

TRAIL BREAK

2022 NEWSLETTER FALL ISSUE





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Trail Break, Fall 2022 Issue

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Winter Wildlands Alliance is a national nonprofit organization dedicated to inspiring and empowering people to protect America's wild snowscapes.

The Future We Could Have

We human beings have an extraordinary capacity for envisioning a better world. In the midst of a crushing heat wave, the air filled with exhaust, the noise of jackhammers and chainsaws, and the smoke of a half dozen wildfires, we can imagine drifting snow. We can imagine healthy watersheds teeming with wildlife. We can imagine birdsong, glaciers, stately whitebarks standing strong against a winter sky. We can imagine the long, switchbacking climb to the col, the view across countless unbroken ranges, the

wind cold on our cheeks, that first sweet turn down into the gully. We can imagine half the Earth set aside for the ancient ways, a perfect counterbalance to our penchant for invention and mechanization.

And yet here we are: divided and cynical. Millions of us have become obsessed with a version of freedom so narrow and impoverished that it includes only ourselves, each of us like a packrat alone and wretched in his respective burrow, waiting for the thieves to come. One man wants to push his ski resort to the



Wilderness boundary at the base of the Tetons. Another wants to build a gondola up Little Cottonwood Canyon. One wants to hold back the last drops of snowmelt to keep his houseboat afloat (seriously, check Blue Ribbon Coalition's proposal for Lake Powell). Another will structure the cosmos around his gods-given right to drive his machine to the headwaters of every river.

Occasionally, when the threat is clear and simple, we stand up and say no. We save Red Lady, Bonanza Flat, Lookout Peak on the Stanislaus, maybe Moose Mountain, maybe Teton Canyon, maybe Bears Ears, maybe the Arctic National Wildlife Refuge. Otherwise, to keep our sanity as the winters grow shorter and as the pines cede more and more territory to the desert, we tell ourselves these things are out of our control. What can we do about any of it anyway?

Not long ago I heard marine biologist Ayana Elizabeth Johnson on the radio talking about the need for us to radically re-envision our future relationship with the natural world. "We know what we're supposed to do," she said, "in that same way that we know that things are out of balance, on a cellular level." What holds us back, she argued, is essentially a failure of imagination. "We don't spend enough time talking about the future we could have, engaging our imaginations and envisioning a world where we actually implement all these climate solutions we already have."

If you're holding this little magazine, reading these little words, you know exactly what that future looks like. You can see it and feel it. And you know where to find it. Right there is our greatest collective hope for a better world. Hang onto it. Share it with as many people as you can. There's a lot of work to be done. But together, we can keep each other stoked and on track. Together, we can turn our best and wildest visions into a thriving planet we can all live and play and ski on.

Cheers

Cathe.

David Page, Executive Director Winter Wildlands Alliance

Beyond Acknowledgement:

LISTENING TO THE LAND

By Danielle Stickman

After a two-year hiatus from sessions with my wellness coach—two years of navigating an ongoing pandemic, moving, and changing jobs—I was struck when she offered the exact words I needed: "I would like to first acknowledge everything you've been through in the last two years."

This simple statement moved me. Tears filled my eyes, and I let myself cry hard.

My passions range from yoga teaching, hiking, running, beading, snowboarding and fat tire biking to the occasional rock-climbing adventure. Alongside these activities, my Dena'ina and Koyukon Athabascan roots call me home to the land to my life-sustaining cultural practices of fishing, gathering, harvesting and protecting. Perhaps it's my nomadic heritage that keeps me moving and busy, in search of that familiar feeling of moving and living in tune with the seasons, as my Ancestors lived.

Last winter I went snowboarding. Though

it had been a while, my limbs moved, turned, and danced down the mountain, steady and at ease. I also traveled by dog sled along the Yukon River, and after a minor fall and a swim through mounds of snow, the dogs and I found our rhythm. That rhythm felt like coming home, an honoring of the animals and the land; an acknowledgement and reminder that we are interdependent with nature—not independent of nature.

After the dog sledding trip, we started a long drive south. We sat in silence for some time. Thoughts of starting my own dog sled team percolated, along with reflections of what it means to exist in 2022. I wanted to hold onto that feeling of connection with the dogs and the land, the feeling of coexistence with all things. I struggled with two questions when I returned to the city: How do I hold onto this deep land connection in a fast-paced place, and how do I share this with others? My mind turned to the practice of land acknowledgements.



Murphy Dome, Alaska. Unceded Lower Tanana Dene lands. Photo by Emily Sullivan, @emelex

To acknowledge the land is to acknowledge the life-sustaining energy the land provides. When my wellness coach acknowledged everything I'd been through since 2020, I didn't just hear her words, I felt her genuine care and was reminded that care starts with ourselves first. I must care for and listen to my body and its connection to the land.

