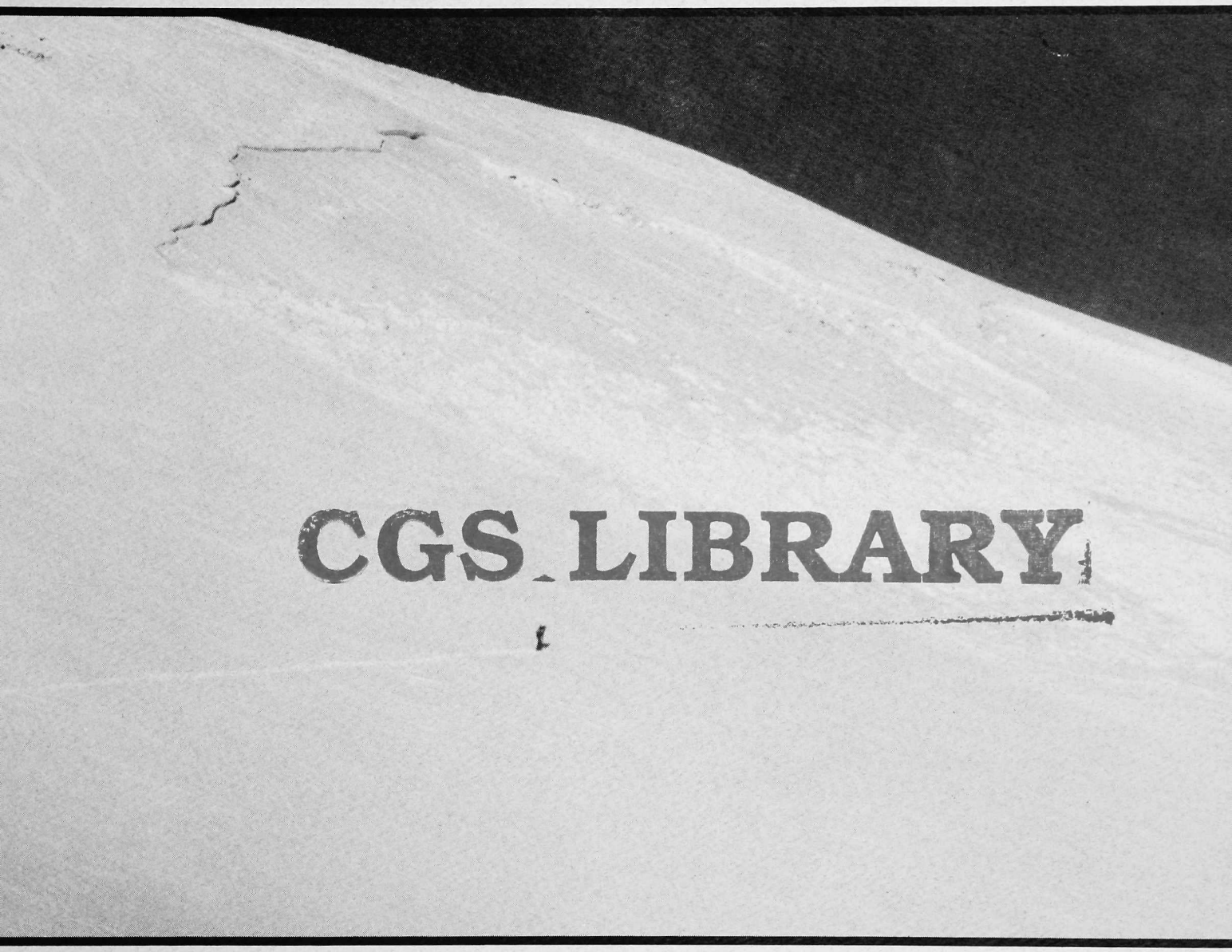
Snow & Avalanche



❄ *1991-92 Annual Report* ❄

Colorado Avalanche Information Center

Colorado Geological Survey

Department of Natural Resources

Colorado Avalanche Information Center

ANNUAL REPORT
1991-92

July 1992

Colorado Geological Survey
Colorado Department of Natural Resources
1313 Sherman, Room 715
Denver, Colorado 80203

STATE OF COLORADO

ROY R. ROMER
GOVERNOR

JOHN W. ROLD
DIRECTOR

COLORADO GEOLOGICAL SURVEY
DEPARTMENT OF NATURAL RESOURCES
715 STATE CENTENNIAL BUILDING — 1313 SHERMAN STREET
DENVER, COLORADO 80203 PHONE (303) 866-2611

MEMORANDUM

TO: Colorado Citizens

FROM: John W. Rold, Director, Colorado Geological Survey J.W.R.

DATE: July 15, 1992

SUBJECT: CAIC Annual Report

The Colorado Avalanche Information Center has completed its fifth year under the management of the Colorado Geological Survey and its ninth year within the Department of Natural Resources. The Center plays a key role in helping the Colorado Survey achieve its statutory goal of reducing the human and economic losses from geologic hazards. Every winter and spring, snow avalanches impact recreation, tourism, commerce, industry and the citizens of Colorado. The Center counters the effects of snow avalanches through a dual mission of forecasting and public education.

As detailed in this Annual Report, most measures of the program indicate continued success. Knox Williams and his staff increased funding support, the number of sponsors, the use of the public hotlines, attendance at educational seminars, and informational contacts with the news media. Though avalanche-related deaths rose, property damage was exceptionally low.

The Center remains wholly funded by grants and donations from both the public and private sectors with no Colorado General Fund support. This year the Center managed to increase revenues by 11 per cent over last year. The staff of the Avalanche Center has managed to form a strong coalition of sponsors, whose belief in its mission and support have made the Center possible.

Please review this year's Annual Report. Knox and I would welcome your suggestions as to how the Center might improve or expand its services.

Colorado Department of Natural Resources

Colorado Avalanche Information Center
10230 Smith Road
Denver, Colorado 80239
(303) 371-1080

DIRECTOR'S STATEMENT

To Our Sponsors and Patrons:

Every summer, the writing of our Annual Report becomes a time of reflection on the winter past. This year one event stands out, and that was the avalanche of March 5 on Red Mountain Pass which took the life of Eddy Imel, a Colorado Department of Transportation employee. For years Eddy had reported avalanches to the Avalanche Center. Apparently, his desire to "get the job done" overcame his certain knowledge of the extreme avalanche hazard on this day. We lost one of our own in this tragedy that stabbed at the heart of his family, the community of Ouray, the CDOT, and the Avalanche Center.

When we opened the Avalanche Center in 1983, we took on the responsibility of warning of extraordinary avalanche hazards. In nine winters, I feel we have done a good job in meeting this responsibility. But the events of March 5 tell us that we can do better, that we must do better.

Response to the challenge to improve our methods and operations began immediately. The Avalanche Center is working closely with the CDOT to improve on-site timing and detail of our storm and hazard forecasts on Red Mountain Pass. Additionally, we will help CDOT develop an action plan for statewide avalanche hazard reduction.

Developing and executing this plan will pay dividends from this day forward. The obvious benefit will be greater safety for highway employees and highway travelers. There will also be a trickle-down benefit for back-country users, for the additional data gathered along highway corridors can be incorporated into our forecasts for the surrounding back-country.

The Avalanche Center will likely see its role expanded with changes in our operations and additions to our work load. If this happens, we will accept the added responsibility as an affirmation of our commitment to providing the best possible service to the public and our sponsors.

As always, we thank you for your support.

Sincerely,

Knox Williams

Knox Williams
Director

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EXECUTIVE SUMMARY

Administration: The Colorado Avalanche Information Center is managed by the Colorado Geological Survey of the Department of Natural Resources. Knox Williams is program director.

Funding: The Center is totally cash and federally funded. In FY 91-92, total revenues were $130,435 (compared to $117,475 last year.)

Housing: The Center is housed at the National Weather Service in Denver, with an office also with the U.S. Forest Service in Fort Collins.

Staff: Four forecasters shared the responsibilities of a 7-day work week during the winter season from November through April.

Summary of avalanche events: A total of 2,523 avalanches were reported to the Center this season (36% above normal). Avalanche Warnings were posted on 23 days (11 below normal). Eight people died by avalanche (4 above normal). Property damage was exceptionally low, estimated at $15,000.

Avalanche hotlines: The Center maintains avalanche message phones in seven Colorado cities and towns for the public to call for current conditions. Some 66,445 calls were made to the hotlines this winter, up 19% from last year. Users of the Colorado TravelBank, a computer bulletin board into which we put our daily forecasts, made 26,951 contacts seeking weather and avalanche information.

Media contacts: The Center logged 202 contacts with broadcast and print media, once more achieving a timely and accurate dissemination of avalanche information and a high profile for the Center. Additionally, five mountain radio stations broadcast our hazard evaluations and forecasts daily.

Public education: Center personnel presented 51 avalanche awareness talks and field seminars, reaching on a personal level some 2,553 people. We continued to distribute to the public the Center's avalanche awareness cards, brochures, and posters.

Hazard grading: Each year the Center grades itself on its daily avalanche hazard forecast. This year the results were 96% correct forecast, 2% over-forecast, and 2% under-forecast.

FUNDING and BUDGET

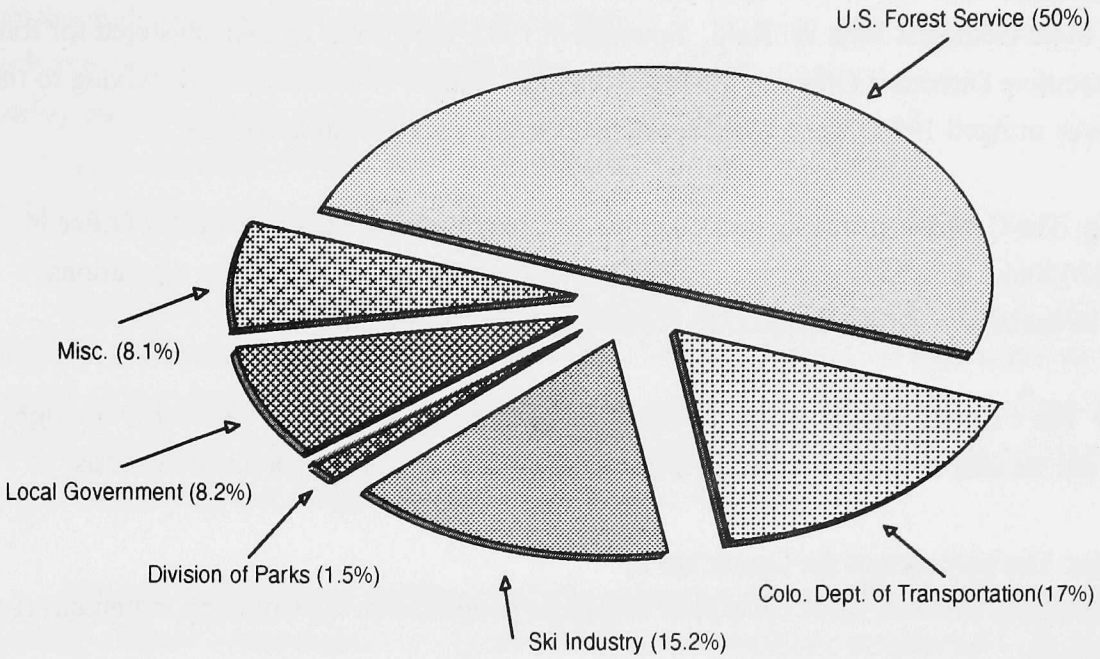
The Colorado Avalanche Information Center is totally funded by grants and donations. A year ago funding was $117,475. For FY 1991-92, funding of $130,435 came from the 30 sponsors listed below.

Federal	
U.S. Forest Service	$65,000
State	
Colorado Department of Highways	$22,000
Colorado Division of Parks, Snowmobile Fund	$ 2,000
Local Government	
Eagle County	$ 3,000
Pitkin County	$ 3,000
Summit County	$ 2,000
Town of Breckenridge	$ 1,200
Town of Frisco	$ 1,000
Town of Silverthorne	$ 500
Ski Industry	
Colorado Ski Country USA	$15,000
Winter Park Recreational Association	$ 1,000
Breckenridge Ski Corp.	$ 1,000
Vail Associates	$ 1,000
Steamboat Ski Corp.	$ 1,000
Arapahoe Basin	$ 500
Snowmass Resort	$ 250
Crested Butte Pro Patrol	$ 100
Miscellaneous	
Summit Foundation	$ 5,000
Colorado Mountain Club, Denver Group	$ 2,430
Colorado Mountain Club Foundation	$ 1,130
Mountain Rescue - Aspen	$ 500
Alfred Braun Hut System	$ 300
Tenth Mountain Trail Association	$ 300
Henderson Mine and Mill	$ 300
International Alpine School/Telluride Pro Patrol	$ 300
Neptune Mountaineering	$ 200
Summit Huts & Trails Association	$ 200
North Face	$ 150
Yule Creek Avalanche Services	$ 50
Individual Donation	$ 25
Total	***$130,435***

WHERE THE MONEY CAME FROM

REVENUES

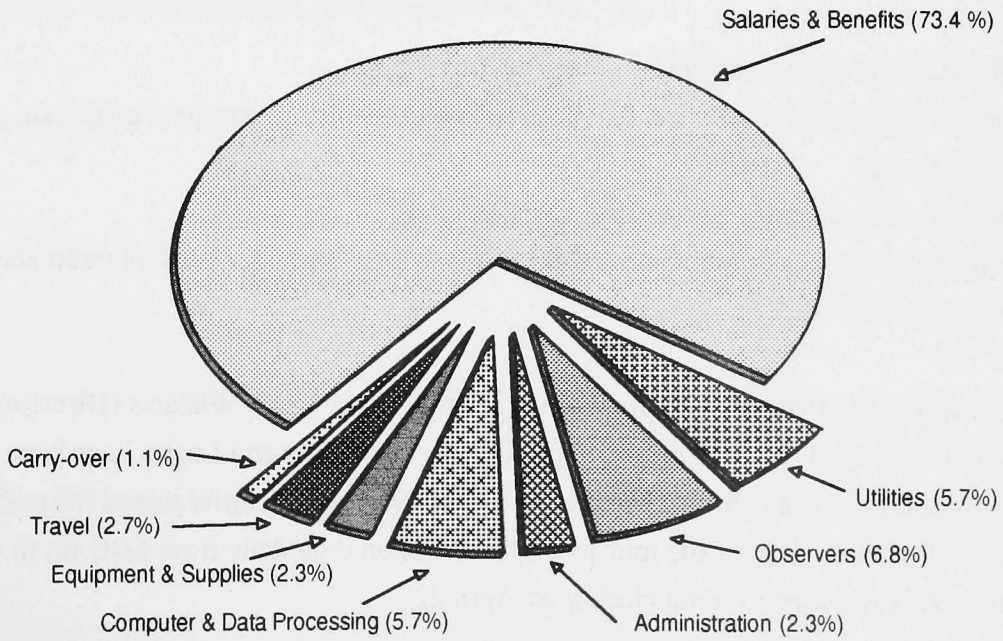
$130,435



HOW THE MONEY WAS SPENT

EXPENDITURES

$130,435



OPERATIONS

Administration: The Center is managed by the Colorado Geological Survey under the directorship of State Geologist John W. Rold. Founded in 1983, the Center was administered for four years by the Executive Director's Office of the Department of Natural Resources before moving to the Geological Survey in April 1987. The Center is totally funded by grants and donations.

