Gallatin National Forest
AVALANCHE CENTER

2007-2008 ANNUAL REPORT

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ACKNOWLEDGEMENTS

FRIENDS OF THE AVALANCHE CENTER
TEAM BOZEMAN AND YAMAHA
BRIDGER BOWL
SWEET PEA LANDSCAPING
GERALD CARISCH

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Fremont Search and Rescue (Ron Miller)
Pinhead Classic
Gallatin County Search and Rescue
Community Food Co-Op
Jeff King at Edward Jones Investments
Barrel Mountaineering
The Yellowstone Club
Big Sky Ski Patrol
Gallatin Valley Snowmobile Association
Danhof Chevrolet
Moonlight Basin Ski Patrol
Montana Mountaineering Association

Cover photographs by GNFAC, Beni Zweifel and Jesse Schroeder.

INDEX

From the Director: Our 18th Year of Operation

Greetings!

Ron, Mark, Scott and I want to thank all of you for a great season. It has snowed so much it's hard to keep all the storms straight. On December 4th we started our daily avalanche advisories with an Avalanche Warning and on April 6th we ended with a 20" snowstorm in the Bridger Range! It felt like there weren't many days without snowfall. From now on we'll remember the "great" winter of 2007-08 instead of having to rummage back to 1996-97.

More people than ever received our advisories this year. We try to give everyone the necessary information to make safe decisions about traveling in avalanche terrain, but some folks still get into trouble. The only fatality of the season occurred on January 20th when a skier was caught in a slide in Beehive Basin. Additionally, there were four separate, live recoveries. Three snowmobilers and one skier were completely buried, but dug out in the nick of time by their partners. Nationally, it was a bad winter for avalanche fatalities with 32 deaths, far above the 10-year average of 25.

The Avalanche Center had some personnel changes this year. Ron "mangled meniscus" Johnson started the season fresh out of knee surgery. Although he couldn't do field work, he was able to put in steady office hours and teach. In December we hired Mark Staples part-time to cover Ron's missing field days. The Friends of the Avalanche Center funded this extra position. Scott started the season knowing he might not finish since he was applying for another job overseas. At the end of March his job came through and left the Center after 10 seasons of work. Mark filled in and we finished without a hitch, although it wasn't quite the same without Schmidty.

I'm proud of what we accomplished. This was the Avalanche Center's 18th year of operation and our advisories and education programs are as popular as ever. Highlights of the season include:

We put out 125 avalanche advisories which were accessed an average of 2,695 times a day. This is a 12% increase over last year.

Our Avalanche Education Program has expanded over the last two seasons with the help of the Friends of the Avalanche Center. We gave a record 96 lectures, seminars and field sessions to 3,927 people. That's 30% more talks than last year.

A local motorsports shop, Team Bozeman, worked with Yamaha and the Friends of the Avalanche Center for the 8th year in a row to loan us snowmobiles. This year we were given two, powerful, 2008 Yamaha Nytro MTX 4-stroke sleds to ride. We held on tight and by the end of the season we shredded over 1,300 miles on each one.

For the second year in a row we made YouTube videos of our field work. These have been a huge success and this season we produced 17 videos which were viewed 36,500 times.

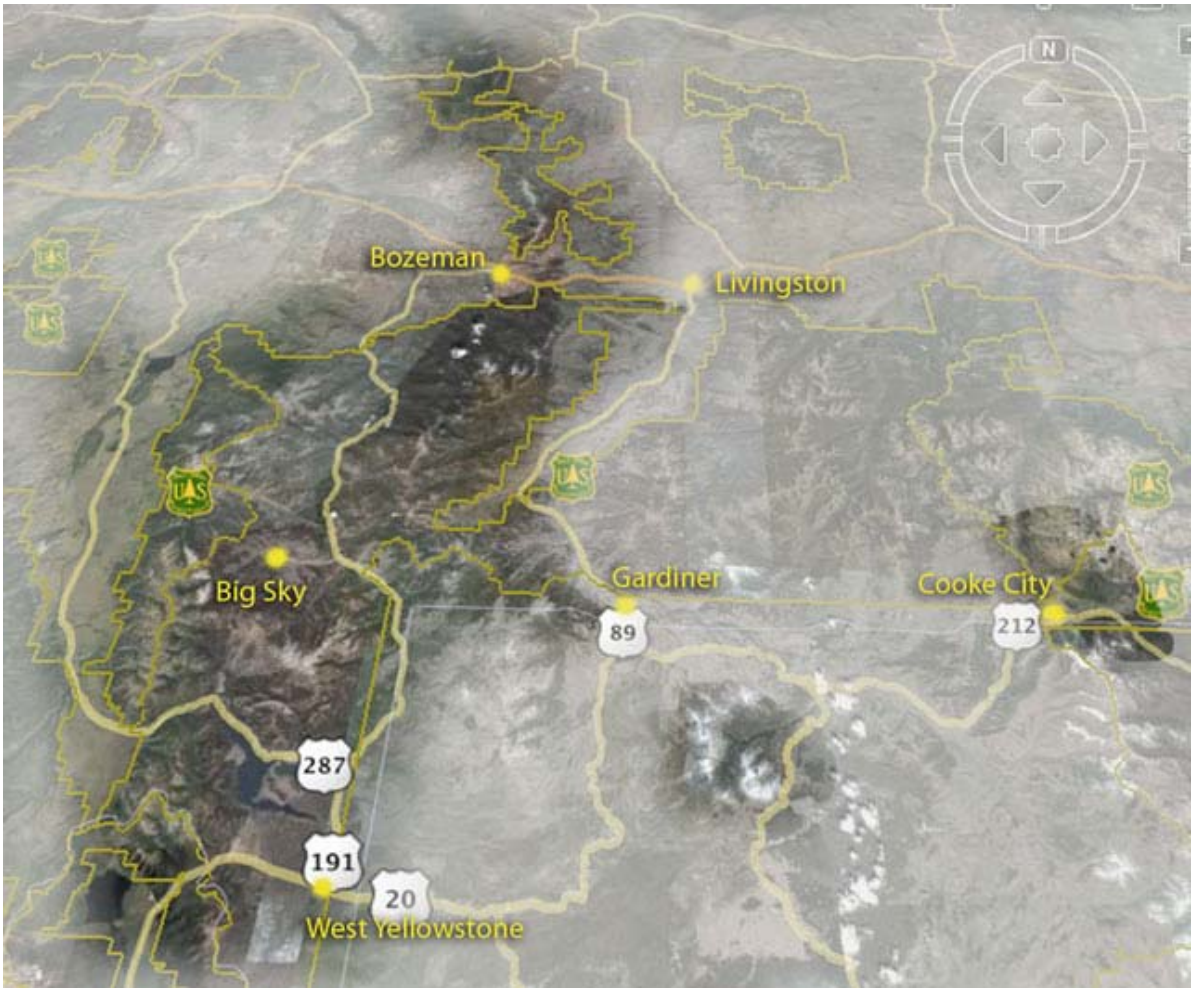
We could not do this job without the support of the local community. The Friends of the Avalanche Center financially supported us more than ever before. Donations from individuals, groups, foundations and businesses all went to great use fulfilling our mission of educating the public about avalanche danger.

I hope you enjoyed this winter and found our services worthwhile. As the seasons change, so do our activities. Ron is almost fully healed and will head back as a climbing ranger in Grand Teton National Park. Mark will teach NOLS courses. Scott will be busy sailing the high seas driving a huge, remote controlled submarine (really!). In May I'm heading to Pakistan and Afghanistan for another adventure.

Have a safe summer!

Doug Chabot

ADVISORY AREA

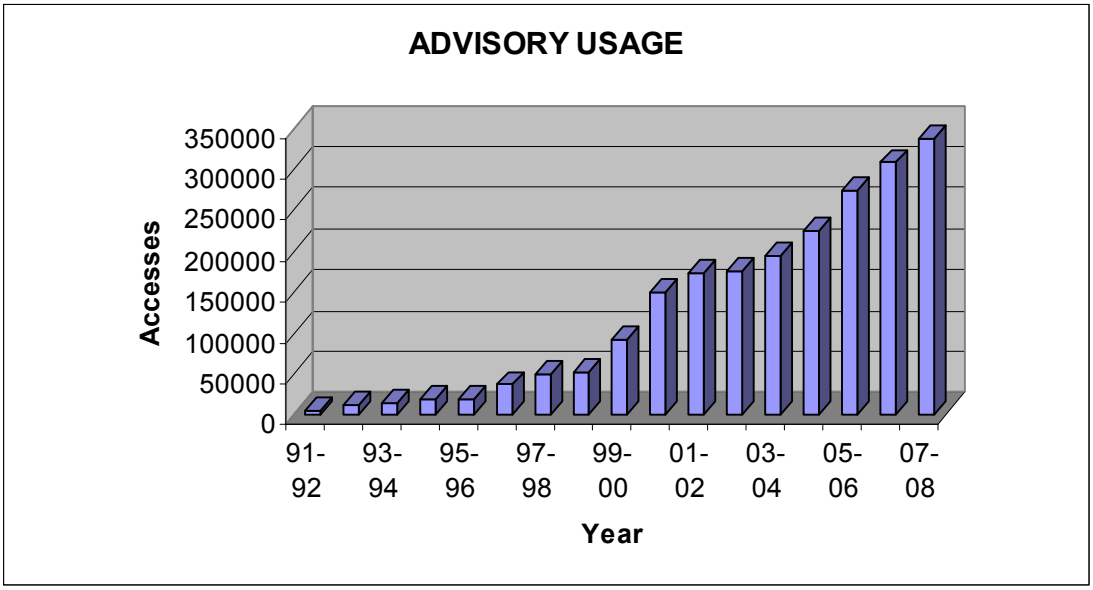


The GNFAC covers over 10,000 sq. kilometers

- Bridger Mountains
- Gallatin Range
- Madison Range
- Washburn Range
- Beartooth Mountains around Cooke City
- Henry Mountains (Lionhead) near West Yellowstone

AVALANCHE ADVISORIES

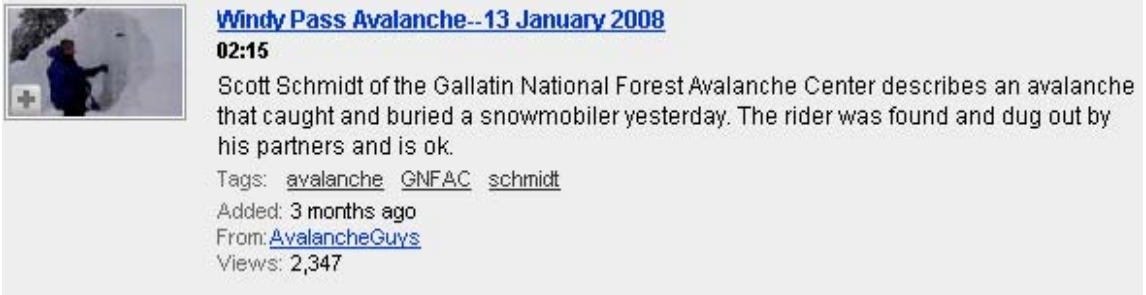
The avalanche advisory reaches 2,695 people a day.



Starting on December 4th and ending on April 6th, we put out 125 avalanche advisories. On average, every day we sent out 26 faxes, got 93 calls to the hotline, had 649 hits on the advisory web page and emailed 1,927 subscribers. This totals 2,965 accesses a day, 12% more than last year.

YouTube
Broadcast Yourself™

For the second year in a row our YouTube videos continued to be a hit. We made 17 clips that got viewed over 36,500 times!



AVALANCHE EDUCATION

Our Avalanche Education Program grows every year. The Friends of the Avalanche Center helped us teach classes throughout southwest Montana. *Jay Pape* continued as Education Coordinator for the Friends and did an outstanding job. All the instructors from last year returned. *Jay Pape, Dale Gullett*, *Angela Patnode* and *Jeff Watt* were the backbone of the program.

The GNFAC and the Friends taught 96 classes reaching 3,927 individuals. This was a 30% increase in avalanche education opportunities for the public! The Friends taught 58 of these classes and paid their instructors with help from a $5,000 grant from the *Hans Saari Memorial Fund*. The proceeds from last year's King and Queen of the Ridge at Bridger Bowl paid for the rest of the Friends Education expenses.

Besides lectures and field sessions, we try to get as much avalanche information as possible into the hands of winter recreationists. We printed 50,000 8-panel brochures on Avalanche Safety that were distributed to other avalanche centers throughout the western US. Here at home we handed out 9,000 of these. Yellowstone National Park gave this brochure to everyone pulling a snowmobile trailer headed to Cooke City.

We taught 96 avalanche classes reaching 3,927 individuals!

E. Knoff

AVALANCHE EDUCATION

DATE	INSTRUCTOR	GROUP	COURSE	#
13-Oct	Chabot	Nat Avalanche Center Meeting	Snow Pilot	50
13-Oct	Chabot	Avalaunch Film Festival	Ava. Awareness	110
20-Oct	Pape	Snow Expo	Ava. Awareness	12
21-Oct	Pape	Snow Expo	Ava. Awareness	35
22-Oct	Chabot	National Avalanche School	Avalanche Terrain	170
23-Oct	Chabot	National Avalanche School	Dzn Turns Movie	55
25-Oct	Johnson	National Avalanche School	Avalanche Rescue	170
2-Nov	Schmidt	North Dakota Snow Expo	Ava. Awareness	23
3-Nov	Schmidt	North Dakota Snow Expo	Ava. Awareness	140
5-Nov	Pape	Chief Joseph Middle School	Ava. Awareness (x2)	250
12-Nov	Johnson	SW Montana Ski Patrols	Various Topics	100
14-Nov	Pape	Bozeman Leadership	Ava. Awareness	35
14-Nov	Schmidt	Nevada DOT	Ava. Awareness	23
16-Nov	Pape	Northern Lights Trading Co.	Ava. Awareness	22
20-Nov	Pape	Belgrade Middle School	Dzn More Turns (x2)	55
21-Nov	Pape	West Yellowstone Rendezvous	Dzn More Turns (x2)	55
28-Nov	Johnson/Birkeland	ASMSU	Ava. Awareness	177
29-Nov	Chabot	Gallatin County SAR	Various Topics	20
29-Nov	Johnson/Birkeland	ASMSU	Ava. Awareness	150
1-Dec	Pape	MT Mountaineering Assoc.	Field Session	10
1-Dec	Birkeland /others	ASMSU	Ava. Awareness	70
5-Dec	Pape	Billings Basecamp	Ava. Awareness	30
5-Dec	Schmidt/Johnson	Team Bozeman	Ava. Awareness	20
6-Dec	Schmidt/Gullett	Team Bozeman	Ava. Awareness	20
8-Dec	Pape	Snowmobile Groomers	Ava. Awareness	35
9-Dec	Patnode	PSIA	Ava. Awareness	10
9-Dec	Schmidt/Gullett	Team Bozeman	Field Session	12
12-Dec	Johnson/Pape	BNSF	Ava. Awareness	29
13-Dec	Schmidt/Staples	West Yellowstone Guides	Ava. Awareness	40
13-Dec	Pape	Grizzly Outfitters	Ava. Awareness	15
14-Dec	Schmidt/Staples	West Yellowstone Guides	Field Session	26
14-Dec	Chabot	West Yellowstone Guides	Field Session	6
15-Dec	Gullett	Adventure Cycle & Sled	Ava. Awareness	6
17-Dec	Pape	Cooke City SAR	Ava. Awareness	28
18-Dec	Pape	Cooke City SAR	Field Session	18
21-Dec	Patnode	Bozeman HS	Dzn More Turns (x4)	100
29-Dec	Gullett	Cooke City Public	Ava. Awareness	10
5-Jan	Johnson/Pape	Helena Snowriders	Ava. Awareness	70
7-Jan	Pape	Big Timber Public	Ava. Awareness	6
7-Jan	Staples	Monforton School	Dzn More Turns	10
9-Jan	Pape	Timber Trails	Ava. Awareness	40
14-Jan	Johnson/McKittrick	Broadwater Co. SAR	Ava. Awareness	15
15-Jan	Pape	MOSS	Ava. Awareness	30
16-Jan	Johnson/Savage	Big Sky Public	Ava. Awareness	57
16-Jan	Pape	Yellowstone Polaris	Ava. Awareness	25

16-Jan	Gullett	Redline Sports	Ava. Awareness	36
19-Jan	Gullett	Cooke City Public	Ava. Awareness	45
19-Jan	Johnson	Island Park, ID Public	Ava. Awareness	20
20-Jan	Chabot/Schmidt	Island Park, ID Public	Field Session	25
23-Jan	Johnson	ASMSU	Ava. Awareness	130
24-Jan	Johnson	ASMSU	Ava. Awareness	130
25-Jan	Schmidt	Morning Star 2nd Grade	Ava. Awareness	80
26-Jan	Birkeland/Pape and Others	ASMSU	Field Session	100
27-Jan	Pape	MT Mountaineering Assoc	Ava. Awareness	8
29-Jan	Patnode	Team WINS	Ava. Awareness	30
30-Jan	Johnson	USFS Hebgen RD	Ava. Awareness	5
30-Jan	Johnson/Birkeland	ASMSU	Advanced Avalanche	40
31-Jan	Johnson/Birkeland	ASMSU	Advanced Avalanche	40
1-Feb	Gullett	West Yellowstone Public	Ava. Awareness	18
2-Feb	Birkeland/Pape and Others	ASMSU	Field Session	34
4-Feb	Patnode	Ophir Middle School	Ava. Awareness	75
5-Feb	Pape	MOSS	Ava. Awareness	18
6-Feb	Johnson	Museum of the Rockies	Ava. Awareness	53
6-Feb	Patnode	BWAG'S	Ava. Awareness	5
11-Feb	Pape	Arrowhead Middle School	Ava. Awareness	45
13-Feb	Pape/Patnode	Sacajawea Middle School	Ava. Awareness (x3)	85
13-Feb	Patnode	MSU Ski Club	Ava. Awareness	25
14-Feb	Pape	Park County High School	Ava. Awareness	30
15-Feb	Pape	Sleeping Giant Middle School	Ava. Awareness (x8)	245
15-Feb	Gullett	West Yellowstone Public	Ava. Awareness	10
16-Feb	Pape	Cooke City Public	Ava. Awareness	10
23-Feb	Johnson/Faulkner	Lewis and Clark NF Public	Ava. Awareness	50
23-Feb	Schmidt	MOSS	Ava. Awareness	5
23-Feb	Pape	MOSS	Ava. Awareness	10
25-Feb	Schmidt	West Yellowstone High School	Ava. Awareness	30
26-Feb	Johnson	Hillcrest Retirement Community	Ava. Awareness	50
29-Feb	Gullett	West Yellowstone Public	Ava. Awareness	3
4-Mar	Patnode	BYEP	Ava. Awareness	15
5-Mar	Pape	BYEP	Ava. Awareness	10
6-Mar	Patnode	BYEP	Ava. Awareness	10
13-Mar	Gullett	West Yellowstone Public	Ava. Awareness	20

TOTAL= 96 Talks/Seminars/Field Sessions to 3,927 People

AVALANCHE INCIDENTS

45 incidents resulted in 12 partial burials, 5 full burials and 1 death.

This year there were many avalanche incidents. By January 17th we had 4 live recoveries (3 snowmobilers and 1 skier). All were found by their partners with avalanche transceivers. Unfortunately, on January 20th a skier died in an avalanche in Beehive Basin in the northern Madison Range. Tyler Stetson, a young, avid skier had an unlucky day, even in light of the fact he was doing many things right. Below is an article I wrote for the Bozeman Daily Chronicle's *Carve* on the accident.

The chart to the right represents all of the avalanche incidents and accidents reported to us. We only hear about a handful of the avalanches actually triggered, but with incidents involving injury and death we're usually notified quickly. The table shows that many of these incidents are clustered around certain dates. Not surprisingly, these were usually preceded by significant snowfalls.

As of April 15th there were 33 avalanche fatalities in the US, well above the 10 year average of 25. The breakdown by state is: WA-6; CO-5; AK-4; WY-4; MT-3; CA-3; UT-3; ID-2; NH-1; ND-1.

Running Out Of Luck

By Doug Chabot
Carve March 2008

Experience is a hard teacher because she gives the test first, the lesson afterwards.

-Vernon Sanders Law

Tyler Stetson died in an avalanche on January 20th while skiing with his close friend, Logan King, in Beehive Basin, a popular spot to tour, make turns and enjoy the Montana backcountry. They weren't alone that day; many people were tasting the powder, but things went terribly wrong.

Four other avalanches completely buried people in the month leading up to Tyler's fateful day. Fortunately, these had happy endings when folks were dug out alive. They went home, had a beer and toasted their partners, families and life in general. Why did they live and not Tyler?

Luck.

Of course it's not that simple, but close enough. All of the burials had similar conditions that Tyler and Logan were faced with: steep terrain, unstable snow. They all triggered slides, but Tyler triggered the one that killed him rather than teaching him a lesson. Tyler was missing luck. For whatever reason, Mother Nature was especially unforgiving that day.

He and Logan dug snowpits, carried rescue gear, were concerned with the avalanche danger and talked about it with each other and with skiers they bumped into that day in Beehive. They had taken a Level 1 avalanche class. They *knew* it was dicey and attempted to keep everything in check, but it didn't work because a small error had enormous consequences.