"Qet'ni'yi" is a Dena'ina Athabascan phrase that means "it is saying something." "It" refers to the earth, animals, and weather—they are all saying something. Many of us have forgotten how to listen to the land, waters, and animals. I have forgotten to listen from time to time. We often escape to the land to avoid hearing the rest of the world. However, that is the best time to listen.

Offering the land an acknowledgement is more than words. It is a shift in mindset, an active practice in listening, and a reflection and appreciation of the original stewards of the land. To acknowledge millenias-old reciprocity with all beings, plants, and the earth. To acknowledge this relationship also means to listen in, and to learn what it means in practice for myself.

How will you practice listening?

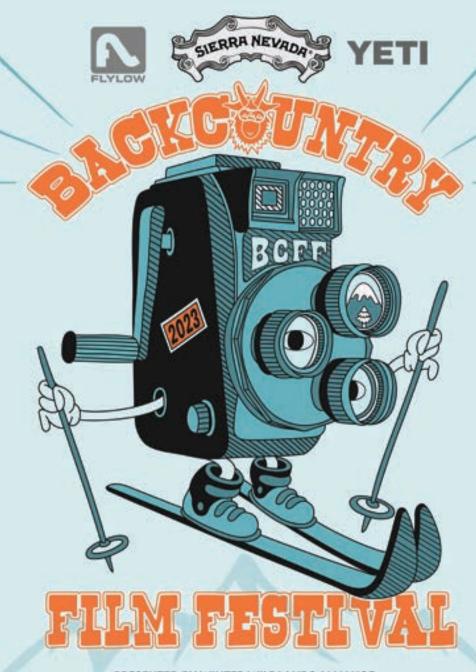
IN OUR PHOTO CAPTIONS THROUGHOUT TRAIL BREAK,

we acknowledge the ancestral and ongoing stewardship of Indigenous lands. We recognize that this acknowledgement is only a first, insignificant step toward addressing the many historical and ongoing injustices that underlie and undermine our current public lands system. Winter Wildlands Alliance is committed to improving our allyship with the Indigenous communities on whose lands we have the fleeting privilege to work and play, and to taking impactful action toward equitable access, environmental justice, and the restoration of Indigenous leadership in the stewardship of the Earth we all love and depend on.





DANIELLE STICKMAN is an artist, educator, outdoorswoman, and auntie. She enjoys time spent harvesting with her family on her Dena'ina homelands, creating art for her small beading business, and works to enhance equity in conservation.



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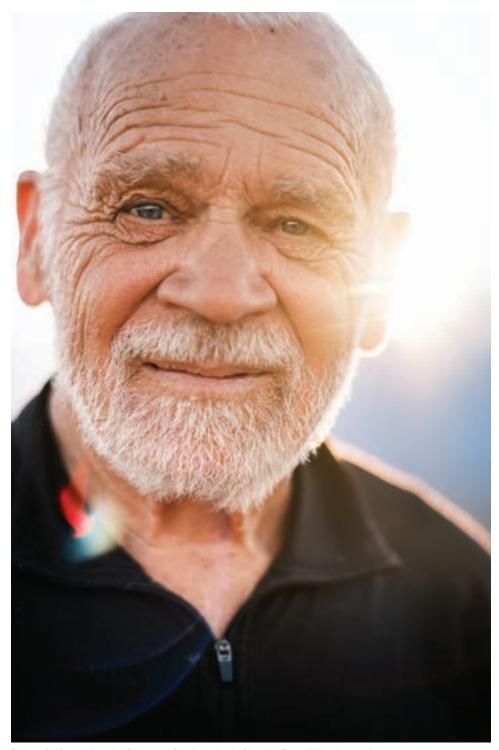












Bishop, California. Unceded Paiute and Shoshone lands. Photo by Bruce Willey, brucewilleyphotography.com

Legend, Member:

DOUG ROBINSON

KIRKWOOD, CA

The legendary Sierra Nevada backcountry skiing and clean climbing pioneer, author of "The Whole Natural Art of Protection" (Chouinard catalog, 1972) and A Night on the Ground, a Day in the Open (2004), has been a Winter Wildlands Alliance member since before we started keeping records. He first came to us by way of Snowlands Network, one of our founding grassroots groups. After a half century of adventuring and guiding in the big mountains, he's still advocating for simplicity and freedom-and we feel he's earned the right to be a bit crotchety. "Backcountry skiing is in an explosive growth phase," he says. "Obviously that's a good thing because it increases our constituency, our voice. But I find the emphasis on Alpine Touring gear with fat skins that's now the assumed mode of travel to be unfortunate. Lately I've been pointing out the Nordicheritage gear and its ability to lope more freely over moderate terrain, and even climb 3000-foot headwalls by switchbacking skinlessly on fishscale patterned bases."

