emerge. Either way, this question draws links from what one expected to what the group actually did. As you point out, this question is very similar to the After Action Review questions: "what was expected?" and "what occurred?"

When were we most at risk?

For me personally, I've found this the most insightful and valuable conversation starter of the bunch. We all perceive exposure, consequence, and vulnerability differently. This question brings each of these matters right to the forefront and often uncover the "why" behind people's emotions about choices made. This question helps to calibrate a team's perceptions.

Where could we have triggered a slide?

This simple question begs one's summary hazard analysis. Sometimes people will describe where they believe the group was lucky, and exposed themselves to a slope that could have slid, but the intent behind the question is to identify where in the terrain observed were avalanches possible or likely today. Define the day's avalanche problem by describing specific features, hopefully ones that we didn't choose to expose ourselves to today.

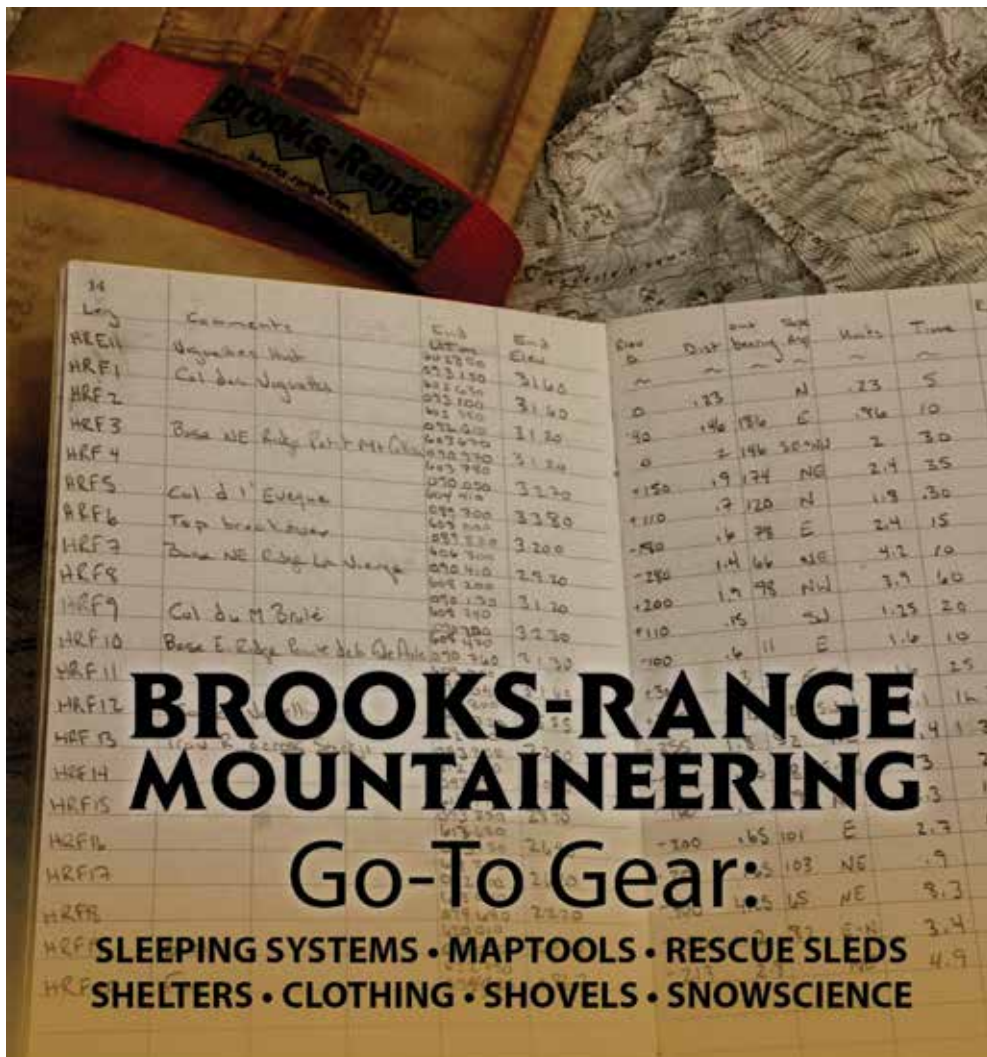
What would we do differently next time?

This is the link forward, the chance to make the conversation proactive and practical. If we miss this step, we're undeniably more likely to make the same mistakes again and again.

We first published these 4 questions in our 2011 AIARE field book. ▲



Ben Pritchett is the Director of the Crested Butte Avalanche Center, and served as AIARE's Program Director from 2002 through last winter.



VHSG OPERATIONAL COMMUNICATION NOTES

BY SPENCER STORM

Size:

Group size for our formal AM/PM meetings is usually 12-18 staff members (8-10 guides, 2-4 pilots, and 2-4 ground staff). With this many potential contributors it is very important that all members have a solid operational awareness. Commentary during the AM/PM briefing is expected to be:

Relevant, Appropriate, Clear and Concise.

After initial AM/PM briefings are completed we break into small groups (pods) of no larger than 4. This is an important step as it encourages all members to contribute and reduces the span of control to a maximum of three.

Reproducible:

VHSG has standardized forms for both AM and PM meetings to ensure our briefing and debriefing practices remain consistent and relevant. These forms are completed by our dispatcher who acts as scribe to ensure in-season and post-season review and collaboration is efficient.

The guidelines are a simple working document created by myself and others including Serra, Sharaf, and Raynor.

All guides and staff certainly contribute to our ongoing attempt at improving communication in a fast paced operational environment.

Spencer Storm resides in Little Cottonwood Canyon and has been working in the ski industry since 2002 as a ski patroller, guide, rescuer, and operations manager in Utah, Colorado and Alaska. Spencer has led four different guiding operations while founding two and is an American Avalanche Association certified instructor. Preferences include deep powder snow and steep skiing, dislikes include the need for snowmaking and parochialism.



VALDEZ HELI-SKI GUIDES OPERATIONAL COMMUNICATION

Good communication is an operational imperative.

This is a communication and conduct policy that all guides and staff should attempt to follow.

Demeanor in guide meetings:

- Operational problems should be addressed with a focus on developing solutions, without insulting, or demeaning.
- Please remember that listening is important so pay attention, respect your peers, and acknowledge each other often.

Praise in public:

- Positive feedback for efforts of others is encouraged.
- Sarcasm, personal criticism and demeaning commentary are strongly discouraged.
- Where a conflict exists or criticism is appropriate, it is to be handled “outside of group discussion” with or without management assistance, which should be offered for any circumstance requiring mediation.

Respect for each participant’s opinion:

- Guides should be encouraged to collaborate and to allow each other to complete a statement before any response. Please don’t interrupt.
- Guides should not be discouraged to question opinions and forecasts. The basis for disagreement should be expressed professionally and without personal criticism.

Respect for the group and operation:

- Guides and Forecasters make a concerted effort to follow the meeting schedule.
- Guides understand the importance of being prepared and using time efficiently. Individual contributions are important but should be relevant and appropriate.
- Each guide is expected to be familiar with the weather forecast before the AM guide meeting commences and should have reviewed recent VHSG daily Avalanche Forecast and other relevant observations.
- In the field “buy-in” and group input is an important part of run progression within the Pod.

Objection of any participant to the daily plan:

- Each guide team member not only contributes to the discussion, they share opinions.

VHSG AM Snow Safety & Weather:

Quality of Discussions & Training:

The quality of the guide meeting discussion on snow safety and weather forecast is important. Discussions should quickly move through a progression of:

- What: problematic layer, to
- How: what atmospheric conditions caused the layer to develop, to
- Where: what other drainages, aspects and altitudes within operating terrain would have been subject to those atmospheric conditions.

AM Guide Meeting:

Our time is limited in our meetings and “attention is a scarce resource” so please remember to speak concisely, clearly, and appropriately.

0800-0810: Weather and Avalanche Forecast, Daily Operational Mindset

0810-0815: Guide Collaboration and Input

0815-0816: Logistics and Groupings

0816-0830: Break into small groups (Pods) (2-4) for daily plan and zone review with Pod Leader. ★

Digital Run Book Presentation of relevant operational zones

Pod leaders lead specific discussion regarding zone, hazards, and groupings while encouraging contribution from other guides.

★ Guide staff breaks into daily PODS where POD leader leads daily plan and terrain management plan with zone specifics as they relate to forecast as well as groupings and efficiency.

