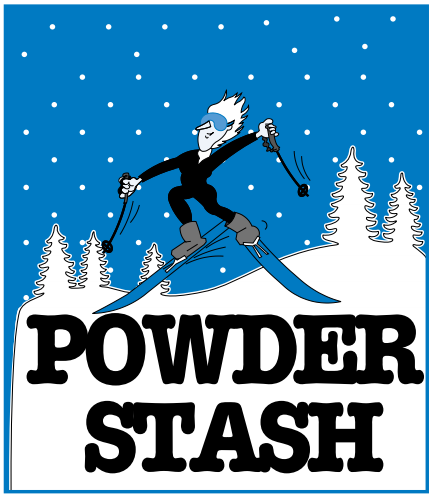
COLORADO DEPARTMENT OF NATURAL RESOURCES

A Newsletter for Friends of the CAIC

Winter 2003 ❄ Volume 7, Number 2

THE Beacon

It was with much relief that winter in Colorado started with a fury. Snow arrived deep, wet, and plentiful. While most of the rest of the western United States remained parched, Colorado was basking in some of the best snow conditions in years. Unfortunately winter has not stuck around, and as I write this column, all of the river basins in Colorado are reporting a below average water situation. From an avalanche perspective alone, this could spell problems in the future as a shallow snowpack in the early season generally translates to a weak foundation for later snows to fall on. Unable to support the new snows, avalanches become a serious concern. Time will tell, and as everyone in Colorado knows, if for no other reason than water, we need snow.



by Scott Toepfer

Several issues seem to come up each new season. Most involve our efficiency in getting our email messages to you each day. I'd like your help in smoothing our office transition into winter. First, if you have signed up as a Friend and have not received our emails, it is most likely because of a transcription error, probably on my part. One advantage to our having your phone number in our database is that it allows us to contact you if we can't make out your email address. There were a couple of days that I would input maybe 100 Friends applications, which really increases the odds of a mistake. Especially when I can best be described as a one-fingered chicken-pecking typist.

So, if you are not receiving our daily emails we can fix it, but we need to hear from you. And if your snail or email has changed, give us your old address as well as your new one. That will make it easier for us to find you in our database and process the change.

The staff at the CAIC feel it is very important to give you the best service we can.

We have occasionally been accused of using weather jargon in our daily reports. Over the past seven or so seasons we have tried to minimize this. Some of our readers want us to get right to the point. Other readers enjoy learning some of the finer points of our atmosphere. That places us between a hard slab and a soft slab. When we first started the Friends program, our daily reports required a codebook to decipher. For whatever deviant reasons, we each took great pride in coming up with new abbreviations to put in our daily updates. When our forecasts became the printed document you see today, instead of just a phone message, we found we had opened a Pandora's box of problems. We now try to keep the jargon to a minimum, and at the same time teach people about our quirky and loveable atmosphere. So believe it or not, we have gotten much better and will always try to improve the product we provide.

Once again we have another full issue for *The Beacon*. First we have a bio on Jerry Roberts. It is not easy to dig personal information out of Jerry. He has worked as a highway forecaster in our Silverton office for several years now. A good friend of his, Peter Shelton, put a short piece together that brings a glimpse into the life of the elusive Mr. Roberts.

In our second article, Mark Mueller, our lead forecaster at both Wolf Creek and Monarch Passes, looked into historical avalanche information from Wolf Creek Pass. During his research he documented what was likely the most active avalanche cycle in the history of the Wolf Creek Pass highway corridor. There may have been as

continued on page three

Jerry Roberts: "Snowviewer"

by Peter Shelton

Jerry Roberts' email handle is "Snowviewer." He got it from a poem by the Japanese haiku master Basho:

"Come, let's go
snow-viewing
till we're buried."

Not that Jerry expects to be buried any time soon. He hates that thought. Loves snow. Loves, respects and is awed by and infinitely curious about avalanches. What he likes is forecasting snow and avalanche conditions for Colorado's San Juan Mountains as part of the CAIC/CDOT team based in Silverton. What he really likes is forecasting in the morning then driving up to Red Mountain Pass to check his predictions in the field. If that means climbing Ohio Peak and digging a couple of holes and working carefully down a couple thousand vertical feet of five-percent powder snow back to the truck, then so be it.