Housing: The Center is primarily housed at the National Weather Service Forecast Office in Denver (at 10230 Smith Road.) The space provided is shared with NWS Fire Weather operations. Secondary office space is provided by the U.S. Forest Service in Fort Collins.

Season: The Center operates on a full-time basis seven days a week from November through April. During the summer months, the Center is closed and the staff works on a part-time basis.

Purposes: The purposes of the Center are to:

- monitor the changing weather, snow cover, and avalanche conditions in the Colorado mountains (see Data Sites below);
- provide twice-daily information to the public, via recorded telephone messages (hotlines) (see Section VII);
- warn of dangerous avalanche conditions by issuing avalanche warning bulletins via the NOAA Colorado Weatherwire and the news media (see Section VII);
- present educational avalanche awareness talks, seminars, and public service announcements (see Section VIII);
- investigate all significant avalanche incidents (see Section VI);
- be a focal point of avalanche information for sponsors, news media, government or private agencies, researchers, writers, etc.
- provide specialized information to sponsoring agencies; and
- maintain a computer data set of mountain weather and avalanche events, from Colorado and other mountain states (see Section VI).

Staffing and Duties: Personnel for the 1991-92 winter were: Knox Williams (Director), Nick Logan (Associate Director), Dale Atkins, and Scott Toepfer. Williams and Logan have been with the Center since its inception in 1983, Atkins came on board in 1987, and Toepfer joined the staff this year. This is a strong, skilled staff. One of the four forecasters was on duty daily from 6:30 am to 4:30 pm, from opening day on November 13, until closing on April 22.

The forecaster was responsible for:

- monitoring mountain weather, snow, and avalanche conditions;
- logging all incoming data from observers;
- evaluating field data and National Weather Service data;
- making daily snow stability evaluations and forecasts;
- updating recorded telephone messages (hotlines) twice daily;
- issuing and terminating avalanche warnings when warranted;
- handling special requests from sponsoring agencies; and
- initiating or responding to calls from the news media.

Data Sites: The Center maintains a network of mountain observation sites for providing weather, snowpack, and avalanche data to the forecast office. Altogether there are approximately 32 manned sites: 20 are ski areas, and the remainder are highway and backcountry locations. The Center supports contract observers at Berthoud Pass, Gothic, and Red Mountain Pass; it also has access to data from remote weather stations maintained by the Soil Conservation Service.

Education: Forecasters present avalanche awareness talks and field seminars to many groups, providing education opportunities to citizens, tourists, and avalanche practitioners. In addition, forecasters maintain frequent contact with news media personnel to give broad (and accurate) coverage of current avalanche conditions. Such news stories not only inform but also enhance avalanche education among the public. Section VIII details our efforts toward public education and safety.

Publications: The Center publishes avalanche-related articles as need and opportunity arise. This year we worked on three projects, as detailed in Section VIII.

WEATHER and AVALANCHE SYNOPSIS

Before the winter of 1991-92 started there was great interest among weather watchers. There were two significant natural events that could cause short-term weather changes for the western United States. In the Pacific "el Niño" was developing, a favorable condition for a strong subtropical storm track to bring abundant snows from California to Colorado. But depending upon how the Pacific ocean warms "el Niño" can cause devastating drought. In addition to something in the water, there was something in the air. In the Philippines Mt. Pinatubo, a volcano, spewed tremendous volumes of ash and sulfur dioxide into the atmosphere. Besides causing the skies' milky hue on clear days and beautiful twilights, this geologic gunk could serve as condensation nuclei for available moisture causing more clouds and snow. In theory it seemed that heavy snows could choke the mountains.

In reality, the mountains were at the mercy of "el Niño" and the position of the subtropical jet stream. When the jet was over Colorado--November, February and March--frequent storms dumped snow in the mountains. When the jet slipped south--December and January--or when the jet swung to the north--April--Colorado was in the weather void. The periods of doldrums dominated, thus seasonal temperatures were above normal throughout the mountains. Winds were less than normal, and snowfall totals in the Northern, Central and Southern Mountains[1] were below normal.

The winter of 1991-92 produced a snow cover in the Colorado mountains that produced two distinct personalities: benign in the first half of the winter, and sinister in the second half. A record number of avalanches was the result. Similar to last winter, this winter got off to an early start with deep snows in October and November producing a strong and stable snowpack. The months of December and January were very dry, allowing the upper portion of the pack to weaken drastically. The light snows in February caused many avalanches, but it was not until winter returned with vengeance in March that the big avalanches started to fall.

Snowfall

Table 1 shows monthly and seasonal snowfalls for all sites that regularly reported data to the Avalanche Center this year. The dry and mild fall ended suddenly, just before Halloween, with a steady flow of moisture. Snowfall for November was plentiful, 125-215% of normal.

December was very dry. Snowfall amounts in the Northern Mountains ranged from 10-28% of normal; in the Central Mountains, 20-34%; and in the Southern Mountains, 50-70%.

[1] The geographical regions called Northern, Central, and Southern Mountains of Colorado are used extensively in this report. The Northern Mountains extend from the Wyoming Border to a line from Denver to Hoosier Pass (just south of Breckenridge) to Glenwood Springs, as the southern boundary. This boundary roughly follows the I-70 corridor but dips south in the area of Breckenridge to include the Ten Mile Range. The Central Mountains extend south from this line from Denver-Hoosier Pass-Glenwood Springs to a southern boundary line from Pueblo to Montrose. The Southern Mountains lie between this Pueblo-Montrose line and the New Mexico border.

Table 1. 1991-92 snowfall totals in inches (percents of normal are for sites with 10 or more years of record)

	Nov	Dec	Jan	Feb	Mar	Apr	*Total Dec-Mar*	% of Norm	*Total Nov-Apr*	% of Norm
Northern Mountains										
Arapahoe Basin	68	12	18	37	82	47	***149***	72%	***264***	
Bear Lake	55	8	19	20	60	17	***107***		***179***	
Beaver Creek		13	34	48	72		***167***	80%		
Berthoud Pass	95	13	34	40	70	33	***157***	78%	***285***	95%
Breckenridge		6	23	26	61		***116***	55%		
Copper Mountain	63	9	23	32	58	33	***122***	70%	***218***	85%
Eldora	54	9	27	22	55		***113***			
Loveland		12	24	50	94		***180***	79%		
Steamboat		21	43	46	34		***144***	58%		
Vail		15	62	70	92		***239***	90%		
Winter Park Resort	98	17	58	42	66		***183***	71%		
Winter Park Town	57	10	30	23	51	18	***114***	75%	***189***	84%
Central Mountains										
Aspen Highlands		11	27	26	50		***114***	67%		
Aspen Mountain		8	29	23	46		***106***	65%		
Crested Butte		15	17	36	44		***112***	68%		
Gothic	63	19	13	45	56	26	***133***	57%	***222***	68%
Monarch	70	14	38	43	76	15	***171***	91%	***256***	
Snowmass		12	21	21	39		***93***			
Sunlight		14	12	35	48		***109***	61%		
Southern Mountains										
Purgatory		26	21	36						
Red Mtn. Pass		29	23	44	87	14	***183***	86%		
Telluride	65	20	18	34	73		***145***	78%		
Wolf Creek	78	44	26	51	60		***181***	67%		

January was even drier without significant storms, and again snowfall for all mountain areas was below normal. Snowfall amounts in the Northern Mountains ranged from 42-98%; in the Central Mountains, 23-84%; and in the Southern Mountains, 38-61%.

February brought hope to skiers as almost daily snow fell in all mountain areas, but by the end of the month total accumulations for most areas were light. Only Vail was above normal (130%) and Beaver Creek and Monarch had normal snowfall totals (100%). Otherwise, the Northern Mountains got 60-95% of normal; the Central Mountains, 65-95%; and the Southern Mountains, 79-82%. February also marked a change in the snowpack as a fragile slab formed above weak lower layers.

Snowfall improved in March as most mountain areas received near-normal to above-normal snowfall. Amounts in the Northern Mountains were 92-127%; the Central Mountains, 92-140%; and the Southern Mountains, 120-130%, except Wolf Creek got 75%.

This pattern of snow did not continue in April. In a reversal of last year's wet end, April snows were few. Amounts were 47-90%. Warm temperatures and intense sunshine caused many wet-snow avalanches.

For the seasonal trend, note in Table 1 the percent-of-normal totals for December-March. All sites were below normal, 55-91%. Also in Table 1, note that only four data sites (all in the Northern and Central Mountains) have long-term snowfall records for the six months of November-April. Abundant snowfalls in November helped boost the seasonal totals for all four sites, but only Berthoud Pass received near-normal (95%) snowfall.

Avalanches

A total of 2,517 was reported to the Center from November to April. Four avalanches in May and two in June, all involving people, brought the count to 2,523. This number is 36% above the average of 1,850 avalanches. Table 2 shows the monthly distribution of these events, including those reported in May and June.

November produced few avalanches (109 as shown in Table 2). Deep early-season snows created a strong and stable base with almost no depth hoar development. The light snow in December and a solid lower snowpack combined to produce only 89 avalanches. The base remained strong but the upper layers of the snowpack lost strength from the persistent temperature gradient. Consequently, January produced many avalanches (415) with only light snowfall. February produced even more avalanches (693). In March the snowpack crumbled from heavy snows. A total of 958 avalanches was reported. A warm and sunny April produced numerous wet slides (253), a cycle that lasted to early May.

In most seasons the spring warm-up produces a dense, strong snowpack that is incapable of causing deep-slab releases. This spring that pattern was not true. Weak kinetic-snow layers in the mid and upper portions of the snowpack were fragile support for new snow. High sun angles and warm temperatures weakened the fragile bonds. The snowpack was deeply unstable and dangerous until it melted away under the early summer sun.

Avalanche Hazard and Warnings

Tables 2, 3, and 4 present several looks at the avalanche hazard and warning days this season. Table 2 shows the hazard ratings (low, moderate, high, extreme) for the Northern, Central, and Southern Mountains on a days-per-month basis. The table also shows avalanche counts, accidents, and warning periods by month.

Table 3 shows a monthly summary of warning days for the 1991-92 season plus the previous 17 seasons. (A warning day is one on which the hazard was rated high or extreme and an Avalanche Warning was issued.) Warnings were issued on 23 days. This is far below the average of 34 days. No warnings were issued for December and April.

Table 4 breaks the warning days this season into regional statistics for the Northern, Central, and Southern Mountains. It is typical for the Southern Mountains to lead in warning days.

Table 5 shows the impact of avalanches this season on Colorado mountain highways. It lists the number of events and dates on which both natural and artificially triggered avalanches reached roadways.

Avalanche Accidents

The last part of Table 2 lists a monthly breakdown of avalanches involving people and property in 1991-92, while Table 6 compares these same statistics with long-term annual averages. The winter of 1991-92 was worse than normal in the number of people caught, totally buried, and killed. The number killed--eight--was four above the long-term average. Estimated property damage was only $15,000.

Table 7 lists all accidents reported to the Avalanche Center this winter. Note seven fatalities occurred on February 25, March 1, March 5, March 29, April 1, and June 13 (two climbers killed in one avalanche.) An additional accident occurred about February 17th, however, the body was not found until July 10th. Avalanche Center personnel try to investigate all fatal accidents (see Section VI).

Figure 1 portrays the number of avalanche accidents (defined as an incident in which at least one person was caught) compared to the posted hazard rating in that region at the time of the incident. Statistics from both 1991-92 and the average over the previous five years are included. In 1991-92 most avalanche accidents happend during times of high hazard. On average, though, by a narrow margin

most accidents happen during times of moderate hazard, most likely because more people are in the backcountry and in steeper terrain during these times. (We are working hard in our hotline and seminar messages to dispel the misconception that *moderate* means safe.)

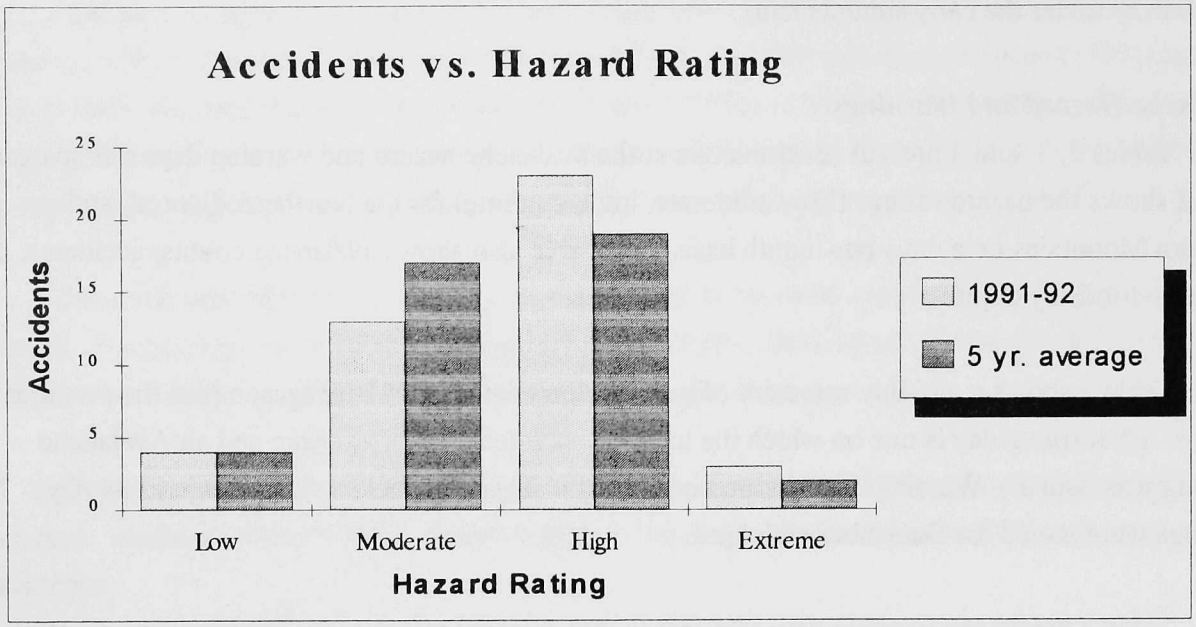


Figure 1

This synopsis has presented a general and statistical overview of the 1991-92 winter season, with tables 1-7 showing different aspects of the season. For a more detailed description of events, the reader should continue to the next section, the Detailed Winter Summary.