PM Guide Meeting:

Pod reports should be limited to two minutes or less and should include avalanche and weather observations, quality of snow and the availability of fresh tracks available in the circuits skied. Small group discussion and commentary should quickly move to a close as the day concludes.

A brief POD leader meeting to discuss next day operations will follow the PM guide meeting.

Overall, the quality of the discussion and communications within the group in meetings and in the field are going to be a product of a team-based, collaborative approach as well as VHSG’s operational communication structure. ▲

APPROACHING DEBRIEFS: A NOLS-BASED PERSPECTIVE

BY LIZ KING

NOLS uses debriefs as an education tool for generating tangible lessons and action plans that can be applied to improve future performance. The goal of a debrief is to encourage learning and growth by taking the time to acknowledge what things were done well that should continue to happen and what, if anything, needs to be addressed or changed moving forward. In a nutshell, this is part of the Kolb Learning Cycle, a model that illustrates how we develop judgment and learn from what we have done before. It's the foundation of experiential education.

Debriefs, at their worst, become a painful daily ritual of tedious conversation that inevitably coincides with hunger and exhaustion. To run an effective debrief, as a third party or as a facilitator for your own group, takes some intention. Before the conversation begins, think about what kind of debrief this should be and does anything need to be specifically addressed. Posing the question, "so... how'd it go?" does not do much to generate specific learning.

NOLS is currently emphasizing two different approaches to debriefs, technical and adaptive, and for the purposes of discussion these will be defined by how they address problems.

A **technical issue** has a solution and can often be solved by changing structure or gaining competence.

Adaptive challenges involve problems with attitudes, values, perspectives, attachments, etc...and are much more difficult to address, fix, and improve on in the future (because personal growth is hard). There are an unlimited number of ways to apply these approaches to debrief your day in the mountains.

Examples of technical debrief questions that may be relevant at the end of a tour:

- How did we do with timing? Were we hitting our schedule and, if not, was that OK?
- Did we put the skin track in an appropriate place? Where was there room for improvement?
- At what points today were we exposed and why did we accept that risk?
- Am I fit enough coming off my recent vacation in Baja to have gone for this objective? Should I get my ass in shape before going into terrain this committing? Did I have the bandwidth to think about things other than the wind I was sucking?
- Was our assessment of today's problem list accurate? Were there any surprises that we could have forecasted for?

These technical topics are typically areas where there are known best practices that can be identified and reinforced. It is also SUPER IMPORTANT to acknowledge and discuss successes so that they can be replicated in the future. Humans, like dogs, learn well through positive reinforcement and taking a moment to recognize the good from the day will make those behaviors more likely to be repeated in the future.

Adaptive debriefing is harder. In the avalanche world, this is where you address the most complicated human factors and conflicts. Questions that can help open this conversation include:

- How did we make decisions and was that process effective? Did the entire party support the decision that was made?
- Was anyone consciously or unconsciously impeding our ability to work within the agreed-upon strategic mindset?
- Were interpersonal dynamics negatively impacting anyone's ability to share concerns or contribute to the discussion?
- What did you do to empower others and encourage equal participation?
- Was our/your risk tolerance for these conditions appropriate? And, if not, why is that our/your risk tolerance?

By opening these discussions, the debriefer aims to create an opportunity for reflection on each person's role in understanding

PROFESSIONAL PERSPECTIVE: NOLS

If we don't take the time to name how to move forward, we just had a long and potentially challenging conversation for nothing.

the human factor and in providing partners with useful and specific feedback. This is where listening becomes a crucial skill which takes some practice to master. Adaptive debriefs can feel like hard conversations, and it is important to be able to have hard conversations with the people you trust, whether in the backcountry or out. Compared to technical debriefs, adaptive next steps are harder to pin down, and finding tangible things to move forward with can be the beginning of changing behaviors that may be entrenched and need to go.

As a debriefer, it can be challenging to navigate the question of, "how much input should I offer?" Often, taking the role of a neutral facilitator is what the situation warrants. With this approach it is best to ask questions, ask follow-up questions, and then think about what questions are not being asked. On the other hand, it can be perfectly appropriate, even necessary, for some perspective to be put forth. There is an interesting concept kicking around NOLS that when debriefing an instructor team, the supervisor should "never be neutral." This statement has been made to empower the person guiding the conversation to offer input on performance, perspective on any incidents, and feedback on what was done well/did not meet expectations.

Depending on the emotional space in which people exist, offering input can be problematic as everyone needs to be open to listening as opposed to taking a defensive stance. Navigating your role as a debriefer, and which approach to take, is often an art. Before the conversation begins, decide where it should go. This strategy of backplanning can provide a roadmap, give you structure, and guide the types of questions that are being asked. If daunted by deciding how to approach a conversation, ask the people what will be most helpful for them.

End debriefs by asking the question of "what next?" and take the time to reflect on how the conversation can improve your time in the mountains. This final step is imperative in employing the leaning cycle because, if we don't take the time to name how to move forward, we just had a long and potentially challenging conversation for nothing. ▲

Liz King lives in Victor, ID where she works as a program supervisor for NOLS Teton Valley and guides for Yostmark Backcountry Tours. For fun she skis, mountain bikes, and rides her Mustang, Waffles, whenever possible. Born in Houston, TX, Liz began her career with NOLS after graduating from the University of Montana and works as a horsepacking, backpacking, and winter instructor in addition to her "office job."



A small avalanche just above the skin track in Mail Cabin gives the inquiring backcountry traveler a host of information to be incorporated into future decisions.
Photo Patrick Solomon

LEARNING FROM MISTAKES

Train your intuition to make good decisions in avalanche terrain

Last April we skied on the icefields above Prince William Sound. It was an Alaska trip of a lifetime: great friends, perfect weather, and mostly stable snow. We skied so many monster faces and powder-filled chutes that we didn't bother counting.

It's tempting to congratulate myself and say, "Well done. Your experience, conditions, and partners came together for another ideal trip." The problem is, congratulating myself for a job well done doesn't improve my avalanche skills. Getting better takes effort, practice, and admitting my mistakes.

I recently read Jonah Lehrer's book *How We Decide*. It's easy to read and full of decision-making nuggets directly applicable to backcountry skiing. While Lehrer doesn't have the cachet of Kahneman—the author of *Thinking, Fast and Slow*, the most popular book for avalanche psychology—Lehrer is a better writer. He eloquently synthesizes modern decision research into a usable form. What stood out most to me in *How We Decide* was how to train our intuition to make good decisions.

Lehrer starts the book by explaining the problem with our attempts to be rational. While some situations necessitate slow, rational decision-making, such as when planning a day of backcountry skiing, most of our decisions in the backcountry come from intuition. We make thousands of intuition-based decisions each day. Should I turn left or right around those trees ahead? We don't have time to deliberate the pros and cons of each decision. We just do it.

The problem is that intuition can steer us wrong in avalanche terrain. Our brain doesn't do well with uncertainty (see my previous essay *Managing Avalanche Uncertainty* www.stockalpine.com/posts/managing-avalanche-uncertainty.html). It's like winning at the slot machine. We get such a visceral thrill from winning the slots, which is similar to the visceral thrill of skiing a steep powder face that doesn't avalanche. We may have made a poor decision and gotten lucky. If we get away with those bad decisions, and don't re-analyze them, we are simply reinforcing our bad habits and intuitions. Just like the casino eventually wins, if we keep succumbing to the powder, and perceiving that we're making good decisions in the face of avalanche uncertainty, the avalanche will win.

So how do we train our intuition to make good decisions in the face of so much uncertainty?

According to research summarized by Lehrer, we can train our intuition by examining our mistakes. This research particularly follows the aviation industry and work done by psychologist Carol Dweck. By studying mistakes, we can build patterns in our brain to recognize those bad situations and make good decisions instead.

Close calls (see another of my blog posts about my personal close calls: www.stockalpine.com/posts/close-calls-with-avalanches.html) with avalanches are one type of mistake that we can examine and use to train our intuition to avoid in the future. It's also worth examining the many small mistakes that occur while backcountry skiing. In ski guiding operations, mistakes and close calls are debriefed during the evening guide meeting. In avalanche courses, students are taught to debrief with the questions: "Where were we most at risk?" and "How can we do better next time?" What follows is an example of how we can examine mistakes on a day-to-day basis.