"Winter Wildlands
Alliance is the best hope
for gathering lovers of
wild snow together into
a coherent and effective
political force."



Arapaho and Roosevelt National Forest, Colorado. Unceded Aeapaho, Ute, Cheyenne, and Ochethi Sakowin lands. Photo courtesy of Maddie Fahnline

Advocate, Member:

MADDIE FAHNLINE

ELY, MN

Originally from Colorado, Maddie learned to ski when she was just three years old. She is a backcountry skier, ice climber, and an advocate for wild places. Maddie got involved with Wild Winters when her local backcountry ski spot, Moose Mountain in Northeast Minnesota, was threatened by a proposed ski resort expansion plan which would have put one of the finest backcountry

ski areas in the midwest in-bounds. She supports WWA because she believes in the mission and knows that "the fight for our public lands is complex, and it is hard to be a small grassroots organization going against a mega corporation." She adds: "Winter Wildlands Alliance stepping in and providing assistance, resources, and boosting those grassroots efforts is invaluable."

"I don't want to sit on the sidelines and hope that someone else will save these places; if they are to be protected it takes action in the present and people who will speak up for them."



Seattle, Washington. Unceded Duwamish Lands. Photo by Andrew Burton, @andrew_burton

Board Member:

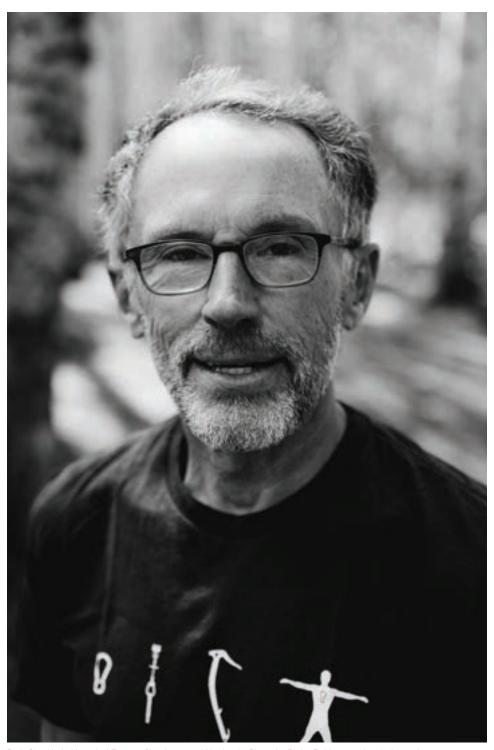
DENIS TUZINOVIC

SEATTLE, WA

Denis is the Environmental Coordinator in Seattle for Patagonia. He's involved in DEI initiatives and helps lead Patagonia's LGBTQ+ Community Group. He also volunteers for the Raincoast Conservation Foundation as their U.S. Operations Coordinator. When, as a kid, his family first

moved to the United States from Bosnia, he learned to ski with a local community center in Chicago. "Without that opportunity," he says, "my family couldn't afford ski lessons." In his free time, he enjoys birding around the Seattle area, skiing, and hiking with his partner.

"I'm glad that Winter Wildlands Alliance provides the opportunity for kids to learn to snowshoe and about snow science at SnowSchool. Programs like this influenced me to become an advocate for protecting our winter wildlands."



Park City, Utah. Unceded Eastern Shoshone and Ute lands. Photo by Blake Bekken, pocketsindependent.com

Member, Activist, Founder of Black Diamond Equipment:

PETER METCALF

DRIGGS, ID

Founder and CFO Emeritus of Black Diamond Equipment, Peter now serves on the boards of several conservation-oriented nonprofits. We caught up with him in Park City recently to talk about the proposed expansion of Grand Targhee Ski Resort into neighboring Teton Canyon. He'd spent the summer climbing in Wyoming's Tensleep Canyon and in Europe. "We're facing an existential battle over the issue of continued development into wilderness and national forest areas that have immense recreational, watershed, viewshed and biodiversity values." he said. "The deck is stacked in favor of for-profit ski areas being able to bulldoze forward with expansion plans, even when it's not in the community's interest, even with residents coming out in overwhelming numbers saying we don't want this."

"We don't want to lose the values we get from these undeveloped lands. We need to change the laws to put the community and the common good on equal footing with for-profit private interests. And that's going to take all of us being engaged."

Skiing With Wildlife

What are our impacts and what can we do to minimize them?

By Jana Rogers

hen I'm in the space between frozen toes and golden light, perched on a windswept ridge, it's hard to imagine that the sport I love can negatively impact the health of an ecosystem. But as grounding as skiing can feel, the fact is that increasing pressure from an explosion in winter recreation magnified by changing climate, advances in technology, and media glorification poses mounting threats to wintering wildlife and habitat.