Table 2. 1991-92 winter summary of avalanches, hazard days, and accidents

Topic	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	*Total*
No. of avalanche warning periods	1	0	1	1	2	0			***5***
No. of days with warning in effect	2	0	3	6	12	0			***23***
No. of observed avalanches	109	89	415	693	958	245	4	2	***2,515***
No. of days with 1 or more slides	21	14	28	23	28	24	3	2	***143***
Northern Mountains									
No. of days with:									
low hazard	7	21	9	11	0	0			***48***
moderate hazard	12	7	18	5	22	11			***75***
high hazard	0	3	4	13	9	15			***44***
extreme hazard	0	0	0	0	0	0			***0***
Central Mountains									
No. of days with:									
low hazard	7	19	13	12	0	0			***51***
moderate hazard	11	9	14	5	22	12			***73***
high hazard	1	3	4	12	7	14			***41***
extreme hazard	0	0	0	0	2	0			***2***
Southern Mountains									
No. of days with:									
low hazard	3	21	12	11	0	0			***47***
moderate hazard	12	9	15	6	21	13			***76***
high hazard	4	1	4	12	8	13			***42***
extreme hazard	0	0	0	0	2	0			***2***
Avalanche accidents									
people caught	4	3	10	14	22	5	2	6	***67***
people partly buried	2	1	3	4	3	3			***16***
people buried	0	0	0	3	6	1			***10***
people injured	0	0	0	0	1	1		2	***4***
people killed	0	0	0	2	3	1		2	***8***
vehicles caught	0	0	0	1	4	1			***6***
property sites damaged	0	0	0	0	0	0			***0***

Table 3. An 18-year summary of avalanche warning days

Winter	Nov	Dec	Jan	Feb	Mar	Apr	*Total*
1974-75	0	9	16	10	15	2	***25***
1975-76	3	4	6	12	4	0	***29***
1976-77	0	4	7	5	5	2	***23***
1977-78	2	5	7	8	15	0	***37***
1978-79	0	13	12	0	9	5	***39***
1979-80	6	5	20	9	5	4	***49***
1980-81	0	6	2	6	16	5	***35***
1981-82	4	8	3	3	4	0	***22***
1982-83	1	7	3	14	16	5	***46***
1983-84	8	15	3	3	12	9	***50***
1984-85	2	10	4	6	12	3	***37***
1985-86	12	3	0	12	0	0	***27***
1986-87	0	0	15	6	5	0	***26***
1987-88	0	8	17	4	3	0	***32***
1988-89	3	11	0	13	0	3	***30***
1989-90	0	6	0	4	10	0	***20***
1990-91	0	9	6	6	9	0	***30***
1991-92	2	0	3	6	12	0	***23***
Total	***43***	***123***	***124***	***127***	***152***	***38***	***607***
Average	2.4	6.8	6.9	7.1	8.4	2.1	33.7

Table 4. Avalanche warning days by region, 1991-92 (dates in parentheses)

Region	Nov	Dec	Jan	Feb	Mar	Apr	*Total*
Northern Mountains			(7-9)	(17-19)	(4-7) (9-10) (28-31)		
Days:	**0**		**3**	**3**	**10**	**0**	***16***
Central Mountains			(7-9)	(14-19)	(4-10) (28-31)		
Days:	**0**		**3**	**6**	**11**	**0**	***20***
Southern Mountains	(18-19)		(7-9)	(14-19)	(4-11)		
Days:	**2**		**3**	**6**	**8**	**0**	***19***
Total	***2***		***9***	***15***	***29***	***0***	***55***

Table 5. Avalanches reaching Colorado highways, 1991-92

Highway	Location	Natural avalanches		Triggered avalanches	
U.S. 6	Loveland Pass	**6**	Feb. 9 Mar. 19, 24, 28	**16**	Dec. 14 Jan. 8, 16 Feb. 22, 25 Mar. 9, 10, 30
U.S. 40	Berthoud Pass			**1**	Feb. 24
I-70	Vail Pass	**2**	Apr. 7, 11		
U.S. 50	Monarch Pass			**1**	Mar. 9
U.S. 550	Red Mountain, Molas, & Coal Bank Passes	**19**	Oct. 31, Jan. 7 Mar. 5, 6, 8, 29	**8**	Feb. 14 Mar. 6 Apr. 7
Colo. 361	Camp Bird Mine	**5**	Mar. 6	**1**	Mar. 9
Colo. 145	Lizard Head Pass	**1**	Apr. 8		
Colo. 65	Grand Mesa	**1**	Mar. 6		
Colo. 62	Guanella Pass	**1**	Mar. 10		
Fall River Rd.	Rocky Mtn Nat Park	**1**	Mar. 29		
Ike Tunnel	portal road	**1**	Mar. 9		

Total: 64 avalanches (37 natural and 27 triggered)

Table 6. Summary statistics of Colorado avalanche victims

Category	*Total* 1970-91	Average (21 winters)	*Total* 1991-92
People caught	***788***	38	***67***
People partly buried	***209***	10	***16***
People totally buried	***147***	7	***10***
People injured	***71***	3	***4***
People killed	***85***	4	***8***

Table 7. Colorado avalanche accidents grouped by month, 1991-92 (italics indicate fatal accident)

Date	Location	Details
11/5	Berthoud Pass	1 ski tourer caught
11/8	Hoosier Pass	1 ski tourer caught and 1 snowboarder caught & partly buried
11/9	Rocky Mountain Natl. Park	1 climber caught & partly buried
12/1	Berthoud Pass	1 ski tourer caught
12/13	Wolf Creek	1 patroller caught & partly buried
12/14	Snowmass	1 patroller caught
1/1	Monarch	1 patroller caught
1/3	East Vail Chutes	1 o.b. skier caught
1/7	Loveland	1 patroller caught
1/8	Monarch	1 patroller caught
1/8	Steamboat (Toots)	2 ski tourers caught & partly buried (two incidents)
1/11	Indian Gulch (nr. Leadville)	3 snowmobilers caught, 1 partly buried, 2 machines damaged
1/30	Keystone	1 o.b. skier caught
2/2	Sunlight	1 ski tourer caught & partly buried
2/14	Red Mountain Pass--US 550	1 highway worker & snowplow caught
2/14	Purgatory	1 patroller caught
2/15	East Vail Chutes	1 o.b. skier caught & partly buried
2/17	*Stone Creek, nr. Beaver Creek*	*1 o.b. skier caught, buried, and killed*
2/17	Ironton Park--Red Mtn. Pass	2 ski tourers caught & partly buried
2/23	Hot Sulphur Springs	2 sledders caught, 1 buried (foot sticking out)
2/23	East Vail Chutes	1 o.b. skier caught
2/23	Vail Pass	1 ski tourer caught & buried (hand sticking out)
2/24	Beaver Creek	1 o.b. skier caught
2/25	*Sneffles Range--nr. Telluride*	*1 ski tourer caught, buried & killed*
2/28	East Vail Chutes	1 o.b. skier caught
3/1	*Lost Lake (nr. Eldora)*	*2 snowshoers caught, 1 partly buried, 1 buried & killed*
3/5	*Red Mountain Pass*	*2 highway workers caught, buried, 1 injured & 1 killed*
3/5	Red Mountain Pass	1 highway worker caught

Continued on next page...

Table 7. Continued...

Date	Location	Details
3/5	Red Mountain Pass	3 motorists caught
3/5	Snowmass	2 lift skiers caught (2 incidents)
3/6	Jones Pass	2 ski tourers caught, 1 buried
3/6	Loveland	1 o.b. skier caught
3/8	Rabbit Ears Pass	1 ski tourer caught, buried & injured
3/9	Guanella Pass--Colo. 62	1 county worker & snowplow caught
3/15	Shrine Pass	1 snowmobiler caught
3/17	French Gulch (nr. Breckenridge)	1 ski tourer caught & buried (dug self out)
3/17	Telluride	1 ski tourer caught
3/26	Keystone Ranch	2 mountain bikers caught
3/28	Irwin	1 snowcat guide caught & partly buried
3/29	*Montezuma*	*1 snowcat skier caught, buried & killed*
4/1	*Berthoud Pass--1st Creek*	*3 ski tourers caught, 2 partly buried, 1 buried & killed*
4/1	East Vail Chutes	1 o.b. skier caught & partly buried
4/11	Vail Pass	1 motorist caught, car totalled ($15,000)
5/2	Quandary Peak	1 ski tourer caught
5/3	Loveland Pass	1 backcountry skier caught
6/1	Peak 10 (Ten Mile Range)	2 ski tourers caught
6/13	*South Maroon Peak*	*6 climbers caught, 2 injured, 2 killed*

DETAILED WINTER SUMMARY

The following narrative is a detailed, month-by-month description of weather and avalanche events and trends of the 1991-92 winter season. If you are into details, this is the section for you.

October

Winter hit with sudden impact even before November arrived. October had brought a beautiful Indian Summer for more than three weeks, then a massive arctic airmass invaded Colorado on October 27th and brought one of the coldest storms ever to hit so early. The first snows of the winter were especially heavy in the San Juan and Sangre de Cristo Mountains of southern Colorado. Wolf Creek got 12" on the 28th and another 24" on the 30th, bringing its total depth on that date to 44". October 29th brought very cold temperatures, with minimums of -5° F to -12° F in the mountains.

The first recorded avalanche of the season was on the 31st when the Blue Point slide hit Highway 550 on Red Mountain Pass and covered the road 2 feet deep.

November

A new surge of arctic air blasted Colorado on the 2nd, and record cold temperatures were the result on the 3rd. That morning under clear skies, Alamosa reached -26° F, and Fraser and Crested Butte hit -30° F. This was the earliest -30° temperatures ever recorded in Colorado.

The next storm came in from the northwest on the 5th and brought snow through the 7th which was mostly confined to the Northern Mountains. On the 5th-7th, Berthoud Pass and Loveland both got 12" and Mary Jane, 16". On the 6th-8th, 12 natural and controlled avalanches were reported in the Berthoud and Loveland area. On the 9th, a climber in Rocky Mountain National Park triggered an avalanche and was carried 1,000 feet down the Tyndall Glacier. Luck was with him; he escaped serious injury.

A very weak system on the 11th brought snows of 1-3" to all mountains. The 12th and 13th were clear, warm, and beautiful. On the 14th, though, the next storm swept in from the southwest and hit the San Juan Mountains. By the 16th, 33" of snow had fallen at Wolf Creek, 29" at the top of Telluride ski area, and 25" in Silverton. In the Central Mountains, Gothic picked up 11" and Monarch, 9". From Aspen northward, almost no snow fell at all.

Another storm began late on the 17th and brought snow to all the mountains. This storm ended midday on the 19th, and some typical snows in those 48-hours were: in the Northern Mountains - Mary Jane, 24"; Berthoud Pass, 20"; Steamboat, 17"; Loveland, 16"; and Vail and Breckenridge, 11"; in the Central Mountains - Aspen, 15"; Gothic, 24"; and in the Southern Mountains - Red Mountain and Wolf Creek passes had 10" each.

Because of four days of snow, the Avalanche Center issued an Avalanche Warning (the first of the season) for the Southern Mountains at 1:15 pm on the 18th. The warning was dropped on the 19th after the storm ended. More than 20 avalanches were reported during this episode.

November 20th dawned clear and crisp with morning low temperatures at the zero mark. Clouds and light snow returned on the 21st, and scattered light snows continued until the morning of the 23rd. Accumulations for this small storm were 5-15" in the Northern, 4-8" in the Central, and 1-8" in the Southern Mountains. Moist northwest flow returned on the 24th and brought snows mostly to the Northern Mountains the next three days. Storm totals by the 27th were 9-12" in the Northern, and 2-4" in the Central and Southern Mountains.

Thanksgiving Day (the 28th) was cloudy with minor flurries, but by the 29th general light snows were falling throughout the mountains. By the 30th, snowfall totals were 4-13" in the Northern, 4-9" in the Central, and 6-16" in the Southern Mountains.

November had exceedingly few clear days and many days of light snow, as a parade of small storms swept through the Colorado mountains. Snowfall was above normal at all sites. Berthoud Pass recorded 215% of normal; Monarch, 170%; Winter Park, 165%; Wolf Creek, 130%; and Gothic, 125%.

A total of 109 avalanches were reported to the Center. There were two notable avalanche cycles: the 15th-18th in the San Juan Mountains when 20 avalanches were reported; and the 27th-29th in the Northern Mountains when 30 were recorded. There were no serious avalanche accidents in November. Snow depths by the end of the month were 30-44" in the Northern, 29-33" in the Central, and 37-57" in the Southern Mountains. The growth of beginning depth hoar in the snowpack was essentially nil.

December

December was rather uneventful, especially in the Northern and Central Mountains; only the Southern Mountains received substantial snowfall. Temperatures were generally mild with only one period of subzero temperatures.

The first three days of December brought cold temperatures to the mountains of Colorado: several stations recorded subzero temperatures. Then high pressure dominated the weather pattern with

warmer-than-normal temperatures and no precipitation through the 8th. On the 9th a fast-moving Pacific cold front left 1-2" of snow in the Northern and Central Mountains, with a return to sunny skies on the 10th.

A low pressure center which had been stationary off the California coast for some time finally began to drift eastward. Early on the morning of the 11th snow began in the San Juans and was quite heavy at times. Wolf Creek recorded 12.5" in two days, while Irwin Lodge reported 17.5" through the 14th. Mostly dry conditions prevailed from the 15th-17th.

Unsettled weather returned to the high country on the 18th-22nd. A strong storm approached Colorado from the west but soon tracked south towards Mexico. Moderate to heavy snow began in the Southern Mountains on the 18th and continued through the 22nd. Wolf Creek totaled 17" of new snow, and Purgatory, 7.5". The Northern Mountains did not fair as well: Steamboat received the most snow with 3".

The 23rd-28th brought a return to this December's general weather pattern of clear skies and mild temperatures. A weak storm passed across southern Colorado beginning on the 29th and left little more than a trace of snow in all mountain areas, until the 31st when Wolf Creek and Telluride each saw 4" of new snow.

For the month, all mountains saw below-normal snowfall amounts. The Southern Mountains got 50-70% of normal; the Central Mountains, 20-34%; and the Northern Mountains, 20-28%, with Breckenridge seeing only 10%.

December's snowpack was untypically stable, thanks to the abundant snowfall in November and the generally mild temperatures in December. Lack of snow in the Northern Mountains meant little, if any, avalanche activity. In the Southern and Central Mountains Wolf Creek recorded the most avalanche activity with 18 slides being reported on the 19th. A total of 89 avalanches were reported statewide in December.

Only two avalanche incidents occurred in December. Both involved ski patrollers, and neither was serious. These happened on the 13th and 14th.

January

Except for one storm and a mid-month avalanche cycle, January proved to be an uneventful month. The dry, sunny weather in December and the one large storm in mid-January, however, set the stage for large destructive avalanche activity later in the winter.

The New Year started with fresh snow: On the morning of January 1, there was 8" on the snow stake at Mary Jane, with lesser amounts at all other sites. After the storm passed, cold temperatures were the rule (e.g., -32° F at Taylor Park dam west of Cottonwood Pass), but these quickly moderated to warmer temperatures by the 6th.

A strong winter storm drove into Colorado's mountains on the 7th and 8th. Snowfall totals for various areas were Vail, 30"; Steamboat, 31"; Monarch, 19.5"; and Wolf Creek, 16.5". We issued an Avalanche Warning on the 7th and kept it in effect through the 9th. About 200 avalanches were reported in this warning period. No accidents occurred. The 9th and 10th brought sunny skies and colder temperatures to all mountain areas.