To debrief our trip to Prince William Sound, I've taken a critical look at five runs. Rather than focusing on how bleeping awesome each run was, I've dissected the runs, looking for the mistakes I made. For each run I've assigned a self-critique rating. A 0% score would be an accident. A 100% score would be nailing it.

No Warm Up Chute. Self-critique rating: 20%

From Anchorage, we flew out to Prince William Sound, set up camp, and dashed out for some runs on mellow, south-facing slopes. From our first summit, I looked north, down into a steep chute filled with shallow, soft powder. To me, the snow had that old, ultra-stable look. We skied it. It was amazing. But I bombed it.

Experience is simply the name we give our mistakes.

-Oscar Wilde

BY JOE STOCK

These are my mistakes and how I can improve:

Mistake #1: I didn't apply terrain progression.

I always preach "Apply terrain progression!" Start small and get on bigger terrain if conditions allow. We did plan to start small with some corn runs, but I got lured into the chute. It was like placing a fillet of Copper River Red in front of our really bad cat and saying, "Don't touch!" I couldn't resist. Applying terrain progression takes diligence and self-control. Next time, I'm going to discuss terrain progression with my partners before putting on skis, so they can help keep me in check. Then I'll keep the self-control gun stuck to my head.

Mistakes # 2 & 3: I didn't dig a pit and I didn't listen to my partner.

As we assessed the entrance to the chute, one person in our group said, "I think we should dig a pit." Seemed like a good idea. We had little information on this wild snowpack. Might as well get our hands in the snow and gather some data. Especially if I'm going to ignore terrain progression! But two of us in the group felt that the snow was stable. In my frenzy to ski, I brushed off my partner's request to dig the pit. Big mistake. More data equals less uncertainty. Next time, I'll try and take 10 minutes to dig a pit. And I'll try and listen to my partner's suggestions.

Mistake #4: I didn't consider the weakest link.

Not everyone had 100% confidence in their ability to make turns in this chute. It was steep enough that a slip from the top could send you sliding to the base. With two 100-foot sections of rope, we belayed the initial ski cutter down the steepest section, and the second skier. The problem is, if I'm getting the rope out on the first run, I'm making a big mistake. Next time I'll warm up with terrain progression. And I'll do a better job at tuning into my partner's concerns about steep terrain.

Camp Gully. Self-Critique rating: 60%

This was an obvious pencil-thin chute above camp. One day we returned to camp from a big day of skiing, changed out kit, and booted up the chute. Two of us stopped about 100 meters from the top, feeling that the consequences of a fall were too high for our ability. It was steep, about 53 degrees where we stopped, with cornices curling overhead. Plus, a fall would send you into the rock wall. Above, the chute tilted to 56 degrees. Two others in our group climbed up to the col. These are my mistakes and how I can improve:

Mistake #1: I didn't speak my concern.

On the descent, seeking a safe-zone in the complex terrain, my partner tucked up against the rock wall. At the base of the rock wall was a mini half-pipe of firm snow. In hindsight I should have recognized it as a garbage chute, formed by debris falling from above. From alpine climbing in New Zealand's Southern Alps I'd learned these garbage chutes can offer solid ice for climbing, but if sun hits the upper slopes, or people knock stuff from above, the garbage chute becomes a funnel for high speed rocks and ice.

Like I halfway expected, some debris came rocketing down the garbage chute and thumped my partner in the back. Shocked and creeped out, my partner climbed from the false security of the garbage chute and joined me on the other side of the gully.

Why didn't I say, "Probably less exposed over here, on this side of the chute"? Maybe because I didn't recognize the garbage chute. More likely though, I didn't say anything because I'm so damned worried that people will think, "Oh, that's Joe, the annoying guide telling us what to do again." So in my effort to fit in with my tribe, I stay quiet. Speaking my concern in the mountains, in an assertive manner, to non-clients about safety is one of my weakest skills. I need to work on saying what I'm feeling, right away, so it doesn't build into an explosion of awkwardness, or lead to an accident.

Cracks and Avalanches. Self-critique rating: 30%

On our fourth day, two friends flew out for the day from Anchorage, bumping our group size to seven. A great number for socializing, but an unruly number in avalanche terrain.

We started that morning by carving down a frozen, south-facing run. Next, we headed toward a prominent summit with a glaciated north face. While skinning the ridge to the summit we were spread out over a half mile, partially regrouping at the summit. The views and skiing from the summit were off the hook. But I bombed this one also. These are my mistakes and how I can improve:

Mistake #1: I changed my plan.

While skinning the ridge, we saw a recent soft storm slab avalanche between a series of sunken crevasse bridges. Because of the avalanche and crevasses, I decided I wasn't going to ski the face. I used my photographer excuse to linger by the side and take photos. I watched each skier ride the sluffy, dreamy powder far above the icefield. Nothing avalanched on the top pitch. I raced over and skied the face and joined the group. On the second pitch, I was fourth down. A slab of snow 30 by 30 meters by 30 cm deep pulled out and followed me slowly down the face to the runout below.

Why didn't I stick with my plan to avoid skiing the face? I had seen the older avalanche and crevasse terrain traps. I got suckered in by the powder and snow. I became your typical stupid sheep, following the herd. Next time I'll be more diligent about listening to my negative gut feeling. And then acting upon it.

Mistake #2: I deferred to the knowledge of a partner.

One person in our group had 20 years of snow safety experience at one of the most avalanche-prone ski resorts in the US. Knowing that his avalanche experience dwarfed mine, I deferred to his knowledge. That's not the right thing to do. No matter how much experience a partner has, they're still human, not a robot. They're just as susceptible to powder as I am. I need to make my own decisions and share my fact-based observations with the group in an assertive manner.

Falling Chute. Self-critique rating: 90%

On the sixth day we returned to a beautiful chute that we scouted days earlier. Forty-degree powder dropping into a distant basin. During the week, we discussed the run, its conditions, and how to go about skiing it. Standing above the run, we agreed upon a plan. We spotted from two safe zones. We made two ski cuts. We leapfrogged from safe zone to safe zone. This is my mistake and how I can improve:

Mistake #1: My inability to think of a mistake.

I'm sure I made some mistakes. So what are they? There must be some. It's impossible for me to entirely nail a run. The unknown unknowns. Hmmmm...

Final run. Self-critique rating: 75%

On the last day the sky went grey and the light dead flat. Our energy was low from skiing all week. In an attempt to keep things close to home, we decided on a big, chute-laden face just over the ridge from camp. It was an eye-catching line I'd seen on a trip to the region years earlier.

From camp we skinned and scrambled through rocks until we stood above the run. After an hour of deliberating we returned to camp with no prize. Or was it a big prize? Turning around can be more difficult than dropping in. This is my mistake and how I can improve:



Falling Chute in Prince William Sound, Alaska. We made two ski cuts at the top before leap-frogging down the chute. Photo Joe Stock, www.stockalpine.com

Mistake #1: I didn't participate in the decision-making.

We were on the same page: tired, satisfied from a week of great skiing and thinking about the avalanche we triggered a few days earlier. We all felt on the verge of clicking in and making the first ski cuts. But something creepy kept us from doing so.

Feeling we were on the same page, I hung back and didn't participate as much in the decision-making. My partner's discussion put me at ease. Was that a cop out, or was that one less cook in the kitchen? Either way, I should have clearly stated my opinion backed up by facts: "I think this face doesn't have the storm slab problem we saw yesterday. But the face has shallow-trigger zones around the rocks. If something does avalanche it would grate us through the terrain trap. Plus, the flat light makes assessment difficult."

Applying Learning from Mistakes

Learning from mistakes is yet another gem we can take from aviation and apply to the avalanche world. In personal use, and in all levels of avalanche education, we can use these three aviation decision-making techniques:

1. Crew Resource Management uses the power of all minds in the team to make better decisions and avoid dictatorships that lead to accidents. As Lehrer writes, "It deters certainty and stimulates debate." To avoid aviation lingo, we can call this "team decision-making." An example might be to say open-ended questions to your group such as, "What do you think about ascending the face to the ridge?"
2. Simple Checklists prompt us to consider important steps when dealing with complex problems, such as avoiding avalanches.
3. Debrief your Mistakes, no matter how small, and consider how to avoid them next time. This trains our intuition to make better decisions in the future.