(cont. page 13)

AVALANCHE INCIDENTS

DATE	LOCATION	DETAILS
31-Oct	N. Gallatin Range	1 skier triggered
24-Nov	N. Bridger Range	1 skier triggered
4-Dec	Cooke City	1 snowmobiler triggered, 2 caught, 1 partially buried and injured
22-Dec	Saddle Peak	1 skier triggered, not caught
22-Dec	N. Madison Range	1 skier triggered, caught, partially buried
26-Dec	Cooke City	1 snowmobiler triggered, caught, partially buried
27-Dec	Cooke City	1 snowmobiler triggered, caught, buried, recovered
1-Jan	Cooke City	1 snowmobiler triggered, not caught
2-Jan	Cooke City	1 snowmobiler triggered, partially buried
2-Jan	Cooke City	1 snowmobiler triggered, fully buried, recovered
2-Jan	Beehive Basin	1 skier triggered, not caught
2-Jan	N. Madison Range	1 skier triggered, not caught
2-Jan	Lionhead	1 snowmobiler triggered, caught, partially buried
5-Jan	Beehive Basin	1 skier triggered, not caught
5-Jan	Bangtail Range	1 snowmobiler triggered, caught, partially buried
6-Jan	S. Madison Range	1 skier triggered, caught, not buried
9-Jan	S. Madison Range	1 snowmobiler triggered, caught, not buried
12-Jan	N. Gallatin Range	1 snowmobiler triggered, caught, buried, recovered
14-Jan	Big Sky	1 skier triggered, not caught
17-Jan	N. Madison Range	1 skier triggered, caught, buried, recovered
18-Jan	Cooke City	1 snowmobiler triggered, caught, injured
20-Jan	**Beehive Basin**	**1 skier triggered, caught, buried, killed**
23-Jan	N. Madison Range	1 snowmobiler triggered, not caught
23-Jan	Big Sky	1 skier triggered, not caught
24-Jan	N. Madison Range	1 snowmobiler triggered, not caught
24-Jan	Cooke City	1 snowmobiler triggered, no caught
27-Jan	N. Gallatin Range	1 dog triggered, caught, uninjured
27-Jan	S. Gallatin Range	1 skier triggered, caught, partially buried
29-Jan	N. Madison Range	2 snowboarder triggered, caught, not buried
10-Feb	N. Madison Range	1 skier triggered, not caught

(cont. next page)

(cont. from page 11)

15-Feb	N. Madison Range	5 snowmobiler triggered, 5 caught and partially buried
16-Feb	N. Bridger Range	1 skier triggered, not caught
17-Feb	S. Madison Range	1 snowmobiler triggered, not caught
26-Feb	Big Sky	1 skier triggered, not caught
26-Feb	Big Sky	1 skier triggered, not caught
28-Feb	Cooke City	1 skier triggered, not caught
2-Mar	Big Sky	1 skier triggered, not caught
2-Mar	Cooke City	1 skier triggered, not caught
14-Mar	S. Madison Range	1 skier triggered, not caught
16-Mar	S. Madison Range	1 skier triggered, not caught
22-Mar	Bridger Range	1 skier triggered, not caught
22-Mar	N. Gallatin Range	1 skier triggered, not caught
22-Mar	N. Madison Range	1 snowmobiler triggered, not caught
28-Mar	Bridger Range	1 skier triggered, not caught
30-Mar	Bridger Range	1 skier triggered, not caught
TOTAL=45 Incidents resulting in 12 partial burials, 5 full burials, and 1 death		

Aerial photos of the avalanche in Beehive Basin that killed Tyler Stetson. Photos by Cameron Lawson.

(cont. from page 10)


J. Banta

They ended up on a steep slope and triggered the slide as they were trying to get to safer terrain mere feet away. In the midst of an accident unfolding—there's neither a "pause" nor "rewind" button. It can turn out any number of ways; some good, some bad, and all we can do is hope for the best.

If you travel in avalanche terrain long enough you're going to have a close call. The same goes for any sport that carries risk: climbing, kayaking, dirt-biking, flying. Close calls are reality slapping us across the face reminding us that, yes, we could die here. Close calls take our breath away, soil our pants, give us the shakes and cause nightmares. Because we almost died, close calls also give us valuable lessons that we should never, ever, in a million years forget.

I am 43 years old and have many friends who died in the mountains. The list is in the double digits. I've had my share of close calls—the kind that make me dry heave and question why I'm still alive. I've triggered avalanches I didn't expect. I fell and broke my back 2,500 feet up El Cap in Yosemite. I once leaned out over a cliff face only to realize at the last possible second that I wasn't clipped in. I've had rockfall chop my ropes, fallen unprotected into crevasses and ripped out rappel anchors only to be caught by my backup.

Any one of these could have killed me, but I got lucky and walked away with a lesson. Too many of my friends didn't and neither did Tyler.

Tyler was only 20 years old, but definitely backcountry savvy. He may have had a few close calls under his belt, and on January 20th he should have had one more. The slope should have cracked, or whumphed, or maybe even avalanched. Tyler and Logan's jaws would have dropped, hearts in their mouths, and they'd likely high-five each other for being lucky and getting a great, unforgettable story and an awesome lesson out of the day. Maybe Tyler would have been caught and then dug up by his friend in the nick of time, like the four previous burials this year.

But this is wishful thinking. Tyler was swept off his feet, hit trees and died instantly. Logan gets the lesson burned deep in his soul. And the lesson is this: Backcountry skiing in avalanche terrain is risky business. If you let your guard down, think you're smarter than you are, get too comfortable, or just make a simple mistake—maybe even a mistake you've made many times before, your luck might run out.

It did for Tyler.

LOCAL AVALANCHE INCIDENT DATA 1990-

	Total Incidents	Skier/ Boarder/ Climbers Buried	Snowmobilers buried	Skier/ Boarder/ Climber Fatalities	Snowmobiler fatalities
2007-2008	45	4	11	**1**	**0**
2006-2007	26	3	5	**1**	**2**
2005-2006	22	1	7	**0**	**2**
2004-2005	35	4	4	**2**	**0**
2003-2004	25	2	1	**0**	**0**
2002-2003	40	4	17	**0**	**3**
2001-2002	35	0	7	**0**	**3**
2000-2001	42	8	4	**3**	**1**
1999-2000	30	2	3	**1**	**0**
1998-1999	13	3	1	**0**	**0**
1997-1998	29	8	9	**0**	**4**
1996-1997	20	1	2	**0**	**0**
1995-1996	22	4	13	**0**	**2**
1994-1995	23	8	3	**0**	**0**
1993-1994	23	5	2	**0**	**1**
1992-1993	35	6	8	**0**	**1**
1991-1992	25	2	2	**0**	**1**
1990-1991	10	0	5	**0**	**0**
TOTALS	**484**	**65**	**104**	**8**	**20**

Since the fall of 1990 through April 15, 2008 in southwest Montana:

- 20 snowmobilers and 8 non-snowmobilers died in avalanches on the Gallatin National Forest.
- 104 snowmobilers were partially or completely buried. 65 non-snowmobilers were partially or completely buried.
- 70 people were buried in the mountains near Cooke City. 12 people were killed in avalanches near Cooke City. All fatalities were snowmobilers.
- 17 people were buried near West Yellowstone. 6 of the burials resulted in fatalities. All fatalities were snowmobilers.
- 13 people were buried in the Bridger Range. One skier was killed.
- 42 people were buried elsewhere on the Gallatin National Forest. Three skiers were killed, four climbers died, and 2 snowmobilers died.

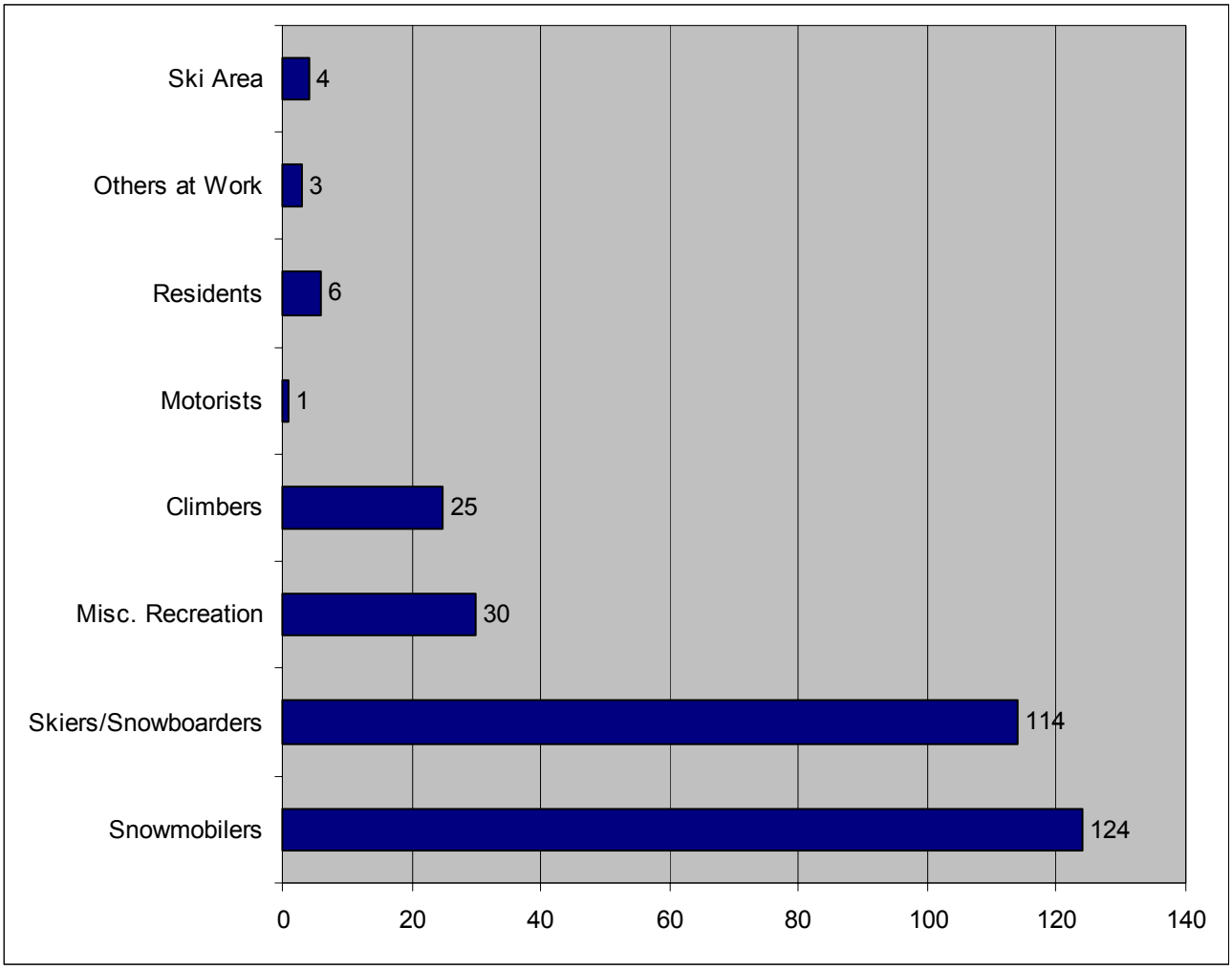
2007-2008 US AVALANCHE FATALITIES: 33

Date	Location	State	Description
04/07	Thompson Pass	AK	2 snowmobilers (hybrid) caught, 1 buried and killed
03/16	Sheep Mountain, near Orofino	ID	2 snowmobilers caught, 1 killed
03/09	Mount Eyak, Cordova	AK	2 skiers caught, 1 injured, 1 buried and killed
02/15	Seattle Creek, near Turnigan Pass	AK	4 snowmobilers caught and buried. 2 killed.
02/08	Garden Valley	ID	1 killed in roof avalanche
02/01	Little Box Canyon	CO	1 snowmobiler caught, buried and killed
01/28	Tokopah Canyon, Sequoia National Park	CA	2 skiers caught, 1 buried and killed
01/25	Near Mountain High ski resort	CA	6 skiers caught, 3 killed in 3 separate avalanches
01/20	Beehive Basin, near Big Sky	MT	1 skier caught, buried and killed
01/18	Huntington Ravine, Mount Washington	NH	1 climber caught and killed
01/13	Canyon Creek, near Whitefish Mountain	MT	At least 2 skiers caught, buried, and killed
01/12	East Vail backcountry	CO	2 skiers caught, 1 partially buried, 1 buried and killed
01/12	Star Valley	WY	3 snowmobilers caught and killed
01/10	Blanca Peak	CO	2 climbers caught, 1 partially buried, 1 buried and killed
01/04	Near Mt Pilchuck	WA	3 hikers caught, 2 partially buried, 1 buried and killed
01/04	East Vail backcountry	CO	1 snowboarder caught and killed
01/03	Fargo	ND	1 killed in roof avalanche
01/03	Snowy Range	WY	4 snowmobilers caught, 1 killed
01/01	Excelsior Pass area, north of Mount Baker	WA	5 snowmobilers caught, 1 injured, 2 killed
12/31	Western Uintas	UT	3 snowmobilers caught, 1 buried and killed
12/25	East of Park City	UT	1 snowmobiler, caught, buried, and killed
12/23	The Canyons	UT	4 inbounds skiers caught, 1 not buried, 1 partially buried, 1 fully buried, 1 killed
12/18	Edith Creek, Mount Rainier National Park	WA	1 snowshoer caught, buried, and killed
12/02	Cameron Pass	CO	1 snowboarder caught, buried, rescued but died of injuries
12/02	Snoqualmie Pass	WA	3 hikers caught, 2 buried and killed, 1 partially buried and self rescued

US FATALITIES BY ACTIVITY 96/97-07/08

ACTIVITY	97-98	98-99	99-00	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	**10-winter totals**
climbers	3	1	0	2	3	5	4	5	0	0	2	25
skiers/snowboarders	5	12	14	12	11	11	6	15	8	9	11	114
in-area skiers/riders	0	1	0	0	0	0	0	2	0	0	1	4
snowmobilers	14	13	5	15	18	14	6	4	12	10	13	124
misc. recreation	4	4	1	4	3	0	4	2	3	1	4	30
motorists/highway workers	0	0	1	0	0	0	0	0	0	0	0	1
residents	0	0	1	0	0	0	3	0	0	0	2	6
others @ work	0	1	0	0	0	0	1	1	0	0	0	3
total	**26**	**32**	**22**	**33**	**35**	**30**	**24**	**29**	**23**	**20**	**33**	**307**

TOTAL US FATALITIES BY ACTIVITY 96/97-07/08



FINANCES AND FUNDRAISING

The Avalanche Center's biggest source of funding comes from the Gallatin National Forest. However, as our program grows we rely on community support, as well as outside grants and donations. The GNF spent over $90,000 this year to fund the Avalanche Center. This money pays for most of Ron and Doug's salaries, plus a lot of the expenses associated with operating the Center (vehicles, office space, computers and support, supplies, travel, etc.). Scott and Mark's salaries and the snowmobiles and extra administrative expenditures are covered by the generosity of many other agencies, businesses and individuals.

Friends of the Avalanche Center

The Friends of the Avalanche Center is our largest supporter outside the Forest Service.

The Friends of the Avalanche Center donated $28,229 to us this year. Page 20-21 outlines their contributions and fund raising efforts. They covered all our administrative costs, snowmobile expenses, education programs and Mark Staples salary.

MT FW&P Recreation Trails Grant

Montana Fish, Wildlife and Parks are strong advocates for the state avalanche program. We apply for a statewide Recreation Trails Program grant every spring and have been awarded monies for the last 9 years. This season we used $7,917 of their monies.

Gallatin County Search and Rescue

Gallatin County Search and Rescue has been a supporter since the beginning of the Avalanche Center. They give us $4,000 every year for general operating expenses. Our partnership with them is invaluable and the funds we receive are greatly appreciated.

MT FW&P Snowmobile Safety Fund

Ray Paige of FW&P is in charge of the state snowmobile safety program and generously donated $3,000 again this year. Additionally, FW&P paid for the printing of 19,000 snowmobile avalanche brochures that were distributed throughout Montana.

Pinhead Classic

Paul Neubauer and *Warren Bauder*, along with a team of volunteers, successfully ran the 27th Pinhead Classic. They raised $1,620 for the Avalanche Center. It was a great party with a Hawaiian theme. Pinheads from all over the state descended on Bridger Bowl for a wild day of racing, crashing and laughing. Thanks again Paul and Warren!

Yellowstone Club

For the second year in a row the Yellowstone Club has donated $3,000 to the Friends.

For the second year in a row the Yellowstone Club has supported us with an unrestricted donation of $3,000. *Tom Leonard,* patrol director, was instrumental in advocating for this gift. The YC Patrol is also one of our main partners for sharing weather and snowpack information.

Gallatin National Forest

The Gallatin National Forest has been incredibly supportive of the Avalanche Center since it's inception 18 years ago. Every year the Forest Service's slice of the federal pie gets a little smaller. Yet even in times of shrinking budgets the Gallatin National Forest has continued to make the Avalanche Center a priority to the recreating public.

Other Donations

Many people donate to the Friends of the Avalanche Center. Ron Miller and the Fremont County SAR gave $1,200 after we taught an avalanche class in Island Park. An Anonymous donor gifted us $1,000. Moonlight Basin Ski Patrol gave us $1,000 from the proceeds of their Level 1 avalanche class. Big Sky Ski Patrol donated $600 from the Dirt Bag Ball profits. Gallatin Valley Snowmobile Association and the Upper Yellowstone Snowmobile Club (Cooke City) each gave us $500. And we received $1,300 in Tyler Stetson's memory from his friends and family. In Cooke City, the Alpine Motel and Elkhorn Lodge donated rooms for Friends instructors. Montana Mountaineering Association reimbursed the Friends for avalanche classes ($400) and the National Avalanche Center covered Doug and Ron's cost to teach at the National Avalanche School ($4,635).

FRIENDS OF THE AVALANCHE CENTER

The Friends are a non-profit 501(c)(3) organization providing a means for individuals and organizations to financially support avalanche education

The Board of Directors include: *Jeannie Wall* (President)*, Greg Caracciolo, Laura Ryan, Dale Sexton, Jay Pape, Mike Harrelson, Lance Riek, Alan Oram, Leah Knickerbocker, Ben Zavora* and *Adam Knoff.*

In order to operate and grow the Avalanche Center we need the Friends. It's that simple. The Board of Directors represents a wide swath of the community and they volunteer hundreds of hours to help make the Avalanche Center a successful and proud organization.

The Friends started in 1992 to help financially support the GNFAC. Since that time they have donated over $131,000 to the GNFAC. These monies mostly came from local individuals, businesses, and organizations in southwest Montana. The Friends are a grassroots group with almost no overhead or administrative costs. They are streamlined, focused, and most importantly, fun to work with.

Avalanche Education Program

The Friends have always supported avalanche education. As we got busier it became impossible for the GNFAC to honor every request for an avalanche lecture. The Friends stepped in and began paying folks to help us teach and this program has grown beyond our expectations. The Friends hired Jay Pape for the second year in a row to coordinate and teach avalanche education classes. With the help of 3 other instructors they taught 58 classes reaching over 1,500 people. The cost of the program was $12,013 ($2765 in hardware/software + $9248 for payroll/ mileage/lodging). Funding for this came from a $5,000 grant from the *Hans Saari Memorial Fund*. The remainder was paid through monies raised at the King and Queen of the Ridge.

Powder Blast

Since 1992 the Friends have donated over $131,000 to the GNFAC.

Under Jeannie Wall's leadership the 9th annual Powder Blast was our best one yet. Days before the event we sold out all 250 tickets. The Powder Blast is the Friends biggest fund raiser held the last weekend in October at the Emerson Cultural Center. For $25 folks got dinner, music, drinks and a great silent auction. Sweet Pea Landscaping, owned by *Ben* and *Elise Zavora*, were the title sponsors. The Community Food Coop and *Jeff King* of Edward Jones also donated cash. After all the bills were paid, the Friends walked away with $16,000, their most successful event to date.

Bridger Bowl: King and Queen of the Ridge

Bridger Bowl is one of the Friends most steadfast supporters. This year they organized the 5th King and Queen of the Ridge Competition. Racers got pledges to hike the ridge with all proceeds going to the Avalanche Education Fund. This year they raised over $14,000 which will be used for next years education program.

Forty-two competitors hiked—7 were under the age of 15! Racers hiked and skied for 5 hours straight and when the clock stopped at 2:30 p.m. *John Parker* reigned King with 26 laps and *Angela Patnode* was Queen with 21!

The top fund raiser, once again, was *Gerald Carisch* with $3,700. *Ben Zavora* came in second with $2,300 in donations.

All of us want to give a HUGE thanks to everyone who competed and pledged. The competitors were: Margot, Hayden and Kevin Diffendaffer; Erika and Karl Birkeland; Gunnar and Heidi Perkins; David Schmidt; Isaac, Sam and Conrad Lowe-Anker; Mark Raymond; Angela Patnode; Laurie Hockett; Marylee Harrer; Hilary Papendick; John Parker; Bill Hyland; Alan Oram; Dick Lewan; Scott Schmidt; Andrew Barefield; Micheal Asay; Ben Zavora; Gregg Smith; Colter Delin; Jeff Lutzenberger; Mike and Clyde Harrelson; Bill Zell; Logan King; Rick Roche; Bryce Johnson; Cody Stevens; Paul Gannon; Gerald Carisch; Alan Swanson; Dan Diaz; Roger Roots; Jim Carter; Kelly Hall; Mark McCollum; and the Bridger Bowl Ski Patrol!

GNFAC Support

In addition to funding the Avalanche Education Program, the Friends give us direct financial assistance every year. This year their support fell into 3 categories.

Administrative. The Friends pay for many things that are outside our normal operations. This included buying GPS units, paying Dick Dorworth for his editing services, costs for our advisory email subscription, weather station maintenance, and fees to professional workshops. This totaled $4,115.

Snowmobile. Team Bozeman and Yamaha loan us snowmobiles every year. The Friends pay for delivery charges, insurance, repairs and general maintenance. This year it totaled $5,301.

Salaries. Ron got knee surgery in Nov and was unable to go into the field. Since we were a man short the Friends paid for a part-time position. We hired Mark Staples who worked all season. Once Scott left in mid-March, Mark worked almost full-time. The Friends reimbursed the FS for this extra position at a cost of $6,800.

The Friends are our safety net. While Ron recovered from knee surgery they paid for an extra position so we could run at full capacity.

DONATED LABOR AND EQUIPMENT

The GNFAC cold not run at its current level without the community donating their time, expertise and equipment. This totaled over $42,500. These donations reflect a dollar estimate of what it would cost to hire people or buy equipment.

Cliff Gullett, Team Bozeman and Yamaha

Cliff Gullett, owner of Team Bozeman, has worked with the Friends to loan us snowmobiles every year since 1999. Yamaha was on board again and this season we rode two 2008 Nytro MTX, 4-stroke snowmobiles. We put over 1,300 miles on these rockets before we turned them in. Having good mountain sleds allowed us to get into backcountry areas where folks are recreating and triggering avalanches. Cliff and Team Bozeman also donated labor and discounted parts, repairs and warranties. And for the 9th year in a row, Team Bozeman hosted our two-day Avalanche Awareness for Snowmobilers class.

Northern Lights Trading Company

Mike Garcia and Greg Caracciolo at Northern Lights Trading Company have supported the Avalanche Center since Day 1. They loan us top of the line skis and boots, plus offer discounted equipment. They also donate gear to the Powder Blast and offer an avalanche awareness lecture every year.

Field Volunteers/Observers

In order to put out the daily avalanche advisory we rely on a dedicated group of unofficial volunteers. Over 60 individuals call or write in their snow/avalanche observations on a regular basis. We are also thankful for the combined efforts of Bridger Bowl, Big Sky, Moonlight Basin and Yellowstone Club Ski Patrols, as well as Ace Powder Guides in West Yellowstone.

The National Weather Service, NRCS, Yellowstone NP and USFS Snow Rangers also provide professional observations and weather data to help us.

On most days of the week one of us is outside gathering data for the next day's advisory. We can not always get out with one another so we rely on an pool of volunteers to accompany us into the field. This year our partners were Genevieve Chabot, Dale Gullett, Paige Leddy, Amy Staples, John Yarrington, Chris Robinson, Chelan Babineau-Z, Nick Bilton, Nick Armitage, Scott Gill, Eric Scranton, Conrad Anker, Beni Zweifel, Ed Adams, Greg Johnson, Tom Thorn, Alan Oram, Jason VanderWeit, Jay Pape and Bean Bowers.