The "till we're buried" part of the haiku may be hyperbole, but it actually does reflect Jerry's commitment. He started out as a kid poking around the Sangre de Cristo Mountains near Canon City, Colorado, on old wood clunkers with leather straps and hiking boots. He's 54 now. He's researched, taught and done avalanche work for the Institute of Arctic and Alpine Research, the Silverton Avalanche School, American Avalanche Institute and forecasted for various mines in Chile. He's absolutely

Jerry spending another day in front of his favorite forecasting tool, the computer (aka, the "confuser").

Jerry prepping his truck for another winter of forecasting on U.S. Highway 550.

devoted to snow. And he could probably count the number of days he's been lift-served skiing on one hand. Hates moguls and crowds and buying a ticket. What he really likes is when it's storming outside and he's drinking tea by the woodstove and writing his own poems. Here's one:

"ten turn poke
in steep
November forest."

And another:

"full moon light
on wind driven snow
slides tomorrow"

As a forecaster, of course, Jerry must communicate with the snow safety guys at the ski areas, with Craig Sterbenz at Telluride and Pat Ahern at Silverton Mountain. That's okay. They're friends and fellow snow viewers. It's just that the backcountry is Jerry's home. He probably knows the San Juans in winter better than anybody alive. His mind is an atlas of ski runs and slide paths: Blue Point, Eagle, Midnight Mine, Silver Ledge, and the Brooklyns. He wrote a poem about driving beneath the Brooklyns (there are 13 of them in a row capable of reaching the road) at night in a storm:

"traveling under
Brooklyn paths
fear is my companion."

He calls this part of his job the Buddhist Road Patrol. Every winter for the last 20 Jerry has taught a month long snow science/avalanche-forecasting program for Prescott College. Some of the kids who come up from the desert wonder about Jerry at first. He makes them work: break trail, dig pits, stare at grains, graph pits, learn Sno Pro, dig more pits, study impetuousness and other human factors. Most of them thought they'd be coming up to Red

Mountain Pass to ski. When they do finally get to make turns in the last weeks of the course, they are wiser than they were. They are on their way to becoming mountain people.

Jerry thinks of himself as a curmudgeon. He doesn't like a lot of the changes coming into the mountains. I think he's more of a traditionalist, a keeper of the old stories, whether, as he says, they are true or not. In recent years he has learned to use the "confuser," as he calls it, and to master the technical skills of weather forecasting. Far from an old man, Jerry turns into a kid when he closes the highway and directs the avalauncher crew or does avalanche control from the helicopter. "Every 12-year-old boy's dream," he calls it.

Powder Stash

continued from page one

much as 15,000 feet of highway covered in avalanche debris. Given the extent of the activity it is amazing no one was killed.

In staying with the southern mountain theme of this issue, we have a piece that was sent to us in November. Many people contact us each season to tell us about near-miss avalanche encounters. In this issue, you can read Danika Gilbert's firsthand account of a very close call while tele-skiing on Red Mountain Pass with some friends.

Here's hoping the winter is a safe and very, very snowy one.

The Avalanche Cycle of January 26–30, 1957 at Wolf Creek Pass, Colorado

by Mark Mueller, CAIC/CDOT Avalanche Forecaster

Introduction:

Wolf Creek Pass in the East San Juan Mountains of Colorado is known for deep snowfalls. A major east-west highway, U.S. 160, crosses the Continental Divide here at just over 10,800 feet. Efforts to keep the highway open year-round began in 1934. The storm of late January, 1957, may have produced the most severe avalanche cycle on record that Wolf Creek Pass has seen. This article looks at what made this avalanche cycle so severe.

Weather Summary:

Weather data for this piece was collected from the Colorado Climate Data Center (CCDC) in Ft. Collins, and articles from the *Pagosa Springs Sun*. The early months of the winter of 1956/57 were dry. Precipitation in Pagosa Springs was measured at .24" in November (1.54" average) and .46" in December (1.81" average). Early in January, winter finally arrived when a storm deposited 6 feet of snow at the Pass. The *Pagosa Springs Sun*, January 10, 1957, states, "The storm on the pass was marked by high winds, lots of snow, and some rain. The snow was exceedingly wet (18" with 2.77" water on 1/9, CCDC data) and most of the slides on the west side of the pass went down Tuesday and Tuesday night." In Pagosa Springs, the same article states, "Better than one foot of new snow fell and in addition it rained most of the day Tuesday."