On a personal level, this winter I'm going to work on examining my mistakes after each day of skiing. I'll especially focus on the two areas I need the most improvement: speaking my mind in large groups of friends and listening to partners when they voice concern. When appropriate, I'll talk with partners, including clients, about the mistakes I've made, being aware to state my mistakes in a way that stresses self-examination, with the goal of promoting discussion. Maybe I can fine tune my intuition to avoid avalanches for another 30 years. ▲

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DIGGING INTO THE AFTER ACTION REVIEW (AAR) WITH TODD HENSHAW

TAR: On Tuesday December 5 I had a phone interview with Todd Henshaw, who was a US Army officer for 24 years, where he used AAR for combat training and operations, so he thought that it would be natural to bring the skill to business applications. He now teaches AAR through Wharton for 75% of the time with the other 25% of his time spent as a consultant.

TH: We use the Army four questions in a constant stream. Most organizations actually spend more time on the third question—WHY did this happen? This is also a good time to coach your people regarding prevention, anticipation, causation, etc.

TAR: What are blocks to using the AAR effectively?

TH: Ego! Unless you are comfortable in your own skin, ego gets in the way.

TAR: How can you have people feel safe and not ego-attached?

TH: To stand up and be self-critical is very difficult. Have this process become part of the culture. At Wharton- we call it Democratizing learning, and people listen to assessment or recommendations based on relevant expertise, not just seniority or rank. The tone within any team needs to be both critical and constructive, so that authority isn't the main criteria for the decision-making. If the leader finds themselves critiquing the team, the tone can't be safe or constructive. The intent would be for the team to assess itself, and for individual team members to account for their own performances., good and bad. AAR helps develop a learning culture, which then makes you more agile. In many circumstances this requires and forces a potential culture change. AAR helps with learning within the team, from each team to the larger organization, and more importantly, helps develop a learning, innovative, and courageous culture, where people provide direct feedback, try to balance performance and learning, and celebrate great performances as well.

Looking at near misses (both yours and of others) is crucial for pre-learning, but using AAR when things go smoothly is good as well. Teams can use the AAR to celebrate.

TAR: How do you get beyond the Dunning-Kruger effect, where people don't always acknowledge their knowledge and expertise gaps?

TH: AAR is great to combat Dunning-Kruger...in a team where feedback is direct and regular, people might get a better sense of true capability, and understand more clearly where they need to focus improvement efforts. People at top need to do this (AAR/ admit that things didn't go smoothly) in order to set an example. Sometimes we start the training in the middle echelons of a company, but CEOs need to model it so that the process takes hold. Organizations need to move away from personality and single-person driven organiza-

tions, i.e., the AAR helps leaders solve complex, adaptive problems by bringing together the best minds in the organization. Gone are the days when one brain will suffice...too much complexity, uncertainty, rapid change...

The 4th question, "how do we do better next time?" is creativity oriented, so it can bring all kinds of new perspectives and practices into a company or a small group. It's also a way to promote inclusion...people have a voice in how the team can change its performance or otherwise adapt to their environment.

TAR: How is this different from a debrief? How do we make it stick?

TH:

1. AAR should be done after critical failures, but also when team is successful, as an opportunity to exploit success
2. Leader doesn't critique, responsibility on team members to prepare for the discussion and participate in the assessment of performance and recommendations for improvement.
3. Focus is on adapting to changing task environment, allows information from the environment to be communicated across the team, and decisions to be made regarding adaptations.
4. The Why is most important, not just the what and when...

We make it stick by demonstrating the value of the learning, and the culture of learning that results.

As a leader, you have to leave breadcrumbs, point out clearly how it worked/ that it has worked/ invest time in showing link between pre/ post. AAR can be short, before or after your day.

Innovations from AAR need to be followed up on/ implemented, the leader assigns responsibility for reinforcing learning. Allotting resources, keep it simple and enforceable. Have the AAR be a natural function, part of normal business. Tying the learning to success will have people seeing the return on investment for the time they've invested in the AAR.

AAR is very popular in the many executive programs that I teach because it is so simple. Implementing AAR is the simplest thing that you can do/ take back and use. It isn't complex, but it's repeatable and easy to remember. You can see differences in your team meetings and conversations almost immediately

Results of the AARs also can influence who you promote and retain organizationally and who you continue to ski with in the recreational world. ▲

Dr. Todd Henshaw is a Senior Fellow in the Wharton Center for Leadership and Change, and teaches extensively for Wharton Executive Education. A former Army officer and Director of Military Leadership at West Point, Todd is a key author of West Point's Leader Development System and designer of the Academy's leadership programs.



AFTER ACTION REVIEWS

THE GOAL:

Create a culture of continuous performance improvement and adaptive learning by systematically reviewing team successes and failures.

NANO TOOL:

Called "one of the most successful organizational learning methods yet devised," the After Action Review (AAR) was developed by the United States Army in the 1970s to help its soldiers learn from both their mistakes and achievements. Since then, the AAR has been used by many companies for performance assessment. And yet, as The Fifth Discipline author Peter Senge notes, efforts to bring the practice into corporate culture most often fail because "again and again, people reduce the living practice of AARs to a sterile technique."

The process itself is an active discussion centered around four key questions:

- What did we intend to accomplish (what was our strategy)?
- What did we do (how did we execute relative to our strategy)?

- Why did it happen that way (why was there a difference between strategy and execution)?
- What will we do to adapt our strategy or refine our execution for a better outcome OR how do we repeat our success?

ACTION STEPS:

Going through the motions of an AAR is relatively easy — putting AARs into the DNA of your organization is the challenge. The following steps will help to make AARs a "living practice" that can transform team and organizational performance.

1. Schedule After Action Reviews consistently to learn from both successes and failures. "Postmortems" have a negative connotation that discourages participation and enthusiasm. AARs should be held during or immediately after successful and non-successful events, using the positive positioning of improving your own performance and not that of someone else.

LEARNING THROUGH PROCESS: A SIMPLE MODEL FOR DEBRIEFING

BY JOHN KANENGIETER

Reprinted from the NOLS publication *The Leader*, Winter 2000, Vol. 16, No. 2

One aspect of leadership training involves the ability to process and learn from experiences. At NOLS we assist learning through the tricky art of debriefing. It is a term that is very common around NOLS, and an integral part of successfully processing an experience. You can transfer these same concepts to your work environment and projects. Here we use the Kolb Experiential Learning cycle as a simple format for debriefing. (See following page.)

I. What happened? Facts

Any event or problem solving session has a story. Let members tell their story about the day from their perspective. If there is conflict in the group or you sense stress, it should be important for everyone to have the opportunity to speak. Example questions include:

1. What were your personal and group goals?
2. What was the route that you took today and why?
3. Were there any close calls that happened on your small group?
4. Were there disagreements in decisions and how were they resolved?

If it was anything but a routine day, allow each person to tell his or her “story” uninterrupted from his/her perspective and experience.

Pitfalls: Do not let students or yourself start the analysis of the event even if their mistakes seem painfully obvious to you. Your role is to be an objective facilitator and your goal is to get the story out in the open. Remember, “just the facts ma’am.”

II. What Now? Feelings

After the events are on the table, it is important for the participants to note the impacts and feelings these events prompted. Students need to make meaning out of the event, including their reaction to it, to grow and learn. Were they stressed? Afraid? Angry? Having a blast?

By doing this, the students are also able to note the effect of their actions on others. Questions that work towards feeling statements include:

1. Pick the best moments of the day for this group.
2. At what point was the day most stressful for you?
3. How did you feel when the group took some of your weight?
4. What one word would describe your thoughts or feelings on the day right now?
5. What are you most proud of today?
6. Were there any times that you didn't know what to do and felt stuck?

Pitfalls: Watch for blaming in the group and be careful that you and others don't invalidate the feelings of a student. Remember, each person has the right to his/her own feelings even if you disagree with his/her perceptions. Be prepared for conflict and commit to exploring it then or later.

III. What Next? Future

At this point participants have a framework for analysis of their events. What lessons have they gleaned from this experience that they can apply in the next similar situation? Preferably, you would guide the students in their own learning by asking questions, but do not be afraid to offer direct feedback if the point isn't coming across. Sample questions are:

1. What would they do differently?
2. What factors went into creating the times that went really well?
3. What advice would they give future leaders facing the same situations?
4. What should we continue to do in the future?

Ask students to pick out which leadership skills were emphasized and which were absent in their event. Make sure the students leave with a plan about what they will continue to do and what they will do differently.

Pitfalls: Don't over analyze a situation if the lesson seems clear to the students. Keep it simple and objective. Be sure to follow-up with positive reinforcement if you see improvements in the students in the future.