Winter may be our playground, but it's high stakes for wildlife. Food scarcity and plummeting temperatures require species to adapt and conserve energy. Adding stress can decrease survival, impact reproduction, and cause behavioral or physiological disturbance such as decreased foraging and habitat abandonment. As winter recreationists, can we reduce wildlife disturbance in order to protect the biological integrity on which we ultimately depend? Just as we constantly mitigate avalanche risk in the mountains, can we make decisions and create collective values that allow wildlife to thrive on the landscape?

"Wintering wildlife is in the lowest condition

in the whole year," says veteran Colorado Parks and Wildlife officer Mike Crosby. When it comes to ungulates, "the males have just come off breeding season, and the females have just come off lactation season and are pregnant. So any stress can be very significant in terms of mortality, and mortality in vitro. We have documented clearly that deer can reabsorb fetuses after too much stress. Elk and moose also slough fetuses."

Wildlife show the strongest avoidance to spatially unpredictable activities, like increased backcountry skiing in new zones.¹ Kim Heinemeyer, Lead Scientist and Project Director for Round River Conservation Studies, has led research and monitoring efforts on rare, declining

Continued, pg. 22

1. Arlettaz, R., Nusslé, S., Baltic, M., Vogel, P., Palme, R., Jenni-Eiermann, S., Patthey, P., and Genoud, M. 2015. "Disturbance of wildlife by outdoor winter recreation: allostatic stress response and altered activity-energy budgets." Ecological Applications 25(5):1197-1212. / Braunisch, V.; Patthey, P.; Arlettaz, R.L. 2011. "Spatially explicit modeling of conflict zones between wildlife and snow sports: prioritizing areas for winter refuges." Ecological Applications 21(3):955-967. / Cadsand, B. A. 2012. "Responses of mountain goats to heli-skiing activity: movements and resource selection." Thesis, University of Northern British Columbia, Prince George, British Columbia, Canada







A Mardy Murie quote hangs crookedly in my Alaska cabin: "Wilderness itself is the basis of all our civilization. I wonder if we have enough reverence for life to concede to wilderness the right to live on?"

Kenai Peninsula, Alaska. Unceded Dena'ina and Sugpiaq lands. Photo by Jana Rogers, @janzy_



North Cascades National Park, Washington. Unceded Nlaka'pamux, Skagit, and Sauk-Suiattle Lands. Photo by Jason Hummel. @iasonhummel



As a member of Winter Wildlands Alliance, you directly support wildland and upper-watershed conservation, nature-based climate solutions, responsible recreation, and experiential winter education programs for more than 35,000 kids nationwide each winter.

Please consider renewing your membership early, becoming a monthly donor, or making an additional donation to protect America's wild snowscapes today.

We can't do it without you. wildwinters.org/join

or vulnerable species including fisher, marten, wolverine, grizzly bears and northern woodland caribou. "The biggest impact on wolverines from any kind of recreation is where people go to new areas," she explains. "Even relatively low levels of recreation will start changing their behavior, and they will start avoiding those areas."

There are very few protections in place that focus on minimizing the damage winter recreation can have on wildlife and habitat. And of course as snowpack declines and as Over Snow Vehicle technology and use grows, impacts only increase.

Under the 2015 Over Snow Vehicle Rule, the Forest Service has a duty to minimize impacts and conflict of uses. Through engaging with this process, recreationalists can advocate for creating buffers around waterways and riparian zones—requiring minimum snow depths to protect soils and vegetation—and for limiting motorized use adjacent to protected areas.

Because noise carries differently on sensitive winter soundscapes, motors have complex impacts—and not just for backcountry skiers looking for solitude. Adam Rissien, WildEarth Guardians' ReWilding Manager, provides one example: "The noise from snowmobiles disturbs the lynx's ability to hunt. If you have snowmobiles running through an area of snowshoe hares, and the snowshoe hares scatter, the lynx will work harder through the winter months to find those prey species." To pinpoint disproportionate impacts, sound modeling and recreational usage mapping can be

overlaid with habitat modeling.2

Although motorized sports are an obvious culprit, human-powered activity also has real impact. Honoring strategic closures and sticking to known access routes is key to concentrating human usage, habituating species to human patterns and limiting contact with wildlife. If skiers do encounter wildlife or see concentrated tracks, Heinemeyer recommends they change their route or objective to minimize disturbance. "If you see multiple tracks, or if there is any evidence animals are active in that area, the best thing is backing out and going somewhere else, to avoid displacing that animal."