The 11th-15th brought continuous snow to all mountain areas. Eldora recorded 13", and Vail, 14.5". On the 13th Aspen Mountain saw an inverted snowfall day with 11" at midway and only 4" on top. The Southern Mountains picked-up generally only a trace of snow on each day during this period.

A mostly dry and sunny period developed from the 16th-20th. On the 17th, however, light snow fell in the Northern Mountains as a weak, upper-level disturbance passed. The high mountain valleys continued to shiver as strong temperature inversions kept temperatures well below zero at night with little warm-up throughout the day.

An upper-level low pressure center passed south of Colorado on the 21st bringing strong mountain-top winds through the 24th and a warm chinook wind east of the Front Range. This wind-event caused 31 avalanches to run in the Northern Mountains.

The 25th-31st brought warm, sunny, and dry weather to the mountains. High temperatures reached into the 40's in some mountain areas, bringing an end to a rather docile January.

Gothic and Sunlight both recorded their driest January on record, with Gothic at 23%, and Sunlight at 28% of normal. Wolf Creek had no new snow after the 8th and saw only 38% of normal snowfall for the month. All other sites saw 40-84% of normal, but Vail and Winter Park recorded 98% and 88% of normal, respectively.

A total of 415 avalanches were reported in January. No major avalanche related incidents occurred in January. A total of 10 back-country skiers, patrollers, and snowmobilers were caught without injury, although two snowmobiles were damaged at Indian Gulch near Fremont Pass on the 11th.

February

Even though snow fell on many days during February, total snowfall was generally below average. Avalanche-wise, though, the month was very active. February was similar to January '87: both months marked a most important change in the character of the mountain snowpack--from shallow and benign to slabby and deadly. A series of weak storms formed a layer of slab snow on top of a mid-pack layer of collapsible depth hoar. This proved to be a stratigraphy that would lead to a string of fatal avalanche accidents in February, March, and April.

The month started sunny and mild with temperatures in the 30's and 40's as high pressure dominated the Rockies. The avalanche hazard was low overall.

On the 3rd, a storm system moved north out of Mexico into southeastern Colorado. Upslope conditions developed along the Front Range, but only a dusting of snow fell. On the east side of the Sangre de Cristo Mountains, however, moderate snow fell. This continued into the 4th when a National Weather Service observer at Cuchara reported 27"! By the next morning, the 5th, another 9" fell at Cuchara. The avalanche hazard rose to high in the Sangre de Cristo Mountains. All other mountain areas were only dusted by the storm, with only 0-2" falling, but Monarch recorded 10".

The storm ended on the 5th and sunny skies returned through the 7th as a high-pressure ridge moved over the mountains. Meanwhile, off the Oregon coast, a deep low-pressure system spun the first in a series of storms crashing into California. By the time these storms reached Colorado they had weakened drastically.

Between the 8th-19th, light snow fell daily in the mountains. Amounts were mostly 1-5". A strong storm hit the mountains on the 13th. On the morning of the 14th, 11-15" of wet snow had fallen in the Southern Mountains. Wolf Creek got 1.85" of water equivalent, and southwest winds gusted to 55 mph. At Red Mountain Pass winds gusted into the 60's. In the Central Mountains 4-11" fell, but Irwin Lodge, near Kebler Pass, got 16". The Northern Mountains reported 3-7".

In anticipation of the heavy snow a Special Avalanche Advisory was issued on the 13th for the Southern and Central Mountains. A slab of snow was being laid down over the fragile mid-pack layers that developed during December and January. The last ingredient for avalanches was now in place. That night a snowplow was caught on Red Mountain Pass, and small slides closed Red Mountain and Coal Bank passes. At 7:00 a.m. on the 14th, an Avalanche Warning was issued for the Southern Mountains: the third warning of the season. As new snowfall and avalanche data were reported from the Central Mountains, the warning area was expanded at 9:45 a.m. to include the area locally around Crested Butte, Gothic, and Kebler Pass.

Winds shifted to the northwest which favored the Northern and Central Mountains with 1-6" of fresh snow reported on the 15th. The not-favored Southern Mountains got 0-2". In the Northern and Central Mountains large numbers of avalanches resulted from the light precipitation: 43 slides were reported, including two avalanche incidents. A backcountry skier triggered a slide and was buried to his neck in the East Vail Chutes. Near Beaver Creek a backcountry skier was caught

Another strong storm targeted the San Juan's on southwesterly flow early on the morning of the 16th. At Wolf Creek heavy snow started to fall at 5:00 a.m., and by 7:00 a.m. 7" had fallen. By noon another 6" was reported. Elsewhere in the Southern Mountains moderate snow fell; at Purgatory 10" was reported at 3:00 p.m. In the Central Mountains light snow began to fall during the day, but with the southwesterly flow, areas north of I-70 went dry.

During the night, winds shifted to the northwest which favored the North and Central Mountains. On the morning of the 17th, 2-9" was reported, but Breckenridge got 13", and Vail, 17". Because of the locally heavy snow, the backcountry around Vail Pass, Vail, and Beaver Creek was added to the warning areas. In the Southern Mountains 5-10" was recorded--all fell the day before.

Another close call was reported. On the 17th two backcountry skiers traveling an old mining road near Red Mountain Pass were caught and partly buried. The two triggered the slide from the compression area.

Light snow continued to fall and on the morning of the 18th a T-5" was reported in the Northern and Central Mountains, but Vail got 9". The Southern Mountains were almost shut out: 0-2". During the avalanche warning period, an Avon man told friends he was going to check the area where the accident occurred on the 15th in the East Vail Chutes. He never returned, but was not reported missing until three days later. By then all clues were gone--covered by new snow. Hikers in the Stone Creek drainage, near the Beaver Creek ski area, discovered his body on July 10. He became the eighth confirmed fatality of the winter.

High pressure returned to Colorado on the 19th and 20th. The sunshine and mild temperatures ended the natural avalanche cycle, so the Avalanche Warning was terminated late on the 19th. From the time the warning was posted on the 14th, 414 slides were reported. Very few of these released to the ground. This was an ominous sign: the snowpack was resembling a house of cards as the slab continued to build on a weak base.

The mild weather was short-lived as three upper-level storms crossed Colorado in rapid succession on the 21st, 23rd, and 25th. Each storm brought small amounts of snow. On the 21st a T-5" fell in the Northern and Central Mountains, less in the Southern Mountains. On the 23rd 1-10" fell in the Northern and Central Mountains, and a T-7" in the Southern Mountains. By the morning of the 24th

in the Northern Mountains, 0-5" was reported, but Loveland got 8", and Eldora, 12". The third storm on the 25th was very weak and only a dusting of snow fell.

The avalanche danger remained high near and above treeline--especially in the Northern Mountains--and backcountry travelers continued to take risks. On the 23rd two backcountry skiers had close calls in separate slides. One skier near Shrine Pass was completely buried with only a hand sticking out. He was dug out by his friends. The other skier was in the East Vail Chutes (near the site of the accident on the 15th). This skier assumed the slope was safe as he had skied it the day before. A wrong assumption, but he was lucky, grabbed a tree and was able to hang on when the slope released.

Also on the 23rd, sinister snow conditions lurked in not-so-avalanche-prone Hot Sulfur Springs. A 10-year-old girl and her brother were sledding on a small hillside in town and triggered a slide. The avalanche ran only 50 feet, but it was far enough to bury the girl. Quick action by her brother saved her life. He found her foot sticking out from the snow and dug her out.

On the 25th, however, a backcountry skier in the Sneffels Range near Telluride was not so lucky: he became the first avalanche fatality of the winter. He triggered a large avalanche and was carried into thick timber. Companions found him in 10 minutes with a transceiver, but he was already dead.

Snowfall totals from the 9th-25th were not impressive, but three sites did well: Vail, 68"; Steamboat, 47"; and Telluride, 41". During this time the snowpack turned deadly as the prolonged light snows accumulated on the weak, kinetic snowpack.

February ended with bluebird skies as high pressure dominated from the 26th. Though the month was about over, the avalanche action was not. On the 28th another out-of-bounds lift skier was caught in the East Vail Chutes. This was the fourth avalanche incident in this area during February.

Despite favorable conditions for heavy snowfall most sites had below-normal snowfall for the month of February. Only Vail was above normal: 130%. Beaver Creek and Monarch both got 100%. The rest of the Northern Mountains got 60-95% of normal; the Central Mountains, 65-95%; and the Southern Mountains, 79-82%.

Lackluster snowfall did not mean a lack of avalanches. On the contrary, February snowfall, though below normal, was significantly above that for December and January. The combination of new snow on a fragile old snowpack were the major contributory factors in the great number of avalanches for the month--693! The stage was set; a major storm would be able to crumble the snowpack's weak foundation with ease.

March

The first two days of March were mild, but the peaceful start was shattered by the season's second avalanche fatality on the 1st. West of the Eldora ski area two snowshoers triggered a small avalanche above Lost Lake. As the two were carried down, friends across the lake watched in horror. One man was partly buried and quickly freed, but the second was totally buried. The group had no avalanche training nor equipment with which to search. The next day, under threatening skies, a probe line found the victim's body buried six feet.

The Southern Mountains got the first snows on the 3rd as a closed low moved east from southern California and into northern Arizona. By the morning of the 4th it had moved into southeastern Colorado and organized into a very strong cyclone. Snowfall was intense at some locations. That morning, sites in the North and Central Mountains reported 1-6", but Monarch got 16". In the Southern Mountains 1-10" fell. During the day another 3-8" fell in the Northern and Central Mountains, and 1-7" in the Southern Mountains.

This storm was reminiscent of one from early March 1990. In satellite photographs both storms resembled hurricanes as moisture wrapped around an "eye". The fourth Avalanche Warning of the season was issued for the Front Range, Sawatch Range, Elk Mountains, and the Sangre de Cristos. Later that afternoon the warning was expanded to include the areas locally around Telluride and Red Mountain Pass.

On the 5th the storm centered over western Kansas continued to pump moisture in a wide arc that took dead aim on the western San Juans. Telluride reported 26" that morning. The mountains were in the midst of an extreme hazard and a major avalanche cycle. Outside of Ouray the road to the Campbird Mine was inundated; in spots avalanche debris was 60 feet deep. And during this storm--like during hurricanes--came a report of both tragedy and a miracle.

Early on the morning of the 5th two Colorado Department of Transportation workers, outside of their rotary snowplow were hit and buried by a slide off the East Riverside path. Three other CDOT workers and a motorist were trapped inside the snowshed on Highway 550 by avalanche debris and fear of additional avalanches. It took eight hours for a crew from Silverton to reach these trapped people. Conditions were too dangerous to search for the buried workers, and fearing the worst the group reluctantly retreated back to Silverton.

Avalanches overwhelmed Red Mountain Pass in the early morning darkness on the 5th. About the same time as the accident mentioned above, another plow driver was hit by a small slide at the Mother Cline avalanche. A short time later the Mother Cline ran again, this time a pickup truck was hit.. The three occupants from the pickup--not fearing what they could not see--trudged four miles to Ouray through deep snow and fresh avalanche debris.

That night as rescuers plotted a strategy, a radio call came from the snowshed. It was one of the missing men from the buried plow. After 18 hours under 10-12' of snow he had dug himself free. He was all right, but his partner did not survive. Once again rescuers from Silverton returned to the snowshed to get the survivor and to retrieve the body, bringing this tragedy and miracle to an end. Meanwhile, Telluride ski area endured its largest avalanche cycle in its 20-year existence. Several huge slides demolished many acres of mature trees, and some ski slopes avalanched for the first time in 20 or more years.

On the 6th, another 1-6" fell in all mountain areas, then after a brief reprieve from winter another storm from southern California moved into the Southern Mountains on the 8th: 4-8" fell. The Central mountains got a T-4" and the Northern Mountains, 0-2". The flow shifted to the northwest on the 9th and favored the North and Central Mountains. Though only 4" and 5" fell at Copper Mountain and Breckenridge the rest of the Northern Mountains were blessed with 9-12". The Central Mountains got 5-12", but Irwin Lodge got 17". In the Southern Mountains only 2-5" was reported. Snow showers lingered through the 11th before a ridge of high pressure was firmly entrenched over the region, ending a long and active avalanche cycle.

In an eight day period between the 4th-11th, 534 avalanches were reported to the Center. Numerous slides ran full track for the first time in 20-30 years. Highways over Red Mountain, Molas, and Loveland passes were struck by slides, as well as Colorado 65 over Grand Mesa and the road to Ophir. In addition to the accidents on Red Mountain Pass, mentioned above, other accidents occurred. On the 6th at Snowmass, lift skiers triggered two post-control releases. On Jones Pass, near Berthoud Pass, two neophyte backcountry skiers were caught. One was buried but his friend heard moans from under the snow and quickly dug out the buried skier. On the 10th, outside of Aspen, a paraglider escaped an avalanche by soaring above it. This flier did much better than another would-be Icarus who triggered an avalanche and crashed his hang glider while trying to take off near Loveland Pass in February, 1976.

Winter's icy grip almost melted between the 12th-17th. A ridge of high pressure kept the storms away from the state. Conditions stayed dry and sunny, temperatures climbed into the 30's and 40's, and winds were light to moderate. Despite the mild conditions the hazard eased only to moderate. Backcountry skiers continued to find themselves in trouble. The most serious incident involved a lone skier on the 17th near Breckenridge who triggered a slide. He grabbed a tree, but was still buried one foot deep. After 30 minutes he struggled free.

The storm track moved back over the mountains from the 18th-25th. Winter returned and shrewdly dealt yet another hand, this on a series of upper-level short waves that brought light snow daily. New snow amounts were typically a T-6", but two stronger short waves on the 20th and 22nd

delivered 8-12" at some sites. On avalanche paths that did not release in the slide cycle earlier in the month, the slab continued to thicken on top of the mid-pack layer of collapsible kinetic snow. The hazard on the wind-loaded high-elevation slopes climbed to high.

In most winters by mid-March a strong bridge of firm snow shrouds the weak layers underneath. Once the bridge has formed, avalanches run only on top of the bridge. But this season the weakness was higher in the pack and the bridge was weak. Observers in the North and Central Mountains continued to report a snowpack collapsing under body weight. On the 23rd control work near Independence Pass produced eight very large avalanches. The snowpack was deeply unstable and dangerous. All that was needed was additional snow for big natural avalanches.

But before the next storm a ridge of high pressure brought the first spring-like day in a week on the 26th. Some backcountry travelers exchanged skis for mountain bikes and took to the low elevations. Near Keystone Ranch two adventurous bikers headed across a steep road cut and triggered a small slide. Both bikers escaped, but one bike was completely buried. It was found later with a metal detector.

The next storm, tracking in from California, moved into the mountains on the 27th. Observers in the Northern Mountains reported 1-4"; the Central and Southern Mountains, 0-1". By late afternoon snow was reported in all mountain areas. On the 28th observers in the Northern Mountains reported 6-9", though Steamboat got only a trace, while Loveland got 12", and Vail, 14". In the Central Mountains 5-14" fell and the Southern Mountains got 6-9". Skiers were thrilled, but avalanche workers were worried; the fifth Avalanche Warning of the season was issued for the Elk and West Elk Mountains, Ten Mile Range, and the Loveland and Berthoud Pass areas.