Another storm hit the area two weeks later leaving one foot of snow in town and two feet at the pass. They had barely gotten this storm cleaned up (avalanching to the highway was not reported) when a bigger storm hit. Snowfall began January 24 and continued through January 30. Avalanching was again widespread and this time a less obvious avalanche path ran big with near fatal consequences.

The Colorado Highway Department staffed a maintenance facility (The Camp) four miles west of the summit with some homes at the site of the present-day upper runaway truck ramp. Two families and three to four additional men lived there. Weather data was collected at this site from the late 1930s into the early 1970s.

In the early

continued on page four

Weather Data From West Side Camp, 9,400

	1/24/57	1/25/57	1/26/57	1/27/57
Snowfall	4	12	14	*Weather data not available due to avalanche overrunning the camp*
Precipitation	.23	.62	1.14	
Density	5.8%	5.2%	8.1%	
Max. Temp.	19	19	24	
Min. Temp.	4	3	14	

(Note the increasing density and air temperature as the storm progresses.)

Avalanche Cycle at Wolf Creek Pass

continued from page three

morning darkness of January 27, 1957, the Camp Slide ran, damaged a house, buried some equipment, and buried a highway worker, Ira Longwell. He was found quickly with just his fingers sticking out of the snow, uninjured but shaken. Reported total snowfall amounts with this storm were in the 12–15 foot range. Avalanche debris was reported 30 feet deep in the front yard of Camp and on the highway. A photo from the *Pagosa Springs Sun* shows a truly impressive pile of avalanche debris.

Avalanche Activity:

Twenty-two avalanches reached the highway during this storm cycle according to WWAN records. Two are recorded as Class 5, the largest size classification and the only two Class 5 avalanches recorded in 50 years of record keeping. Several are identified as "Unknown" and several known paths are recorded as reaching the road more than once during the cycle. On January 31, 1957, the *Pagosa Springs Sun* reported, "Every known slide, and a few new ones, have come down." The article goes on to say, "The road on the Pass from the top down on this (west) side is practically one continuous slide. There are many slides that are at least thirty feet deep and chock full of rocks, trees, and other debris." WWAN avalanche data reports nearly 15,000 feet of the highway covered with debris from this cycle, almost twice the next greatest amount. In my personal experience during the last decade, 1,000 to 2,000 feet of the highway covered by debris would be considered a big avalanche cycle.

The Camp Slide on the morning of January 27 buried much of the snow removal equipment and the fuel storage shed. With no equipment and little fuel, plows from the east side of the pass had to work their way down the west side in order to dig out the camp and its equipment so that snow removal could continue. The highway remained closed until early February.

The Camp Slide is classified as having an "erratic" return interval (Frutiger 1962), with a slide affecting the highway every 10 to 20 years. The starting zone at 11,600 feet has a southerly aspect and the predominant southwesterly windflow during storms can erode snow from the starting zone as well as deposit it.

The Camp Slide has reached the highway on only one other recorded occasion, January 19, 1979 (a record snow year at Wolf Creek). In this case, 36" of light density snow (4.6%) was followed by only 10" of denser snow (9.1%), a known recipe for avalanche activity. In January 1997, another big storm hit the San Juans. I measured 73" of snowfall in 88 hours at the summit, while Wolf Creek Ski Area recorded 85". At my house in Pagosa Springs, I measured 48" (compare this to the 60" recorded in Pagosa in 1957). The Camp Slide ran big again. The debris stopped several hundred feet before the highway at the waterfall (you can see this small waterfall from the highway).

Summary:

From the *Pagosa Springs Sun* of 1/31/57, "This is one of the heaviest snow storms in a like period of time for a great many years. The last years that we had heavy snows were in 1948–49 and 1951–52, but neither of these years resulted in so great a fall of snow or moisture content in such a short period of time."