Dollar Value of Donated Hours and Gear

Equipment:	
Team Bozeman/Yamaha	$8,000
Northern Lights Trading Company	$2,000
Labor:	
Big Sky Ski Area	$3,000
Bridger Bowl Ski Area	$2,000
Yellowstone Club	$2,000
Moonlight Basin	$2,000
National Weather Service	$2,000
National Park Service	$1,500
Team Bozeman	$3,000
Volunteer observers and office help	$7,000
Field volunteers (600+ hours)	$10,000
TOTAL	$42,500

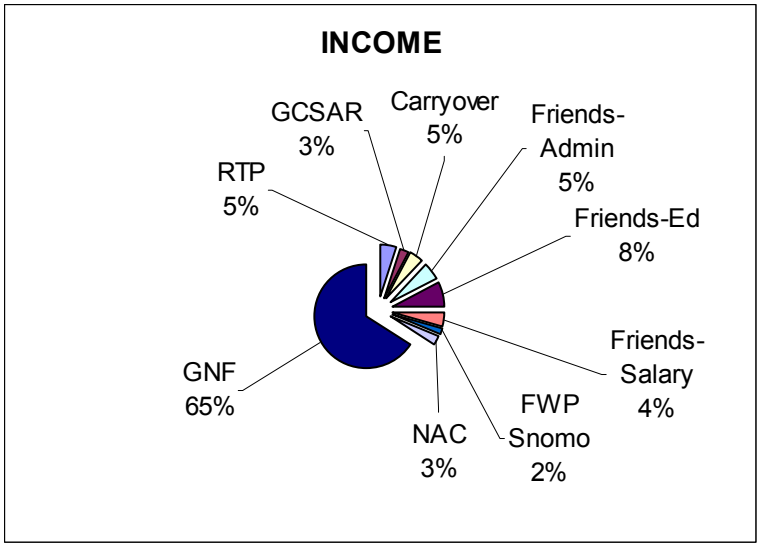
A. Becker

BUDGET

INCOME

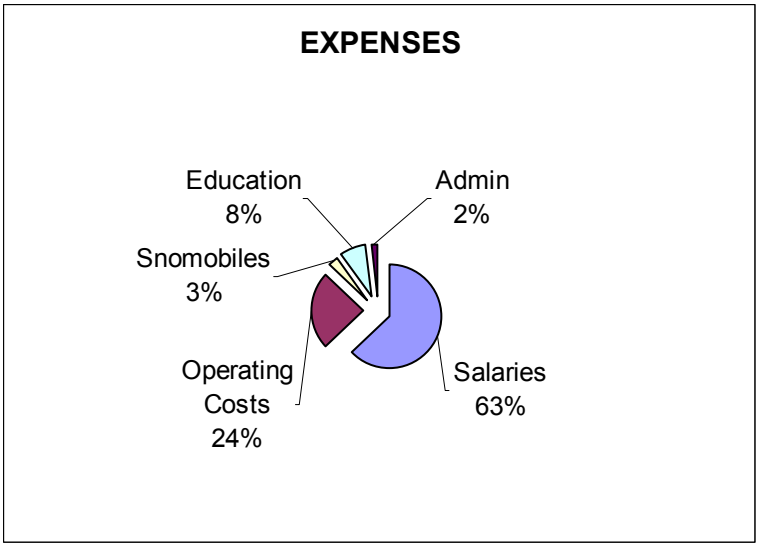
Montana FW&P Rec. Trails Program	$7,917
Gallatin County Search and Rescue	$4,000
• GCSAR carryover	$7,759
Friends of the Avalanche Center	
• Avalanche Education Program	$12,013
• Administrative Support	$9,416
• Salary for Mark Staples	$6,800
Montana FW&P Snowmobile Safety	$3,000
National Avalanche Center	$4,635

TOTAL CASH CONTRIBUTIONS	$55,540
TOTAL GALLATIN NATIONAL FOREST CONTRIBUTION	$93,365
TOTAL INCOME	$148,905



EXPENSES

Salaries	$98,328
GNF operating costs	$20,000
Travel/OT/benefits	$7,500
Snowmobiles equip/maintenance	$5,301
Education	$12,013
Administrative costs	$4,115
TOTAL EXPENSES	<$147,257>



SEASONAL SNOWFALL HISTORY

By Ron Johnson

Snowfall during mid-October produced settled snow depths of 10-14 inches above 8,000 feet. The first Avalanche Information Bulletin of the season was issued October 19, 2007. The first reported avalanche incident of the season occurred the last day of the month near Mt. Blackmore when a skier triggered but was not caught in a small avalanche.

After a couple of weeks of warm, dry weather; winter began in earnest on November 19 when 10 inches of snow accumulated in the mountains of southwest Montana. Even though more snow fell late in the month, SWE amounts for the month were only 45-78 percent of average except at Fisher Creek which was near normal Settled snow depths at the end of the month were: 19 inches at Brackett Creek, 29 inches at Shower Falls, 32 inches at Carrot Basin, 20 inches at Madison Plateau, and a decent 47 inches at Fisher Creek. During the last week of November the combination of thin snow cover and temperatures near 0 F formed faceted crystals within the snowpack.

A warm, moist weather system deposited 1-2 inches of SWE during the first several days of December. This accumulated on a weak snowpack, so the first daily avalanche advisory of the season on December 4 featured an avalanche warning for the southern Gallatin and southern Madison Ranges, the Lionhead area near West Yellowstone, the mountains around Cooke City and the Washburn Range. Large avalanches occurred; the most notable one was triggered by a snowmobiler near Cooke City. He was partially buried and injured in debris from an avalanche that was over a mile wide and slid 1500 vertical feet. Snow fell most days in December and faceted snow near the ground produced numerous human triggered avalanches. Thankfully, there were no fatalities or serious injuries. SWE amounts for the month were well above average.

Snow fell most days during January. SWE amounts were slightly above average in the mountains around Bozeman and Cooke City. They were well above average in the mountains around West Yellowstone. Faceted snow near the ground or a layer of surface hoar combined with small faceted crystals buried 2-3 feet deep were weak layers responsible for an onslaught of human triggered avalanches. Sadly, a skier caught in an avalanche north of Big Sky died from injuries sustained when he struck a tree. This was the only fatal avalanche of the season. Settled snow depths at the end of the month were: 51 inches at Brackett Creek, 59 inches at Shower Falls, 85 inches at Carrot Basin, 82 inches at Madison Plateau, and 96 inches at Fisher Creek. The coldest weather of the season occurred during the third week of January when temperatures plummeted into the -20's F.

Most of February's snow accumulation occurred during the first two weeks. February 17-22 was the longest dry spell of the season. Clear skies accompanied by daytime temperatures in the upper 20's to upper 30's F and nighttime temperatures in the single digits and teens F produced near surface facets and surface hoar. Several inches of snow buried these crystals. The resulting weak layer persisted to seasons end. SWE accumulations for the month were slightly below average at Carrot Basin and Madison Plateau. Brackett Creek, Shower Falls and Fisher Creek had SWE amounts 7-14 percent above average.

Except for Brackett Creek at 93 percent and Carrot Basin at 78 percent, SWE amounts for March were 120-130 percent of average. Most precipitation occurred during the last half of the month. No one was caught or injured in

the nine reported human triggered avalanches that were scattered throughout southwest Montana during March.

It was a wonderful snowy season. SWE amounts at the end of March compared to the average at the end of March for the period from 1971-2000 were: 99% at Brackett Creek, 112% at Shower Falls, 109% at Carrot Basin, 121% at Madison Plateau, and 121% at Fisher Creek. Settled snow depths at the end of March were: 69 inches at Brackett Creek, 92 inches at Shower Falls, 95 inches at Carrot Basin, 91 inches at Madison Plateau, and 135 inches at Fisher Creek.

E. Knoff

SUPPORT EMAILS/LETTERS

Doug, just wanted to let you know that I have been receiving great reviews on the "Dozen more turns" . I have showed it to Search and Rescue, EMT refresher class, Aerial fire depot yesterday with 50 people and have several more schools etc. lined up. With the incident in Montana, use of actual video footage, Sam's accounting of the incident, and how lives continued all powerfully grab people's attention. Interest is high at this time since the news of the fatalities at Whitefish have had extensive news coverage on tv and newspaper. Hope the winter is going well.
Carole A. Johnson
Recreation Specialist
Lolo National Forest
Superior Ranger District

GOOD JOB ON THE BILLINGS AVALANCHE PRESENTATION, GLAD YOU GUYS COULD MAKE IT TO BILLINGS.

-THANKS

-BRENDON

Good morning guys.

We would like to thank you again for taking time to come to Fremont County last weekend. You guys do awesome work getting the information out to the public as well as traveling around to do the same.

Thanks again

All of us at Fremont Rescue.

Thanks again for posting your daily report, and in particular, thanks for posting pictures and videos of your on-site visits. It is both educational and sobering to see (in the case of the Sage Peak video) your forecaster pull sugar out from underneath a 3+ foot windslab. These look like the kind of slopes we all wish we were skiing; having images of the whole story to accompany your text forecast and narrative is very helpful. And it may save our life by causing us to say, "hey, wait a minute, let's think about it before we push over the edge."
Thanks again.
Bruce

Hello,

I wanted to let you know that I really appreciate your thorough and informative advisories. I live over in Hamilton, and despite the distance the advisories are often very helpful and

thought provocative. As hazard evaluation is site specific your addressing the details of complex factors really helps me with my continuing education about snow stability. I will also have a good sense of the conditions when I visit at the end of this month. Glad to hear of the Ernie Miller report as this was one of my fav spots in the early 90s.

John

HI Scott and crew,

I just wanted to thank you for providing this service. I have used it all winter. I have guests that come from all over the country to ride snowmobiles and ski. I print out this email on their arrival and then they have the number to follow up as needed.

I think it's a great service and a nice touch to provide folks with this info when they come to Yellowstone.My season is over now, but I'll be back on your site next winter.

Have a great summer!
Katie Flynn
Yellowstone Vacation Cabins

THANKS!!!

I appreciate all the effort that you folks put into these daily reports. I am certain that you have significantly contributed to the safety of my son, a MSU student and backcountry skier. You guys provide a concise and easy to understand report that should be required reading for all people who participate in backcountry winter sports on southwest Montana. Keep up the good work and enjoy a well deserved rest.

Sincerely,

Brian Roderer

Richmond, VT

Doug, Ron, Mark and Scott,
A sincere "thanks" for all your efforts this season.
Best wishes on all your future endeavors.

Mark Johnston

Thanks for all the work, incident reports and advisories. We're a little bit out of your range but I always find the info useful and can often link it up to similar conditions here. I just got back from a week of hut skiing at Valhalla Mountain Touring where we skied relatively conservative lines thanks to a Feb 25th surface hoar layer. We had a great week in spite of that, conditions being basically mid-winter skiing and getting better all week long. The guides, Evan Stevens and Paul Langevin were both familiar with your reports and hold them in high regard.

Thanx again!

Dave Williams

Geologist

BLM Butte Field Office

Thanks for your good work this winter.
I always enjoyed reading the day's reports.
We'll do it again next winter.
Carol

Attn: Gallatin National Forest Avalanche Advisory Staff : 2007-2008 Winter Season

I appreciated all your good work and reports throughout this "busy" snow season with emphasis on the busy considering measurable accumulation of snow the majority of days. Adding more video's and pictures as you did this year, gave me a new appreciation of just how susceptible snow is to gravity.

Perhaps the deep snows will fill the rivers, produce prolific wildflowers, and benefit the many farmers & ranchers who depend on irrigation.

Hope your summer season is both safe and eventful. Thanks again for all your efforts in helping visitors enjoy and appreciate our public lands.

---Sincerely , Doug Colclasure

Thanks again for all the information again this year. I check it everyday. You guys do a great job but it seems you keep finding all my powder secrets.

David Klatt

After reading your season summary I find myself thinking I should cash in this boring life I have in Minnesota and start going on adventures of my own. You guys are kick-ass! Thanks for the reports and the hard work this winter! I'd still like the opportunity to purchase a video of one of your avalanche awareness for snowmobilers videos. I find it hard to make it out west for a class, but I did make the trek from Island park over to the West Yellowstone holiday inn for one on a Friday night in March-sadly to find out that it was cancelled. Next year I guess! Have a good summer! Id like to receive an annual report when its put together it would be much appreciated! Thanks again.

Ryan Steenson

7400 Glen rd.

Woodbury Mn 55129

Hi guys,
Thanks for all your hard work and really valuable daily emails -- they're

the most useful by far of any weather and snow condition reports.
Good luck in all of your summer adventures!
Sincerely,
Anne Banks

Doug, Ron and Mark,

Thanks to you and your efforts to keep us informed. While I live in Seattle I read the reports each day - using them as I planned 3 trips into Montana's back country this winter. Again, many thanks!

Cordially,
Lynn Dicus

Seattle, Washington

Thanks for the hard work and the wealth of information. I don't know of anywhere else with so much access to free or cheap Avalanche education! And thank you for maintaining a close connection with the ski culture as well.
Cheers,
Dillon

Thanks for all the research and the excellent reporting on snow conditions this winter! As a frequent visitor to the backcountry for 40 some very odd years now, this was the first time I had anything other than the seat of my pants to guide me. I will look forward to hearing from you next winter.
Bill Mackin

FROM YOU TUBE:

your videos

I appreciate what you guys are doing. Your videos explain things that the average snow enthusiast thinks they understand but need to be aware of. Keep up the great work and thank y I appreciate what you guys are doing. Your videos explain things that the average snow enthusiast thinks they understand but need to be aware of. Keep up the great work and thank you for everything!

I think that your videos should be spread around ALL mountain towns where they can be viewed by ALL snow extremists who could fall victim to an avalanche accident. When I lived in Colorado, I set off a significant slide that scared the living shiat out of me. I can't imagine being caught in one.

Thank You.

Thanks!

I find your vids very informative and I am learning a lot. I took an AST1 course through Zacs Tracs, up here in Canada, and it was the best money ever spent. Your vids bring the I find your vids very informative and I am learning a lot. I took an AST1 course through Zacs Tracs, up here in Canada, and it was the best money ever spent. Your vids bring the reality to avalanche awareness.

Keep up the good work.
MARCUSO

AvalancheGuys
Thanks for posting these very informative videos. Your hard work will no doubt keep some people out of trouble and inspire others to learn more about recognizing avy terrain. Please keep it up!
Jeremy Fenno
Mission Ridge Pro Patrol

MUSEUM OF THE ROCKIES
Montana State University

touch history

Ron Johnson
Gallatin National Forest Avalanche Center
P.O. Box 130
Bozeman, MT 59771

Dear Ron,

Thank you for your avalanche awareness and preparedness presentation that you gave on Wednesday, February 6, 2008 at the Museum of the Rockies. Your presentation drew in 80 individuals from Bozeman and the surrounding areas.

The lecture that the Gallatin National Forest Avalanche Center has presented for us over the last several years is a crowd pleaser and always informative. The information that you provide with the stunning video and PowerPoint presentation is a powerful lecture within our community. We look forward to your next visit to the Museum of the Rockies.

Sincerely,

Nikki Dixon
Secondary and Adult Education Specialist
Museum of the Rockies
600 W. Kagy
Bozeman, MT 59717

600 WEST KAGY BOULEVARD - BOZEMAN, MONTANA 59717
P 406.994.2251 F 406.994.2682 www.museumoftherockies.org

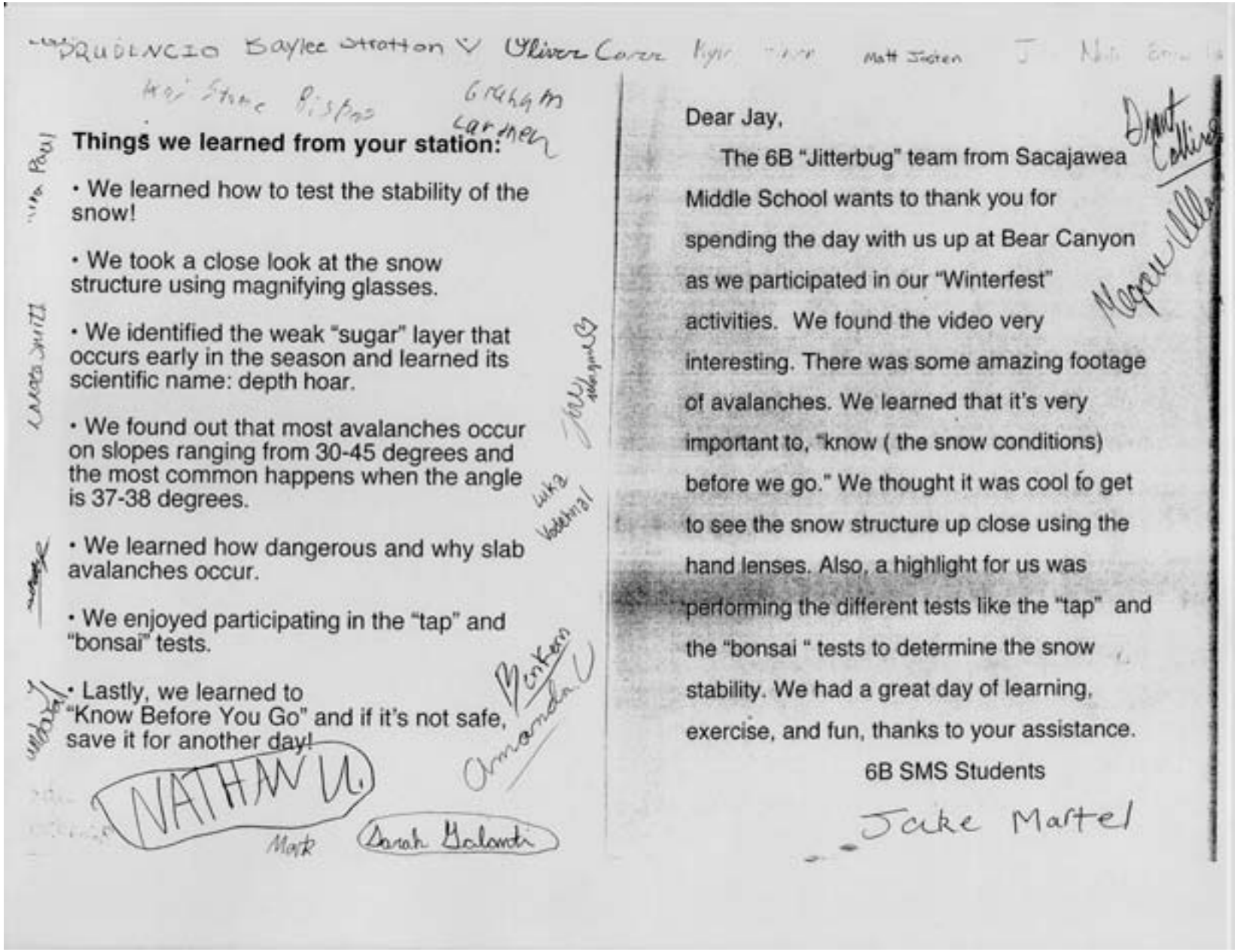
BIG SKY
MONTANA

To whom it may concern:

I'd like to thank the Gallatin National Forest Avalanche Center and the National Avalanche Center staff for all of their help and expertise this season. Karl Birkeland and Ron Johnson presented excellent multi-media talks at the annual Southwest Montana Ski Patrol avalanche training seminar in November. Ron traveled to Big Sky to speak to a large group of local skiers about avalanche awareness in January. Over the course of the year, Doug, Ron, Scott, Mark, and Karl all spent significant time at Big Sky looking at snow, investigating avalanches, and just talking about snow and avalanches with us; this interaction is invaluable to the Big Sky Ski Patrol. Additionally, our ski patrollers rely on their forecasts and advisories, both on duty days and especially on days off in the backcountry. Thanks for providing such an excellent service for another year.

Scott Savage
Big Sky Snow Safety Director


Thanks
Dear Jay,
Thank you so much for coming and teaching us about avalanche safety. I learned a lot about snow pack. I learned that the most dangerous avalanches happen when there is a weak layer called depth hoar on the bottom, which is more like sugar, and a slab of packed heavy snow on top. Thank you again for coming to the snow fest.
Sincerely,
Cody



Things we learned from your station:

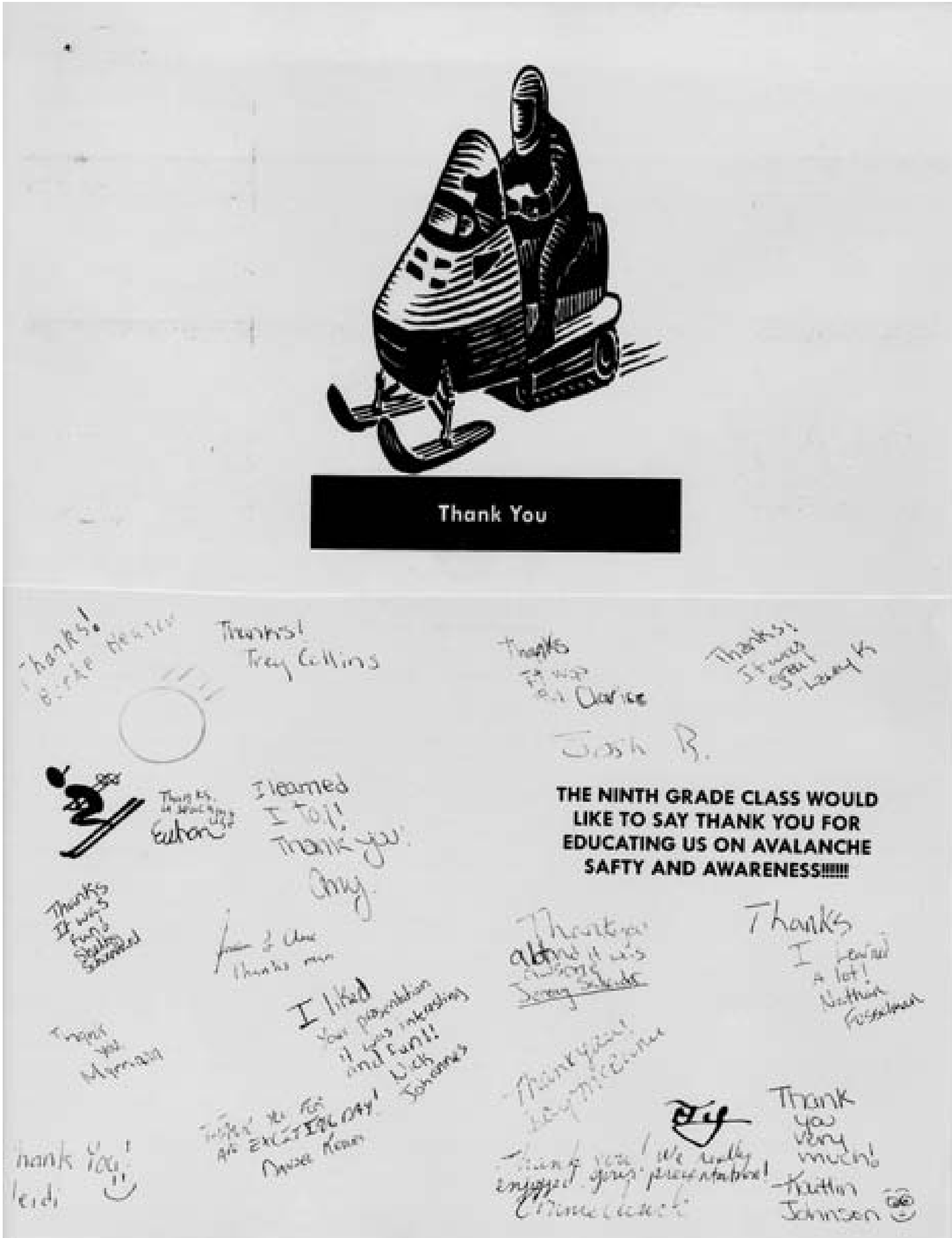
- We learned how to test the stability of the snow!
- We took a close look at the snow structure using magnifying glasses.
- We identified the weak "sugar" layer that occurs early in the season and learned its scientific name: depth hoar.
- We found out that most avalanches occur on slopes ranging from 30-45 degrees and the most common happens when the angle is 37-38 degrees.
- We learned how dangerous and why slab avalanches occur.
- We enjoyed participating in the "tap" and "bonsai" tests.
- Lastly, we learned to "Know Before You Go" and if it's not safe, save it for another day!