That morning in Ten Mile Canyon several big slides stopped in the creek, just short of I-70. By afternoon the hazard was raised to extreme on the west side of the Ten Mile Range and in the Elk Mountains as large avalanches ran full track. At Irwin Lodge a ski guide was caught and partly buried.

Skies cleared on the 29th as a weak ridge of high pressure moved over the mountains. New snow amounts--most of which fell the day before--were 3-9" in the Northern Mountains, but A-Basin got 12". Less snow was reported in the Central and Southern Mountains: only 0-4". Red Mountain Pass was briefly closed by a small slide. Despite improving weather the avalanche danger remained high to extreme, and a slide in Summit County claimed the season's fifth victim. A snowcat skier, a Japanese tourist, was buried and killed above Montezuma, only a few miles south of A-Basin. At some point during the day the man removed his transceiver and left it behind. A probe line, checking between rescue dog alerts, found his body buried 10 feet.

A weak system nipped the Southern Mountains on the 30th; 1-5" was reported. The Central and Northern Mountains remained sunny. The sun caused additional slides as the new snow warmed and

accelerated the creep rates. The bike path through Ten Mile Canyon was inundated again by slides that left debris up to 25 feet deep.

March ended with an interesting and complex weather pattern over the mountains. A closed low off southern California was spinning moisture up into the Southern Mountains. This produced moderate to heavy snow during the day on the 31st. At the same time along the Front Range a weak upslope was caused by a closed low over eastern Canada. This feature caused strong downslope winds at Steamboat, causing havoc at the Colorado professional ski patrol convention.

The snowpack crumbled in March. Near-normal to above-normal snowfall on a weak base meant an astonishing 958 avalanches reported. Many slides ran full track for the first time in 20-30 years. Snowfall-wise, only Wolf Creek was far below normal: 75%. Elsewhere in the Southern Mountains amounts ranged from 120-130% of normal; in the Central Mountains, 92-140%; and in the Northern Mountains, 92-127% of normal snowfall.

April

Ample fresh snow with strong wind in late March had lasting effects on the beginning of April. The storm had since passed but frailties enduring from early winter still beset the snowpack. On the 1st, a group of skiers on a spring tour near Berthoud Pass found themselves faced with tragedy. Three people were caught in a slide as they descended a steep slope. As the snow came to rest, two were only partly buried but one was trapped under four feet of snow. After a burial time of 10 minutes, the victim failed to respond despite rescue efforts to revive him. On the same day near Vail, an out-of-bounds skier was engulfed in an avalanche he triggered. He had better luck, was only partly buried and escaped unharmed.

The 2nd-6th brought spring conditions with warm temperatures, light winds, and afternoon cumulus buildup with convective snow showers. Eventually lightning, as well as avalanches, became a threat to mountain recreationists. At Vail on the 5th, three skiers were struck by lightning after they unloaded from a chairlift at the top of the mountain. While two were only slightly injured, one, a 38-year-old man, died after four days in the hospital.

By the end of the first week the jet stream was north of Colorado. A warm zonal flow fueled the mountains with rising temperatures. This triggered numerous wet snow avalanches. High elevation northerly aspects were still cold with dry snow, but slopes exposed to the sun were prone to wet releases in the afternoon. The Southern Mountains began to experience a wet-slab avalanche cycle on the 6th. Within a few days temperature highs at many sites were in the upper 40's and 50's and the wet cycle became more widespread. North aspects were no longer immune, especially in the San Juan's, and wet snow slid off the steeper slopes at lower elevations in all regions.

Overnight low temperatures near and below timberline barely dipped below the freezing mark, and then only for short duration. The absence of a "hard freeze" provided little time during daylight hours for a "safe" skiing experience. Some steep, snow covered slopes well below treeline remained a constant threat.

As a result, several avalanches reached mountain highways (see Table 5) in early April. One slide on the west side of Vail Pass on the 11th caused extensive damage to a car, injured the driver, and effectively disrupted interstate travel for several hours. Much of the backcountry snowpack was not firm enough to support a skier or snowshoer unless they stayed on a packed trail.

Months earlier, prolonged dry periods laid the ground work for these weak snow conditions; mid- and late-winter weather patterns could not overcome them. Generally, firm snow could only be found above timberline where the wind had produced hard slabs. Even there the relentless sun, now at a high angle, was beginning to erode the snow's strength. Only periodic cloud cover and snow showers inhibited the significant daytime heating. A high avalanche hazard from mid-morning through the evening was common during April.

Almost all avalanches after the 5th involved wet snow. The dry-snow events were direct-action avalanches associated with fresh snowfall and windloading. Two significant snowfall and wind periods were on the 16th-17th; and the 20th-24th. In particular, the 23rd was quite windy near the central and northern Continental Divide. Peak gusts were 69 mph at Arapahoe Basin, 73 mph at Copper Mountain, and 107 mph at Loveland Basin. Natural avalanches triggered from cornice-fall were common. Many of the soft slabs eroded down to the lower wet-snow layers, piling up a mixture of both wet and dry debris in the runout zone.

Snowfall totals this month were below normal for all sites still reporting data. The following are figures for the few areas for which we have long-term records through April: Arapahoe Basin, about 90% of normal; Copper Mountain, 78%; Berthoud Pass, 63%; Gothic, 60%; and Winter Park (town), 47% of normal.

The avalanche total for the month of April was 253 (111 more than in April '91). No formal warnings were issued. Five people were caught in four slides, with 1 injured, 3 partly buried, and 1 buried and killed. One car pulling a trailer was heavily damaged when hit by an avalanche on Vail Pass on the 11th.

The Avalanche Center issued its last scheduled public forecast on April 26th, but continued to forecast and gather data on a part-time basis through May 2nd for sponsors still in operation.

June

On the 13th a party of six climbers triggered an avalnache on 14,156-foot South Maroon Peak, about 15 miles southwest of Aspen. Two climbers died from injuries sustained in a 2,000-foot fall down the avalanche path; two others suffered serious but non-fatal injuries.

Daily Weather, Snowpack, and Avalanche Data

The Avalanche Center relies on incoming data to make accurate assessments of current avalanche stability, and to make mountain weather and avalanche hazard forecasts. There are two main sources of these data--the Colorado observer network and the National Weather Service.

Colorado observer network: The Center has established a network of about 32 manned observation sites in the Colorado mountains. Twenty of the sites are developed ski areas, from which snow safety personnel report current weather, snowpack, and avalanche data. The remaining sites are highway, heli-ski, and backcountry sites, from which volunteers or contract observers report to the Center.

A toll-free WATS line, linked to a Code-a-phone, is available for observers' convenience. This gives quasi-24-hour reporting capabilities. Observers make mandatory morning calls, plus timely updates during changeable conditions. All data are logged by the forecaster at the Center.

The Center can access via computer modem automated weather stations at Vail and Aspen. This gives forecasters real-time data any time during the day or night. This capability will be expanded to include other sites in the future.

National Weather Service: Avalanche Center personnel have access to all the products and expertise of the NWS staff. Computerized weather maps from the new DARE-II work stations, satellite photos, radar data, radiosonde data, information from manned and remote weather stations, and written analyses and forecasts are available. Additionally, discussions with NWS forecasters in interpreting data and products are an immense help.

Westwide Data Network

The Colorado Avalanche Information Center is responsible for the administration of the U.S. Forest Service Westwide Data Network. A portion of funding received from the Forest Service is earmarked for managing this computer data base. In this capacity, the Center serves as a repository for mountain weather, avalanche events, and avalanche accident data for avalanche-prone areas of the United States. The weather and avalanche data from some 60 sites in the mountain West are computerized and stored on magnetic tape and will soon be entered into a PC data base. Information on avalanche accidents in the United States is stored in a data base at the Center.

These data are used by Center personnel on a real-time basis and also for later analysis. Trends in avalanche accidents, relationships between survival and burial times and depths, and types of rescues are essential information to be passed on to snow scientists and the public. Lectures, field seminars, media contacts, and publications by Center personnel are some of the methods for disseminating this information. Additionally, the Center responds to 10-20 requests a year for raw or tabulated data. These requests come from the ski industry, Forest Service offices, universities, snow researchers, and lawyers.

The Center also compiles Avalanche Notes, a monthly newsletter which contains summaries of the computerized weather and avalanche data, as well as avalanche accident information. The newsletter is distributed monthly from November-April to 300 contributors and other interested people and agencies.

Accident Investigation

Avalanche Center personnel try to investigate all significant avalanche incidents and fatal accidents. This winter the Center staff was able to visit four of the seven fatal accident sites during or shortly after the rescue operation. Information obtained from field data, witnesses, survivors, and rescuers is used for current stability evaluation and for future educational purposes.

DISSEMINATION of HAZARD FORECASTS

The Colorado Avalanche Information Center provides vital information to the public, specialized audiences, and sponsors. The following are means by which the Center disperses information pertaining to mountain weather, avalanche, and snowpack conditions. The numbers attest to continued growth of loyal user support.

Public Hotlines

Incoming data from 30 field-observation sites are continually assimilated to prepare forecasts for seven recorded message systems located in Colorado. People can call for three types of information: an up-to-date mountain weather forecast, a current snow condition report, and an avalanche hazard evaluation. The public made good use of this service as some 66,414 calls were placed to the hotlines this season. With another rise in the overall call count, phone usage increasee 19% above last year. Figure 2 puts this growth into perspective. Read on for specifics for each of the hotlines;

Denver: Telephone messages are recorded twice daily on the U.S. Forest Service telephone in Lakewood. A total of 33,255 calls from the Denver and Boulder areas were made to the phone (236-9435) this winter. This represents a strong increase of more than 27% over last winter.

Fort Collins: This message phone, sponsored by The Mountain Shop, was back in full operation last November. The recording system, which is owned by the Avalanche Center, is housed and administered by the Larimer County Sheriff's Office. There were 3,585 calls made to the 482-0457 number this winter. Following a slight drop last year, calls rebounded this season by 29%.

Colorado Springs: This system is sponsored by the Mountain Chalet, a local mountaineering shop where the phone is housed. There were 3,813 calls counted for the 520-0020 number this winter, a decrease numerically of 41%. We believe this was due to two reasons. First, for a portion of the winter, one of the incoming phone lines was used for other business purposes. Second, only one of the two call-counters was logged (monthly) for much of the season, indicating more use of the phone than actually shown. As with the Denver and Fort Collins telephones, updates were made on a twice daily schedule, seven days a week.

Summit County: This area has always shown remarkable support for the Center's services. Summit County is comprised of much avalanche terrain, and precise information is vital. Over the course of the winter 11,935 calls were made to the 668-0600 phone number. This represented another seasonal increase, this time over 19%. The 24 hour message phone is housed and sponsored by the county through the Summit County Rescue Group.

Eagle County: The public message phone here is housed and maintained by the U.S. Forest Service in Minturn. The phone (827-5687) saw 1,338 calls. In addition to this hotline, the Vail and Beaver Creek Ski Patrols use daily information from the Avalanche Center to update their own recorded message phone. This is a service available to skiers leaving the ski area boundary; the phones are provided at gates of departure.

Pitkin County: The Forest Service in Aspen maintains a public message phone for local residents and tourists. Forest personnel get daily information from the Center and, after combining it with other local data, transfer an appropriate message to their recording. Some 3,137 calls were made to this phone during the winter.

Durango: This hotline, in place for the fifth season, provides mountain weather and avalanche information for residents of southwest Colorado. Call counts have continued to rise steadily since its installation. The 9,382 calls people made to get our message represents an increase of 21% over last winter. Seven years of increased hotline use are illustrated in Figure 2 below.

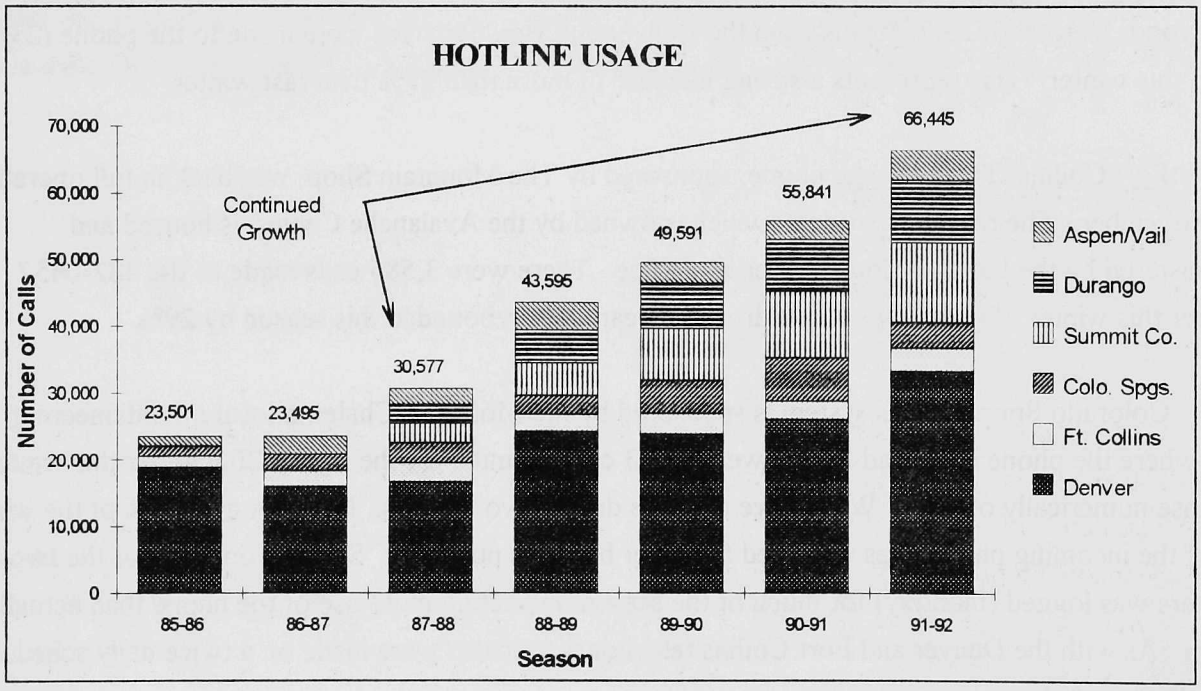


Figure 2.

Radio Broadcasts

The Avalanche Center continues to enjoy a large listening audience through dedicated radio stations in mountain communities. This is especially beneficial to regions where a long distance

telephone call to one of the hotlines would be inconvenient and costly. While some stations broadcast our message daily, others have been most helpful by transmitting Avalanche Warnings or Special Avalanche Advisories when necessary. Listed here are some of the stations conveying our bulletins.

Public radio station KVNF-FM in Paonia has been calling the Center on a daily basis for seven winters to record and broadcast our messages. This is possible through a memorial fund established for an avalanche victim killed near Ridgway in 1984. The station serves the towns of Paonia, Montrose, Delta, Ouray, Ridgway, and other rural communities in southwestern Colorado.