The West Side Highway Camp sat in the open area at the bottom of the avalanche path where it meets the highway. The former camp, abandoned in the late 1970s, is at the site of the present day upper runaway truck ramp about half way up the west side of Wolf Creek Pass.

An increase in new snow density during a storm or increased snow density from one storm to the next is an indicator that avalanche activity threatening the highway could be expected. The weather data above would support that observation. New snow densities increased as the storm progressed, and maximum and minimum temperatures also increased as the storm continued. An increase in air temperature is usually accompanied by an increase in snowfall density. Another important observation from the newspaper articles and the weather data indicated the presence of very heavy snow and/or rainfall. On several occasions in my experience, during major snowstorms snowfall turned to rain in Pagosa Springs. Serious avalanching on the Pass soon followed resulting in closure of the highway. This pattern occurred in February of 1993 and March of 1995.

The reason the Camp Slide was so large in 1957 may be attributed to the lack of early season snow followed by large amounts of new snowfall and the increase in snow density and air temperature. With the erratic return interval for the Camp Slide it may be assumed that when the Camp Slide runs, it often runs big. This has been my limited experience with this erratic slidepath over the last decade. While other nearby paths run more frequently, the Camp Slide requires a bigger stress and therefore can build up to a greater snow depth before it goes. When it does slide, it is big and can easily hit the highway.

My hope is that these investigations will aid future highway avalanche forecasters at Wolf Creek Pass, and I would like to suggest to any future forecaster here to be attentive to air temperature and snow density trends during storms.

References: Frutiger, Hans. 1964. Snow Avalanches Along Colorado Mountain Highways. U. S. Forest Service Rocky Mountain Forest and Range Experiment Station Research Paper RM-7.
Mueller, Mark. 1998. Snow Stability Trends at Wolf Creek Pass, Colorado. *The Avalanche Review* 16(6).
Mueller, Mark. 2000. Snow Stability Trends at Wolf Creek Pass, Colorado. *Proceedings of the 2000 International Snow Science Workshop*, Big Sky, MT.
The Pagosa Springs Sun. 1/3/1957, 1/10/1957, 1/24/1957, and 1/31/1957.

A Small Change in Aspect

by Danika Gilbert

(A personal account of an avalanche near Red Mountain Pass on November 10, 2002)

We were skiing at an area we call Sam's Trees, a nice, gladed, eastern aspect slope. The crew I started up with quickly caught the group of five just ahead of us. As we climbed up the skin track, we all continued checking the snowpack. Basically, there were about 6" of faceted crystals at the ground, just beneath an old crust layer. Above that about one foot of fairly wet snow with about a foot and a half of lower moisture snow topping it off. The lower snowpack appeared relatively stable as the faceted crystals were fairly wet. In all, we decided it was pretty stable and definitely safe to ski.

After two fantastic runs down these eastern slopes, four of us went up for a third run. This time we traversed further north along the treeline than before. Unknowingly, we ended up on a slightly more northern aspect. I started down the slope first, and after a few turns stopped. The terrain below didn't look safe and the snowpack felt less stable. I skied down and to the right to get quickly off the slope. As I neared what would become the right flank, I triggered a slide. From my perspective, the initial slide was about 20 feet wide and it quickly started moving. I struggled to stay on my feet and ski out of the building debris.

At this point, Kennan, who was above and right of me, looked up to see a large fracture propagating to the skiers' left of me, approximately 50 feet above where I was. He said the whole slope seemed to liquefy. What I thought was a relatively small slide felt like it would stop as I neared a small rollover, but just as I thought it was over I suddenly gained speed. Up to this point, my efforts had been to try to stay on my feet and ski out to the right of the debris. As the slide sped up, I was unable to do this, was pulled down and began to gain speed rapidly. Very shortly I found myself headfirst, belly down. I attempted to grab several small trees as I rocketed past, and continued to struggle to stay on top of the slide and move right. My efforts were fairly futile as my skis were dragging me down into the pack. Luckily I was able to avoid being pulled back into the main path of the slide. Just before another rollover, my right ski was torn off. It must have caught on one of the trees I was attempting to grab.