Dear Jay,

The 6B "Jitterbug" team from Sacajawea Middle School wants to thank you for spending the day with us up at Bear Canyon as we participated in our "Winterfest" activities. We found the video very interesting. There was some amazing footage of avalanches. We learned that it's very important to, "know (the snow conditions) before we go." We thought it was cool to get to see the snow structure up close using the hand lenses. Also, a highlight for us was performing the different tests like the "tap" and the "bonsai " tests to determine the snow stability. We had a great day of learning, exercise, and fun, thanks to your assistance.

6B SMS Students

Jake Martel


Thank You
THE NINTH GRADE CLASS WOULD LIKE TO SAY THANK YOU FOR EDUCATING US ON AVALANCHE SAFTY AND AWARENESS!!!!!!
Thanks! Trey Collins
Josh R.
I learned a lot! Thank you. Amy
Thanks I learned a lot!
I liked your presentation it was interesting and fun!
Thank you very much! Kaitlin Johnson

greatly appreciate it, as do the kiddos and mentors.

Y'all Rock!

Dave Granger

P.S. Thanks for letting me tag along for a hike, Angela!

BIG SKY YOUTH EMPOWERMENT

Thank You!

Yo Angela + Jay,

Thanks a ton for continuing to provide snow safety and avalanche awareness presentations for BYEP. Pete and I

The Scoop

WHIMSICAL WEATHER WISDOM

GIVE WEATHER FORECASTERS A BREAK

Being a weather geek is part of my job. I need to know how weather affects the snowpack. Recording past weather is easy. I just collect the data and determine how the recent snowfall, wind and temperature altered the snowpack. Much more difficult is the task of forecasting the weather for the next 24 to 48 hours. Attempts on my part to predict the weather beyond 48 hours is futile and opens the door for ridicule and scorn from friends, family and the users of the daily avalanche advisory. I take the challenge of weather forecasting seriously, but I'm a snow guy, not a degree holding 40-hours-a-week meteorologist.

The real weather geeks in Montana are in the National Weather Service Offices in Great Falls, Missoula, Billings and Glasgow. These hardworking harbingers of weather wisdom not only generate weather forecasts but also a substantial amount of public comment. My admittedly non-scientific survey of public comment indicates that you non-metrological degree holding weather whiners are not pleased with the accuracy of weather forecasts. To which I say, "Lighten up!"

I will attempt to enlighten (sic) you to the trials and tribulations faced by the mighty forecasting meteorologists. The basic idea of a weather forecast is to predict: when and how much precipitation will accumulate, how fast and from what direction the wind will blow, and what will the temperature be, for a given period of time. This simple premise begins with the collection of weather data. Twice a day, at 5:00 am and 5:00 pm MST, a world wide ascension of weather balloons occurs. Data from the balloons are combined with observations taken from a vast array of land and sea based weather stations. All of this data is processed, crunched, massaged, altered, filtered and fussed with by sophisticated, complex, energy using, heat producing super computers. These computers run programs developed by really smart computer programmers with names followed by PhD. The computers produce models of predicted weather. Interpreting the models is the next step of weather forecasting.

The first task of an intrepid forecast meteorologist is to decide how much they trust the weather models. In other words, are the models actually predicting current weather conditions? If the models predict clear skies over Missoula at 8:00 am and it's snowing at 8:00 am the forecaster in the Missoula weather office has to be very suspicious of the weather model's integrity. In that case they need to use their experience and expertise to alter the model data to produce a more accurate forecast. They also need to modify the model data to better represent the local effect mountain ranges, valleys and bodies of water may have on particular storm systems. Once the forecaster has established what type of relationship they will have with the weather model, they present that model to the public as the proclaimed and published public weather forecast.

Now comes the part of weather forecasting that is beyond the control of the beleaguered weather forecaster, which is how you, the weather information hungry public, interpret the forecast. If the forecaster, in good faith, states that overnight there is a 30 percent chance of snow showers; are they at fault if you don't wake up to a foot of new snow? Are forecasters at fault when they issue a winter storm warning and your expectation of waist deep powder is replaced by only six inches of new snow? No. They are not to be blamed for your overly enthusiastic expectation of snowfall based on your hopes for a perfect powder filled storm. Their obligation to you is to do their absolute best to provide the most accurate weather information possible. Your obligation is to accept that information for what it is; an honest attempt by a bona fide weather geek to offer you a weather prediction.

If their prediction is wrong, be gentle. They are human beings with good intentions who occasionally make mistakes. If you can't handle that, then I suggest you don't waste your time seeking weather forecasts. Instead I suggest you seek the only weather information that is 100 percent reliable, OTW.

You can't argue with what you see: Out The Window. •••

Scott Schmidt aglow with a welded layer of the fluff across his grin

All of this data is processed, crunched, massaged, altered, filtered and *fussed* with by sophisticated, complex, energy using, heat producing super computers.

OFF THE GROUND - JAN 2008

NewWest.Net
The Voice of the Rocky Mountains

GALLATIN VALLEY NON-PROFIT PROFILES

Friends of Gallatin National Forest Avalanche Center: Powder Patrol

By Alison Grey, 11-29-07

"Good Morning. This is Doug Chabot from the Gallatin National Forest Avalanche Center with an early season Avalanche Information Bulletin..."

Caption: The Ridge at Bridger Bowl Ski Resort. Photo courtesy of the Gallatin National Forest Avalanche Center.

Before most of us head into the backcountry in Southwest Montana in search of powder and great turns, we count on this familiar voice to inform us on snow pack and mountain conditions. With daily updates and avalanche advisories on the Gallatin National Forest, which encompasses some 10,000-square-miles and five major mountain ranges, Chabot and the crew at the Avalanche Center, provide skiers, boarders and snowmobilers with the necessary information to make better, and safer, decisions in the backcountry.

Founded in 1990, the Friends of the Gallatin National Forest Avalanche Center (Friends of GNFAC) is a non-profit with a mission to promote avalanche awareness in Southwest Montana and financially assist the GNFAC in their operations. With 11 board members, a part-time education coordinator and several avalanche awareness instructors, the Friends lead avalanche lectures and classes, as well as support GNFAC through funding equipment purchases and educational materials as well as contributing to their operating costs.

Treasurer and Education Coordinator Jay Pape, expands on the organization and its efforts.

NewWest.Net: Why and how did your organization come into being?

FGNFAC: The Friends were founded to help support the Gallatin National Forest Avalanche Center. The GNFAC was founded in 1990 by Karl Birkeland (an MSU graduate student) and Kimberly Schlenker of the United States Forest Service. Since that time, GNFAC has grown from one staff member who provided four advisories each week, to three staff members providing advisories every day of the week. This has occurred with generous support of other agencies like the Montana Fish, Wildlife and Parks and the Gallatin Country Search and Rescue, as well as private donations. The Friends of the GNFAC was founded in 1990 to support the future growth and operations of the Center.

NewWest.Net: Why is this organization in Bozeman? What are the advantages and challenges of operating in this area? Are there other non-profits in this area that you partner with or would like to?

FGNFAC: Bozeman is a hub for backcountry activity and the Gallatin National Forest is one of the most heavily used recreation areas in the country, so it is vital to have an avalanche center providing up-to-date, daily information for recreational users on backcountry conditions. By providing the public with current snow pack and mountain weather information, it allows people to make more informed, and safe, decisions.

We currently partner with the Montana Outdoor Science School. With their focus on educating children and adults about the natural history and ecology of our region, it is a natural fit.

NewWest.Net: Where are you directing your resources?

FGNFAC: Currently we are directing our fundraising efforts to provide free or inexpensive avalanche awareness education to all backcountry user groups, be it people out snowshoeing, skiing or snowmobiling.

NewWest.Net: What is your annual operating budget, and can you please break that down between administrative and fund-raising versus program expenses?

FGNAC: The majority of our budget is dedicated to education and community outreach. Last year $10,500 was directed towards 73 avalanche lectures and classes that reached 4,598 people. The other part of our funding goes towards funding Avalanche Center operations. They will tell us what they need, and we will do our best to fundraise that amount of money to provide them with things like the purchase of state-of-the-art remote weather stations, computers and software.

We have two major fundraisers every year: The Powder Blast, a party, silent auction and raffle event, that directly supports the operations of the Gallatin National Forest Avalanche Center, and the King and Queen of the Ridge held at Bridger Bowl every February, where participants gather pledges for each "Ridge hike" they do. The event has grown in popularity and the fittest of Bozeman's backcountry skiers push their limits of endurance in this slog-a-thon. All proceeds go directly towards providing inexpensive or free avalanche awareness education in Southwest Montana.

NewWest.Net: How are you fulfilling your mission statement?

FGNFAC: During the winter of 2006 and 2007, the Friends hired an education coordinator for the sole purpose of promoting, organizing and conducting avalanche awareness classes. Outreach includes local schools, clubs, search and rescue groups.

NewWest.Net: What is your most recent success story?

FGNFAC: Recently we gave an avalanche awareness lecture to 200 seventh graders at Chief Joseph Middle School! This is an age where kids are starting to be interested and exposed to the backcountry. Working with local schools to provide avalanche awareness, helps us get the message of safe backcountry travel and recreation to these kids at a young age, so as they get older and venture further into backcountry, they will have a certain level of avalanche education.

We are also distributing the film, *A Dozen More Turns*, by Amber Seyler. It is a powerful documentary about backcountry skiing, avalanches and how the human factor - non-scientific,

LEARNING FROM THE PAST

By DOUG CHABOT

Montana led the nation last season in avalanche fatalities

KARL BIRKELAND

Ron Johnson, a forecaster with the Gallatin National Forest Avalanche Center, eyes the thin snowpack in Beehive Basin on Dec. 20, 2006.

Last fall we were skiing in October. Season ticket sales went through the roof and skis flew out of the stores. On October 15, I skied from the Ridge of Bridger Bowl to the bottom of the North Bowl without hitting a rock. It was incredible. It was supposed to be a winter of biblical proportions. We all felt it. The Farmers Almanac said so, as did a 30-year Yellowstone Park veteran who noticed extra bushy tails on the squirrels. There were, as well, other pieces of believable folklore. We all thought, "This is it!" Well, that was it alright. No more snow for months. And then it started to snow and along came the avalanches. Small storms stressed the snowpack until entire mountain ranges released an unprecedented avalanche cycle in early February. As a forecaster I was stoked, but as a skier I was scared out of mind. I triggered the largest slide of my life: it broke 4 feet deep and ran a mile wide. Crazy stuff was happening in the mountains and it was all very humbling.

Long range weather forecasting isn't my specialty, but it will snow and regardless of when there are a few irrefutable facts about snowfall. First, snow changes when it hits the ground. The six pointed snowflake might survive its fall to earth, but once it hits changes start. Always. The question forecasters try to answer is whether these changes will make the snowpack stronger or weaker. Several factors drive this change, including snow surface temperature, thickness of the snowpack and density of the snowfall. Last season it snowed early and then stopped. The snowpack was thin and the air relatively cold which changed the snowpack for the worst. The snow changed from good powder in October to large, angular grains that didn't bond by December. You couldn't make a snowball with it. The crystals were big-about the size of my thumbnail— and fell out of your hand like sugar. We call this type of snow depth hoar. In the avalanche biz this is known as job security because depth hoar makes lots of avalanches. It sticks around for a long time but isn't strong enough to support the winter's snowfall. Depth hoar is as weak, dangerous and persistent as a maladjusted teenager with a shotgun, and just as deadly.

With sketchy conditions the avalanche danger stays elevated. A Considerable danger means you'll probably trigger a slide, and even if you don't you'll like see some instability. Last year, out of 128 avalanche forecasts 100 were rated Considerable or higher on some slopes; 45 of these 100 days had someone reporting avalanche activity or cracking/collapsing of the snowpack. Unlike Homeland Security ratings which never seem to amount to anything, if you got outside you saw what we were talking about. Mother Nature has a way of validating danger. Last year Montana led the nation in avalanche fatalities with 6 killed (5 snowmobilers/1 skier) out of 20 nationally (10 snowmobilers/10 non-motorized). This grim distinction illustrates the dangerous snowpack we tip-toed on all winter.

Let's hope for a better recipe this winter. My vote is for lots of early season snow followed by lots of mid and late season dumps! I was talking to my buddy, who has a friend whose uncle said that this year will be the deepest in decades!

Really. ◆

POWDER BLAST TO BENEFIT AVALANCHE CENTER

On Friday, Oct. 26 the Friends of the Avalanche Center with Sweet Pea Nursery are sponsoring the 9th annual Powder Blast at the Emerson Cultural Center.

The Friends raise money to support the Avalanche Center and this is their biggest fundraiser of the year. Doors open at 6:30 p.m. A $25 donation gets you food, music, a great silent auction and two wine/beer coupons. We've sold out the last two years, so get your tickets early at Barnel, Northern Lights, Timber Trails or Team Bozeman.

Maybe you're wondering, "How can I support the Avalanche Center?" or perhaps you're bored that Friday night. Either way, come on down, drop a few bucks, eat, drink, dance, feel good about yourself and maybe walk home with new schwag. You win, we win, and the community benefits. Can't beat it. And thank you for your support. — *GALLATIN NATIONAL FOREST AVALANCHE CENTER*

COUNTING THE DEAD

By DOUG CHABOT

Taking a closer look at avalanche fatalities throughout nation helps dispel popular myths

CURTIS STEELE

A distinct fracture line from a large avalanche is shown last year on a slope south of the Bridger Bowl ski area.

In winter I recreate and work in avalanche terrain which feels more like home than, well, home does. Avalanche terrain is a dangerous place and Montana led the nation in avalanche fatalities last year with six out of the U.S. total of 20.

These numbers tell a story. A look at the distinct user groups, for instance skiers versus snowmobilers, shows who is dying, but a different pattern emerges than what we may expect.

No user group likes to be at the top of fatalities, and I hear often that snowmobilers are killing themselves in record numbers compared to skiers. Just look at Graph 1.

But a look at all the different user groups and their fatalities will help to dispel some popular myths.

The numbers quoted involve fatalities in the US over the last 10 winters as compiled by the Colorado Avalanche Information Center, the keeper of avalanche statistics. The term "backcountry" (bc) refers to areas where the slopes are uncontrolled and help is limited to your party. "Out of bounds" (ob) refers to those who access the backcountry from an adjacent ski area in order to get backcountry turns.

BACKCOUNTRY SKIERS = 55 FATALITIES

Backcountry skiing has become more popular over the last 10 years, as any bc skier can attest. The ski industry confirms this with sales of gear trending upward. Private stashes of powder are no longer private. Folks are venturing further away from trailheads in search of private turns, and the best turns are in avalanche terrain (above 30° steepness). Thus, we're not surprised to see a large number of fatalities from this group.

OUT OF BOUNDS SKIERS = 22 FATALITIES

With open boundaries at many ski areas and skiers accessing the bc from chair lifts and then exiting into the backcountry we're seeing an increase in accidents. It's an easy way to get into avalanche terrain and, consequently, into trouble. I expect this number to grow in the coming years.

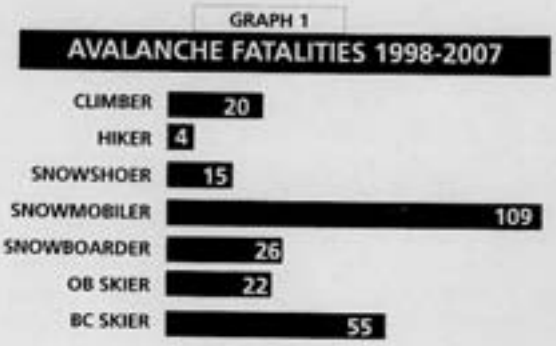
BACKCOUNTRY AND OUT OF BOUNDS SNOWBOARDERS = 26 FATALITIES

Snowboarders are also a growing user group. Split-boards with their wide, magic carpet skins are as convenient for accessing the bc as skis.

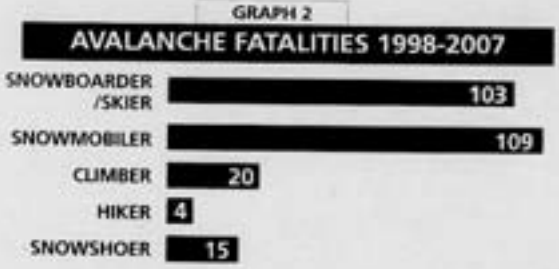
SNOWMOBILERS = 109 FATALITIES

Snowmobiler fatalities were in the low single digits every year until the late 90's when short tracks and small engines made steep terrain difficult to access, but that's drastically changed. A stock sled can climb hills higher, faster and with more maneuverability than ever before. These new sleds accelerate at a blistering pace, as do the fatalities; 109 in the last 10 years compared with 48 in the prior decade.

GRAPH 1



GRAPH 2



SNOWSHOERS/HIKERS = 19 FATALITIES

With 15 deaths in the last 10 years, snowshoer fatality numbers have risen steeply as snowshoeing has gained in popularity. Four hikers have died in avalanches over the same time period. The root cause of fatalities in both groups is similar-they didn't know they were in or below avalanche terrain. Often they were not carrying any rescue gear.

CLIMBERS = 20 FATALITIES

Climbing in the mountains in winter is risky. Climbers aren't looking for gravity's help like a skier. In fact, they fight it, but to approach ice climbs and to summit peaks requires frequent exposure to avalanche terrain. Over the last two decades the rate of avalanche deaths among climbers has remained fairly constant.

My point in examining these numbers is to dispel the notion that snowmobilers are such a deadly bunch. In graphs on the web, statistics in books, newspaper articles and TV reports the fact is emphasized that 55 skiers and 109 snowmobilers died in the last 10 years (Graph 1). End of story. Numbers don't lie. Twice as many snowmobilers as skiers die in avalanches. Snowmobilers must have a death wish or not be as sharp at recognizing avalanche danger.

After becoming a snowmobile rider, teaching countless avalanche classes and studying the stats, I see a different story. The stats show that—motorized compared to non-motorized—109 snowmobilers and 142 skiers/snowboarders/snowshoers/hikers and climbers were killed in the same time frame. To be fair, we need to look at HOW folks use the backcountry because this influences how they make decisions. Gravity powered skiing and snowboarding are very similar. Whether skiing or snowboarding, skinning from the car or leaving the ski area, everyone is equal on top of the slope with the board(s) pointed downhill. A comparison of skier/snowboarder to snowmobiler avalanche deaths shows they are almost dead even with 103 skier/snowboard fatalities to the motorized 109 users (Graph 2). So.....it doesn't look like snowmobilers are dying at a greater clip after all.

We don't know how many backcountry skiers there are compared to snowmobilers. Anecdotally, we assume there are many more snowmobilers than skiers here in southwest MT. Local avalanche death statistics would seem to bear this out with 5 skiers and 15 snowmobilers dying since 1998. Additionally, on any given day a snowmobiler travels more miles, hits more slopes and is exposed to more avalanche terrain than a typical skier. Skiing, snowboarding or snowmobiling in avalanche terrain is dangerous.

Graph 2 illustrates the similarity between the two major groups. Splitting the non-motorized into six groups gives snowmobilers an undeserved reputation for recklessness. We could bring down the snowmobile numbers by breaking them up into mountain sleds, trail sleds, tracks longer than 150" or engines bigger than 600cc, but this would equally skew the numbers and the overriding point. No group has "We've Got our Act Together in Avalanche Terrain" bragging rights. Everybody needs more education. Everybody needs to carry rescue gear, hit slopes one at a time and travel with a partner. Everybody shares the same risks and the same passion for powder. ◆

Doug Chabot is the director of the Gallatin National Forest Avalanche Center. He can be reached at 587-6984.

FALSE ALARMS

By DOUG CHABOT

Avalanche stability tests not always 100 percent accurate

Chris and I were standing in a snowpit finishing up our stability evaluation. We were at the top of a tree lined chute of snow, a beautiful 2,000-foot run. It was snowing, the wind was blowing and the powder was going to be great. We did a few tests where we isolated columns of snow and compressed them with increasing force to get them to fracture. The results showed a relatively stable slope. As I tucked my snow study kit into my pack we talked about what to do and unanimously decided that although the conditions would likely get worse overnight, we should definitely ski the run below us.

Chris stepped out of the snowpit first. As he was clicking into his skis the slope collapsed with an audible and heart stopping "whumph." Nanoseconds later a crack shot across the slope 2 feet downhill which proceeded to rip out the entire gulley below us — our intended ski line. With soiled drawers we asked, "What the hell just happened?"

Avalanche forecasters aren't supposed to have close calls like this, we're supposed to know better. Unintentionally triggering an avalanche is akin to being a fireman and having your house burn down. I made a huge mistake. One of the scariest situations is when the slope is unstable, but my stability tests say otherwise. We call these "false stables," and they can be deadly.

There are several reasons for false-stable results. First, the spatial variability on the slope might be such that the pit is in an unusually strong location. Maybe the weak layer never formed or got destroyed at your exact pit site. Second, there is a certain amount of human error in all field tests, and some errors might lead to false stable results. Finally, if the targeted weak layer has collapsed at the pit location (due to disturbance or proximity to a nearby avalanche) then the interface will subsequently strengthen and may provide false stable results.

Since I was just bitten by one of these "false stable" conditions, instead of completely eaten by it, I decided a little research was in order. I wanted to find out how common false stables were. I tapped in to Karl Birkeland's analytical mind and got some Ph.D horsepower behind this question. Using the SnowPilot database (www.snowpilot.org) we looked at 1,100 snow pits across North America which held over 3,500 stability tests. I yawn just thinking about the research. But, having Karl act as the statistical mercenary, we tourtured the data until it confessed.

GALLATIN NATIONAL FOREST AVALANCHE CENTER

Doug Chabot performs a stuffblock test to gauge the stability of a ski slope.