Radio station KOTO in Telluride continued to broadcast our messages to residents in that region throughout the winter. This was done by recording the daily message from the Durango hotline. The Telluride area has proven to be a high risk for avalanche accidents in the past. KOTO provides backcountry enthusiasts, residents and tourists alike, with valued weather forecasts and avalanche hazard evaluations.

In Summit County, KYSL-FM in Frisco provided surrounding communities with vital updates from the Avalanche Center. People were able to keep abreast of current conditions, plus learn about timely avalanche seminars--all in an area that is no stranger to dangerous avalanche situations. In addition, this winter the station provided time for a two-hour live program with Nick Logan to discuss the Center and avalanche safety.

NOAA Colorado Weatherwire

During times when the avalanche hazard is rated high or extreme, CAIC forecasters issue Avalanche Warning bulletins twice daily until the hazard subsides. At that time an Avalanche Warning Termination bulletin is dispensed. Special Avalanche Advisories are sent out as well during transition periods when the avalanche danger is increasing. These bulletins are transmitted to the news media via the National Oceanic and Atmospheric Administration (NOAA) Weatherwire. Sample warning and advisory bulletins are shown in Appendix A. Tables 3 & 4 also contain related information.

News Media

Throughout the winter, avalanche-related incidents draw the public's, and therefore the media's, attention. These usually involve people, property, highways, or anomalous mountain weather conditions. When these occur, CAIC forecasters are obligated to respond to, and sometimes initiate, contacts with television, radio, newspaper, and magazine reporters. This is done to provide as accurate information as possible for broad news coverage and high visibility. There were 202 such contacts in 1991-92.

Media personnel frequently called for information on current avalanche warnings, avalanche accidents, and current avalanche and mountain weather conditions. The Center provided input for

public interest stories and magazine articles. In addition, many live and taped interviews were conducted for radio and television broadcasts.

Eighteen inquiries came from outside Colorado including calls from the "Associated Press", "Nickelodeon" (TV), "Disney Adventures" magazine, "Outside" magazine in Chicago, the "Boston Herald" in Boston, and KOBS-TV in Farmington, New Mexico, and the "Salt Lake Tribune". "USA Today" in Washington D.C. was also a frequent caller. There was also one international call which came from Japan. This was related to a fatal avalanche near Montezuma on March 29th which claimed the life of a Japanese citizen.

Colorado TravelBank

For the third winter, the Avalanche Center utilized another means to get our messages to the public. Through the "Colorado TravelBank" we can make our reports available to users directly through their own personal computers. Located in Denver, this computer network system is accessed from anywhere in the United States.

The service provides information in 11 different categories on more than 90 topics. This was the third winter they offered mountain weather and backcountry avalanche forecasts dispensed by the Avalanche Center on a daily basis. Our written forecast transfers, via modem, directly into the TravelBank system. It is then available any time to users wanting to call the product up on their home monitor.

In addition to individual users, the service is utilized by travel agents, travel and recreation organizations and other agencies. Our forecasts were also available on 500 cable television systems throughout the country.

Response to this special service remains exceptional. There were 26,951 contacts documented between December and April, up 6% over last year. We are looking forward to using the TravelBank again next season to maintain such a high profile among computer/backcountry enthusiasts.

PUBLIC EDUCATION

A prime responsibility of the Avalanche Center is to provide education about the avalanche phenomenon. If people understand the basic concepts of snow and avalanche safety, and apply this knowledge in the field, accidents can be kept to a minimum. With this in mind, the staff is eager to participate in seminars and field courses throughout the state. Our education objective is achieved through the following means:

Avalanche Awareness Talks and Field Seminars

This season, avalanche education began as early as October 11th. By the time the last talk was given on May 14th, the Center staff had spoken on 51 different occasions to a total of 2,553 persons. Participants attended 1-hour seminars to multi-day field exercises. This is a substantial number, and attendance was up 15% over last season. Comparisons for nine winters are displayed in Figure 3 below.

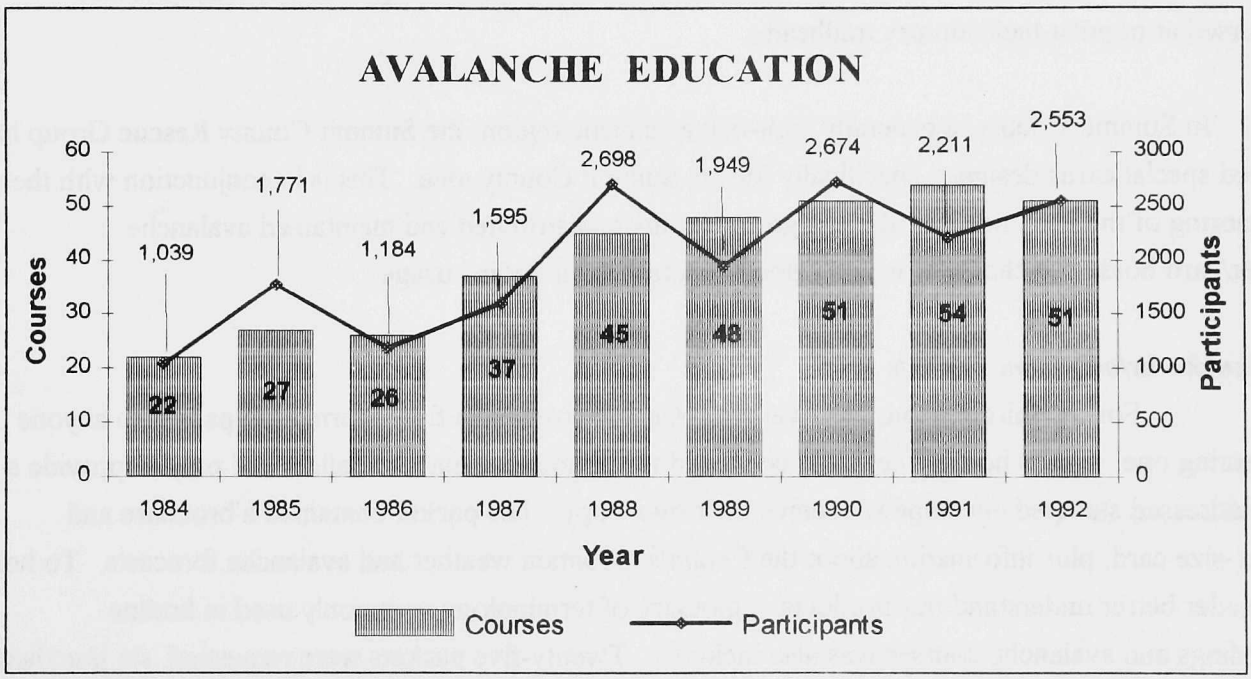


Figure 3.

To sharpen their skills, course participants had the opportunity to learn about such topics as mountain meteorology, avalanche terrain recognition, the Colorado snowpack, methods of safe winter travel, and survival and rescue techniques. The students' backgrounds ranged from professional ski patrollers, search & rescue volunteers, Colorado Mountain Club members, ski and snowmobile clubs,

USFS, Colorado Department of Transportation, and the general public. Table 8 shows more details about the courses. Betsy Armstrong, formerly a full-time Avalanche Center staff member, remains an associate of the CAIC and continues to educate the public about avalanches. Her classes are also listed in Table 8.

In order to monitor our efforts in providing avalanche awareness, Center personnel logged the time spent in course preparation, driving time, and presentation length. The outcome for 1991-92 was: preparation - 84 hours; driving time - 126 hours; and 302 hours spent teaching the various courses. Preparation and travel time decreased by 17% and 13% respectively, while actual teaching time increased by 19%.

Avalanche Cards and Brochures

The Colorado Avalanche Information Center maintains a supply of printed material in the form of wallet-size avalanche cards, and brochures with simplified text and illustrations explaining the "what's," "where's," and "why's" about avalanches. They are distributed at all lectures and seminars, and are included in return letters of correspondence with the public. The handouts contain all of the public hotline phone numbers and definitions of the four avalanche hazard ratings. This literature is also disbursed at popular backcountry trailheads.

In Summit County, a generally high-risk avalanche region, the Summit County Rescue Group has printed special cards designed specifically for the Summit County area. This is in conjunction with their sponsoring of the local hotline. Rescue group members distributed and maintained avalanche poster/card holders in the area, which helped generate local hotline usage.

Avalanche Information Packets

For the third season, the Avalanche Center provided a free information packet to anyone requesting one. Public hotline messages conveyed the announcement that callers had only to provide a self-addressed stamped envelope to receive their own copy. The packet contained a brochure and wallet-size card, plus information about the Center's mountain weather and avalanche forecasts. To help the reader better understand our products, a glossary of terminology commonly used in hotline recordings and avalanche courses was also included. Twenty-five packets were requested, six less than last year.

Publications

The Center worked on three publishing projects this year. First, we worked with the Colorado Mountain Club Foundation, U.S. Forest Service, and Recreation Equipment Inc. (REI) to adapt the well-known Forest Service brochure Snow Avalanche for use in Colorado. The brochure was slightly rewritten to apply to Colorado conditions and distributed free to the public by REI, CMC, Forest Service, and the Avalanche Center.

Second, we published in October an in-house document entitled Avalanche Climatography of the Colorado Mountains. This 41-page report combines data on geography, climatology, and avalanches for all the major mountain ranges of Colorado. It is being used as a reference document by the staff of the Center. Jeff Lukas, a senior geography student at the University of Colorado, did the bulk of the work on this project, and we are very happy with the final product.

Third, Dale Atkins worked all year polishing a paper entitled White Death, which is a comprehensive study of fatal avalanche accidents in Colorado from 1950-92. The manuscript has been completed, and the paper should be available in the fall of 1992 as a Colorado Geological Survey publication.

Table 8. Scheduled contacts with organized groups by Avalanche Center personnel, 1991-92

Date	Personnel	Group	Participants
10/11	N. Logan	Colo. Dept. of Transportation, Silverthorne	36
11/15	N. Logan	Summit Co. awareness, Breckenridge	179
11/7-11	KW, NL, DA	National Avalanche School, Denver	154
11/5, 11/12	D. Atkins	Alpine Rescue Team, Evergreen	12
11/19	D. Atkins	The North Face, Denver	17
11/20	D. Atkins	Alpine Rescue Team, Evergreen	33
11/23	D. Atkins	Coors, Golden	54
12/4	N. Logan	Eastern Mountain Sports, Boulder	100
12/5	D. Atkins, S. Toepfer	Eastern Mountain Sports, Lakewood	12
12/7-8	NL, DA, ST	CSRB seminar, Breckenridge/Webster Pass	51
12/10	K. Williams	Mountain Shop, Ft. Collins	30
12/11	N. Logan	Breckenridge Elementary School, Breckenridge	27
12/11	D. Atkins	Boy Scouts, Troop 667, Arvada	107
12/12-14	KW, NL	Colorado Mountain Club, Denver/Jones Pass	27
12/19	N. Logan	Cherry Creek High School, Denver	30
1/7	D. Atkins	National Ski Patrol, Lakewood	22
1/8-9	K. Williams	Recreation Equipment, Inc., Denver	35
1/8	N. Logan	USFS/WP-MJ public awareness, Winter Park	85
1/11	N. Logan	Summit Co. awareness, Frisco	123
1/11	D. Atkins	American Avalanche Institute, Berthoud Pass	22
1/14	N. Logan	American Avalanche Institute, Berthoud Pass	12
1/14	K. Williams	Paragon Guides/Copper Mtn., Copper Mtn.	40
1/14	D. Atkins	Denver Bicycle Touring Club, Denver	72
1/15	D. Atkins	Neptune Mountaineering, Boulder	81
1/15	B. Armstrong	Mountain Sports, Boulder	90
1/15-17	K. Williams	Paragon Guides, Janet's Cabin	16
1/16	S. Toepfer	Loveland National Ski Patrol, Denver	55
1/17	N. Logan	Colorado Heli-ski guides, Dillon	12
1/17-18	D. Atkins	Silverton Avalanche School, Silverton	120
1/19	D. Atkins	Telluride Avalanche School, Telluride	37

Continued on next page...

Table 8. Continued...

Date	Personnel	Group	Participants
1/20, 22, 25	NL, DA	Colorado Mountain Club, Denver/Jones Pass	29
1/21-23	K. Williams	National Avalanche School Phase II, Telluride	20
1/26 & 2/1-2	NL, DA	AAI / Colorado College, Colo. Spgs./ Hoosier Pass	18
1/30	N. Logan	Ski Haus, Steamboat	90
1/31, 2/1	K. Williams	Aspen Mountain Rescue, Aspen	90
2/5	D. Atkins	Mile High Snowmobile Club, Lakewood	74
2/4	N. Logan	Summit High School, Frisco	36
2/5-6	K. Williams	Recreation Equipment, Inc., Denver	32
2/7-8	NL, ST	Vail Ski Patrol (& public)	50
2/20	K. Williams	Sierra Club, Ft. Collins	30
2/23	N. Logan	Mountain Cyclery, Breckenridge	52
2/24	N. Logan	Minturn Middle School, Vail Pass	15
2/25, 27, 29	KW, NL, ST	Colorado Mountain Club, Denver/Jones Pass	44
3/10	K. Williams	Colorado State University, Ft. Collins	16
3/3-4	N. Logan	Summit Co. Pro. Course, Keystone/Copper Mtn.	24
3/11	N. Logan	Minturn Middle School, Minturn	90
4/9	S. Toepfer	Metro State College, Denver	35
4/25	D. Atkins	SARDOC, Snowmass	10
4/28	D. Atkins	Evergreen Jr. High School, Evergreen	52
5/9	D. Atkins	Hard Snow Workshop, Rocky Mtn. Nat'l. Park	29
5/14	D. Atkins	Colorado Natural Hazard Workshop, Colo. Spgs.	26
		Total	***2,553***

HAZARD GRADING

Avalanche hazard ratings are described by the terms "low," "moderate," "high," or "extreme" to depict the hazard in a given area. The forecaster can choose only one of the four terms used to describe the hazard. If he feels a more complex evaluation is warranted for a given area, he breaks down the description of the hazard this by using specifics such as elevation, aspect, and steepness.

For the eighth year, the Avalanche Center has used a grading system for evaluating its performance of avalanche forecasting. This forecast, based on incoming weather and current snowpack conditions, focuses on the avalanche potential. To arrive at a prediction, the forecaster on duty makes an evaluation for the next 24-hour period. This is done for each of the Northern, Central, and Southern Mountain regions. The forecast is logged every afternoon in the "Daily Hazard Information and Decision Chart" by using one of the four hazard categories. On the following day, the actual hazard rating--based in part on the field observers' estimates--is compared to the previous day's forecast. A grade of "correct forecast," "under forecast," or "over forecast" is then recorded.