One of the hallmarks of a NOLS education is the ability to transfer the leadership skills gained on an expedition and apply them to the world back home. As a leader in any organized group, it is important to know how to negotiate through the tricky terrain of process to gain peak performance from other group members. Debriefing an activity or issue is a great step towards that peak performance. ▲

John Kanengieter is an executive leadership consultant and coach living in Jackson Hole. He is also Sr Fellow at the Wharton Center of Leadership and Change Management. When not climbing the walls of organizations, he loves climbing up mountains, as well as skiing down them as much as possible. john@zeropoint.partners



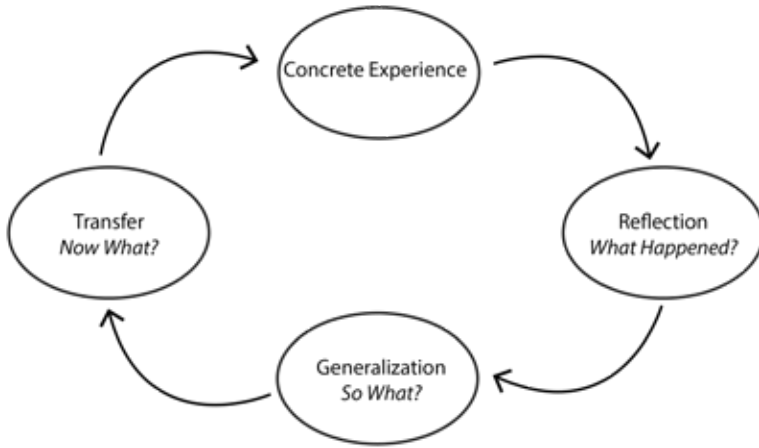
2. Gather relevant facts and figures related to the team's performance. If project deadlines have been missed, product standards are being ignored, or client feedback is disregarded in the team's execution, these facts set the foundation for an AAR that is grounded in relevant data.
3. Make participation mandatory and involve all team members in the discussion — even customers, partners, and suppliers can be included. Each participant will likely have a different perspective on the event, and this serves as a key input into the AAR. Everyone's voice is important, so you must be able to receive criticism from a few levels down. Open-ended questions that are related to specific standards or expectations will encourage involvement.
4. Have a three-pronged focus: performance of team members, the leader, and the team as a whole. Keep the attention on facts and outcomes: what are the strengths and weaknesses of each? This focus keeps the discussion centered on what the team can control (as opposed to what is happening at headquarters or on another team).
5. Follow the “Rules of Engagement.” To encourage honest participation and mutual trust, AARs must be: confidential (joint learning is shared, but individual comments are not), transparent, focused on individual and team improvement and development, and in preparation for “next time.”
6. Share learning across the organization. Many organizations, including Huber and Microsoft, use databases or blogs to make the lessons of AARs available via Intranet to all of their teams. It's inefficient to withhold key learnings from other teams and allow them to make the same mistakes or prevent them from replicating best practices.
7. Consider scheduling a Before Action Review (BAR) prior to your next significant event. The team would benefit from a review of lessons learned and potential integration of these lessons into the new plan or performance standards.

EXPERIENTIAL EDUCATION CYCLE

BY JOHN KANENGIETER, BASED ON THE WORK OF DAVID KOLB

Experiential education is learning by doing. It's the way that humans best retain an understanding of a concept. Today, biologists and neuro-psychologists argue that humans are "hard-wired" to learn this way. Researchers estimate that we retain approximately 20% of what we hear, 50% of what we see and up to 80% of what we do. Experiencing gives us full use of all of our faculties which then in turn helps us to make meaning of an experience. It is a constant cycle that continues throughout our lives.

EXPERIENTIAL LEARNING CYCLE



Concrete experience

Life brings us new experiences every day. Through these experiences we understand cause and effect. In experiential education, the experience comes in the form of living the topic at hand. The participant becomes part of the learning laboratory. They have a stake in the outcome of what becomes learned. Any given experience becomes the vehicle of learning.

Reflection/What happened?

This phase, which asks, "what happened?" presents an opportunity to explore what just transpired. We relive and examine the events of the experience. It gives us an opportunity to name our thoughts and feelings. This reflective stage paves the way for focusing on the differing view and perceptions that other participants may have of the same experience, giving us further insights.

Generalization/So What?

This third phase of the Experiential Learning Cycle asks, "So what?" as it examines abstract concepts and makes connections between ideas and experience. We begin to make judgments that will further determine our future behavior. The experience now takes on a meaning that taps into our values and gives us impetus for change or desire to maintain our present state. We begin to make meaning of the experience and better understand our role in future events.

Transfer/Now What?

In this phase the answer is "Now what?". We begin to connect the experience and our thoughts about it back to our lives. We now realize that we have choices to make different decisions based on this experience. We begin to increase the chance of retaining the insights from this experience when the learnings are applied to a new experience. In fact, the sooner the better. This new experience begins the cycle again. Experience begets learning which begets experience which begets further learning...moreover, research supports that learning can begin in any one of the four quadrants in the cycle. ▲



INTERVIEW WITH JOHN KANENGIETER

CONDUCTED BY LYNNE WOLFE

In November I conducted a phone interview with my old friend and NOLS colleague of 30 years, John Kanengieter, who is a principal in the firm Zero Point Partners, a Leadership development and executive coaching and consulting group. He is also a Sr. Fellow at the Wharton School teaching leadership and high performance teams to executives.

I asked John what tools he is teaching in his work at Wharton Business School that cross to decision-making in the outdoors, and he proceeded to tell me about the After Action Review, or AAR, which he sees as a great and simple tool for assessing almost any action or event. It's good for recapping a meeting all the way up to launching a product. He also suggested that it would be a good tool for quickly debriefing the assessment of a slope or a day in the mountains.

With an AAR, we look at an incident to learn from it. A leader leads discussion, guides it, and needs to be good at this. It's instigated in the spirit of learning vs spirit of evaluation of individuals. It parallels David Kolb's experiential learning cycle, asking 3-4 basic questions

1. **What did we expect to happen?**
2. **What actually happened?**
3. **If there was a gap (positive or negative) what/why was that?**
4. **If we did it again, what would we do differently?**

Kolb: model in late 70s, early 80s- was an experiential educator with some research behind him. Concrete experience takes you around the clock face, starting with first having a "concrete experience", moving to "reflective observation" to "abstract conceptualization", or meaning making, which brings "active experimentation." This leads us to a new experience or new learned behavior. (use a clock, rotate in quarters—see attached article about Kolb)

I think AAR applied to a slope assessment; its usefulness would come after crossing a slope, i.e. what did we expect?—that we would cross safely? 2. What actually happened? (Whumpfung, cracks, AVALANCHE!, nothing etc. 3. This question develops further assessment of the snowpack, 4. If we did it again, since we're still skiing, how will that experience inform us of future decisions?

To be clear, I think the AAR is a great de-briefing tool vs. a decision-making tool. However, its use provides learned information for further decision-making. To take this to avalanche world, "what did we get away with?" evaluates it both positively and negatively.

Question #1—speaks to your preparation levels. You need to have an enlightened leader, where the process is embedded in the culture, and be practiced in the process. Don't turn it into a long drawn-out process, but use less explaining. How do you build on the previous #4? How do you keep track of this/make it an ascending spiral? Write it down!

Ask #1—BEFORE you go (turns this into hypothesis testing).

Process helps point insight through the Dunning-Kreuger but people need to be able to own their days, there has to be PAIN. ▲

COACHING FOR LEADERS: A FEW TIPS

BY JOHN KANENGIETER

COACHING CORE CONDITIONS

Empathy
Respect
Concreteness
Genuineness
Confrontation
Immediacy
Self-disclosure

COACHING PROCESS

After Action Review (AAR)

Also called:

"debrief" "hotwash" "wrap-up"

"post-mortem"

In one extreme, they are called "mishap investigations."