Looking at various stability tests (rutschblock, stuffblock and compression test) we found that 10 percent of the times when signs of instability exist, our tests showed that things were stable — a virtual green light to proceed amongst a sea of red light conditions. With a false-stable ratio of 10 percent, there is a 1 in 10 chance that a stability test conducted on an unstable slope will demonstrate stable results. If you based your decisions solely on pit data and nothing else, you would die quickly. Since we're playing a game with serious consequences this error rate is unacceptably high. Conversely, if you had a 10 percent chance of winning the lottery you'd slap down your dollar bet every day.

Lucky for us it's not all futile.

CARVE DECEMBER 14, 2007

We cope with this miscalculation by using lots of other data. Recent avalanches or collapsing/cracking of the snowpack trump stability tests every time. In my example I wasn't paying attention to things like recent snowfall, rapid wind-loading or a weak faceted layer 2 feet underfoot. The avalanche danger wasn't incredibly obvious, but what else could I do?

I could have dug another pit.

If Mother Nature isn't tossing you a bone and you don't see anything obviously unstable you can reduce this 10 percent error rate to nearly 1 percent by digging another snowpit. Looking at the problem from a purely probabilistic standpoint, a second pit in another location will drop your chances of getting a false stable from a 1 in 10 chance to almost 1 in 100. Since Chris and I knew things weren't great, we should have tossed out the tests that showed that things were stable and dug another pit. Odds are good we would have found the instability we were looking for.

From a recent issue of Backcountry magazine, the author recounts a ski trip and writes, "The snowpack is thin and variable, but a quick pit analysis determines that it's stable — Between my feet shoots an arching crack and with a low rumble, the avalanche releases." It looks like he too was fooled by false stable conditions. ◆

Doug Chabot is the director of the Gallatin National Forest Avalanche Center. He can be reached at 587-6984.

WORDS OF WISDOM

By DOUG CHABOT

Avalanche survival strategies to live by

This article is a reworked, shortened piece originally written by Karl Birkeland of the National Avalanche Center for The Avalanche Review. You can read the full piece by clicking on Snow & Avalanche Articles on www.mtavalanche.com.

Avalanche survival is currently a hot discussion topic among many avalanche professionals. In response to comments from experienced avalanche workers, the news media has carried articles stating that swimming may lead to dying in avalanches. Was the long-established dogma of swimming in avalanches actually wrong? Has the avalanche community been misleading the public for many years about how to best survive an avalanche?

CURTIS STEELE

Fracture lines from an avalanche snake along a slope near the south boundary of Bridger Bowl.

Of course, the best way to survive an avalanche is to not get caught. However, once you are caught, what is the best survival strategy? Many avalanche victims are found with their hands well away from their faces suggesting they were unable to create an air pocket, which is critically important for surviving under the snow for any length of time. "Swimming" might not allow people to get their hands in front of their faces quickly enough as the avalanches come to a stop. The idea that avalanches stop quickly is well established and emphasizes the need to create an air pocket well before it halts.

However, the idea of not swimming doesn't resonate for many. Once knocked off our feet by an avalanche, are we really better off simply trying to guard our airway for the entire ride? Or, are there things we can do to increase our chances of survival?

A PRACTICAL VIEW

Alaska's Chugach Range has served as a testing ground for guiding heli skiers in extreme terrain. Guiding the area has been a learning process resulting in no small number of avalanche involvements, and the survivors have swapped stories and devised optimal survival strategies. Though every avalanche is different, and each avalanche may require a different approach, some common strategies have emerged. These have been compiled by Theo Meiners, operator of Alaska Rendezvous Guides Heliski, and are discussed here.

These guidelines apply to skier or snowmobile triggered slides that are medium to large sized and not involving other hazards like terrain traps. Field observations show similar flow patterns for many avalanches. The release of the avalanche is followed by laminar flow which turns into a violent turbulent zone as the sliding snow and blocks roll over the stauchwall (the lower boundary of the breaking slab). The snow then exits this turbulent zone, flows again mostly as a laminar flow (depending on the terrain over which it is traveling), and begins its deposition phase. The head of the slide continues to subduct as it compacts and entrains the snow on the slope while rolling forward. Depending on where you are in the slide, there are different possibilities of escape before you go for the full ride! The strategies are:

1) Ski, board or snowmobile away fast.

2) If it catches you, self-arrest on the bed surface.

3) If knocked downhill with skis /snowboard still on, use your skis as brace and spin on hip/bed surface to get skis downhill (like a kayaker using a paddle) and stand and ski away (even if you are in a lot of snow this method works in initial phase).

4) If ejected from skis use back stroke/log roll combination to fight for flank and self-arrest on to flank or bed surface. The main thing to do is to fight. Any resistance at all will slow your progress as slide accelerates away from you.

5) If you are in an area of turbulence, do your best to go with the flow. Maintain white water position with feet down hill. After going through the turbulent area you may emerge before the deposition area. Assist the currents of the avalanche with back stroke action once you are through the turbulent area. Continue to try to back stroke and log roll to get to the flanks and self-arrest.

6) Do whatever you can to avoid head of slide as it is subducting and will pull you down and under the slide. Absolutely do not swim forward of head if you can help it.

CARVE JANUARY 11, 2008

7) Use essential equipment for surviving/escaping capture. This includes a helmet to help prevent a head shot and the resulting confusion, an Avalung to maintain breathing and to keep you from gagging (thereby helping to prevent panic), the usual transceiver/probe/shovel combination, and of course trusted partners. Never say die and never go Gumby; you have a lot to teach others from this experience!

Of course, when we teach others about avalanches we don't want to focus on how to survive an avalanche. Instead, we need to emphasize the importance of not getting caught in an avalanche. Still, having a viable plan might save the life of a person who unintentionally does get caught in a slide. Clearly, each avalanche will be somewhat unique and different strategies might work in different avalanches. However, we believe that Theo's seven points can be a useful plan for surviving avalanches. ◆

Doug Chabot is the director of the Gallatin National Forest Avalanche Center. He can be reached at 587-6984.

RIDGE HIKING CONTEST TO BENEFIT AVALANCHE CENTER

You like to hike the Ridge at Bridger Bowl. You like to ski in the backcountry and to get the daily avalanche advisories. You like to stay informed and updated. But you're poor. As much as you'd like to support the Friends of the Avalanche Center with a fat check, you can't. Luckily for you there's another option. You can hike the Ridge for pledges at the fifth annual King and Queen of the Ridge event on Saturday, Feb. 16. Get your family, friends and co-workers to lay down a flat rate for the day, or pledge per hike. The event lasts five hours and last year John Yarington reigned King with a record 27 hikes with Jeannie Wall close on his heels at 26 laps, shattering the female record. You can puke your guts out trying to break 27, or do something creative like seeing how many hikes to Hidden Gully you can do. With pledges not necessarily tied to the number of hikes, you can call it good after just one, or enjoy the day at a casual pace. As in years past, all proceeds are earmarked for avalanche education in southwest Montana. Since 2003 we've raised over $46,000!

SHOW YOUR SUPPORT

It's not too early to hit the StairMaster and train for a heart-thumping day of hiking and turning in order to make a few bucks for avalanche education right here at home. Further enticement to participate is provided by Bridger Bowl which gives away prizes like skis, packs, gift certificates and other goodies. For more information and registration forms, go to the Events page at www.bridgerbowl.com.

RUNNING OUT OF LUCK

By DOUG CHABOT

Fatality highlights danger of traveling in the backcountry

CAMERON LAWSON

This aerial photograph shows the avalanche that killed Bozeman skier Tyler Stetson on Jan. 20.

Experience is a hard teacher because she gives the test first, the lesson afterwards.
— Vernon Sanders Law

Tyler Stetson died in an avalanche on Jan. 20 while skiing with his close friend, Logan King, in Beehive Basin, a popular spot to tour, make turns and enjoy the Montana backcountry. They weren't alone that day; many people were tasting the powder near Big Sky, but things went terribly wrong.

Four other avalanches completely buried people in the month leading up to Tyler's fateful day. Fortunately, these had happy endings when folks were dug out alive. They went home, had a beer and toasted their partners, families and life in general. Why did they live and not Tyler?

Luck.

Of course it's not that simple, but close enough. All of the burials had similar conditions that Tyler and Logan were faced with: steep terrain, unstable snow. They all triggered slides, but Tyler triggered the one that killed him rather than teaching him a lesson. Tyler was missing luck. For whatever reason, Mother Nature was especially unforgiving that day.

He and Logan dug snowpits, carried rescue gear, were concerned with the avalanche danger and talked about it with each other and with skiers they bumped into that day in Beehive. They had taken a Level 1 avalanche class. They *knew* it was dicey and attempted to keep everything in check, but it didn't work because a small error had enormous consequences.

They ended up on a steep slope and triggered the slide as they were trying to get to safer terrain mere feet away. In the midst of an accident unfolding—there's neither a "pause" nor a "rewind" button. It can turn out any number of ways; some good, some bad, and all we can do is hope for the best.

If you travel in avalanche terrain long enough you're going to have a close call. The same goes for any sport that carries risk: climbing, kayaking, dirt-biking, flying. Close calls are reality slapping us across the face reminding us that, yes, we could die here. Close calls take our breath away, soil our pants, give us the shakes and cause nightmares. Because we almost died, close calls also give us valuable lessons that we should never, ever, in a million years forget.

I am 43 years old and have many friends who've died in the mountains. The list is in the double digits. I've had my share of close calls — the kind that make me dry heave and question why I'm still alive. I've triggered avalanches I didn't expect. I fell and broke my back 2,500 feet up El Cap in Yosemite. I once leaned out over a cliff face only to realize at the last possible second that I wasn't clipped in. I've had rockfall chop my ropes, fallen unprotected into crevasses and ripped out rappel anchors only to be caught by my backup.

Any one of these could have killed me, but I got lucky and walked away with a lesson. Too many of my friends didn't and neither did Tyler.

Tyler was only 20 years old, but definitely backcountry savvy. He may have had a few close calls under his belt, and on Jan. 20 he should have had one more. The slope should have cracked, or whumphed, or maybe even avalanched. Tyler and Logan's jaws would have dropped, hearts in their mouths, and they'd likely high-five each other for being lucky and getting a great, unforgettable story and an awesome lesson out of the day. Maybe Tyler would have been caught and then dug up by his friend in the nick of time, like the four previous burials this year.

But this is wishful thinking. Tyler was swept off his feet, hit trees and died instantly. Logan gets the lesson burned deep in his soul. And the lesson is this: Backcountry skiing in avalanche terrain is risky business. If you let your guard down, think you're smarter than you are, get too comfortable, or just make a simple mistake— maybe even a mistake you've made many times before, your luck might run out.

It did for Tyler. ◆

Doug Chabot is the director of the Gallatin National Forest Avalanche Center. He can be reached at 587-6984.

The Scoop

What if?

Your passion is the pursuit of perfect powder snow. You have invested significant time and money to develop the skills and acquire the equipment necessary to succeed. And you have considered that this pursuit could get you or your partner injured or killed in an avalanche. You should, as well, consider a tool that can save lives: the answer is derived from a simple question. What if an avalanche happens?

Ask this question before inviting friends on a winter adventure. What if I'm caught in an avalanche? Do they have rescue beacons, shovels and probe poles? Have I seen them use their rescue beacons? Have they recently deployed their probe poles? Will they bring sturdy shovels or save weight with small, flimsy ones? Do they have good wilderness first aid skills? Will they freak out in an emergency? Then ask, what if my friends ask me the same questions?

Ask the question at the trailhead. What if one of us is caught in an avalanche? Do we have rescue beacons? Are they strapped to our bodies? Do they have good batteries? Are they on and transmitting? Are we sure each beacon is working properly? Does everyone have a shovel and probe pole? Where are they? Let's see them. When was the last time we practiced with our beacons? Should we do a quick beacon drill before leaving the trailhead? If not, why not?

Before you ski or ride a steep powder slope ask, what if I trigger an avalanche? Is there a safe spot that I can try to get to? Will I get swept over cliffs or through trees? Are there terrain traps where I might get buried several feet deep? Can I jettison my gear if I'm knocked over? Am I prepared to fight for my life? How long would it take my friends to dig me out? Do I trust them with my life? What if they fail?

Before your partners ski or ride a steep powder slope ask, what if they're caught in an avalanche? Is there any way I could be caught? Can I see the entire slope? What will distract me from watching them? Am I prepared to save their lives? What if I fail?

When watching folks from another party play on a nearby slope, ask, what if that slope slides. How many are there? Where are they? How long would it take us to safely get to them? Are there other folks nearby that could help? How long would it take for the local search and rescue team to get there? Is everyone in our group willing and capable of being in charge of the rescue? If not, why not?

"What if an avalanche happens?" is a simple question. A truthful answer and associated questions provides a checklist by which you can determine whether you have the tools and mindset to safely pursue your powder-induced passion. •••

Ron Johnson
Avalanche Specialist
Gallatin National Forest
Avalanche Center

OFF THE GRID, FEB 2008

OFF THE GRIND - MARCH 2008

Dogs, Partners & Backcountry Ethics

Dog lovers, here is a story you are going to enjoy.

On January 27, a 3 year-old Labrador Retriever named Lizzie, her master and his friend were ski touring near Mt. Blackmore, south, of Bozeman, Mont. Lizzie ventured too close to the edge of a cornice; it broke and she was peeled off of the ridge. An avalanche fractured beneath the ridge and Lizzie was swept over cliffs. Poor weather and concerns about snow stability thwarted search efforts by Lizzie's owner and his companion who returned home and reported the tragic incident to the Gallatin National Forest Avalanche Center.

The following day Lizzie's story was included in the GNFAC avalanche advisory. Many people sent e-mails and phone messages expressing sorrow about the dog's demise. But on February 3, an entire week later, Lizzie showed up at the Blackmore trailhead and some good folks returned the dog to her grateful, relieved owners. Lizzie's return was dutifully noted in the GNFAC avalanche advisory, which spawned an onslaught of public and media interest. Why not? It's a good story with a happy ending.

One response though sparked my interest. The author of the e-mail felt that Lizzie's wandering onto the cornice was a breach of backcountry ethics. He asked, "What if there had been other people on the slope beneath the ridge?" His comment and question weren't directed specifically to Lizzie (who could care less) or her owner (who I know is very conscientious), but to all people who ski with canine companions. His premise is that a dog on the same slope as people is unsafe because in avalanche terrain there shouldn't be more than one on the slope at a time.

A few years ago a partner and I were carefully skinning up an open and steep slope with a small treed ridge along the edge in the northern Bridger Range. We discussed our tactics of ascending the untracked pitch, mindful of exposing one person on the slope at a time

while using the ridge as a "safe area." About half way up I heard a snowmobile whining as the rider grabbed the throttle and made a high-mark run up the slope. The rider had every legal right to be there and I was impressed with his sled and riding ability. I was also pissed, not because he took our line but because he compromised our safety. All our efforts to mitigate the avalanche hazard were for naught as he zoomed by while I was on the slope. Fortunately, that day's stable snowpack withstood the combined force of skier and snowmobiler.

I've had similar experiences in popular backcountry ski playgrounds in the Wasatch Range in Utah and on Wyoming's Teton Pass. Skiers, snowboarders and dogs appeared above me and schussed by as I surveyed my surroundings. I wondered, "What if this slope avalanches?" "Where will we all end up and who will do the rescue?" And I'm guilty of the same offense. I've enjoyed fine runs until dropping over a crest in the slope to find myself immediately above a skier recovering from a crash. It's happened more than once, and every time I berate myself for being careless and dangerous.

How do dogs fit into this commentary? In the backcountry they should be considered partners, and their owners should be held accountable for their actions. Just as every snowmobiler, skier, snowboarder, hiker, snowshoer or climber should be held accountable for their backcountry travel ethics.

My wife and I have a working avalanche search dog. Olive is a black lab that works five days a week at Bridger Bowl. Occasionally she joins me for a backcountry excursion. What I expect of her is to be my partner. If other folks are on a slope I make every effort to keep her near me. If I'm skiing, she is on a sit, stay command until I get to a safe spot. Once I'm secure she is free to rip the slope in whatever style suits her. But it's her run. No one else should be on the slope.

My goal is to have as much fun in the backcountry as possible. It's more fun when the experience is shared with good partners, whether human or canine. It's really fun when we know we've done everything possible to mitigate avalanche danger to ourselves and others by living by and repeated about this simple but important mantra: In avalanche terrain only expose one person or dog at a time. And clean up your partner's mess too. •••

Ron Johnson
Gallatin National Forest
Avalanche Center

What are you worth?

A Dozen More Turns:
An Avalanche on Mt. Niemesis
A film on DVD by Amber Seyler

MOUNTAIN GAZETTE

On the first day of 2005, five experienced, competent and intelligent backcountry skiers were caught by an avalanche in the Centennial Mountains of Montana. One of them, Blake Morstad, was killed. Another, Sam Kavanaugh, came within minutes of losing his life and was lucky to have only lost his left leg below the knee.

Morstad had earned a master's degree in mechanical engineering. He had studied avalanche dynamics extensively with the Snow Studies Department at Montana State University in Bozeman. Just over a month after his death, his wife gave birth to their first child, a son, Blake Samuel.

Morstad's death and Kavanaugh's near death and subsequent crippling injury were the result of giving into the temptation every backcountry skier knows and, in most cases, has succumbed to: the desire for a dozen more turns in terrain and conditions that, in avalanche terms, were questionable at best and, in this case, at worst. It is an enticement that every skier and boarder has encountered. Some give in. Others do not. Some escape unscathed. Others are injured or die. All know the same lure of the next great turn.

After the avalanche, the survivors made a series of decisions that clearly almost killed Kavanaugh (he spent three days nearly bleeding to death in the hut) and perhaps cost him any chance of saving his leg. These decisions and actions (and inactions) are easy for those who were not involved — who have the inestimable benefit of hindsight, a warm, clean, well-lighted place to sit and drink tea and write upon computers, and not facing the rigors of hauling a seriously injured friend eight miles through snow-covered mountains to the nearest road and access to medical care — to criticize.

But for most backcountry skiers I know, such criticisms would be akin to throwing rocks in glass houses. Still, examining those decisions and the events and people that led to them is an exercise in education. As always, there are lessons to be learned from the mistakes of others, and Director Amber Seyler's *A Dozen More Turns* is a well-told story that may very well save lives and injuries and immense grief among an impossible to determine percentage of people who see it.

This is a video EVERY backcountry skier and boarder would do well to see.

Seyler, a graduate student at Montana State University Science and Natural History Filmmaking Program, had never made a film before. She told Montana State News that she set out to make "... a very sciency film about snow and avalanches." She teamed up with Doug Chabot, director of the Gallatin National Forest Avalanche Center, and began photographing him digging snow study pits, teaching classes and other scientific perspectives of grappling with avalanches. She planned on filming a few vignettes and interviews with avalanche survivors.

Then she interviewed Kavanaugh.

Seyler intended to parse Kavanaugh's interview to a two-or-three-minute segment of her "sciency" film. But Kavanaugh is a man not afraid to express his emotions, and it would be a cold viewer who would be able not to care about those emotions as he expresses them in the film. As Seyler told the News, "Almost immediately, it became apparent that the story Sam had to tell was too big, too powerful, to be relegated to a small part."

And right about then, some of Kavanaugh's friends re-visiting the scene in the late spring were walking across the debris from the avalanche when they found a video camera with footage taken the day of the avalanche as well as the night before in the hut at their New Year's Eve party. Using footage from the video mixed in with interviews with Kavanaugh, Chabot and others, Seyler created a 30-minute adventure/cautionary/educational tale that will, alternately, break your heart and make you think about your own decisions the next time you're in the backcountry contemplating a few more turns of your own.

"People who recreate in the backcountry need to watch this film," Chabot told the News. "All of us that watch this movie will see ourselves in it. We've all made similar mistakes — the difference is we got away with it."

The only hero in this film is a helicopter pilot who isn't even in the film, but everyone else is just like most backcountry skiers we all know, just like you and me. Kavanaugh, a civil engineer, has returned to backcountry skiing on a prosthetic leg of his own design and has become an accomplished paralympic bicyclist.

A Dozen More Turns is available through Friends of the Gallatin National Forest Avalanche Center, Box 6799, Bozeman MT 59771 or through the Avalanche Center at www.mtavalanche.com

– Dick Dorworth

Montana Fish, Wildlife & Parks

Avalanche Expert Says There Is Enough Snow To Avalanche

Friday, November 30, 2007
Parks

Print

Snowmobile riders and skiers maybe wondering what December will bring for their favorite winter sports. Those who are paid to watch Montana's snow and avalanche conditions say there are already plenty of places with enough snow to enjoy.

"The is snow out there. And remember, if there is enough snow on the ground to ski or snowmobile, then there is enough snow to avalanche," said Doug Chabot of the Gallatin National Forest Avalanche Center.

Chabot said human triggered avalanches are the greatest concern. Ninety-two percent of all people caught in an avalanche either triggered it themselves, or someone in their party triggered it.

What are avalanche conditions? Avalanche danger begins when major snowstorms and winds create successive layers of unstable snow pack. Avalanches are more likely to occur during or after a snowstorm when the snow has been blowing and drifting. The new snow hasn't bonded to the underlying snow pack and it is unstable.

About 90 percent of all avalanches start on open slopes of 30-45 degrees. Over half of all avalanche fatalities occur on small slopes of less than 300 vertical feet.

To be safe, Chabot urges winter recreationists to prepare now by inspecting and testing their avalanche survival gear, including a transceiver, probe pole and shovel.

"Now is a good time to put fresh batteries in your avalanche transciever and to inspect and do some practice drills with your gear to be sure everything is in good order," Chabot said.

Chabot said that before going out, outdoorsmen and women should also: * take the time to call Montana's local avalanche centers for the latest snow updates

and danger ratings, * always travel with a partner, and * only put one person at a time on a steep slope.

Check Montana's avalanche centers at www.avalanche.org for specific information on the locations of past avalanches, current conditions and to learn more about online tutorials about avalanches.

"If you don't have avalanche gear, make this the year that you acquire it," Chabot said. "You may save your life or the life of another by always carrying a transceiver, shovel and proble on your body when you are in avalanche terrain."

Still, even with all the fancy technology, beyond a couple days, you just won't know for sure, said Johnson.

Maybe it will snow, and maybe it won't. Get used to it. That's the weather.

[End of article]

BOZEMAN CHRONICLE, NOV 1, 2007

Coffee With Doug Chabot

A weekly conversation with a local sports figure

CHABOT
Avalanche expert

A mountain guide and former Bridger Bowl ski patrolman, Doug Chabot is getting anxious for the next big storm, which should push area snow levels past the tipping point, and put him back in the field. As the head of the Gallatin National Forest Service's Avalanche Center, he's spent the last few weeks on prep work: education, securing vehicles and fundraising, which included last week's 9th annual Powder Blast, a $13,000 to $15,000 windfall. On the cusp of another season, Chabot talked with the Chronicle about the dangers already present in early-season backcountry skiing.