The scores for this season and previous years are shown below:

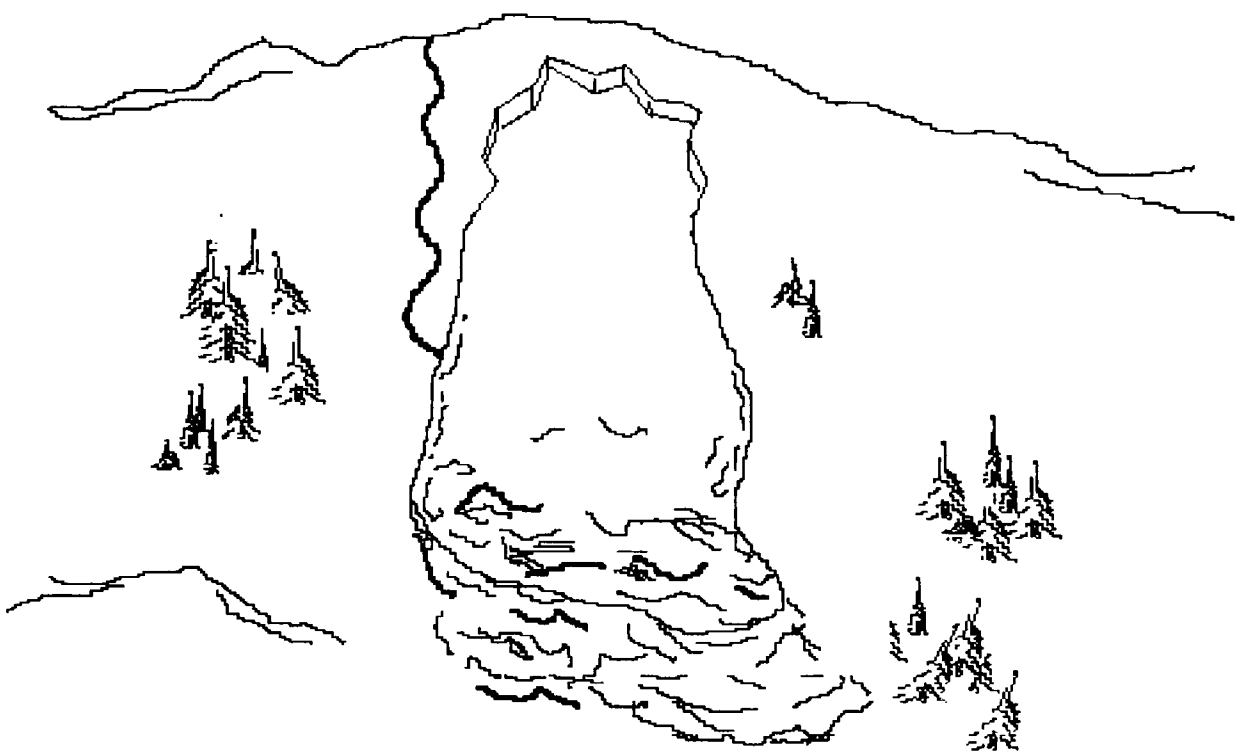
	1991-92	1990-91	1989-90	1988-89	1987-88	1986-87
Correct forecast:	96%	91%	91%	90%	86%	95%
Over forecast:	2%	4%	6%	5%	8%	2%
Under forecast:	2%	5%	3%	5%	6%	3%

Our "correct forecast" maintains an exceedingly high level, 96%. This is quite satisfying because it remains well above 80% in a field that is as much art as science. The "under forecast" percentage matches the equally-low incidents of "over forecast".

Sample Avalanche Warnings & Advisories

This appendix contains examples of products that Avalanche Center forecasters issue to the media via the NOAA Colorado Weatherwire. These include a Special Avalanche Advisory and some selected bulletins from avalanche warning periods this winter. A Special Advisory is issued when the avalanche danger may increase significantly in the next 12 hours--perhaps to reach the warning stage. An Avalanche Warning spans a period of time when the forecaster feels avalanches are certain to occur in a particular area(s).

The following examples show some of the progression during particular warning periods. Local weather and snowpack conditions influence warning boundaries and hazard ratings. These can change during the course of a warning period. On **page 42** you will find a Special Avalanche Advisory issued in January. **Pages 43-46** show you some events from a warning period in February. **Pages 47-50** take you through a warning period in early March, the longest-running of the winter. It was the first of two issued in March and it enveloped eight days in the southwest mountains. March ended with an avalanche warning, our last for the season. Samples from it are found on **pages 51-53.** Read on to see the general content and format used in the Avalanche Center's announcements.



SPECIAL AVALANCHE ADVISORY
COLORADO AVALANCHE INFORMATION CENTER
NATIONAL WEATHER SERVICE DENVER CO
4:15 PM MST MONDAY JANUARY 6, 1992

...SPECIAL AVALANCHE ADVISORY FOR ALL MOUNTAIN AREAS...

A SPECIAL AVALANCHE ADVISORY IS BEING ISSUED FOR ALL MOUNTAIN AREAS FOR TONIGHT AND TUESDAY. THIS IS THE RESULT OF A VIGOROUS STORM WITH POSSIBLY HEAVY SNOW AND MODERATE WINDS THAT IS MOVING INTO THE SOUTHERN MOUNTAINS THIS AFTERNOON. SNOW AND WIND WILL SPREAD TO THE CENTRAL AND NORTHERN MOUNTAINS TONIGHT AND TUESDAY.

THE BACKCOUNTRY AVALANCHE HAZARD IN THE SOUTHERN AND CENTRAL MOUNTAINS IS RATED MODERATE WITH HIGH HAZARD ON NORTH-EAST-SOUTHEAST FACING SLOPES. BOTH NATURAL AND HUMAN TRIGGERED RELEASES ARE LIKELY ON THESE SLOPES. BACKCOUNTRY TRAVEL SHOULD BE LIMITED TO SLOPES LESS THAN 30 DEGREES IN STEEPNESS.

IN THE NORTHERN MOUNTAINS THE HAZARD IS RATED MODERATE ABOVE 10,500 FEET AND ON NORTH-EAST-SOUTHEAST SLOPES BELOW 10,500 FEET. NATURAL AND HUMAN TRIGGERED AVALANCHES ARE POSSIBLE.

BACKCOUNTRY TRAVELERS SHOULD BE PREPARED FOR DIFFICULT TRAVEL CONDITIONS AND POOR VISIBILITY.

THIS MESSAGE IS OF PARTICULAR INTEREST TO PERSONS USING THE BACKCOUNTRY OUTSIDE OF DEVELOPED SKI AREA BOUNDARIES. WHERE NECESSARY SKI AREAS USE AVALANCHE CONTROL METHODS WITHIN THEIR BOUNDARIES.

FOR ADDITIONAL AVALANCHE INFORMATION CALL ... 236-9435 IN DENVER AND BOULDER ... 482-0457 IN FT. COLLINS ... 520-0020 IN COLORADO SPRINGS ...668-0600 IN SUMMIT COUNTY ... AND 247-8187 IN DURANGO.

ATKINS
COLORADO AVALANCHE INFORMATION CENTER
9192

AVALANCHE WARNING ... BULLETIN NO. 1
COLORADO AVALANCHE INFORMATION CENTER
NATIONAL WEATHER SERVICE DENVER, CO
7:00 AM MST FRIDAY FEBRUARY 14, 1992

... SOUTHERN COLORADO MOUNTAINS ...

AN AVALANCHE WARNING IS IN EFFECT IMMEDIATELY FOR ALL BACKCOUNTRY AREAS OF THE SOUTHERN COLORADO MOUNTAINS. THE AVALANCHE HAZARD IS EXTREME BOTH ABOVE AND BELOW TREELINE. FRESH SNOW AND STRONG WINDS IN THE LAST 12 HOURS HAVE CAUSED AVALANCHES ALONG US HWY. 550 SOUTH OF RED MOUNTAIN PASS THIS MORNING.

THIS WARNING IS VALID THROUGH SATURDAY FEBRUARY 15.

BOTH NATURAL AND HUMAN TRIGGERED RELEASES ARE LIKELY ON SLOPES 30 DEGREES AND STEEPER. BACKCOUNTRY TRAVEL SHOULD BE LIMITED TO AREAS AWAY FROM AVALANCHE PATHS AND AVALANCHE RUNOUT ZONES FOR THE NEXT 24 HOURS.

US HWY. 550 IS SOUTH OF RED MOUNTAIN PASS IS OPEN ONLY TO EMERGENCY TRAVEL AT THIS TIME DUE TO AVALANCHES THAT HAVE CROSSED ONTO THE HIGHWAY.

THE AVALANCHE HAZARD IS CURRENTLY RATED HIGH BOTH ABOVE AND BELOW TIMBERLINE IN THE NORTHERN AND CENTRAL MOUNTAINS.

BACKCOUNTRY TRAVELERS IN THE CENTRAL AND SOUTHERN MOUNTAINS ARE ADVISED TO STAY CLEAR OF ANY OPEN SLOPE OR GULLY STEEPER THAN 30 DEGREES. USE GOOD ROUTE SELECTION TO AVOID STEP SLOPES ABOVE YOU. KEEP ABREAST OF CHANGING CONDITIONS BY CALLING ONE OF THE NUMBERS LISTED BELOW.

THIS MESSAGE IS OF PARTICULAR INTEREST TO PERSONS USING THE BACKCOUNTRY OUTSIDE OF DEVELOPED SKI AREA BOUNDARIES. WHERE NECESSARY SKI AREAS USE AVALANCHE CONTROL METHODS WITHIN THEIR BOUNDARIES.

FOR ADDITIONAL AVALANCHE INFORMATION CALL ... 236-9435 IN DENVER AND BOULDER ... 482-0457 IN FT. COLLINS ... 520-0020 IN COLORADO SPRINGS ...668-0600 IN SUMMIT COUNTY ... AND 247-8187 IN DURANGO.

TOEPFER
COLORADO AVALANCHE INFORMATION CENTER
9192 3-1

AVALANCHE WARNING ... BULLETIN NO. 4
COLORADO AVALANCHE INFORMATION CENTER
NATIONAL WEATHER SERVICE DENVER, CO
12:00 PM MST SUNDAY FEBRUARY 16, 1992

... AVALANCHE WARNING CONTINUES FOR SOUTHERN COLORADO MOUNTAINS AND LOCALLY IN THE ELK AND WEST ELK MOUNTAINS AROUND CRESTED BUTTE

AN AVALANCHE WARNING REMAINS IN EFFECT FOR ALL BACKCOUNTRY AREAS IN THE SOUTHERN MOUNTAINS SOUTH OF A LINE FROM PUEBLO TO MONTROSE, AND LOCALLY IN THE ELK AND WEST ELK MOUNTAINS AROUND CRESTED BUTTE INCLUDING THE KEBLER PASS AND GOTHIC AREAS. THE BACKCOUNTRY AVALANCHE HAZARD IS RATED HIGH BOTH ABOVE AND BELOW TREELINE.

THIS WARNING IS VALID THROUGH MONDAY FEBRUARY 17.

UP TO 2 FEET OF NEW SNOW FELL IN THE LAST 3 DAYS AND IS THE CAUSE OF THE HIGH AVALANCHE DANGER IN THE BACKCOUNTRY. MODERATE TO STRONG WINDS HAVE CREATED WIDESPREAD SOFTSLAB AVALANCHE CONDITIONS IN THE BACKCOUNTRY. POOR VISIBILITY IS HAMPERING BACKCOUNTRY OBSERVATIONS...BUT 123 AVALANCHES HAVE BEEN REPORTED FROM THE WARNING AREA.

WE RECOMMEND THAT BACKCOUNTRY SKIERS AND SNOWMOBILERS LIMIT TRAVEL TO GENTLE TERRAIN...FOR NATURAL AND HUMAN TRIGGERED AVALANCHES ARE LIKELY ON SLOPES 30 DEGREES AND STEEPER.

THIS MESSAGE IS OF PARTICULAR INTEREST TO PERSONS USING THE BACKCOUNTRY OUTSIDE OF DEVELOPED SKI AREA BOUNDARIES. WHERE NECESSARY SKI AREAS USE AVALANCHE CONTROL METHODS WITHIN THEIR BOUNDARIES.

THE NEXT SCHEDULED AVALANCHE BULLETIN IS FOR 4 PM TODAY.

FOR ADDITIONAL AVALANCHE INFORMATION CALL ... 236-9435 IN DENVER AND BOULDER ... 482-0457 IN FT. COLLINS ... 520-0020 IN COLORADO SPRINGS ...668-0600 IN SUMMIT COUNTY ... AND 247-8187 IN DURANGO.

ATKINS
COLORADO AVALANCHE INFORMATION CENTER
9192 3-4

AVALANCHE WARNING ... BULLETIN NO. 8
COLORADO AVALANCHE INFORMATION CENTER
NATIONAL WEATHER SERVICE DENVER, CO
11:00 AM MST TUESDAY FEBRUARY 18, 1992

... AVALANCHE WARNING CONTINUES IN THE SOUTHERN MOUNTAINS AND FOR PORTIONS OF THE CENTRAL AND NORTHERN MOUNTAINS...

THE BACKCOUNTRY IN THREE COLORADO MOUNTAIN AREAS REMAIN UNDER AN AVALANCHE WARNING.
1...AROUND VAIL PASS...VAIL...AND BEAVER CREEK
2...ELK MOUNTAINS AND WEST ELK MOUNTAINS AROUND CRESTED BUTTE...GOTHIC...KEBLER PASS...AND MARBLE.
3...SOUTHERN MOUNTAINS...SOUTH OF A LINE FROM PUEBLO TO MONTROSE

SINCE FRIDAY UP TO 3.5 FEET OF SNOW ACCOMPANIED BY MODERATE WINDS HAS LOADED AVALANCHE STARTING ZONES ADDING LOTS OF WEIGHT TO AN ALREADY WEAK SNOWPACK.

THE BACKCOUNTRY AVALANCHE HAZARD IS RATED HIGH BOTH ABOVE AND BELOW TREELINE IN THE WARNING AREAS.

THIS WARNING IS VALID THROUGH TUESDAY FEBRUARY 18.

SINCE FRIDAY 257 AVALANCHES HAVE BEEN REPORTED. WE EXPECT MORE NATURAL AND EXPLOSIVE OR SKI TRIGGERED AVALANCHE TODAY.

WE RECOMMEND THAT BACKCOUNTRY SKIERS AND SNOWMOBILERS LIMIT TRAVEL TO GENTLE TERRAINFOR NATURAL AND HUMAN TRIGGERED AVALANCHE ARE LIKELY ON SLOPES 30 DEGREES AND STEEPER. IT IS A GOOD TIME TO SKI AT THE SKI AREAS. IN THE BACKCOUNTRY PEOPLE TRIGGERED AVALANCHES ARE A VERY REAL THREAT IN STEEP TERRAIN.

THE NEXT SCHEDULED AVALANCHE BULLETIN IS FOR 4 PM TUESDAY.

THIS MESSAGE IS OF PARTICULAR INTEREST TO PERSONS USING THE BACKCOUNTRY OUTSIDE OF DEVELOPED SKI AREA BOUNDARIES. WHERE NECESSARY SKI AREAS USE AVALANCHE CONTROL METHODS WITHIN THEIR BOUNDARIES.