TYPES

Formal
Internal
External, independent observer
Informal
Personal

"KEY IS THE SPIRIT IN WHICH AARS ARE GIVEN"

Depersonalized (What, not Who)

Everyone contributes

Have a focus

No blame

Focus equally on strengths and weaknesses

Leader guides but does not lead the discussion

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RITUAL

This story first appeared in the Early Winter issue of *Ascent Backcountry Snow Journal*, 2017

It's fucking cold out there. *The wiper blades barely keep up with the snow and wind, I can vaguely make out the trailhead sign in my headlights. I sit and contemplate why I'm here, there are a thousand reasons I could've stayed in bed this morning, it's my day off and I have plenty to do, my feet and back hurt and I don't remember the last time I slept more than eight hours straight. But the storm and snowpack don't care. We are forecast to put another significant load on a house-of-cards snowpack, it's midweek so most of the world will stay out of the mountains until the storm ends, but something calls me. A curiosity to try and understand the puzzle. Will this be the event that brings the world tumbling down? There is also a desire to share information and possibly teach someone or many, and maybe I find the missing piece that keeps people home and safe on a day they don't belong up here....*

I grudgingly pull on my boots, the familiar dance around my steering wheel, savoring every bit of heat I can absorb before launching into the dark and cold. I go through the same rituals, I check my gear, my pack, my attitude and my plan.

The first ten minutes suck, they always do. My body is older and more beat up than it used to be and it takes a bit to get things moving. The cold air burns my lungs and the snow sticks to my beard. I think about my bed, my computer desk, the hot coffee I left on the counter, and the breakfast I didn't finish. Then my brain wanders to the bills I need to pay, the 23 things I need to do before class this weekend. Then a particularly strong gust of wind brings me back to where my head belongs. Focus, it's game on. Back to the ritual.

Rituals, habits, beliefs, and routines are a constant part of our daily lives, it's just part of being human. We arrive at our rituals and habits in various ways, through education, experience, trial and error, near misses and accidents to name a few. I tend to break my backcountry decision-making tools down into four separate but overlapping categories:

Habit—I'm not sure you can even classify this as decisions or decision-making as much as routine acts. Something triggers an action that results in a specific reward. It could be as simple as thirst triggering the reminder to drink water or pulling on a puffy at the top of the skin track to retain warmth. I've been in these spots so many times, I rarely consciously think through the action or the outcome, I just respond to a trigger.

Students discussing descent options on Red Mountain Pass as a cold front arrives earlier than advertised. Photo Jake Hutchinson

For in truth habit is a violent and treacherous schoolmistress. She establishes in us, little by little, stealthily, the foothold of her authority; but having by this mild and humble beginning settled and planted it with the help of time, she soon uncovers to us a furious and tyrannical face against which we no longer have the liberty of even raising our eyes.

— Montaigne

BY JAKE HUTCHINSON

Guts (Intuition)—Spend enough time around someone who has made a career of avalanche hunting and eventually you will observe them justify a decision just because “it doesn't feel right.” Intuitive decisions are often instant judgments and reactions based on tacit knowledge and/or prior experience.

Heuristics—A fancy word for cognitive short cuts or rules of thumb that simplify difficult decisions by substituting them for easier ones. We all use heuristics daily to replace difficult decisions with easier ones. It also pertains to using the old decision or pattern even when circumstances have changed.

Experience—Probably our greatest teacher in the mountains. Last time I ran into A, B was the outcome. I feel like I often subconsciously put these experiences away and they become the foundation of my gut feelings and intuition.

And so, I continue up the hill. No longer paying much attention to the act of putting one foot in front of the other, unknowingly following the contour of the mountains, making calculated kick turns to avoid or manage the next crux on the skin track ahead. Instead I am just stuck in a Zen-like state of observation. Wind direction, speed, and gusts. How much snow is moving, where is it coming from, where is it going? Is the new snow forming a slab? Is it reactive? How quickly is my skin track being filled in behind me, if at all?

Habits and rituals work most of the time if the known variables stay the same, or if we are able to observe the correct variables for the situation at hand. I find that my rituals vary from the mundane to the complex. It starts in the kitchen. Hot water gets started for coffee before anything else. Without coffee, there really is no point in making decisions. My good friend and mentor Don Sharaf and I share a very similar morning ritual, he spelled it out like this:

“I like to start the day with a cup of coffee at a less than frantic pace. A slow perusal of the local and regional weather and avalanche conditions updates my understanding of the three to five different snowpacks that I'm attempting to follow. The pace picks up quickly from there, but taking it slow at the start gives me a bit of perspective on the day.”

Once my plan is made and it's time to walk out the door, my habit turns to a checklist. Mostly a gear run-through at this point. No one likes to end up at the trailhead with their boots still on the dryer or their skins still hanging to dry. It also helps keep my mind focused on the objective and all the variables I may encounter between the trailhead and wherever I have chosen to go.

Approaching the ridgecrest. The wind has picked up and visibility is less. I've been here many times, I can almost negotiate this terrain with my eyes closed, and there are moments the wind and snow make me feel blind. It's time to be hyper-vigilant. The familiarity trap is set and I'm walking right into it. This is not the normal weather I see here, the storm came from a slightly different direction and where I normally see cornices and drifts, I'm crossing patches of dirt and grass. Time to change the ritual. Trial, error, and previous experience are suddenly less relevant, it's time to approach this as a beginner, with an open mind and keen observation.





Wendy Wagner leads Don Sharaf to the promised land at Thompson Pass.
Photo Jake Hutchinson

Drew Hardesty, from the Utah Avalanche Center, provided this input:

"I thought about it a bit, but it led me down a slightly different path. It has more to do with two things - group think for myself and looking at the world with open eyes.... or a "beginner's mind". The first I mean the old Mark Twain about "Don't believe everything you think." I like this. If I can remember this, it helps me try to look at things more objectively and my own opinions with skepticism.

During long bouts of high pressure, or seasons when we lack a persistent weak layer or deep slab problem, our experience and expertise allow us to safely move through the mountains most of the time. You can't ever really turn the risk knob down to zero once you choose to go out, but you can get pretty close. It's when things begin to change that experts start getting into trouble.

Time for reflection as a Level 3 student begins his Full Snow Profile Exam.
Photo Jake Hutchinson



By approaching these changes with a "beginner's mind" we can avoid falling into the trap of trying to outthink or outsmart the avalanche conditions."

The ridge is almost unbearable. The wind gusts seem to steal the air straight from my lungs and the snowflakes feel more like ice daggers against my exposed cheeks. My desire to not stay here much longer is subdued by my desire to poke Mother Nature right in the chest a few times, just to see what I can get away with. It's foolish. I'm alone, no one really knows where I went or what my plan is. But I'm an avalanche hunter and an adrenaline and knowledge junkie. One little ski cut or cornice drop can't hurt, right....

So how do I manage my risk and exposure? How have I kept myself mostly on the right side of the snow all these years? Is it luck? Am I that good? Do I just know something no one else does? Erich Peitzsch, former Director of the Flathead Avalanche Center in Montana, provided this wisdom:

"One thing I really try and do every time (whether work or play) is simply step back from the stoke of what I'm about to do (or dread if it's raining), take a breath, think hard about what I'm planning on doing and how it fits within my risk tolerance bubble (always shrinking and expanding), who's going with me/what are their limits as well as mine, and remind myself that I am always willing to say "it's time to turn around."

I think he sums it up really well. I ask myself the same three questions at the top of every run I take:

1. Am I willing to turn off my transceiver, throw it in my pack, and leave all my rescue gear on the ridge? If not, why?
2. If this slope slides and I am killed, what will my mom read about me in the paper? What will my friends say?
3. Lastly, I run through ALPTRUTH. It's just a way for me to make sure I'm looking at things objectively and not through some sort of skewed face shot colored lens.



Drew Pogge goes deep during high hazard on Teton Pass.
Photo Jake Hutchinson

Dig a pit. I'm out here to see if/how the new snow is behaving. This is a good use for a snowpit as anything. Find a spot. Safe, representative, polite—another ritual from years of teaching and learning. Don't put your pit in the center of the ski line and don't get buried digging one, you'll look like a damn fool—I hear Kimbrough's voice in my head every time and chuckle, he provided this wisdom to me via his own poor judgment and unfortunate experience.

It's another ritual, I dig every pit the same, whether teaching or looking for answers. I probe first, shovel like I'm in a rescue. Quick layer ID, ECT, shovel shear and gone. If I find something that warrants further investigation then so be it. The snowpack is hugely variable, I have no interest in the minutiae of a particular spot, I want to focus on the big picture and try to understand all the variables around me. Things are more stable than I expected. The threshold has not yet been crossed, there may be a window for an unplanned ski run here...

Erich continues:

"At this point in my life/career, one question I always ask is: 'How much uncertainty is there?'"