On the people at risk in the early season

Three groups: skiers, who are hungry for turns. Give them just a skiff of snow, especially if it's blowing in a gully somewhere, and they're all over it. Second would be the ice climbers, mainly over by Sphinx Mountain. We've had a double fatality over there two years ago. Third is hunters, who are out there hiking by themselves, and a lot of time they don't have avalanche gear with them at all. So they can cross a small slope that is avalanche terrain but they're not really thinking about avalanches, so they get into trouble that way.

On basic avalanche knowledge

The number one thing you have to know is how to identify avalanche terrain. And then, if they choose to go into avalanche terrain, then they need a partner, shovel, beacon, probe, and education. It's like anything. The more information and education you're willing to get, the better decisions you're going to make in the field. There's no question about that. But a one-hour avalanche awareness talk is going to give you something. You walk away feeling, OK, I might be able to identify avalanche terrain now.

On how to educate yourself

By the season, we put out a daily avalanche advisory every day (http://www.mtavalanche.com/current/). If you're a backcountry skier, I think you need what we're putting out there every day. That's what you're going to need to stay on top of these conditions. Even if you're only going to go out on Saturday, if you follow the storms, if you follow what other people are doing in the field, it'll give you a much clearer picture of what to expect. If you've been reading the advisories, it'll make sense. It's actually like taking a little course. You start to learn a lot about how the weather affects the snow pack and where people can get into trouble.

On the backcountry at this time of year

Once we get a base, once we get 16 inches or so. We'll see a lot of people heading out. The bottom line's if there's enough snow to ski, if you are making turns down something, then there's enough snow to avalanche. I would say that most people don't know that. You can have an eight-inch deep avalanche, but if it knocks you off balance, it can take you over a cliff possibly. And that's what killed two ice climbers a couple of years ago. A tiny, tiny avalanche, and you look at it and think – no way. But it came from high enough above them and carried enough punch that it knocked them over. And it was in terrain where you cannot be knocked over. So that is some of the danger.

On what Doug's looking forward to this winter

This time of year, I get pretty excited about the ice up in Hyalite. What's nice around Montana, especially in November, is it's low enough snow that you can walk to all the ice climbs. You don't have to be wallowing around. It gets cold at night, so there's ice that's forming. So this time of year, I get pretty excited about that. Then another great thing with my job as a skier is that every year I try to go somewhere new. So I'm excited to hit a few new areas, backcountry places that I haven't been to yet. I can't say where those are. I want to keep it a secret.

— Conversation with Mike Kiefer of the Chronicle

NewWest.Net
The Voice of the Rocky Mountains

OBSESSION OR HOBBY

Predicting the Weather: Will it Snow?

By Alison Grey, 11-17-07

It's Weather Channel season. Whether we love the station or love to hate it, it's that time of year again where we await the ski season with impatient anticipation. The channel is set on permanent and we check weather Web sites religiously, searching for the next low front to move through the Rockies and bring those vital storms.

Caption: Lulu Pass Weather Station. Photo courtesy of Gallatin National Forest Avalanche Center.

We analyze past years, look deeply into patterns throughout the country and attempt to predict the powder in our neck of the woods. And of course, we want forecasters to predict the powder that *we* want. Don't tell us it's going to be a warm season with little hope of powder days. Argh.

When it storms, we love the Weather Channel. When the snow doesn't come, we hate it. Yet, we can't turn it off.

"It's interesting to me how folks complain about the weather forecast, but they still check it every single day," said Ron Johnson of the Gallatin National Forest Avalanche Center. "If you bought an album you didn't like, you'd listen to it a couple times, but you'd get rid of it. With weather, people will listen to it every day and hate it."

There's a lot of talk, effort and thought that goes into powder and trying to predict whether it's coming or not. Most of us ski addicts, sleep, dream and live for that white fluffy goodness. So much so, that it completely alters our life plans, whether that be professional or personal. We'll forfeit anything for powder.

With such sacrifices being made by ski bums across the Rocky Mountain West, there's a lot riding on the snow, so it makes sense that weather becomes a major facet of our existence.

While we can control most of aspects of our daily lives, Mother Nature aint one of them. So, our next best option is to make the Weather Channel a constant fixture on our televisions and try to predict the powder.

After an unpredictable, and less than stellar, season last year, will this year be the big one we've

all been waiting for? We all want to know: Will it snow??!!

While there is a lot of talk and effort that goes into predicating the weather, Johnson believes that long-term forecasts are about as accurate as flipping a coin.

For example, look at the wacky weather situation we encountered last year. As early as October, we were skiing powder, but by December all of that snow was gone, then it puked again in February. No one could have predicted such a bizarre bi-polar season, said Johnson.

This year, the pre-season couldn't be more different, with tropical temps descending upon Montana and pushing our ski season further and further back. In the Bridger Range, there is only a 4 to 8-inch base, two to three storms short of skiing, said Johnson.

Is this normal for November when looking at long-term weather patterns? What does this mean for our ski season this year?

Apparently, this year is not so odd in the grand scheme of things. Johnson said it's not so unusual to have warm fall temperatures. Apparently, there have been much worse, drier and warmer, Novembers than this in the past! What? Really??!! Apparently, it is so.

While the weather has been a little wacky the last few years, with winters that are starting later and springs that are a little warmer, Johnson can't say if this is the results of global warming or simply a few off years.

Still, the fact that this November is not the worst one in the course of this region's history, gives us powder people some hope that our ski season is not all lost.

And, Johnson says that this year, according to the overall jet stream and weather patterns, Montana is open for snow storm opportunities and low pressure systems that were not here last year.

There are *possible* storms, that *could* happen, and these predictions are *better* than last year. Still, weather is a fussy thing, and that could all change in the long road, so don't count on it, he said.

With all these highs and lows, ups, downs and maybes, weather prediction becomes a psychological battle, a love story of sorts, said Johnson.

People will look deeply into the weather forecast and see what they want to see, not necessarily what is the truth. If they want it to snow, they will look for powder predictions and elevate a storm's probability, whereas, when it comes to warmer drier conditions, they will be less likely to accept these predictions as a reality.

"When folks don't like what's happening now, they will look for any glimmer of hope in the long range," he said. "Our judgment and perceptions are altered by the past trends and what we're looking for as opposed to what will actually happen or what we want."

Apparently, simply leaving it up to Mother Nature and fate is not enough. We latch onto computer models, analyze previous years and look deeply into the data that tracks high and low fronts as a means to find some means of control over the weather.

Still, even with all the fancy technology, beyond a couple days, you just won't know for sure, said Johnson.

Maybe it will snow, and maybe it won't. Get used to it. That's the weather.

[End of article]

Avalanche of interest

Experts say classes key to reducing fatalities

Rich Landers
Outdoors editor
December 2, 2007

The Spokesman-Review Backcountry ski guides require customers to practice with avalanche transceivers. Non-guided ski and snowmobile parties also should practice these rescue skills, experts say. (FILE The Spokesman-Review)

The first significant snowstorms in the high country have ushered in two simultaneous seasons of interest to skiers, boarders and snowmobilers – the winter sports season and the avalanche season.

The number of avalanche-caused deaths in the United States has been trending downward since a record 35 fatalities were recorded in 2001, according to statistics compiled by the Colorado Avalanche Center.

The decline in annual fatalities seems to indicate that increased emphasis on avalanche forecasting and awareness training is having some results, experts say.

To reach the critical audience of 20-something backcountry skiers who are the most common victims of avalanches, Montana officials resorted to putting avalanche forecasts and videos on YouTube last year. (Go to www.youtube.com and search for "AvalancheGuys.")

Snowmobilers, powered by new high-performance machines, outpaced backcountry skiing victims to become the major factor in the spike of avalanche deaths that started in the 1990s.

Inside

The Inland Northwest's most ambitious schedule of courses and workshops on avalanche awareness/*T2*

Last year, 23 people died in avalanches across the United States. Montana led the statistics with six fatalities, but Idaho ranked high in the statistics.

Twelve of the nation's fatalities last season were snowmobile riders and three out of the 12 were from Idaho.

Triggering an avalanche means that you've already done something wrong and avalanche gear and training can't change that fact, said Doug Chabot, Montana Avalanche Center director for the Gallatin National Forest.

Chabot makes this and other clear points in a powerful 30-minute documentary on backcountry travel in avalanche terrain. The film was produced this year with the help of the Avalanche Center based on footage from the party involved in a 2005 tragedy near Bozeman.

"A Dozen More Turns," by Amber Seyler focuses on the human factor that led to the death of an avalanche expert caught up in the emotional high of skiing deep backcountry powder with his group of five.

Although it's based on a skiing accident, the factors apply to all backcountry travelers, including snowmobilers.

One man, who survived the incident only because of a heroic rescue by a military helicopter, said the group had discussed the snow conditions and dangers but essentially disregarded them as the day went on because they were "so stoked" about the great skiing in new powder snow.

For the sake of going just a little higher to get a few more turns, they exposed themselves to unstable snow that killed one of their group. The other victim suffered injuries that required the amputation of his leg.

All winter backcountry travelers should carry a shovel, probe and avalanche transceiver while recognizing and compensating for risks, Chabot says.

But the surviving victim in the documentary makes an impassioned case for playing it safe when conditions are questionable.

Lives will be saved this year, Chabot said, if winter backcountry travelers adopt these basic behaviors to reduce avalanche risks inherent in the sports.

One at a time: In Montana, more than half the people killed in avalanches would be alive today if only one skier or rider at a time was exposed on a slope.

Carry gear: If all backcountry travelers carried rescue gear and knew how to use it, the number of fatalities would be significantly reduced. There is nothing worse on a ski or snowmobile accident scene than finding someone dead from a shallow burial where a transceiver may have saved a life.

Acknowledge conditions: Learn to recognize the signs of recent avalanche activity and unstable snow conditions and avoid traveling in that terrain. Monitor avalanche forecasts.

Safety education: Avalanche training helps a snowmobile rider to make informed decisions based on real data instead of wishful thinking. Organizations frequently put on snow travel courses and seminars.

Gigantic avalanche hurts snowmobiler

By BRETT FRENCH
Of The Gazette Staff

A mile-long avalanche in the mountains north of Cooke City partially buried a North Dakota snowmobiler Tuesday, injuring his shoulder.

"I was amazed with the size of the avalanche and the distance over which the fracture propagated," Mark Staples of Bozeman's Gallatin National Forest Avalanche Center wrote in his online report. "The 2-3-foot crown line was over a mile wide, and the avalanche ran 1,500 vertical feet on south to east aspects."

The center monitors avalanche conditions across southwest Montana and writes daily updates on avalanche danger for posting on its Web site. Two of the center's snow specialists, Staples and Doug Chabot, visited the site of the slide Wednesday on Scotch Bonnet Mountain.

"It would be safe to say it's one of — if not the biggest, the longest avalanches that we've seen," said Ron Johnson, snow

Please see Avalanche, 7B

Avalanche near Cooke City

VICTOR AGY/Gazette Staff

Avalanche

Continued from 1B

specialist at the center. "But with the amount of snow we've had fall, it's not surprising."

Avalanche danger is rated high across southwest Montana. That's because of a heavy, wet snowfall earlier this week that fell on top of an unstable, granular base. It's a pattern that's been repeated elsewhere, such as areas around West Yellowstone and Big Sky. With snowmobilers and backcountry skiers and snowboarders anxious to get out, the mix can be dangerous.

"It's the beginning of the season, so folks are amped to get out," Johnson said. "There was a bit of a slow start to the winter this year. Now we've got all this snow. But folks' desire to get on with winter recreation combined with unstable snowpack is a bad mix right now."

The center is advising riders to stay away from the base of avalanche areas after Staples and Chabot, who visited the site of Tuesday's slide, found much of the terrain still unstable.

"Numerous natural avalanches have occurred on Henderson, Sheep, Miller, Mineral and Republic mountains," Staples wrote. "We experienced widespread collapsing, which never ceases to scare the heck out of me. Even though we were tempted with great riding conditions, we carefully avoided terrain over 30 degrees and even flat terrain connected to steep slopes because we felt it would be easy to trigger an avalanche."

According to the state's monitoring site, the mountains around Cooke City have about 5 feet of snow. The forecast called for the area to receive another 2 to 4 inches of snow Thursday, but by noon 5 inches had already fallen in Cooke City.

There is a positive to all of the avalanche activity.

"With the widespread avalanches, a lot of the paths have already slid, so the weak layer is out of there," Johnson said. "But certainly not all the avalanche paths have released, and those that didn't will be problematic for quite a while."

Johnson said time will ease the danger, allowing the snowpack to settle.

"The reason widespread avalanches occurred on Monday and Tuesday is that the snow load came in a relatively short time," he said.

According to the information the Avalanche Center received, the snowmobiler caught in Tuesday's avalanche was from Fargo, N.D. He was riding with two others when he got stuck. The avalanche hit him as he tried to free his snowmobile. His head and arm were above the snow, although the group was equipped with avalanche beacons. The snow depth toward the toe of the slide, where the snowmobiler was buried, was 8 to 10 feet deep.

"They had all the avalanche rescue gear but didn't need it," Johnson said. "The story has a good ending."

Contact Brett French at french@billingsgazette.com or at 657-1387.

Details

Last year in southwest Montana, six avalanche fatalities were recorded out of 26 incidents. Nationally last year, there were 20 avalanche fatalities, including three in Wyoming. Ten were snowmobilers; others were nine skiers and a snowshoer.

For daily updates on avalanche conditions, click on the link in this story or call 587-6984. The center also offers avalanche education courses.

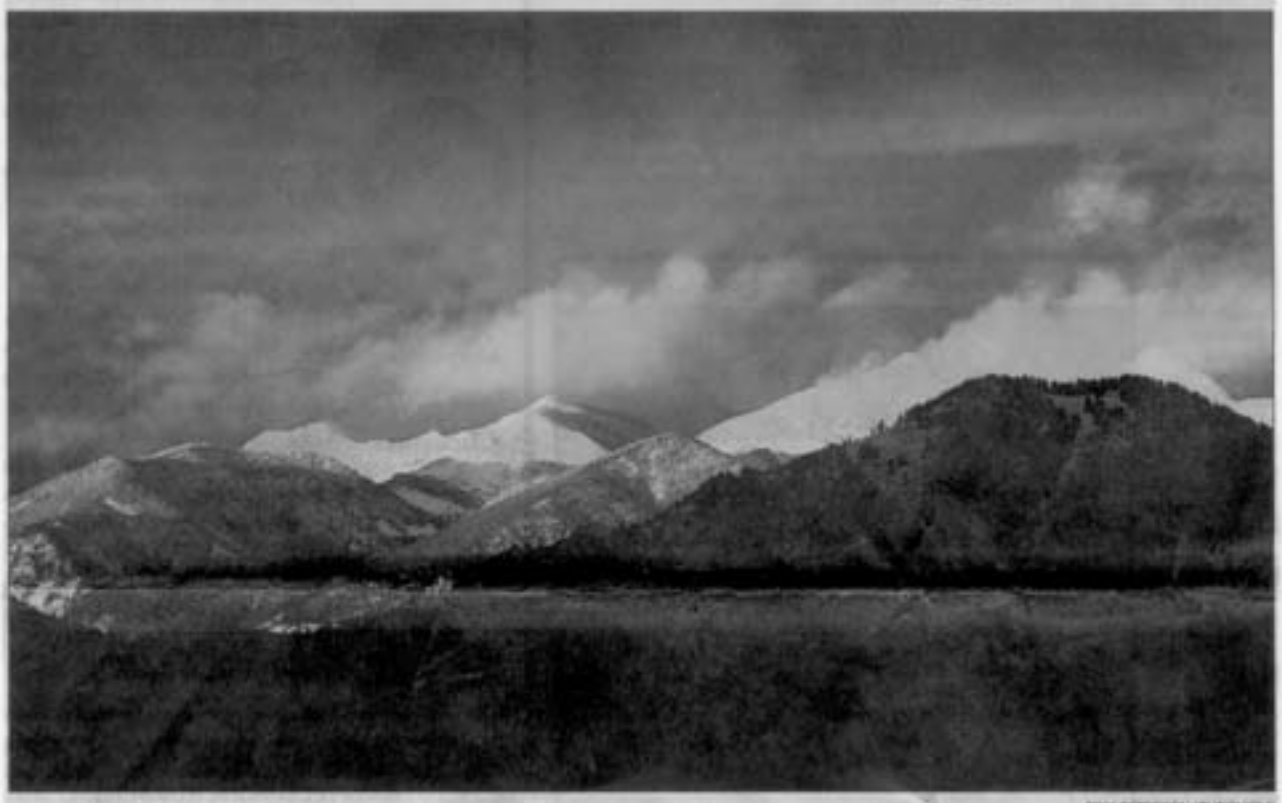
VIDEO

billingsgazette.com

To watch a video about the Avalanche Center's investigation of the Scotch Bonnet slide, click the link in this story.

Avalanche warnings posted for Southwest Montana mountains

Beautiful ... but dangerous



ERIK PETERSEN/CHRONICLE

The setting sun casts a warm glow on the Bridger Mountains Tuesday. Avalanche danger was listed as high for the mountains in Southwest Montana following recent heavy, wet snow.

By **CHRISTINE UTHOFF**
Chronicle City Editor

Backcountry avalanche warnings were issued Tuesday for all types of mountainous terrain around Bozeman – mostly due to the accumulation of heavy, wet snow from recent storms.

The avalanche danger was listed as high on all slopes Tuesday. The warnings do not apply to operating ski areas.

Doug Chabot, director of the Gallatin National Forest Avalanche Center, said Tuesday that the warnings would likely remain in effect today on steeper slopes, but it was unclear if they would be removed from other areas.

Considerable slide activity was noted Tuesday in several lower-elevation areas near Big Sky, and in the Lionhead area near West Yellowstone, where Chabot said he and a colleague ventured to check out conditions.

Chabot said there was a lot of activity in Lionhead, and evidence of slides from the previous day.

"There were signs of instability, lots of cracks; a ton of that in the Lionhead area," Chabot said.

He also said they heard a lot of noise.

"We've added a lot of heavy snow, a lot of weight to the snow pack," Chabot said. "And when you add a lot of weight, really quickly it can adjust."

In Big Sky, members of the Big Sky Ski Patrol reported slides in areas that rarely see avalanches.

(More on **Avalanche**, page A12)

AVALANCHE WARNINGS

Tuesday: High on all slopes

Today: Check with the Gallatin National Forest Avalanche Center for a 6 a.m. update. On the Web: www.mtavalanche.com

AVALANCHE AWARENESS CLASS

What: Two days of class time and a session on the slopes

Who: Designed for snowmobilers, but anyone who spends time outdoors can attend

When: 6:30-9:30 p.m. today and Thursday; field session Sunday

Where: Team Bozeman Motorsports, 2595 Simmental Way (another class is planned Dec. 13-14 in West Yellowstone)

Admission: Voluntary donations to the Gallatin National Forest Avalanche Center

Details: Call Team Bozeman at 587-4671

BOZEMAN DAILY CHRONICLE DEC 5, 2007 - FRONT PAGE

Avalanche/ from page A1

"We've had a few avalanches on some of our lower-mountain runs," said Jimbo Humphries, assistant patrol director. "It's a little bit unusual for those to avalanche at any time."

Similar reports were given to the avalanche center by the Yellowstone Club.

No one was reported injured or caught in the activity near Big Sky.

The only injury reports Tuesday came out of Cooke City, where a couple snowmobilers were caught near a low pass, but were able to pull themselves out, Chabot said. One of the snowmobilers injured a shoulder in the incident.

Tuesday's avalanche warnings were issued for the southern Gallatin and southern Madison Ranges, the Lionhead area near West Yellowstone, the mountains around Cooke City and the Washburn Range in northern Yellowstone National Park.

New snow over the previous 48 hours was deposited on an extremely weak snow pack, according to the warnings posted on the avalanche center's Web site, www.mtavalanche.com.

Chabot said Tuesday that "things are always the most sensitive following a storm." He said outdoors and backcountry enthusiasts should continue to check the avalanche advisories daily, "because things change."

The Associated Press contributed to this report.

Christine Uthoff can be reached at cuthoff@dailychronicle.com or 582-2638.

Bozeman Daily Chronicle

A4

FRIDAY, DECEMBER 7, 2007

OUR OPINION

Check out Avalanche Center site before going out to play

This is the time of year when the predominant pastime of Gallatin Valley residents and visitors shifts from camping and fishing to skiing and snowmobiling. After a couple of dry, warm winters, this one got off to a good start with a series of November and early December storms that loaded up the surrounding mountains with a base of snow.

The building snowpack and upcoming holidays mean that people will take every opportunity to get into the backwoods of the surrounding mountains in increasing numbers to play.

Southern Montana's mountains also have another, less-welcome visitor every winter. Avalanches. The terrain and weather conditions in this part of the country are ideal for snow slides. Last year, Montana avalanches killed a half-dozen people and injured others. And hundreds of other avalanches moved snow off of steep slopes without making deadly headlines.

This year is shaping up to be a bad one for avalanches. Earlier this week the Gallatin National Forest Avalanche Center and Big Sky ski-area operators said they already had seen evidence of numerous slides. And winter doesn't even begin until Dec. 22.

This year is shaping up to be a bad one for avalanches. And winter doesn't even begin until Dec. 22

It is rare to see numbers of avalanches in late November and early December. To make things worse, some of the slides were discovered at low elevations, where avalanche experts rarely see problems at any time of the year.

People trigger some avalanches by skiing or riding a snowmobile across unstable snow on steep slopes. In that case, they are in the middle of the action and susceptible to injury right when the avalanche releases. Other snow slides occur naturally when a heavy layer of snow stacks up on a steep slope until it no longer can hold its own weight. Thin layers of ice that form between the snowpacks from different storms increase the likelihood of an avalanche.

Fortunately, the Avalanche Center assesses the probability of avalanches in numerous recreation hot spots every winter and reports the data quickly and efficiently to the public. Anyone heading into the hills with skis or snowmobiles this winter needs to check the center's Web site frequently and heed any advisories.

The center updates its assessment of avalanche conditions throughout the Greater Yellowstone region at least once each day. Because conditions change any time the temperature fluctuates, new snow falls or the wind blows, the center's experts suggest that backcountry travelers check the data for updates at every opportunity, but at least each morning.

The center's Web site, www.mtavalanche.com, also includes plenty of links to information on avoiding and surviving avalanches. It teaches viewers to assess avalanche conditions on their own and report findings directly to the center.

The Gallatin National Forest Avalanche Center is a unique and valuable resource for winter recreation enthusiasts in this part of the country. Skiers and snowmobile riders can increase the probability of fun, safe wintertime play by taking advantage of its free expertise.

No one injured in Big Sky avalanche

By AMANDA RICKER
Chronicle Staff Writer

People watched as a 200-foot-wide avalanche barreled down Liberty Bowl ski run on the south face of Lone Peak at Big Sky Resort Wednesday, but no one was caught in the slide.

"Basically, the timing of it was that there were people above it, just not below it," said Dax Schieffer, public relations manager for the ski resort, said Thursday.

The avalanche occurred at about 1:30 p.m. It was about 2-feet-deep and slid 800 to 1,000 feet, according to Doug Chabot, director of the Gallatin National Forest Avalanche Center.