Then I found myself pulled deep down (maybe 2–3 feet) into the slide as I was carried over this next rollover. As I was pulled under, I swam hard and struggled to stay up in the moving debris. Seconds later, I felt the avalanche slowing, so I struggled harder and began punching my arms to try and break through. As the pack was settling in, I managed to get my right arm through. With some continued struggling I unburied my face and cleared my mouth and nose (which were packed full of snow) and tried to yell to the guys.

continued on page six

A Small Change in Aspect

continued from page five

By this time, Scott had skied to where he could see my arm and was quickly there to dig me out. Kennan was just behind him, as was Josh. They all worked to free my left leg, which was in a lot of pain. This ski had stayed on, and my leg was being pulled from the hip. My only injury was from this—a pulled hamstring and pretty sore muscles from the hip down. Shortly after digging me out, we began the search for my other ski. After about 30 minutes of digging and probing, Kennan found my ski! During this time, the adrenaline was slowing and I walked about 10 feet left of where I had recently been buried to have a look into the main avalanche gully. It was *huge* and pretty overwhelming to see. This brought on my first sobering thoughts, because till then my brain was in high gear thinking only about what I had to do to survive. Whew!

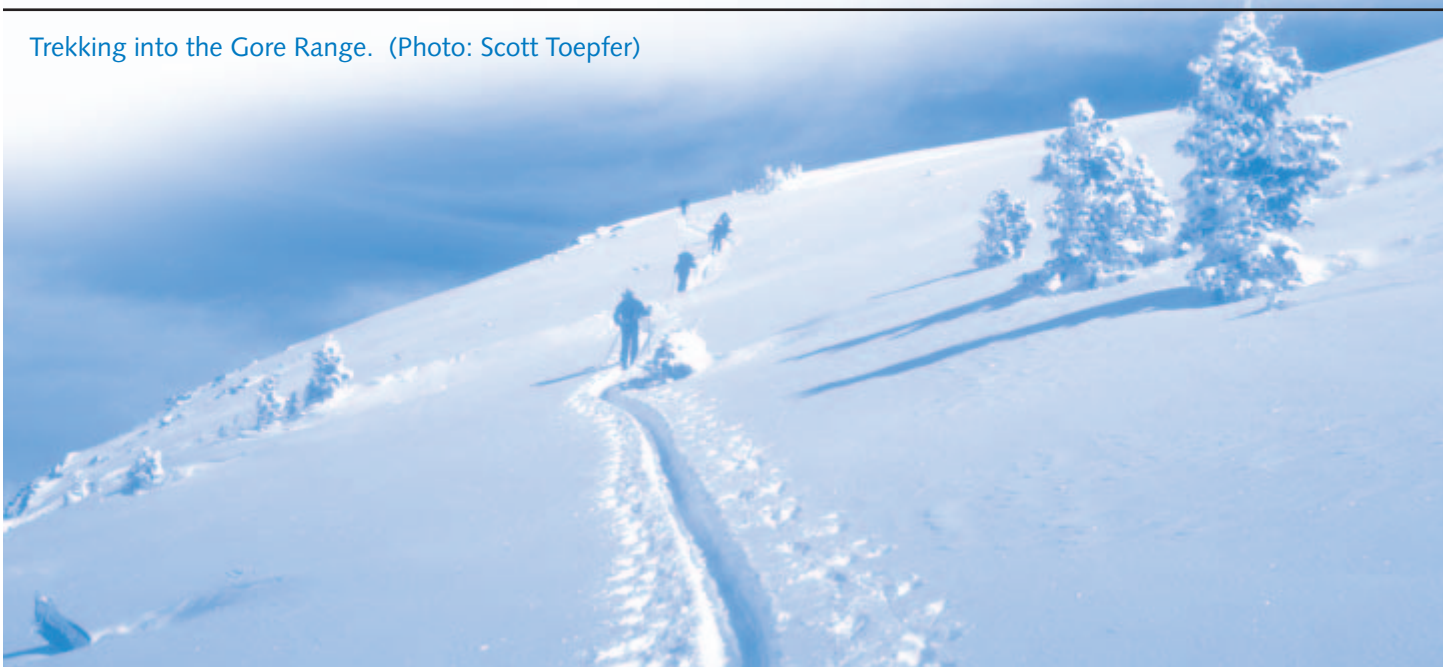
The guys have told me a bit about what was happening for them during this time. Kennan was the closest to me and had a pretty good view of the whole thing. From his perspective, the entire hill seemed to go at once. The fracture broke about 50 feet above me. He was off to the right of it but had to move quickly to avoid being caught in the edge as it grew. Kennan watched as I was carried past the trees and kept screaming at me to try and grab anything I could. He watched me disappear into the moving avalanche.