If I can't answer it or if there is simply too much, I turn around and think about how much fun skiing with my boys always is. That usually provides the answer."

I do the same. It's just a ski run, there isn't a snow-covered mountainside on this earth that is worth dying for. I also find myself a tad selfish and just wanting to enjoy that great run again and again and again. And so I decide to ski. A mellower, yet still sufficiently steep, low consequence bowl. I ask my questions, I come up with 5-7 of the ALPTRUTH criteria. Time to reassess and make sure I've arrived at my decision consciously and objectively. I feel good about the decision, I give myself a little insurance with a small cornice drop and follow it with a ski cut....

Don adds his second ritual:

"Ski cut every run."

Whoa, did I say that without the normal caveats of not too deep, not a hard slab, not a high consequence run? Yes.

Don continues:

Assuming I don't have shots (hand charges) available and

that I have already chosen a run that has good stability, I'm going to double check my decision by making my first "turn" a ski-cut. If I'm wrong, I would rather be wrong at the top of the run than in the middle of it. All that being said, I tend to avoid high consequence runs with deep slabs or hard slabs unless I have full confidence that it won't slide.

The skiing is ok, the wind has made it slightly variable, maybe even a bit adult. But I'm outside and there isn't anyone else around as far as I can see. At the bottom I continue:, skins on, drink some water, puffy jacket off and back to the top. My senses and focus are once again tuned to the world around me and the subtle clues it may offer to this complex puzzle. I write a few notes and snap some pics. The snowfall intensity has increased, the front must be near. The journey back to the car is uneventful, the skiing still fair but luckily getting worse.

Did I learn anything that will make a difference today? Maybe, maybe not. Often the pertinent negatives are just as important as the

positive results. It all gets written down for the final part of the ritual. The sharing of info. Pics, pit results, and overall obs get sent to the UAC. The plan for tomorrow begins to take shape...

Ritual and habit are great tools that help us make better decisions and stay alive in a world that would love to eat us up. Just don't get so stuck in them that you forget your "Beginner's Mind" every now and then. I think my buddy Don sums it up best:

"Be grateful. Too often I go out for a run for the exercise and not for the sheer enjoyment of being in the mountains. It's a little more difficult when your backcountry summit looks like the top of a ski area, but remember that few other people have the good fortune to be outside enjoying the view and air. If I treat the backcountry like a gym, then I'm going to lose the best part of what backcountry skiing can offer." ▲

Quince Buckley evaluates a crown. Photo Greg Cunningham



LEARNING WEAPONS

Using Debrief to Slay the Silence

As I watched my team have difficulty communicating and debriefing, and talked with others in the industry who have difficulty communicating and debriefing productively, I sat down to write about it—as I am wont to do.

The first version was slightly, I'll say 'argumentative,' and I figured I should back up. Why do I care about debriefing and communication? Safety. My ultimate measure of my job as a patroller was always "Did we kill anyone in an avalanche today/this season?" Every day the answer was no, that was a success, even if there were near misses or things could have been done better.

The things that could have been done better and the near misses are a learning opportunity. We have to try to learn from mistakes: every mistake. Everything in my philosophy supports the goal of everyone coming home. Particularly, I believe in using debriefing and honest communication as learning tools.

"Just talk to each other." I know, easy for me to say... It starts with understanding that ski patrolling is a dangerous, niche, high risk job (and that backcountry skiing is high risk fun—all you non-professionals should be motivated to debrief also). If you truly believe in avalanche risk, if that is a reality to you, then you will come to the conclusion that anything you can do to learn, reduce risk, and improve your risk assessment is necessary, even if it makes you uncomfortable. Better knowledge and skill sets create better safety margins.

If you don't believe in avalanche risk, or deep down you really believe it can only happen to someone else, what is your motivation to debrief or communicate? While I tend to dismissively view critique as risk free, for many people it is not. But the rewards of debriefing and communication outweigh the risk. If they don't, you need to seriously consider the potential ramifications of not learning and whether you're well suited for such an intense high risk job.

If you believe you have complete control, that you're not assuming any risk, then your risk assessment stops before it really starts. What is your motivation to be involved in debrief? If you don't believe that learning from an incident could save your life or your partner's or teammates', all you're going to see in admitting to a mistake is vulnerability, repercussion, and/or public ridicule. Cultures of fear and shame exacerbate this and make a team less safe.

Complacency does not equal negligence. Hindsight bias does not mean an incident is preventable. You have to remember that those reviewing an incident almost certainly have much more information than the people involved in the incident. Some accidents in the mountains are simply the result of a single mistake, or wrong place wrong time in a high risk environment.

Some accidents, for example ones where there appear to be obvious errors, should be preventable. However, if an accident was preventable by anyone involved, they would have prevented it, and the incident would instead fall between nothing and a near miss. There is a point on the timeline when an accident becomes inevitable: could be minutes, days, or even years before the accident happens. The chain of decisions leading to an accident is based on the experience and expertise of those involved. If they had different/more experience or better/more training, maybe there would have been different decisions and results.

Differences in experience and expertise are not negligence, and experience and expertise do not make all accidents preventable.

If you want to prevent a future accident you have to act now. Change your mindset and learn enough to prevent that accident before you get there. Last minute reversals of thinking that saved your donkey are not a spontaneous revelation; they are the result of lessons you learned that help prevent accidents.

It's easy to blame an individual for breaking someone's rules—and move on without considering whether there were other, possibly systemic, factors that influenced decisions.

BY LIAM BAILEY

Debrief and after action reviews are tools for improving skills, knowledge, and safety. They help prevent future accidents by highlighting and discovering training, operational, and other problems. If you keep making the same mistakes, odds are they will catch up to you. If you can't admit that you made a mistake, you have zero chance of learning from it. Beware Dunning-Kruger. Beware knee jerk "solutions" that don't actually address the problems.

An after action review (AAR) process needs to be honest to be effective and enhance safety. If you don't believe what you're doing is dangerous then your risk assessment never goes further than "there is no risk." Failure to understand or try to understand the perspective of the individuals involved, failure to objectively present your side of it, failure to make a complete and objective review, or a blinding desire for a clean and simple conclusion—all do a disservice to the debriefing/AAR process.

It's easy to blame an individual for breaking someone's 'rules'—and move on without considering whether there were other, possibly systemic, factors that influenced decisions. Human error will never go away. Without objective debriefing and evaluation we won't be able to tell the difference between negligence—and an accident with contributing factors we could fix—to improve operational safety.

Communication depends on team dynamic and environment. Not only is robust dialogue a key to high functioning teams, but the higher functioning the team, the easier it is to have robust dialogue. Positive and constructive feedback is not meaningful from people whom you don't respect. Constructive and positive feedback means everything from people you do respect. Respect supports communication.

It's difficult to communicate completely with people you don't trust. Trust has everything to do with communication. If the entire team strives for integrity and leadership character, then respect, trust, and communication can't help but follow. Some key leadership characteristics are maturity, flexibility, confidence, justice, compassion, humility and control of emotions under adverse conditions.

The only way to avoid passive aggression and bitterness behind the scenes is by having an open objective forum. No matter how well a debrief is tailored toward learning, toward avoiding making the same mistakes twice, toward moving forward positively—constructive feedback is never going to be enjoyable. It's not deep powder skiing. It's a discussion about how you screwed up. Are you motivated to learn?

How do we best deliver feedback so it can be channeled into learning, development, and safety? How do we receive feedback without getting defensive and not listening? It's not easy, but if you look for the answers within the questions, it will help you consider the goal of the discussion.

Put yourself in someone else's shoes and move forward with learning under your belt. Have you considered someone older may have done things one way for 30 years and is now being expected to change overnight? Unrealistic much? Do you look for someone to complain to because you weren't treated the way you expect? Have you ever talked to anyone about how you expect to be treated?

Find a way for critique and constructive feedback to be part of your program. If constructive feedback disappears, the team's expertise will disappear with it. If you're not communicating on the little things you won't communicate on the big things. My parents credit their 40 plus years of successful marriage in large part to a relatively simple vow to talk to each other no matter what.

What's the take away? Besides everything above, draw a line. Make it clear in your team that robust dialogue and after action reviews will happen and are intended to be a learning opportunity, no matter what tone or manner the critique is presented with. At work, ideally this will happen from the top down, but if it doesn't, then band together as a group to make it happen. Constant constructive feedback, reflection, and discussion are keys to high functioning teams, personnel, and operational safety. ▲

IMMEDIATE FEEDBACK

Through the fall I get an itch to ride, by Halloween the itch is quite annoying. I'm sure I'm not alone in experiencing this. However, this year I had no idea that I would get an immediate reminder of how carefully we must scratch.