Ski Mountaineer and Exum Guide Kim Havell also pays attention to signs like scat and tracks when moving through the mountains. "It's really neat to be able to read nature. It's part of what we do with snow—why wouldn't we do it with animals?" When it comes to minimizing interactions with wintering wildlife, she says, "it comes down to really simple stuff: stay on the main routes, and get up extra early if you want the pow."

Den disturbance is another primary winter concern. A Kenai Peninsula study found brown bear sows select dens on isolated steep slopes, intentionally inaccessible to humans.³ After documenting brown bear den abandonment in response to

^{2.} Burson, S. 2008. "Natural soundscape monitoring in Yellowstone National Park December 2007— March 2008." National Park Service, Yellowstone Center for Resources, Mammoth, WY.

^{3.} Michael I Goldstein, Aaron J Poe, Lowell H Suring, Ryan M Nielson, Trent L McDonald, 2010. "Brown Bear Den Habitat and Winter Recreation in South-Central Alaska." The Wildlife Society.

heli-skiing, biologists speculated use of suboptimal denning sites can affect bear distribution patterns and lead to population decline.⁴ Bears are able to wake up quickly to avoid danger, wasting critical energy needed for survival.

"If bears have to expend energy to relocate their den, or to rebuild, that's energy they don't have to survive the rest of the winter," says Rissien. In the Sierra Nevada, black bears are at risk of increased den and cub abandonment because they rely on the same deep northeast aspects as skiers.⁵ Many vulnerable species, such as wolverine, give birth to young in the middle of winter recreation season. "It's not just about protecting den sites," adds Heinemeyer, "it's about protecting the resources the female needs to be successful in raising her kits."

Receding snowpack creates a funnel effect as humans and alpine species such as wolverine, canadian lynx, mountain goat and bears all seek an increasingly finite resource. Wildlife with significant habitat loss—such as the famously isolated Jackson Hole bighorn sheep, already marginalized by development—are especially vulnerable. A now well known (and often maligned) University of Wyoming GPS study illustrated how pressure from backcountry skiing taxes

sheep's limited energy.6

As a Jackson local, Havell says that skiers aren't the cause of the bighorn sheep's decline, but they are part of the solution. "We're the last entity to try to help. Yes, development pushed it, and people are pushing from all sides, but we are the last ones that can actually do something about it."

We all know the saying, "with great privilege comes great responsibility." So, as skiers and climbers, are we willing to change our objective if we run into a band of sheep? Will we honor closures and stay on established routes to avoid critical winter habitats? Will we keep dogs from running ahead on the skin track, and do our best to recreate quietly and responsibly? Chasing objectives without active stewardship lacks accountability.

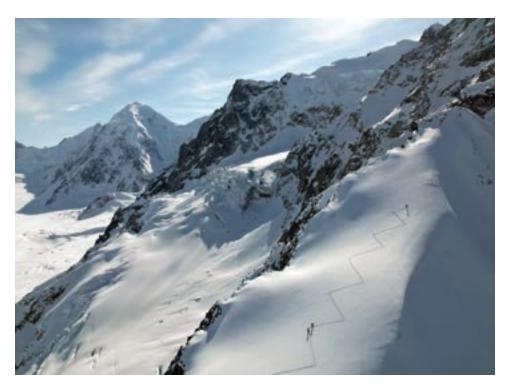
By following biologists' lead, the winter recreation community is uniquely poised to bolster conservation's success on the ground. In fact, Heinemeyer attributes the success of her studies of wolverines' avoidance of winter recreation to the willingness of recreationalists to participate in the research. "It was unique in that way, and powerful in the information we were able to collect," she says. "Recreationalists love to know wolverines are out there and appreciate the animal even if they know very little about it."

The South Columbia Mountains Wolverine Project, co-founded by biologist Doris Hausleitner, has also used citizen science

^{4.} Crupi A.P., D.P. Gregovich, and K.S. White. 2020. "Steep and deep: Terrain and climate factors explain brown bear (Ursus arctos) alpine den site selection to guide heli-skiing management." PLoS ONE 15(9): e0238711

^{5.} J.M. Goodrich, J. Berger. 1994. "Winter Recreation and Hibernating black bears."

^{6.} Courtemanch, A.B. And M.J. Kauffman. 2014. "Seasonal Habitat Selection and Impacts of Backcountry Recreation on a Formerly Migratory Bighorn Sheep Population in Northwest Wyoming, USA." University of Wyoming.





Alaska Range, Alaska. Unceded Dena'ina, Ahtna, and Lower Tanana Dene lands. Photos by Jana Rogers, @janzy_

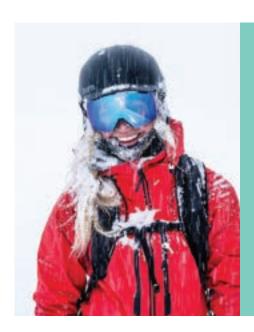
to identify critical reproductive areas. Habitat modeling paired with hair-sample genetics led to the first den protections of their kind, with humans respecting drainage boundaries of known female wolverines. "It's really exciting for us because there is a direct conservation impact," Hausleitner explains. "The response from every user group has been overwhelmingly positive."