"It was a significant slide," Chabot said.

A team of 40 to 50 ski patrol members, snow-safety workers and rescue-dog teams searched the site of the avalanche twice over four hours for any people that might have been trapped in the slide, Shieffer said.

Both searches found the area to be clear.

Big Sky's ski patrol had taken routine avalanche-control measures Wednesday morning, using explosives and making cuts across the slope to look for any weak layers, Shieffer said.

(More on **Avalanche**, page C2)

2007 **RECORDS**

Bozeman Chronicle, December 28, 2007

Avalanche/ from page C1

Big Sky Resort has one of the best avalanche control programs in the country and did everything it could to prevent the avalanche, Chabot said.

Sometimes slides like this one just happen.

The ski areas can lower the risk of an avalanche to almost zero, but it's never totally gone, he said.

"We try to beat Mother Nature into submission so we can ski the slopes," Chabot said. "But every now and then, Mother Nature, she fools us."

Chabot spent Thursday at the site of the avalanche, trying to reconstruct how it occurred. Some weak snow that fell around Thanksgiving probably contributed to the slide, but what triggered it is still unknown, he said.

When the avalanche broke, it was a busier-than-average day at Big Sky, Shieffer said. Resort officials closed a few lifts and runs, but were able to keep the core area open.

"We train for instances like this and it was an impressive coordinated effort to thoroughly search the area," he said.

Amanda Ricker can be reached at 582-2628

blown in tubular

AVIE-TUBE ADJUSTMENT

MONTANA AVALANCHE FORECASTERS TURN TO ONLINE VIDEOS

Changing avy tubes

Bulldogs riding skateboards. Amateur rap videos. Illegal street racing. Avalanche forecasting? YouTube is best known as the home of privately produced—and often ridiculous—home movies online. But now it's a valuable tool for the Gallatin National Forest Avalanche Center (GNFAC), where visitors to the Center website cannot only catch the daily report, but also watch footage illustrating how the results were gathered, and the analysis of avalanche events.

"I'm always looking for ways to make my job easier, and to get the word out faster," says GNFAC Director Doug Chabot. "We always try to make it (forecasting) as educational as possible. We want people to see these (videos) and say, 'Oh, so that's a clean shear,' and pick up a little something in the process. They can see exactly what we're doing, and it bumps up the impact that much further."

Chabot first conceived of using YouTube while visiting mountaineer Conrad Anker. "Conrad's kids were showing me these videos they had put on YouTube," says Chabot. "And it looked really cool and easy so I just started messing around with it before winter."

The GNFAC is the only avalanche center in the country to offer video analysis on YouTube, with 16 offerings last year. "We've had over 25,000 hits on some, which is pretty good for our small community."

"YouTube is easy to use, easy to search, and people can post comments. And it's free," Chabot says. "The videos are incredibly informative, especially at accident sites, where people can see the terrain and the slope and say 'I ski stuff like that.' Or they can watch us doing stability tests and maybe learn something, if they haven't ever seen it done before."

Chabot also pioneered Podcast avy reports, with several hundred subscribers receiving forecasts on their iPods each morning, much like NPR or BBC Podcasts. "If we want to reach people, especially young people, we have to stay with the times," says Chabot. "And Podcasts and YouTube are cool."

So where is the future of forecasting headed? "I think phones are next," Chabot says. "Text messaging, and using the phone to receive forecasts." And with phones now offering video and Internet, the forecast options will only continue to grow. "If a picture's worth a thousand words," Chabot says, "then videos must be worth even more."

—Drew Pogge

SOURCE:
www.mtavalanche.com

Backcountry - JAN 2008

January 2008 - MSA

A heart is beating, the clock is ticking

By RON JOHNSON
Avalanche Specialist
Gallatin National Forest
Avalanche Center

You watch your partner climb a steep slope covered with a foot of new snow after a good day riding and you hope that he has enough horsepower and skill to climb the hill. Suddenly the slope fractures. Your friend is caught in an avalanche. The clock starts ticking.

You last saw him and his sled tumbling in the avalanche halfway down the slope. You're about 50 yards from the toe of the avalanche debris. After a few moments the snow dust settles and you determine that the whole avalanche path slid and it's safe to begin searching for your friend. You start your snowmobile and ride to the toe of the debris. **Elapsed time is 2 minutes.**

You fumble taking off your gloves and helmet. Cold, trembling hands make it difficult to unzip your jacket. You struggle to release your avalanche beacon from its harness. You look at your beacon and it takes awhile to figure out how to switch it to search mode. **Elapsed time is 3 minutes.**

The avalanche debris is soft and blocky; it's hard to get good footing as you commence a primary search for the signal from your partner's avalanche beacon. You stumble several times as you work across the debris. About 25 yards upslope from the toe of the debris you finally hear a signal and see distance and direction displayed on your beacon. **Elapsed time is 5 minutes.**

The distance indicator on your beacon shows 25 meters. You orient your beacon to know what direction to move and start a secondary search. The distance indicator increases to 30 meters. You stop, confused. What's wrong? You're frustrated until you remember to turn around and move in the opposite direction. The distance indicator decreases as you move in an arc toward a clump of small trees at the edge of the debris. A few meters below the trees, the distance indicator shows 3 meters. You think you're close to where your friend is buried. You decide it's time to pinpoint his position. **Elapsed time is 7 minutes.**

With your beacon held just above the snow surface you try to locate the strongest signal. After several passes, you're convinced your partner is buried beneath your feet. Off comes your backpack and you root through it looking for your probe pole and shovel. It takes several attempts to assemble your probe pole. Your attempts to connect the handle and blade of your shovel are thwarted by an icy handle. Finally, your rescue gear is ready and you start probing. After a dozen probes, you strike a solid object. The probe is 3 meters long. Two meters sticks out of the snow. It's time to dig. **Elapsed time is 10 minutes.**

The snow flies as you dig like a fiend. You finally hit something. It's his leg. You dig along his body until you finally uncover his head, which is buried 4 feet deep. The clock stops ticking. **Elapsed time is 15 minutes.**

Learning to be safe

Avalanche Center aims to educate public about safe backcountry travel

SEAN SPERRY/CHRONICLE

Lance Riek, an instructor with Gallatin National Forest Avalanche Center, guides students through testing and analyzing the stability of the snow with a snow pit, Saturday in the Bridger Range.

By MICHAEL BECKER
Chronicle Staff Writer

No matter how much safety equipment backcountry snow users bring along, there's no guarantee anyone will survive an avalanche.

That's why the Gallatin National Forest Avalanche Center prefers to keep people out of those dangerous situations in the first place.

Partnering with Montana State University's Outdoor Recreation program, the Avalanche Center held a series of indoor classes this week to teach winter recreationists how to stay safe in avalanche areas.

The classes culminated Saturday with an outdoor class at Bridger Bowl, where about 70 people accompanied instructors onto the slopes to learn how avalanches happen and how to spot the signs of possible, future avalanches.

"If people are traveling in the backcountry in the wintertime, the skills you learn in an avalanche training course could save your life," said Karl Birkeland, a scientist with the U.S. Forest Service Avalanche Center, which works with the local center.

Last winter, 26 avalanches were reported in southwestern Montana, according to the Avalanche Center's report. Six people died in those avalanches, and the center estimates that 92 percent of avalanches are caused by the people caught in them.

Birkeland, who has studied avalanches for 26 years, led Saturday's class. He said field experience is vital to learning to steer clear of dangerous areas.

AVALANCHE SAFETY TIPS

- Be aware of weather conditions where you'll be traveling, particularly in backcountry areas were recent snowfall or even windblown snow can make slopes unstable.
- Watch for telltale signs like cracking snow and listen for the "wolfing" sound of snow collapsing beneath the surface.
- Plan for the worst, no matter the conditions; carry an emergency locator beacon, a shovel and a probe.
- Ski with a partner, and resist the temptation to play on risky slopes.
- Check daily advisories issued by the Avalanche Center at www.mtavalanche.com.

Source: Ron Johnson, avalanche specialist at the Gallatin National Forest Avalanche Center

"The best way for anyone to learn is out in the field with your hands doing it, digging in the snow and doing an actual beacon search," Birkeland said.

At Bridger Bowl, he and other instructors showed students how to spot avalanche-prone terrain. They dug pits to examine the different layers of snow and how they interact with each other. They also practiced using emergency locator beacons.

Avalanche specialist Ron Johnson, who co-taught the classes, said avalanches usually happen on slopes of 30 to 45 degrees, but that doesn't eliminate the possibility of slides on shallower slopes.

"As long as it's steep enough for snow to slide, it can still be dangerous," he said.

Johnson advises that recreationists who ski, snowboard, snowshoe or ride in the backcountry examine the Avalanche Center's daily advisories and check the weather conditions before heading out.

Even aside from those precautions, there are other signs to watch for while on the snow.

"Nature's kind enough to provide some pretty obvious clues as to where a slab will release," Johnson said.

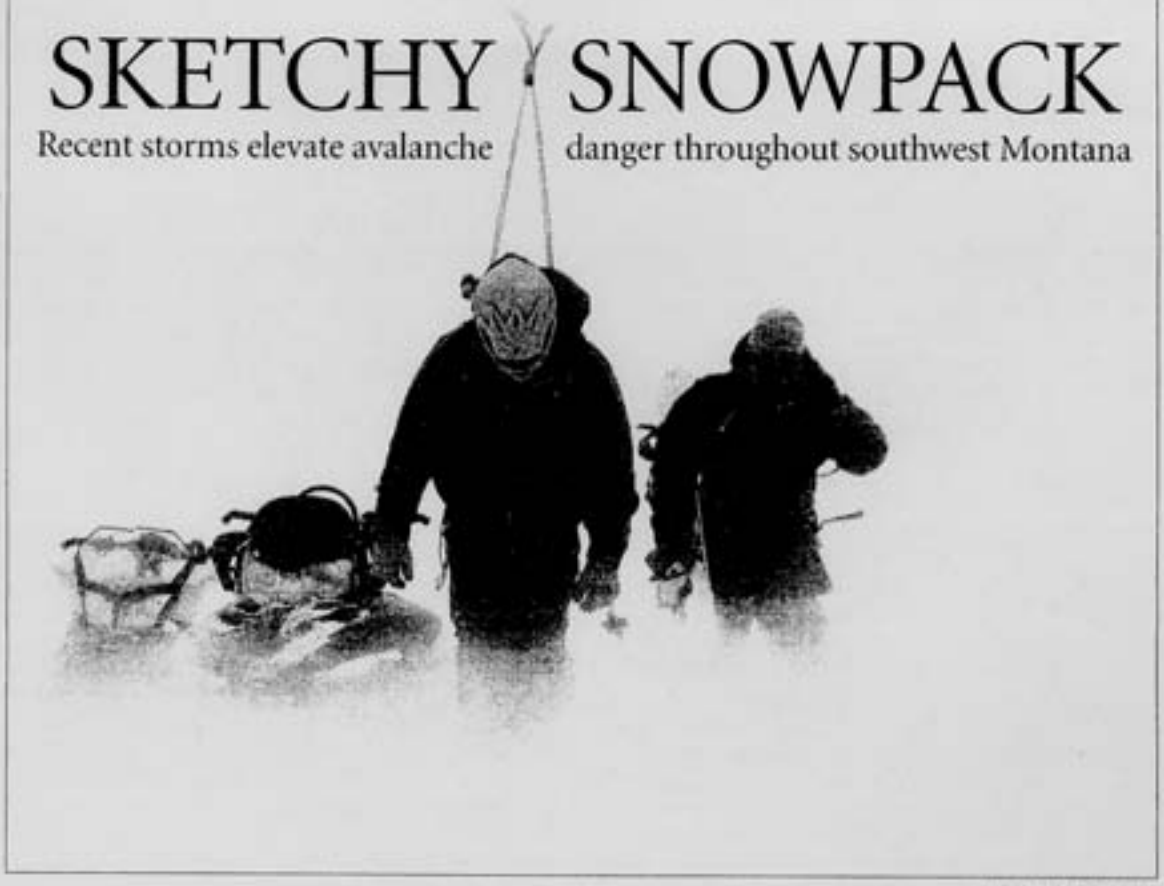
Some signs of an imminent avalanche include cracks forming in the snow or a "wolfing" sound beneath the snow that indicates layers beneath the snow collapsing, Johnson said.

Apart from the environmental factors, the training classes also cover what Johnson called the human factors.

(More on **Avalanche**, page C3)

SKETCHY SNOWPACK

Recent storms elevate avalanche danger throughout southwest Montana



ERIK PETERSEN/CHRONICLE

A backcountry skier and snowboarder battle the elements as they head out in search of good snow above Fairy Lake in the Bridger Mountains. Recent high winds and unstable snow conditions have increased avalanche danger in parts of southwest Montana.

By MICHAEL BECKER
Chronicle Staff Writer

Fresh snowfall in the mountains of southwestern Montana has increased the likelihood of avalanches over the next several days, and experts are advising skiers and snowmobilers to be cautious when venturing into the backcountry.

Recent winter storms dumped as much as 11 inches of snow in some areas. The precipitation was followed by winds gusting up to 75 miles per hour that blew even more snow onto already ladra slopes.

Doug Chabot, director of the Gallatin National Forest Avalanche Center, said natural and human-caused avalanches have been reported near Cooke City, West Yellowstone and Big Sky, as well as in the Bridger Mountains, since Wednesday.

Speaking by cell phone from the mountains near Big Sky where he was investigating a recent avalanche, Chabot said the center's scientists have located fragile layers of snow beneath the fresh, heavy accumulation, a condition that increases the chances of a slide.

What's more, he said, conditions throughout the region vary considerably, sometimes differing from one ridge to the next.

"It's that variable that makes it scary," Chabot said. "If the winds increase, the avalanche danger is likely to get worse in the short term."

"It's a time to kind of notch it back. You might have your favorite area you go to all the time and feel confident in, but if it's steep, you want to make real sure the snow is safe."

— Doug Chabot,
Gallatin National Forest Avalanche Center director

Blaine Heaps, owner of Hi Country Snowmobile Rentals in West Yellowstone, said the avalanche danger was on the minds of most of the snowmobilers passing through his shop Saturday.

"Most of the guys who like to venture off are quite concerned," he said. "Most of them are either renting beacons or have their own safety gear. You know, you've just got to be cautious."

Heaps said most of his customers Saturday told him they planned to stick to established trails. Those who planned on heading into the backcountry were paying close attention to posted advisories, though.

In Cooke City, Misty Polk at the Cooke City Exxon said fresh snowfall draws plenty of people into the store to rent snowmobiles and safety beacons.

"If they hear we're getting a lot of snow, we'll have guys driving out here from Minnesota," Polk said. "We're trying to do what we can to keep them safe."

Polk said the store posts local avalanche warnings and advisories, provided daily by the U.S. Forest Service. Because of the increased danger, many snowmobilers are playing it safe, she said.

"They're very concerned and some people aren't even taking those risks. They're not climbing those hills that are going to avalanche," Polk said.

Some of that concern, Polk said, is linked to an avalanche Wednesday north of Cooke City that buried a North Dakota man.

Mark Abrahamson, 29, was "high marking" with a group of friends on Scotch Bonnet Mountain when the slide began. High marking is driving a snowmobile up a slope to see how high one can go.

Using avalanche safety beacons, Abrahamson's friends were able to find him and revive him after about 15 minutes, the Park County Sheriff's Office said.

Chabot recommended that people planning to ski or snowmobile in the backcountry either call the Avalanche Center or visit its Web site, www.mtavalanche.com, for daily advisories.

The best advice at present, though, is to be cautious.

"It's a time to kind of notch it back," Chabot said. "You might have your favorite area you go to all the time and feel confident in, but if it's steep, you want to make real sure the snow is safe."

LOOK OUT BELOW

PHOTO COURTESY GALLATIN NATIONAL FOREST AVALANCHE CENTER
A DAMAGED SLED IS HALF-BURIED AFTER BEING CAUGHT IN AN AVALANCHE IN THIS JAN. 13 PHOTO. THE RIDER WAS BURIED ON THE OF THE TREES, BUT WAS FOUND UNINJURED.

Fresh powder means more riders – and a greater chance of avalanches

By BEN PIERCE
Chronicle Outdoors Editor

Heavy snowfall in the mountains of Southwest Montana has drawn legions of snowmobilers to the slopes this winter season.

But along with the fresh powder comes the potential for avalanches. The steep mountain terrain many snowmobilers and backcountry skiers enjoy can be a hazardous place to play.

"Snowmobilers are able to cover so much terrain that if there are unstable slopes, they have a higher chance of hitting them," said Doug Chabot, director of the Gallatin Nation Forest Avalanche Center. "When we look at statistics, we have seen snowmobile fatalities take off."

Chabot said that the increase in snowmobile-related avalanche fatalities can be attributed to two factors. First, technological advancements in the industry have allowed snowmobilers to access more extreme terrain. Second, some snowmobilers have become so skilled that they can easily accessing steep mountain slopes.

There are a number of critical safety precautions that snowmobilers can observe to stay safe when sledding in avalanche country.

First and foremost, snowmobilers should never sled in avalanche terrain without a partner. The buddy system means that you'll have someone watching your back should things turn south.

Secondly, never have more than a single snowmobiler riding on a slope at once. Statistics have shown that a high number of snowmobile-related accidents result in multiple fatalities.

"If they want to highmark, or get in the terrain, only put one person in the terrain at a time," Chabot said. "If your partner gets stuck, you don't go up to help. If snowmobilers do that one thing, it will cut avalanche fatalities in half."

Finally, all snowmobilers should carry the appropriate rescue gear when traveling in the backcountry. A probe, transceiver and shovel can mean the difference between life and death in an avalanche situation.

Chabot said that the number of people carrying rescue gear in Southwest Montana is high, but exceptions still exist.

"The worst is when you go to an accident and someone didn't even have a beacon on," he said. "The statistics show that if you are in an avalanche and you are dug up in 15 minutes, you have a 90 percent chance of surviving."

Snowmobilers can also take tips from Mother Nature.

A fracture across a slope indicates unstable snowpack and should be avoided. Chances are likely that similar conditions exist in the surrounding area and snowmobilers should use caution.

Conditions this season are ripe for large avalanches.

"Right now, generally what we have is a weak layer buried three feet from the surface," Chabot said. "It is a thin layer of sugary grain snow that doesn't do well supporting much weight. Skiers and snowmobilers have been triggering this layer on steep slopes. It is a problem layer deep in the snowpack which makes it harder to trigger, but when you do trigger it, it makes the slide bigger."

Snowmobilers can keep up to date with current avalanche conditions on the Gallatin National Forest by logging on to www.mtavalanche.com or by calling 1-406-587-6981. The Gallatin National Forest Avalanche Center issues the avalanche report every morning by 7:30 a.m. The report details avalanche conditions and issues recommendations for backcountry users.

The purpose of the Avalanche Center Web site, stated on its homepage, "is to help provide the public with current snowpack and mountain weather information, as well as to assist with avalanche education."

For snowmobilers who want to learn more about avalanche safety in the backcountry, the Gallatin National Forest Avalanche Center offers avalanche-awareness classes specifically aimed at snowmobilers. The courses cover safe spots for watching other snowmobilers highmark, digging snow pits to reveal layers in the snowpack, how to ride on steep slopes and how to handle a rescue situation.

Contact the Gallatin National Forest Avalanche Center at 1-406-587-6984 or log on to www.mtavalanche.com for more information.

Ben Pierce is at bpierce@dailychronicle.com and 1-406-582-2625.

Bozeman Daily Chronicle

e.com

TUESDAY, JANUARY 22, 2008

50 Cents

Avalanche kills MSU student

By MICHAEL BECKER
Chronicle Staff Writer

A Montana State University student who had taken avalanche courses and wanted to become a ski instructor died Sunday in an avalanche west of Big Sky.

Tyler Stetson of Shelburne, Vt., died after he was caught in an avalanche about 1 1/2 miles from the Beehive Basin trailhead at 3:30 p.m., the Gallatin County Sheriff's Office said Monday.

According to the Gallatin National Forest Avalanche Center, Stetson, 20, and his roommate, Logan King, had been skiing in the nearby Middle Basin before digging a snow pit on a northeast-facing slope between Beehive and Middle basins.

King is a snow science major at MSU.

Stetson was an avid skier with deep knowledge of the backcountry, said Alexander Anderson, 19, a fellow MSU student who grew up with Stetson in Vermont.

"They knew the situation and they knew everything and it was just a freak accident," Anderson said Monday. "(Stetson) was the most knowledgeable person that I knew when it came to avalanches."

Stetson had asked Anderson to come skiing earlier Sunday. But because of the cold, Anderson declined and Stetson and King left without him.

Although King declined to speak to the Chronicle on Monday, Anderson relayed part of his story. King told Anderson that he and Stetson were standing about six feet apart when the slide began above them. The snow split between the two skiers. The snow under King held; the snow under Stetson let go.

Officials at the avalanche center reported that several people from another group had just skied the slope where the slide was triggered. Then, when Stetson and King skied just off that group's path, they triggered the avalanche.

(More on **Avalanche**, page A8)

Avalanche/ from page A1

Center officials estimated that the avalanche was between 400 and 500 feet wide. It slid 500 vertical feet, caught Stetson in 1 to 3 feet of snow and carried him into a stand of trees partway down the slope.

Two witnesses at the top, King and the group that had just skied the same slope began a transceiver search. They found Stetson within 10 minutes, but he had already died of trauma, the center said.

The avalanche happened on U.S. Forest Service land outside of resort boundaries. The 5-kilometer trail near the area begins two miles north of Big Sky and is a popular backcountry skiing area, according to the Gallatin National Forest.

Scott Schmidt, an avalanche expert with the center who investigated the accident area, said Monday that the spot where Stetson and King dug their snow pit was a ways up the slope from where the avalanche broke loose.

At the site of their pit, the snow pack was mostly stable. But where the avalanche broke, Schmidt found a layer of loose material about 6 inches off the ground that likely caused the slide.

That kind of variation, even between spots on the same slope, is typical of conditions around Big Sky this year, Schmidt said.

"That's the problem we're having down in that area this year," Schmidt said. "Especially in the Big Sky area right now, a lot of people don't spend time digging in the snow and looking at the stability."

According to the Colorado Avalanche Information Center, avalanches have killed 22 people across the West since Dec. 2.

On Sunday, authorities from Gallatin and Madison counties investigated the incident, including 11 members of the Big Sky Search and Rescue team, the Big Sky Ski Patrol, the avalanche center, county rescue dogs and a helicopter team, according to the search and rescue team's Web site.

Stetson was a junior at MSU, studying cell biology and neuroscience, but friends said Monday that his true passion was skiing and the outdoors.

"He was the man. He was smart, very, very athletic," Anderson said. "I always had to chase his ass up the ridge at Bridger in the backcountry. Even when he was breaking trails he was faster than me."

Stetson's Facebook profile was last updated Saturday. In his last status update, Stetson wrote, "I have never skied so many epic days in my life ..."