Scott and Josh were further above and to the right of Kennan and didn't see the slide till they heard Kennan yelling. When Scott looked over he saw the entire slope moving in blocks the size of vans. He immediately descended to a point where he could see the slide. About 100 feet lower than where he had been, he topped a roll to see my hand sticking out of the snow.

The fracture ran about 380 feet to the north (skiers' left) and 50 feet above where I originally triggered the slope. The crown was about 5 feet deep, and ran about 1000 vertical feet down the steepening gully. This is a common slide path, just to the west of the hairpin turn at Chattanooga off Highway 550.

So basically, I was stupid—and got really lucky. I didn't realize that I had moved onto a little different aspect and didn't take enough time to evaluate this new slope. Our ease with the earlier skiing lured me into this new aspect. I quickly realized the snowpack was different and the terrain was much steeper. I stopped above what I thought was the most dangerous area and headed quickly right. I was obviously too far down though. I was quite lucky that I was on the right edge when I was caught. A few feet further left, and I would have been gone. I'm also lucky to have avoided serious injury—both from the danger of hitting my head against all the trees or getting wrapped around them. I did have my ski leashes on, a big no-no; however, they didn't really seem to affect whether my skis stayed on or not. On the ski I lost, the leash bent and ripped the loop right off my boot. The other foot was securely stuck in the binding. My advice though is *don't* ski with leashes.

I'm so thankful to the guys. I never for a moment was worried that they wouldn't find me (we all had beacons and shovels). I just knew I had to avoid getting hurt or carried too far. I desperately wanted to get to the top of the snow so they could find me quickly. They were fantastic and provided me with great support as the emotions of the whole event started unrolling. In all, I didn't feel afraid at all during the event. It's only been afterwards, as I've thought back over it all, that the fear has grown. I have definitely thought a lot about how my friends must have felt watching it all happen right in front of them. I most definitely have a stronger appreciation for being alive and healthy.



Trekking into the Gore Range. (Photo: Scott Toepfer)

You've got questions? We've got answers.

by Scott Toepfer

Q: *"What is virga?"*
—Margaret Stalder

A: Virga is precipitation, either rain or snow that falls from clouds, but evaporates before it hits the ground. It happens when the underlying air is very dry, so it seems to be most common in the southwestern United States. It often times looks like a wispy veil hanging below dark clouds.

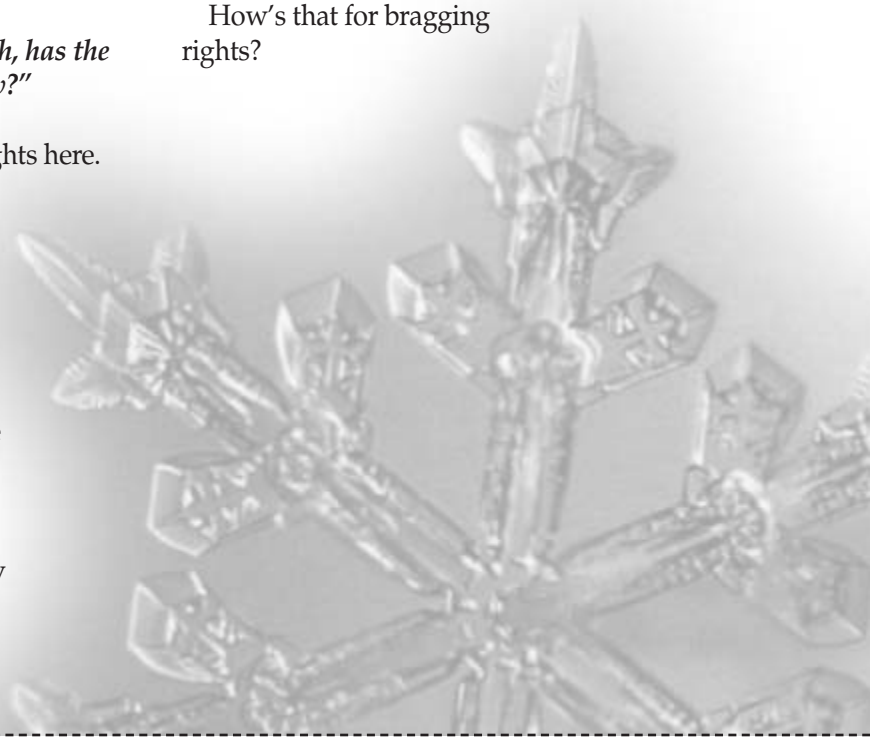
Q: *"Do you know which state, Colorado or Utah, has the least amount of moisture content in falling snow?"*
—Gareth Richards.