A Mardy Murie quote hangs crookedly in my Alaska cabin: "Wilderness itself is the basis of all our civilization. I wonder if we have enough reverence for life to concede to wilderness the right to live on?" I am confronted by an uncomfortable question: how much must I limit myself in order to protect what I love? The winter recreation community, with its shared joy of movement and discovery, is essential in creating the social value needed to protect wildlife. Because we all have impact, we all have an invitation to take responsibility for our actions, to

learn how to move consciously through sensitive habitat—or sometimes to avoid it entirely—and to become part of a collective solution.

"We are having an impact," Havell reflects, "and if we don't care... and we don't start paying attention, we are going to lose what makes this special in the first place. Every little bit of this matters for the future of the planet."

We all want access to public land. We want to pursue activities that enrich our lives. We want to share photos and stories from remote places. But as we struggle to find the balance between access and impact in a rapidly changing climate, I hope we can see ourselves as guests in these ecosystems, moving gently and consciously through (or around) sensitive habitats with the kind of reverence Mardy Murie asks of us, being part of the solution rather than just one more set of impacts.



JANA ROGERS is a photographer and creative with a background in sustainable product and material design. Her creative work has supported wildlife conservation, awareness of public land use, and climate change issues internationally. Jana's love of mountains and skiing was cultivated as a child, and her life continues to be shaped by snow and a deep devotion to wild places and wildlife



SKINTRACK RECIPE

Hal's Kimchi Noodle Thermos Soup

Fermented Warmth, Special Meter ++

Best prepared directly in your Ski Kind Yeti wide-mouth thermos. Let it power up your ski day—quietly fermenting alpine flow—your own secret onggi pot deep in your pack!

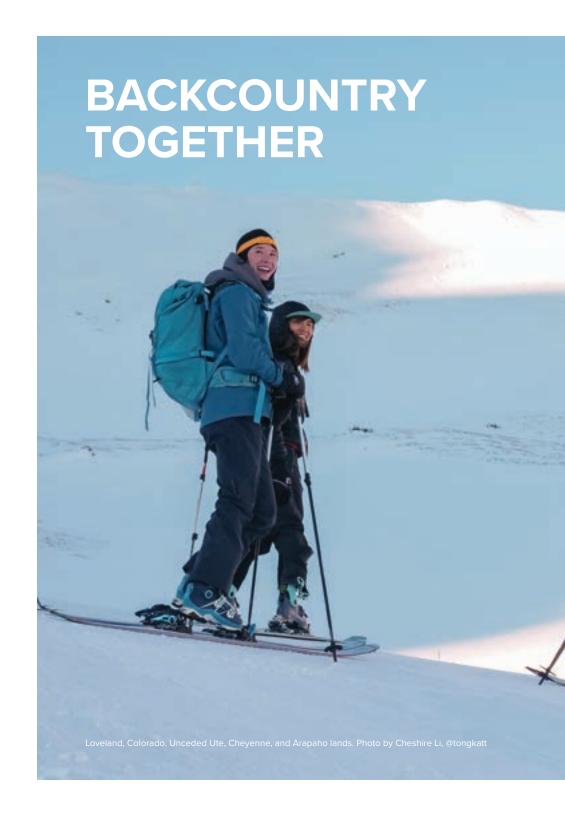
2-3 heaping tablespoons kimchi
Small bundle sweet potato noodles*
1 tablespoon Hoisin sauce
Boiling water