Be Prepared for the Backcountry:

Q & A with Ron Johnson

Jelica Summerfield
Outdoors Writer

If conditions are right, backcountry snowriding can be described as the perfect winter outdoors experience. Hiking or skinning up the mountain is great exercise, and makes turns through freshies all day just that much more rewarding. I don't snowmobile, but I imagine that same breath-catching thrill is also achieved. As fun and exhilarating as these experiences are, they don't come without significant risks.

As witnessed most recently near Big Sky, avalanches pose a huge threat in Montana backcountry and out-of-bounds areas. In hopes of increasing awareness about safe travel in the mountains for us younger folks, I talked with Avalanche Specialist Ron Johnson from the Gallatin National Forest Avalanche Center.

Gallatin National Forest Avalanche Center © *Courtesy*

A snowmobile-triggerred slide resulting from wind-loading on Jan. 23.

Hawk Tawk (HT): What advice do you have for young backcountry snow enthusiasts?

Ron Johnson (RJ): Young backcountry snow enthusiasts should learn all they can about avalanche terrain, snowpack stability, safe travel techniques and self rescue skills. The best way to learn these is by attending an avalanche course, especially one that includes a field session. There are several opportunities available in the Bozeman and Big Sky areas. A link to a calendar with education opportunities is provided at our website at www.mtavalanche.com.

HT: What often gets overlooked when skiing out of bounds?

RJ: A skier venturing into the backcountry by exiting a ski area must realize that the snow conditions and rescue resources have changed. Because the snowpack within the ski area boundaries gets a lot of ski traffic and is monitored and controlled by ski patrollers, the snowpack in open areas is generally devoid of significant weak layers and is generally more stable than the snowpack outside ski area boundaries. Once a skier crosses a ski area boundary they become responsible for determining the avalanche danger. They also need to realize that any rescue outside the ski area boundary will depend on their skills and abilities and not be the responsibility of the ski patrol.

HT: What can the recent avalanche tragedies teach us?

RJ: Recent avalanche accidents teach us that the powerful pursuit of powder needs to be dampened a tad so that the avalanche danger posed on a specific slope is carefully considered. Also, regardless of the actual or perceived avalanche danger it is important to travel with a partner, carry and know how to use an avalanche rescue beacon, shovel and probe pole and then only expose one person at a time on a slope. These are the basic rules of backcountry travel.

HT: How can we prepare ourselves for backcountry conditions before heading into the mountains?

RJ: A good start to prepare for a backcountry excursion is to read or listen to the daily avalanche advisory. The Gallatin National Forest Avalanche Advisory can be accessed by calling 587-6981 or log on to www.mtavalanche.com. Unfortunately, the avalanche that took the life of Tyler Stetson was completely unforeseen, even after assessing the slope. Stetson had extensive backcountry experience and knowledge of the terrain, dug two separate snow pits, and witnessed another group ski the same slope minutes beforehand. This should reminds us to evaluate the risks we take in order to ski the deep.

Throughout the month of February, several classes (introductory level and up) will be offered in Bozeman. Check GNFAC's website or visit any local outdoor gear store for more information regarding prices, levels, and dates.

Brush up on your avalanche knowledge at websites like www.avalanche.org or www.recco.com.

Don't be a fool. Get educated and save a life.❖

Think hiking up Bradley's or Sluiteman's is safe? Even though they are right next to an avalanche-controlled area, those two out-of-bounds options are still dangerous. As printed on Bridger's Mountain Map: "Extreme Avalanche Potential exists beyond the Ski Area Boundary. The terrain beyond the Ski Are Boundary is not patrolled. Rescue outside the area boundary is the responsibility of the Gallatin County Sheriff."

Black Lab survives Montana avalanche

By Amy Beth Hanson - 02/08/2008

HELENA — Tom Pick was backcountry skiing with his 3-year-old black Labrador Lizzie in southwest Montana when a small avalanche carried the dog down the side of the mountain.

She disappeared from his reach and into the swirling snow. Pick searched for two days with no sign of Lizzie — haunted by the sight of the dog's eyes gazing up at him as she fell.

"I'll probably always see her eyes just looking up at me as she slid down into that thing," Pick said in an interview this week. "You could tell that she was scared." Pick eventually gave up on the search and assumed the dog was gone. So when the phone rang on Super Bowl Sunday and the caller told him Lizzie had been found, Pick assumed it was her body.

"As much as we still wanted to have hope, at some point you kind of lose it and brace yourself," Pick said.

Instead, it was tale of dogged survival. Lizzie had managed to survive not only the avalanche, but a week in the snowy backcountry before walking down the mountain and being spotted at a lake about five miles away.

Pick said he and his wife, Kathleen Williams, are "both still kind of pinching ourselves, afraid that it's a dream or something. We still don't know exactly what transpired." Doug Chabot, an avalanche forecaster with Gallatin National Forest, noted Lizzie's safe return in his daily avalanche report Tuesday. "If the dog could talk, there would be a made-for-TV movie, motivational speaking tour and best-selling book," Chabot said.

Since Lizzie can't talk, Pick tells the story.

The last time Pick saw Lizzie was Jan. 27 as the two were moving up a ridge on Mount Blackmore, south of Bozeman. Lizzie had moved ahead of him and he was about to tell her to move away from the ridge when a cornice broke 8 to 10 feet from the edge, sparking the avalanche.

"Once the snow cleared on the bottom, I couldn't see anything. There was no response, there was nothing moving around. It was about as helpless a feeling as you could experience," Pick said.

The 58-year-old state water quality specialist made his way down the mountain and back up the avalanche chute to search for the dog. The next day, Chabot, the avalanche forecaster, tried to ski into the slide area, but a blizzard forced him to turn around.

Pick searched the day after that but still could not find Lizzie, who was a constant companion to he and his wife.

The couple, still grieving, were planning to attend a dinner with friends on Super Bowl Sunday when Pick's cell phone rang.

The caller, Jess Sullivan, told Pick that he and his family had been riding snowmobiles and ice fishing at Hyalite Reservoir when they noticed a black Labrador hanging around. He said they were among the

last to leave and the dog didn't seem to be with anyone, so they brought her back to Bozeman and called the number on her tag.

"It turned out they live less than a mile from where we do," Pick said. "We were right over there and picked her up. Other than a pretty good cut on her head that had already started to heal, other smaller cuts and losing somewhere between five and 10 pounds, she looked great." Williams took Lizzie to the vet the next day and she checked out fine, but the dog had to be gradually reintroduced to solid food.

For now, Lizzie, a keen bird-dog, will being staying close to home.

"Lizzie is, I think, officially retired," Pick said. "She's going to stick to the low-angle terrain from now on."

AVALANCHE!

Science is battling winter's white killer—but can technology trump recklessness in the backcountry?

IT WAS THE WEEKEND they'd been waiting for all year. After an early season marked by disappointing snowfall, friends Jason Crawford, 27, Brett Toney, 27, and Kris Rains, 26, awoke Feb. 17, 2007, to find the hills around Helena, Mont., buried in fresh powder. "It was the best snow we'd had all season," Crawford says. "We were pretty anxious to get out."

The snowmobilers' destination was a remote spot called the North Fork Bowl, deep within the Big Belt

• STORY BY **JEFF WISE**
• PHOTOGRAPH BY **RICHARD ARMSTRONG**

ANATOMY OF AN AVALANCHE

Each winter outdoor enthusiasts, especially snowmobilers, venture into the backcountry, lured by the solitude and untracked expanses. There, far from any ski patrol, one of the biggest risks they face is a slab avalanche, in which a strong layer of snow breaks from the slope above it like a pane of glass and roars down the mountain with churning, deadly force. Here's how it happens.
— Erin McCarthy

A snowmobiler prepares to high mark a backcountry mountain slope. The open expanse may show signs of wind-deposited or eroded snow and previous avalanche activity, like fracture lines, making it a prime location for a slide.

mountains. They had gone high marking in the surrounding range—riding their snowmobiles up steep slopes, turning out of the climb at the last possible moment before stalling or tipping—yet they had only managed to reach this spot once before. From the trailhead it took an hour of hard technical riding, but when they arrived, the sight of the bowl took their breath away: a wide-open amphitheater covered in chest-high snow. Sled-head paradise.

As usual, Toney gunned his engine first, racing straight up the 40-degree slope, with Crawford close behind. At the top of their run, both machines bogged down in the deep, soft snow. Climbing off his sled, Crawford looked at Toney. His friend stood about 30 ft. upslope and the same distance to his right. Suddenly, Toney bolted, leaping across the snow before falling on his stomach. "What the?" Crawford said. Then he turned up the hill and saw it: a wall of white—4 ft. high and 300 ft. across—thundering down on them. "I turned, took two big lunges and fell on my stomach," he recalls. "My first thought was, 'I'm going to die.'"

Eight hundred tons of snow slammed into him like a speeding freight train. Buried in the roaring tumult, Crawford tried to struggle, but the heavy snow was so thick he could barely move his arms and legs. "Every once in a while," he says, "I'd see a flash of light."

Then everything went dark.

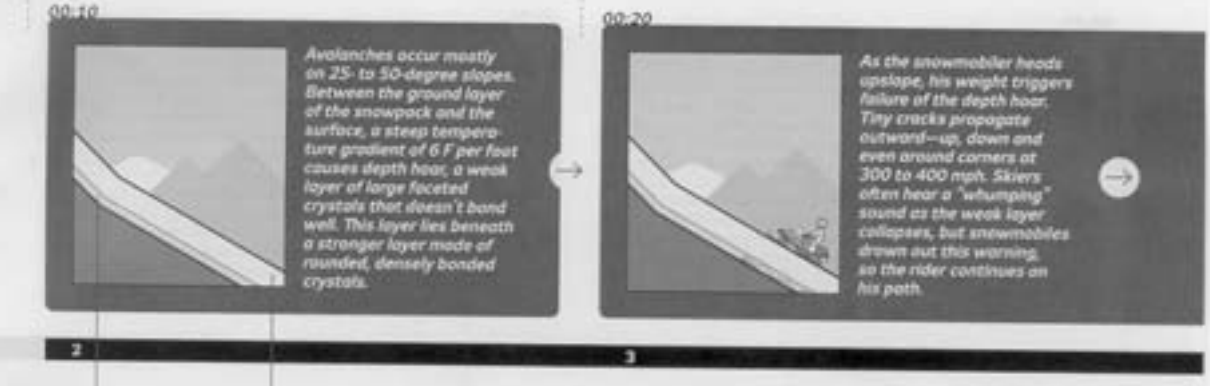
THE HORROR THAT STRUCK the Montana snowmobilers was not an isolated incident. Throughout the 1950s and '60s, there were fewer than 15 deaths per year caused by avalanches in the U.S. But in the '70s, as more people began venturing into the backcountry on skis, snowshoes and snowmobiles, the number of fatalities started creeping up, reaching highs of 30 or more per season. Since 2002, avalanches have killed an average of 25 people in the United States each year. And they are rarely flukes. Ninety-two percent of the victims are caught in slides triggered by themselves or their companions.

Snowmobilers can be particularly at risk. "Machines are powerful enough now, and the riders are good enough, that they can get onto avalanche slopes that they could never have reached 10 or 15 years ago," says Doug Chabot, director of the Gallatin National Forest Avalanche Center in Bozeman, Mont. "And in any given day, a snowmobiler is going to hit a lot of slopes, all over the place." It's like playing Russian roulette and pulling the trigger over and over. Although snowmobilers make up about half of all avalanche deaths, snowshoers and skiers are also at risk since one person's weight can be enough to trigger a slide.

Avalanches may be deadly, but they're also spectacular. They can accelerate 10 million tons of snow to 200 mph in seconds. They can knock over trains and demolish villages—in 1970, one slide in Peru killed 18,000 people.

The majority of fatalities are the result of dry slab avalanches—the kind that caught Crawford and his friends. Temperature throughout the snowpack can vary greatly—from

ILLUSTRATIONS BY **OOGO**



Weak Layer Crystals
2 mm

Strong Layer Crystals
0.5 mm

SAFETY TIPS

× Before venturing into the backcountry, take an avalanche safety course. The American Avalanche Institute (*avalanchecourse.com*) offers classes in Wyoming, Montana and Utah.
× Check the avalanche forecast before setting out. Visit the Forest Service National Avalanche Center's Web site, *avalanche.org*. In the backcountry, stay alert for signs of danger. Evidence of recent slides or heavy snow are major red flags.
× A slope that's steep enough to ski is steep enough to slide. When crossing a potential avalanche path, travel one person at a time.
× Each group member should have an avalanche transceiver, which can help rescuers find people who get buried, and a probe, which can pinpoint their locations. Make sure you know how to use both—it will be too late to practice after a slide strikes.
× Carry shovels. When an avalanche comes to rest, it sets into a mass that's hard, heavy and difficult to dig through without proper equipment.
× If your buddy is buried, move fast. The survival rate among victims buried less than 15 minutes is 90 percent. By 30 minutes, that drops below 50 percent. After 2 hours it's virtually nil. Seventy-five percent of victims die from asphyxiation; trauma from hitting rocks and trees makes up most of the remainder.
× If caught in an avalanche, let go of everything you're holding and try to swim to the top. When the slide begins to slow, use your hands to create a pocket of air around your face, and thrust an arm or a leg toward the surface.

around 32 F near the ground to 5 F or colder at the top layer. A steep temperature gradient of 6 F per foot can result in depth hoar, a faceted layer of crystals near the ground that fractures easily and can cause the stronger, densely bonded snowpack above it to slip. The snow Jason Crawford was riding on had fallen atop a similar type of faceted layer, called surface hoar. "These are beautiful, feathery, big flakes," Chabot says, "and they're really weak. They just won't hold a whole lot of weight above them before they all tip over—literally, like dominos."

As the friends high marked on the fresh powder, this layer of tiny ice dominos collapsed in an outward-expanding wave that went ripping up the hill. When it reached the steepest part of the slope, the snowpack fractured in a long, horizontal band called a crown. At that instant, everything beneath it slipped away en masse.

Up to then, the process had been practically invisible. Although very little about an avalanche can be discerned by the naked eye until snow comes roaring down the mountainside, there are some known risk factors. Eighty percent of avalanches occur during or within 48 hours of a snowstorm, which adds weight on top of fragile layers. Another factor is strong winds, which can deposit snow into dangerously high drifts. A release usually will occur on slopes of 25 to 50 degrees that are above the timberline and face away from prevailing winds. An abrupt rise in temperature can also weaken the structure of the pack as the snow melts.

Researchers in the U.S., Canada and Europe are struggling to better understand snowpack dynamics in order to forecast avalanches more accurately and help the public avoid and survive them. Yet even the most seasoned expert can only assess the snow's condition accurately by digging a 5- to 6-ft. snow pit and smoothing the wall to get a clean look at a cross section of snow. The procedure takes a long time, and is only valid for a particular stretch of snow. Farther up the hill, or on the other side of a bowl, the story might be totally different.

To speed the process of analyzing the snowpack,

researchers are developing an instrument called a penetrometer. When pushed into the snow it can generate an instant profile of the snow layers on a handheld computer. "You can get many observations in the same time it would take you to do a single manual profile," says Bruce Jamieson, director of the Applied Snow and Avalanche Research Group at the University of Calgary in Alberta, Canada.

Of course, all the information and understanding in the world isn't going to do any good if it isn't applied by the folks out in the backcountry. The unfortunate fact is that too many people fail to treat avalanches with respect. "We all knew that it was bad avalanche conditions," Jason Crawford says. "Brett had seen the bowl slide before. But we kind of thought we were invincible, you know?"

That kind of outlook is all too common. Everyone who loves the backcountry knows what it's like to get powder fever, the urge to go play in the snow and be the first to lay down tracks. Avalanche researchers understand the compulsion. So a major focus is figuring out how to prevent bad decision making. After 58 people died in North American slides during the disastrous winter of '02 to '03, the Canadian Avalanche Association developed the Avaluator, a wallet-size card to help users objectively assess the threat level. One side is a checklist of simple questions about possible dangers: "Are there signs of slab avalanche activity?" "Are there signs of unstable snow?" On the other side, a chart cross-indexes the type of terrain with the updated avalanche forecast danger level. In each case the card yields a go/caution/no-go advisory.

"What these cards do is, they jog our memory," Chabot says. "They make us think twice."

Ultimately, the goal of avalanche research is to save lives. And as it happens, the past few years have actually seen a modest decrease in the fatality rate. But can science take the credit? Most experts suspect not. "The condition of the snowpack is probably the biggest factor," Jamieson says. "In the two previous winters, we generally had better snowpack,

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The slab moves past the stauchwall and flows downhill; the snow, roiling like a river's rapids, sucks the rider in. Disoriented and fighting for air, he tumbles in the snow, which can reach speeds of up to 200 mph in seconds. A large slide can release 300,000 cubic yards of snow, equaling 20 football fields filled with snow 10 ft. deep.

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The slide fans out as the terrain flattens. The pulverized snow, which has a density of up to 40 percent, sets into a heavy, chunky mass within seconds. The rider, almost completely buried in the avalanche's deposition zone, will find it hard even to move his fingers. If he's not injured, digging himself out could still take hours.

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SAFETY TECH

1. ***Stay on the Surface*** The 5.3-pound Avalanche Airbag System Freeride Model ($733, *avalanchebackpack.com*) deploys twin balloons in a matter of seconds, providing 5 cu. ft. of extra volume, which can buoy you to the snow's surface.
2. ***Find Your Friends*** If you're a survivor, the S1 scanner from Ortovox ($409, *ortovox.com*) can detect up to four buried people at once and display their locations on a screen. Compatible with all standard avalanche beacons, the unit can lead you to the victims in order of proximity.
3. ***Breathe Easier*** The Avalung II from Black Diamond ($130, *avalung.com*) buys you up to an hour if you get buried. Weighing just 9 ounces, it straps over your shoulder and extracts air from the surrounding snow, supplying it through a mouthpiece.

Avalanche Debris Crystal
0.2 mm

PHOTOGRAPHS BY BRUCE TREMPER (SLAB, ABOVE LEFT; BURIED, ABOVE RIGHT)

with lower levels of avalanche danger."

Odds are, that lucky streak won't last. With more and more people hitting the backcountry, fatalities could easily rise again.

IN JASON CRAWFORD'S CASE, his luck hadn't totally run out. As the avalanche slowed to a stop, he came to rest with his head above the surface. Spitting snow out of his mouth, he wheezed for air and slowly struggled to free himself. His helmet had been ripped off, and one of his ankles was badly sprained. He called for his friends, and tried to dig, but found no sign of them. The avalanche debris—massive, icy blocks of snow—was 10 to 15 ft. deep.

"Yelling for these guys, knowing that my best friends are under the snow suffocating and there's nothing I could do about it—that's the worst feeling in the world," he says. "I wouldn't wish that on anybody. I'll remember it forever."

Ahead lay an ordeal almost as dangerous as the avalanche: digging out his snowmobile, fighting his way back through miles of punishing, technical riding with a damaged machine. Twice he became stuck, and only managed to free himself after hours of work. Finally, his machine died for the last time—just after delivering him to a well-traveled logging road. He hobbled another 2 miles on his bad ankle before he managed to find help. Not until the next day was a search team able to recover the bodies of Rains and Toney.

That day changed Crawford's life. For a month he was in a wheelchair, then on crutches. A year later, he still hasn't made a full physical recovery. Emotionally, the wounds are deeper. This winter, he says, he'll get back on his snowmobile and go high marking, but with a different outlook. He's going to stick to well-traveled terrain that he knows isn't going to slide.

"We talked a lot about avalanches," he says. "We just never thought it could happen to us. I don't know a better way to put it to make it sink in for somebody else: it can happen to anybody."

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BACKCOUNTRY BOMBS

CORNICE CUTTING NO HACK JOB

TEXT BY JEFF BURKE
ILLUSTRATION BY CARRIE COOK

Cornices are beautiful: white, transfixed crescendos of nature, icons of the alpine environment. When used properly, they can also be great tools for assessing snow stability. And, safely sending one down a slope is an invaluable skill in any backcountry traveler's bag of tricks.

Cornice cutting allows backcountry skiers or mountaineers to test a slope without the risk of actually getting onto it. It's also superior to using results from stability tests performed on adjacent slopes. That all seems straight forward, but make no mistake, cutting cornices is very dangerous.

"The most obvious danger associated with cutting cornices," says Ron Johnson of the Gallatin National Forest Avalanche Center in Bozeman, Mont., "is being too close to the edge and falling off the ridge when the cornice breaks."

Doug Abromeit, director for the U.S. Forest Service Avalanche Center in Ketchum, Idaho, warns of a second danger: "Dropped cornices are called the bombs of the backcountry, and they can trigger large slides that can bury other skiers, climbers, etc., who happen to be in the path." An average cornice is 30-percent density with a weight of 300kg per cubic meter (660 lbs.). It's not uncommon for backcountry skiers to cut cornices larger than two cubic meters, which is well over 1,200 lbs. bounding down a hill. It's easy to see why they are called "bombs."

Cornices are notorious for breaking farther back than expected. One rule of thumb to help avoid getting pitched off is if you are cutting a cornice on a 40° slope, imagine a line continuing up through the cornice at 40° until it reaches the top. Picture where that line would be and stay well behind it. It's also worth mentioning that following a large cornice down its path after it has gone down the slope is a relatively safe route in high avalanche conditions.

There are three basic ways to cut a cornice: kicking them with your skis, cutting them with a saw, and cutting them with a knotted cord. For the first two methods, it's more than a good idea to be belayed to an anchor, as you're probably right on the breaking point. While 7mm dynamic rope is acceptable to some professionals, thicker diameter cord is recommended.

"The best way to cut a large cornice and avoid going off the ridge with it, is to use 100-feet or more of thin parachute cord with knots tied every 18 inches and a weight (large washer/small carabiner) in the middle of the cord," says Abromeit. One person should be on each end of the cord and at opposite ends of the cornice they intend to cut. Toss the cord over the top, snugging the cord up beneath the cornice (the weight helps when tossing the cord). Get far back from the edge (farther than you think you should) and begin "sawing" the cornice off. One person pulls, the other releases tension, back and forth, back and forth. "It is very important they are standing on the opposite side of the ridge while they are cutting," maintains Abromeit.

"People should practice cutting small cornices on 'safe' slopes," he adds. "And then work up to actually cutting large cornices in potentially dangerous terrain."

While cornice cutting is far from absolute, it's a pretty reliable test and can help determine slope stability. "The most important thing to remember when cutting a cornice," says Ron Johnson, "is that it is only one stability evaluation tool and should be used in conjunction with other tests and snowpack observations."

THINGS TO CONSIDER:

- How far back can the cornice break?
- Is anybody on the slope below?
- Can I safely cut this cornice without falling with it?

THINGS TO PRACTICE:

- Start small and work your way up to larger cornices.
- Belay your partner from a safe spot, i.e., tree anchor, ski anchor.
- Assess the slope angle with regards to the potential breaking point. Then take a big step back. Hell, take two.

"The most obvious danger associated with cutting cornices, is being too close to the edge and falling of the ridge when the cornice breaks." —Ron Johnson