A: You have touched on a matter of bragging rights here. I have heard that Utah lays claim to the greatest snow on earth, that probably requires some sort of definition that I do not want to tackle at this time. There is no doubt that Utah gets more snow (for deeper powder days), but as far as water content in new fallen snow, Colorado has drier snow. That makes sense as we are just a little further away from the ocean. I looked at the NWS web site and looked up some well-known spots, like Alta and Park City in Utah, and Dillon, Vail & Wolf Creek in Colorado. Colorado wins the dry snow award by a couple of percentage points. I took a cold month, January, just to keep any rain events out of the equation. If possible, I also tried to keep elevations the same, around 8,000 ft.

For January in Park City the average water content is 8.96 percent, in Moab 16.5 percent and for Alta it is 8.76 percent.

In January for Colorado at Aspen it is 7.24 percent, Vail is 5.01 percent and for Wolf Creek Pass we found 5.06 percent.

How's that for bragging rights?



Renewal Notice (or recruit a Friend)

Yes, I will join the Friends of the Avalanche Center. Enclosed is my donation of:

- ❑ $30*, which gives me a CAIC window decal (if I am a new Friend), *The Beacon* newsletter, the Avalanche Wise booklet, and a morning forecast by e-mail.
- ❑ $45*, which gives me all the stuff above, plus an afternoon forecast sent by e-mail.
- ❑ Please accept my additional donation of $_____*
- ❑ I'm a renewing member.
- ❑ I'm a new member. Please send a CAIC decal.

* Your donation may be tax deductible and your canceled check is your receipt.

Name _____

Address _____

_____

e-mail _____ Phone # _____

Please mail this form & your check payable to "CAIC" to: Colorado Avalanche Information Center • 325 Broadway, WS1 • Boulder, CO 80305

Mission: The Colorado Avalanche Information Center promotes safety by reducing the impact of avalanches on recreation, industry, and transportation in the state through a program of forecasting and education.

Staff:
Knox Williams—Director
Nick Logan—Associate Director
Dale Atkins—Forecaster, Web Master
Scott Toepfer—Forecaster, *The Beacon* Editor
Lee Metzger—Forecaster, Ike Tunnel
Stu Schaefer—Forecaster, Ike Tunnel
Mark Mueller—Forecaster, Pagosa Springs
Andy Gleason—Forecaster, Silverton
Jerry Roberts—Forecaster, Silverton
Aleph Johnston-Bloom—Forecaster, Silverton
Rob Hunker—Forecaster, Carbondale
Halsted Morris—Avalanche Educator
Brad Sawtell—Summit County Staff

Durango.....970-247-8187
Summit County.....970-668-0600
Denver.....303-275-5360
Fort Collins.....970-482-0457
Colorado Springs.....719-520-0020
USFS-Aspen.....970-920-1664
Crested Butte.....970-349-4022

Friends of the CAIC
325 Broadway WS1, Boulder, CO 80305
phone: 303-499-9650
fax: 303-499-9618

e-mail: caic@qwest.net

website: http://geosurvey.state.co.us/avalanche

CAIC
COLORADO AVALANCHE INFORMATION CENTER

Colorado Avalanche Information Center
325 Broadway, WS1
Boulder, CO 80305
(A part of the Colorado Geological Survey)

FIRST CLASS
U.S. POSTAGE
PAID
Denver, CO
Permit # 738