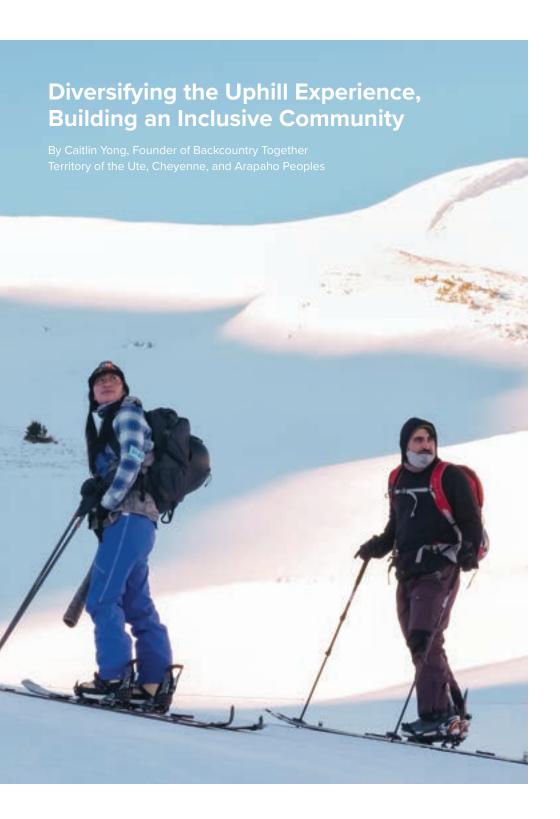


Directions: Boil water. Make Dawn Patrol coffee (separately). Take first sips. Wipe sleep from eyes. Combine all ingredients in thermos with leftover boiling water. Seal tightly, call it done. You're cooking in the skin track! Enjoy the warmth, stay light and fast, and let your backcountry special meter chime!

*After rigorous testing, Hal reports sweet potato noodles stay al dente the best, but other noodles work in a "powder day pinch."









The author laying it out on asphalt. Bakersfield, California. Unceded Yokuts lands. Photo by Jeff Suchy

hrashing down the natural curves of the San Dimas mountains on downhill skateboards is where I started. My passion was hiking up closed mountain roads and then skating down, squeezed into hairpins on a powerful downhill longboard. It was human-powered liberating fun, but not the safest. After retiring early from professional downhill longboard racing, I started looking into backcountry splitboarding.

The freedom of the backcountry and expressive flows of touring and riding looked like the sport/lifestyle for me. But for years the price of splitboards was costprohibitive. I contemplated cutting one of my snowboards in half to convert into a splitboard and kept dreaming of the day I would be able to tour the backcountry.

Piece by piece, I built my first splitboard setup, waiting patiently for sales. It didn't have all the bells and whistles. My bindings often iced up, leaving me unable to transition. But it was a splitboard! When I found a killer deal on a beacon, shovel and

probe, I was ready! It was my time to shine!

I signed up for an avalanche safety course: AIARE 1 at Rocky Mountain National Park. It was my second time using my splitboard, and it was a disaster. Trying to focus on learning while also catching my breath on the uphill, and transitioning my dang splitboarding bindings felt like total mayhem. I would not recommend the experience. On top of that, one of the instructors was making fun of all the splitboarders, saying: "And this is why you should switch to skiing."

I'm glad I took my AIARE 1 to learn how to do companion rescue, spot terrain traps and safely navigate avalanche terrain, but I wished there had been a community to help walk me through realistic steps to confidently get into backcountry riding. My journey into the backcountry was a bumpy ride full of unwelcoming barriers at every twist and turn. I was the only BIPOC rider in that course and on most backcountry tours for my first year. More experienced backcountry riders did not seem excited



Arapahoe National Forest, Colorado. Unceded Cheyenne and Ute lands. Photo by Cheshire Li, @tongkatt

to have me learning alongside them. I was excluded from group photos for some reason (it might have been that I did not fit the "image"). My feelings of being treated differently were constantly gaslighted, and people would speak for me on my own skill level without my permission.

There is already a large barrier to entry into backcountry skiing and splitboarding when it comes to skills, knowledge, and gear, and we do not need another barrier to our community. It's time to diversify the backcountry and provide welcoming and safe spaces for everyone. From feeling unheard, unseen, and outcast, my first year splitboarding made me want to give up on this sport and community entirely. I never want anyone to endure those feelings in the backcountry, and that is what sparked the momentum to create Backcountry Together.

Backcountry Together is a community and organization that aims to lower the barrier to entry into backcountry splitboarding and skiing for BIPOC and ally riders. It's the community I wished I'd had when I was first starting out. We meet resort riders who are interested in transitioning to backcountry riding where they are familiar and comfortable, putting aside preconceived notions and diving into the experience with enthusiasm and warm inclusivity.

Arapahoe Basin Ski Area partners with us for our in-bounds uphill meetups, waiving fees for our community members. Deuter/ Ortovox lends us beacons, shovels, probes, and backpacks, and Weston lets us borrow demo backcountry setups. For our meetups in town, Patagonia Denver and Arc'teryx Colorado have hosted community gatherings to help educate about the opportunities to try a backcountry setup and the steps to safely get into backcountry riding.

In February of last year, we met up at A-Basin at the crack of dawn. Before long we were uphilling at a conversational pace up to Black Mountain Lodge. We all knew this was the start of something special.