I was finally able to satisfy my backcountry itch on November 4. The few days prior had brought a considerable amount of moisture to the Tetons. I made plans to ride at Grand Targhee with two friends, one of them was my usual backcountry partner; the other a friend completely inexperienced in a backcountry environment. Unfortunately my more experienced riding partner texted me at 3am to bail because of a severe cold. I was still determined to go, and thought that some one-on-one time with my curious but less experienced friend could mean that I would have plenty of opportunity to pass on some of the avalanche and backcountry education I've had thus far.

We arrived in the parking lot close to 7am, knowing that the sun didn't come up until around 8, because we wanted to give ourselves the best chance possible to find some untracked powder. Our objective was to hike up to the ridge and then drop into either The Good, The Bad, or The Ugly, depending on which looked the best.

Overnight there had been a reported 10" of snow and the wind had been, and currently was, blowing significantly out of the west-southwest. Our hopes of yesterday's bootpack still being usable were quickly dashed. We wished later that we had brought our splitboards.

After working pretty hard to get to the top of Wild Turkey I decided that if we were going to be able to dig a pit on a respective aspect then this was our chance. We traversed around the corner of the slope and started digging in what looked like a good place. My primary layer of concern as we started digging was the old October snow, but since I hadn't been out yet I didn't know exactly what to expect. Our pit was at approximately 9000 feet, facing north-northwest, and it was surprisingly deep at 160 cm to the ground. The old October snow was about 130 cm down. I recognized that the surprisingly high depth of the snowpack was because we were in a very wind loaded area, but felt that it was similar to what we were going to ride, making it an appropriate spot for a pit. After digging, I felt that the old October snow could be considered too far down to worry about at that particular aspect and elevation, and that my new primary layer of concern was a rain crust, about 25 cm down from the top. Our quick test pit was great for some discussion on what we were seeing, what to

My friend at the base of Grand Targhee on November 4th, the morning of our ski outing. Photo Joe Hill

I want to feel lucky, or blessed, or perhaps a little of both. I know I made the right call but I want to think that I made that call for all of the right reasons. I'm not positive that I did.

BY JOE HILL

watch for, etc. We performed an Extended Column Test, which on the 13th tap resulted in a failure at the rain crust, directly below my shovel. We didn't see any propagation across the entire column. Pulling the top of the broken column off showed a pretty clean shear, one that I thought showed that the rain crust would make an excellent bed surface for a slide. I ended up having to really hammer well past 30 taps to get anything to happen with the old October snow. After digging I agreed with the rating for the day, which was Considerable above 9000 feet.

We filled in our test pit and started back up the ridge. We saw several other people but it seemed that they were all heading up to the Headwall, which was further than we wanted to go. We didn't mind they were making tracks somewhere else.

As I got up to the sign labeled "The Ugly" I poked my head over the edge to see what was going on. It definitely looked very wind loaded. I pulled out my inclinometer, and it looked to be 38 to 40 degrees. I paused and had a much longer discussion internally than I ended up having externally with my partner. The Ugly looked completely filled in. No tracks. To be honest it looked incredible. I thought to myself, "it's not likely to slide, you've ridden this in the early season before, you didn't see any propagation in your ECT test, perhaps all the tracks on this slope earlier this week have helped to compact the lower layers of snow, the rating today is 'only' Considerable, and not High."

I actually started formulating in my head the argument I would make to go ahead and ride that slope, but I found that coming up with a good argument to drop in was actually pretty difficult to do given the discussions we'd had earlier that morning. How could I expect my friend to accept anything we'd talked about that morning as important information if I basically told him that none of it applied to this slope and that we'd be fine? Before I opened my mouth I thought about how I knew that all the ingredients in the recipe for a slide were definitely there, that the slope was incredibly loaded, and that the loading had occurred within the last 24 hours. We had just talked about how Considerable avalanche conditions mean that human-triggered slides are likely. After all of those thoughts raced between my ears, either my gut or the voice in my head said, "don't ride it." Our resulting conversation was brief because, as it turned out, my friend had his own concerns about dropping in there too. The decision to move on was an easy one to make. Instead of dropping my backpack and getting ready to ride I started looking for alternative line options.

Using my inclinometer, it looked to me that if we hiked up to the Good and dropped in there, the slope was closer to 30 degrees, it also had a much cleaner runout below it than the Ugly. We spoke briefly about our options, and ultimately decided to hike up to the Good and drop in.

We did so, and it was great! We had some awesome turns, along with our fair share of face shots and laughs. It was a very successful early season powder mission. My friend and I both had obligations back home so we decided one lap was good enough. We walked back to the pickup with smiles on our faces and felt that our itch for powder had temporarily been satisfied.

At this point you might be thinking, well what was the point of that whole story? So far so good right? Right. But there's another chapter to this story.

Two days later, I was asked by a friend and local skier how my experience on Saturday had been. I told him how it went and then he proceeded to tell me that two of his friends had been at Targhee the same day. I knew that both of them were very experienced in the backcountry and had many years of education and experience. One of them was an individual I would call a mentor of my mentors.

My friend reported that they had actually ridden the Ugly, probably less than an hour after I had poked my nose over the edge myself. They had decided to ski cut the top of the slope and then drop in. The first skier rode across the top of the slope to do his ski cut, the same way I'm sure he has done many times. As he did so he



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initiated a fracture which then propagated and slid. He attempted to step out of the snow heading downhill but was unsuccessful. In the blink of an eye he was helplessly barreling down the slope. The skier still standing at the top watched in fear as he saw his partner topple over and slide downhill with all the snow, narrowly missing a large tree, before disappearing in the resulting powder cloud. Luckily when the skier caught in the slide stopped moving he was able to holler uphill and let his skiing partner know that he was shaken up, but ok.

They had ridden the exact slope that I had decided not to, within the same hour; and it had avalanched. Almost certainly the exact same thing would have happened to me or my friend if we hadn't looked at that slope and then decided "nah, better not." Would one or the other of us have been able to holler uphill that we were ok? None of us will ever know since forecasting danger in the backcountry is rarely black and white. It is even more rare to receive such immediate feedback on whether we've made a right call to avoid disaster. We usually only get such immediate feedback after we've made a wrong decision and then we're in a mess.

In retrospect I can't help but wonder how many times have I been that close to a potentially unfortunate event and not known? I really wonder if I would have made the same choice if I had been with a different riding partner, someone more experienced, so that then I wouldn't have been playing the role of an educator. Would my mindset have changed if I'd had my Avalung or an avalanche airbag? Are there any other variables that, if they had been different, would have led me to feel too comfortable or overly-confident resulting in a wrong call?

I've had a few weeks to reflect on this experience and I still haven't decided exactly how to feel about it. I want to feel lucky, or blessed, or perhaps a little of both. I know I made the right call but I want to think that I made that call for all of the right reasons. I'm not positive that I did. My fear of being ashamed was part of it after all, and I'm not 100% proud of that. Of course I hope that I'll be able to make the right choice the next time I need to, and that

time I'd like to not wonder if my reasons were the right ones.

I've been encouraged by avalanche educators in the past to make sure and answer a few questions as a group before heading out. Those questions should answer what the group's objective is, what the day's expected conditions are, what any of the group member's concerns might be. The more we can do as backcountry travelers to understand what each group member's mindset is and be able to collectively tweak it if needed, then the better off we'll be. The different dynamics among a group are much more important than I ever realized when I first entered the backcountry as a teenager. Turns out it's not only about chasing the froth and getting as gnar-bar as possible, at least it's not if you want to keep doing this a long time.

After the fun has been had and you're back at the car I've also been encouraged to always be sure to debrief. Was the day a success? Was everyone comfortable with the decisions that were made throughout the day. If not, then why is that? I've been instructed that the debriefing should always include asking the group if the right calls were made or if they simply got away with it. Hopefully this kind of reflection encourages group members to be honest with themselves and consider how the next trip can improve if needed. I feel that luckily my friend and I did a decent job of this on our trip on the 4th of November. The major difference was that we ended up getting a surprise additional debriefing two days later.

In the end the one thing I am certain of is that I'm glad you're hearing about this experience because I made a right call, and not because you are reading a case study about how I didn't get away with it. ▲



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