The Future of Snow

Small humans take on big questions

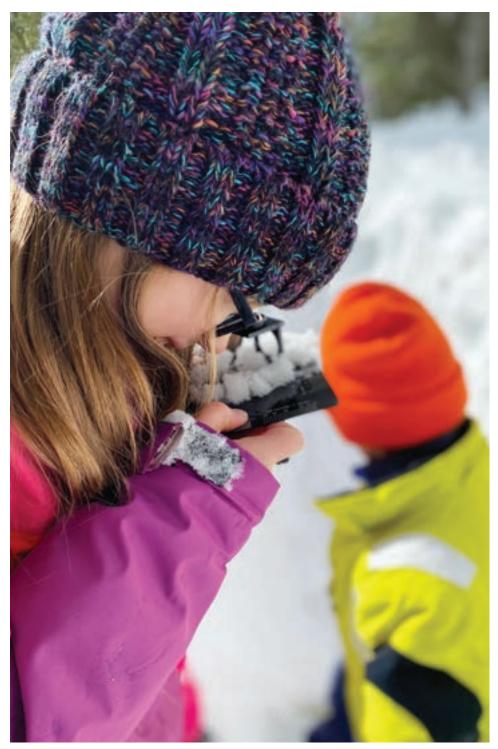
By Kerry McClay, National SnowSchool Director

t's a cold sunny day in early February and one of the teachers in our SnowSchool group says what most of us are quietly thinking: "I wonder when we'll get some more snow?" Standing at the edge of the high school football field in rural Idaho City, Idaho, it's clear that though December was unusually snowy, a cold dry-spell has now settled across the central Idaho mountains for the foreseeable future.

As we watch, pairs of fourth graders scamper on snowshoes across the hard icy snow, looking for undisturbed spots to conduct their snow survey data collection. Equipped with shovels, thermometers and yardsticks, some of

the kids laugh as they dig through icy snow, while others debate with their partners about the best approach. Though this school was recently awarded an official STEM Designation for their dedication to integrating such activities, today the students seem happy just to be outside. They also know that after their data collection they will finish the day with a fun-filled snowshoe romp through the nearby Ponderosa pine forest.

The students and their teachers aren't the only ones surveying this snowcovered football field and wondering about the future of the snowpack. Every week a NASA-funded research



Sandpoint, Idaho. Unceded Salish, Kootenai, and Kalispel lands. Photo courtesy of soleexperiences.org



Sandpoint, Idaho. Unceded Salish, Kootenai, and Kalispel lands. Photos courtesy of soleexperiences.org

team from nearby Boise State University surveys this same field as part of an ongoing project to further develop remote sensing technology. The team utilizes a large drone mounted with specialized radar to scan the snowpack in an attempt to measure its density. They'll compare the drone-gathered data to data they collect by hand (using methods not too dissimilar from the fourth graders).

This is the future of snow science, and it is increasingly focused on making more accurate snow water content predictions in a changing and unpredictable world. Once this technology is perfected, NASA hopes to launch a satellite equipped with instruments that will ultimately help measure, perhaps even in real time, the water content of snow in mountain watersheds (and globally). In dry western states that rely on mountain snow for up to 80% of their annual water supply, the question is: how soon will this future arrive?

The overlap of SnowSchool to professional snow science is not exclusive to this location in Idaho City. Across the 70-site SnowSchool network, some 35,000 students and their teachers are annually invited to submit snowpack measurements to Community Snow Observations (CSO), another NASA-funded project that aims to improve snowpack modeling with citizen science data.

After today's field trip, SnowSchool's Annual Snowpack Prediction Contest asks students how much snow and water will accumulate in their mountains this winter. The students make their

predictions using current and historical data from local mountain weather stations, and the closest prediction wins a prize. At the National Flagship SnowSchool site at Bogus Basin this activity is powered by the SnowSchool Weather Station, a snow monitoring station designed and installed by the USFS Rocky Mountain research station. In other locations students use their nearest NRCS SNOTEL stations. This is all modeled after the work snow hydrologists do every winter and spring crunching snowpack numbers to help make water supply forecasts in communities across the west.

Interestingly, the US Bureau of Reclamation just hosted a snowpack prediction contest of its own. Professional research hydrologists were invited to develop high-resolution imagery of a particular watershed to develop a snowpack modeling method that can accurately predict snow water equivalent— In September of 2022 a total of \$500,000 in prize money was awarded to the contests' finalists!

This ongoing scientific push to better understand one of Earth's most important and fleeting resources begs a question relevant to all of us: What is the future of our snow? With emerging science and our increasing technological ability to see into the future we may not find an answer we like. But we can certainly hope that our investment in this group of inspired fourth graders on this cold, dry Idaho day will keep the stewardship of mountain watersheds top of mind for at least another generation of humans.



HOWEVER YOU SLIDE OVER SNOW THIS SEASON—



on skis, a splitboard, a snowmobile, a plastic sled—please **do it with kindness.** It takes all of us together to keep the backcountry open, accessible, inclusive, and protected.