FOR ADDITIONAL AVALANCHE INFORMATION CALL ... 236-9435 IN DENVER AND BOULDER ... 482-0457 IN FT. COLLINS ... 520-0020 IN COLORADO SPRINGS ...668-0600 IN SUMMIT COUNTY ... AND 247-8187 IN DURANGO.

ATKINS
COLORADO AVALANCHE INFORMATION CENTER
9192 3-8

AVALANCHE WARNING TERMINATION ... BULLETIN NO. 11
COLORADO AVALANCHE INFORMATION CENTER
NATIONAL WEATHER SERVICE DENVER, CO
4:40 PM MST WEDNESDAY FEBRUARY 19, 1992

... AVALANCHE WARNING TERMINATED ...
... BUT BACKCOUNTRY AVALANCHE HAZARD REMAINS HIGH ...

THE AVALANCHE WARNING FOR THE COLORADO MOUNTAINS FIRST ISSUED ON FRIDAY FEBRUARY 14 HAS BEEN DROPPED. THE SNOW AND BLOWING SNOW CONDITIONS THAT INITIATED THE HIGH HAZARD HAVE ENDED AND THE MAIN CYCLE OF AVALANCHE RELEASES HAS ALSO ENDED.

SINCE WARNINGS WERE FIRST POSTED ON THE 14TH ... 414 AVALANCHES HAVE BEEN REPORTED.

DESPITE THE DROPPING OF THE WARNING ... THE AVALANCHE HAZARD IN ALL BACKCOUNTRY AREAS OF THE COLORADO MOUNTAINS REMAINS HIGH. A SIGNIFICANT THREAT FROM HUMAN TRIGGERED AVALANCHES CONTINUES. WE RECOMMEND THAT BACKCOUNTRY SKIERS AND SNOWMOBILERS LIMIT TRAVEL TO GENTLE TERRAIN. TRIGGERED AVALANCHES ARE LIKELY ON SLOPES 30 DEGREES AND STEEPER ... ESPECIALLY NEAR AND ABOVE TIMBERLINE.

THIS IS THE LAST BULLETIN ON THIS AVALANCHE SITUATION.

THIS MESSAGE IS OF PARTICULAR INTEREST TO PERSONS USING THE BACKCOUNTRY OUTSIDE OF DEVELOPED SKI AREA BOUNDARIES. WHERE NECESSARY SKI AREAS USE AVALANCHE CONTROL METHODS WITHIN THEIR BOUNDARIES.

FOR ADDITIONAL AVALANCHE INFORMATION CALL ... 236-9435 IN DENVER AND BOULDER ... 482-0457 IN FT. COLLINS ... 520-0020 IN COLORADO SPRINGS ...668-0600 IN SUMMIT COUNTY ... AND 247-8187 IN DURANGO.

THIS IS THE LAST BULLETIN ON THIS AVALANCHE SITUATION.

WILLIAMS
COLORADO AVALANCHE INFORMATION CENTER
9192 3-11

AVALANCHE WARNING ... BULLETIN NO. 2
COLORADO AVALANCHE INFORMATION CENTER
NATIONAL WEATHER SERVICE DENVER, CO
4:00 PM MST WEDNESDAY MARCH 4, 1992

... NORTHERN AND CENTRAL AND SOUTHERN COLORADO MOUNTAINS ...
... BACKCOUNTRY AVALANCHE HAZARD HIGH ...

AN AVALANCHE WARNING WAS ISSUED TODAY AT 11 00 AM AND REMAINS IN EFFECT FOR THREE AREAS OF THE COLORADO MOUNTAINS AND WE ARE ADDING A FOURTH AREA. THESE ARE

1...THE FRONT RANGE FROM ARAPAHOE BASIN AND LOVELAND PASS NORTH ALONG THE CONTINENTAL DIVIDE TO CAMERON PASS.
2...THE SAWATCH RANGE AND ELK MOUNTAINS OF THE CENTRAL MOUNTAINS. THIS INCLUDES THE MOUNTAINS AROUND MONARCH AND ASPEN.
3...THE SANGRE DE CRISTO MOUNTAINS.
4...THE SAN JUAN MOUNTAINS IN THE IMMEDIATE VICINITY OF TELLURIDE AND RED MOUNTAIN PASS.

THIS WARNING IS VALID THRU THURSDAY MARCH 5.

THE CAUSE OF THE HIGH AVALANCHE HAZARD IN THESE AREAS IS SNOWFALLS OF 18 INCHES AT MONARCH ... 15 INCHES AT TELLURIDE ...14 INCHES AT LOVELAND AND ARAPAHOE BASIN ... MORE THAN 12 INCHES IN THE SANGRE DE CRISTOS ... AND ABOUT 8 INCHES AT ASPEN. IN ADDITION WINDS EXCEEDING 20 MPH ABOVE TIMBERLINE HAVE CAUSED BLOWING SNOW. NATURAL AND HUMAN TRIGGERED AVALANCHES ARE LIKELY IN THESE AREAS. WE RECOMMEND THAT PEOPLE PLANNING BACKCOUNTRY TRIPS INTO THESE AREAS POSTPONE THEIR TRIPS UNTIL THE HAZARD MODERATES ... OR AT LEAST AVOID ALL SLOPES 30 DEGREES AND STEEPER.

OUR OBSERVERS ARE REPORTING ALL THE SIGNS OF DANGEROUS SNOW ...SLAB BUILDUP ...SHOOTING CRACKS ...COLLAPSE. HOWEVER POOR VISIBILITY IS PREVENTING AVALANCHE OBSERVATIONS IN THE BACKCOUNTRY ... SO WE HAVE NO AVALANCHE COUNTS AT THIS TIME.

THE NEXT AVALANCHE BULLETIN IS SCHEDULED FOR 11 AM THURSDAY.

THIS STATEMENT IS OF PARTICULAR INTEREST TO PERSONS USING THE BACKCOUNTRY OUTSIDE OF DEVELOPED SKI AREA BOUNDARIES. WHERE NECESSARY SKI AREAS USE AVALANCHE CONTROL METHODS WITHIN THEIR BOUNDARIES.

FOR ADDITIONAL AVALANCHE INFORMATION CALL ... 236-9435 IN DENVER AND BOULDER ... 482-0457 IN FT. COLLINS ... 520-0020 IN COLORADO SPRINGS ...668-0600 IN SUMMIT COUNTY ... AND 247-8187 IN DURANGO.

WILLIAMS
COLORADO AVALANCHE INFORMATION CENTER 9192 4-2

AVALANCHE WARNING ... BULLETIN NO. 7
COLORADO AVALANCHE INFORMATION CENTER
NATIONAL WEATHER SERVICE DENVER, CO
11:30 AM MST SATURDAY MARCH 7, 1992

... AVALANCHE HAZARD HIGH IN FIVE MOUNTAIN AREAS ...

THE AVALANCHE WARNING REMAINS IN EFFECT FOR FIVE COLORADO MOUNTAIN AREAS. THESE ARE

1...THE FRONT RANGE FROM ARAPAHOE BASIN AND LOVELAND PASS NORTH ALONG THE CONTINENTAL DIVIDE TO CAMERON PASS.
2...THE SAWATCH RANGE AROUND MONARCH PASS
3...ELK MOUNTAINS AROUND ASPEN.
4...THE SANGRE DE CRISTO MOUNTAINS.
5...THE SAN JUAN MOUNTAINS IN THE IMMEDIATE VICINITY OF TELLURIDE AND RED MOUNTAIN PASS.

MODERATE TO HEAVY SNOWFALL IS THE CAUSE OF THE HIGH AVALANCHE DANGER IN THESE AREAS. SNOWFALL AMOUNTS SINCE WEDNESDAY INCLUDE 41 INCHES AT TELLURIDE ... 29 AT MONARCH ... 15-20 IN THE ASPEN AREA ... 19 AT LOVELAND AND ARAPAHOE BASIN ... 26 AT ROCKY MOUNTAIN NATIONAL PARK. BOTH NATURAL AND HUMAN TRIGGERED AVALANCHES ARE LIKELY IN THESE AREAS.

DURING THE WARNING PERIOD 403 AVALANCHES HAVE BEEN REPORTED ... 8 PEOPLE CAUGHT BY AVALANCHES: 3 MOTORISTS ... 3 BACKCOUNTRY SKIERS ... 2 HIGHWAY WORKERS ... OF WHOM 1 WAS KILLED ON RED MOUNTAIN PASS MARCH 5.

PEOPLE TRIGGERED AVALANCHES IN THE BACKCOUNTRY REMAIN THE BIG THREAT ON SLOPES 30 DEGREES AND STEEPER. THEREFORE BACKCOUNTRY TRAVELERS SHOULD AVOID STEEP SNOW LOADED SLOPES AND GULLIES AND LIMIT ACTIVITY TO GENTLE SLOPES WELL AWAY FROM AVALANCHE STARTING ZONES.

THE NEXT AVALANCHE BULLETIN IS SCHEDULED FOR 4 PM SATURDAY.

THIS MESSAGE IS OF PARTICULAR INTEREST TO PERSONS USING THE BACKCOUNTRY OUTSIDE OF DEVELOPED SKI AREA BOUNDARIES. WHERE NECESSARY SKI AREAS USE AVALANCHE CONTROL METHODS WITHIN THEIR BOUNDARIES.

FOR ADDITIONAL AVALANCHE INFORMATION CALL ... 236-9435 IN DENVER AND BOULDER ... 482-0457 IN FT. COLLINS ... 520-0020 IN COLORADO SPRINGS ...668-0600 IN SUMMIT COUNTY ... AND 247-8187 IN DURANGO.

ATKINS
COLORADO AVALANCHE INFORMATION CENTER
9192 4-7

AVALANCHE WARNING ... BULLETIN NO. 12
COLORADO AVALANCHE INFORMATION CENTER
NATIONAL WEATHER SERVICE DENVER, CO
4:00 PM MST MONDAY MARCH 9, 1992

... AVALANCHE HAZARD PERSISTS ...
... AVALANCHE HAZARD HIGH IN THREE MOUNTAIN AREAS ...

THE STORM THAT LEFT FROM 10-17 INCHES OF SNOW IN THE LAST 24 HOURS IN THE TELLURIDE AREA, RED MOUNTAIN PASS, CONTINENTAL DIVIDE NORTH FROM LOVELAND PASS TO CAMERON PASS NEAR AND ALONG THE CONTINENTAL DIVIDE HAS PASSED TO THE EAST. THE AVALANCHE HAZARD IS EXPECTED TO MODERATE TOMORROW DUE TO WARMING TEMPERATURES. THE AVALANCHE WARNING AREAS ARE:

...THE SAWATCH RANGE AROUND MONARCH PASS AND COTTONWOOD PASS

...THE SAN JUAN MOUNTAINS IN THE IMMEDIATE VICINITY OF TELLURIDE AND RED MOUNTAIN PASS

...FRONT RANGE CONTINENTAL DIVIDE NORTH FROM LOVELAND PASS TO CAMERON PASS

BOTH NATURAL AND HUMAN TRIGGERED AVALANCHES ARE LIKELY AT THIS TIME FOR THESE AREAS.

SEVERAL MOUNTAIN ROADS REMAIN CLOSED AT THIS TIME DUE TO AVALANCHE ACTIVITY: US HWY. 550 RED MOUNTAIN PASS, US HWY. 6 LOVELAND PASS, AND THE ROAD TO OPHIR IN THE SAN JUAN MOUNTAINS IN SOUTHWESTERN COLORADO.

HUMAN TRIGGERED AVALANCHES IN THE BACKCOUNTRY REMAIN THE BIG THREAT ON SLOPES 30 DEGREES AND STEEPER. THEREFORE BACKCOUNTRY TRAVELERS SHOULD AVOID STEEP SNOW LOADED SLOPES AND GULLIES AND LIMIT ACTIVITY TO GENTLE SLOPES WELL AWAY FROM AVALANCHE STARTING AND RUNOUT ZONES.

THE NEXT AVALANCHE BULLETIN IS SCHEDULED FOR 11 AM THURSDAY.

THIS STATEMENT IS OF PARTICULAR INTEREST TO PERSONS USING THE BACKCOUNTRY OUTSIDE OF DEVELOPED SKI AREA BOUNDARIES. WHERE NECESSARY SKI AREAS USE AVALANCHE CONTROL METHODS WITHIN THEIR BOUNDARIES.

FOR ADDITIONAL AVALANCHE INFORMATION CALL ... 236-9435 IN DENVER AND BOULDER ... 482-0457 IN FT. COLLINS ... 520-0020 IN COLORADO SPRINGS ...668-0600 IN SUMMIT COUNTY ... AND 247-8187 IN DURANGO.

TOEPFER
COLORADO AVALANCHE INFORMATION CENTER
9192 4-12

AVALANCHE WARNING TERMINATION ... BULLETIN NO. 15
COLORADO AVALANCHE INFORMATION CENTER
NATIONAL WEATHER SERVICE DENVER, CO
11:15 AM MST WEDNESDAY MARCH 11, 1992

... AVALANCHE WARNING...TELLURIDE AND RED MOUNTAIN PASS...DROPPED ...

WARMING TEMPERATURES ARE ALLOWING THE SNOWCOVER TO SETTLE AND STRENGTHEN IN THE SAN JUAN MOUNTAINS. NO NATURAL AVALANCHE RELEASES HAVE BEEN REPORTED IN THE PAST 24 HOURS. THEREFORE THE WARNING FOR THE IMMEDIATE VICINITY OF TELLURIDE AND RED MOUNTAIN PASS HAS BEEN TERMINATED.

NO AVALANCHE WARNINGS ARE IN EFFECT AT THIS TIME FOR THE COLORADO MOUNTAINS.

BEWARE...THE DANGER IS NOT ENTIRELY OVER. SOME NATURAL AVALANCHES ARE STILL POSSIBLE IN THE TELLURIDE AND RED MOUNTAIN PASS AREA...AND PEOPLE TRIGGERED AVALANCHES ARE LIKELY AT ALL ELEVATIONS. THE HAZARD REMAINS HIGH.

IN THE REST OF THE COLORADO MOUNTAINS THE HAZARD IS MODERATE WITH POCKETS OF HIGH HAZARD ON ALL ASPECTS AND ELEVATIONS.

BACKCOUNTRY TRAVELERS SHOULD CONTINUE TO USE EXTRA CAUTION ON OUTINGS..AND AVOID SLOPES 35 DEGREES AND STEEPER. SAFE TRAVEL CAN BE FOUND ON SLOPES LESS THEN 30 DEGREES AND WELL AWAY FROM AVALANCHE STARTING AND RUNOUT ZONES.

THIS IS THE LAST BULLETIN ON THIS AVALANCHE SITUATION.

THIS STATEMENT IS OF PARTICULAR INTEREST TO PERSONS USING THE BACKCOUNTRY OUTSIDE OF DEVELOPED SKI AREA BOUNDARIES. WHERE NECESSARY SKI AREAS USE AVALANCHE CONTROL METHODS WITHIN THEIR BOUNDARIES.

FOR ADDITIONAL AVALANCHE INFORMATION CALL ... 236-9435 IN DENVER AND BOULDER ... 482-0457 IN FT. COLLINS ... 520-0020 IN COLORADO SPRINGS ...668-0600 IN SUMMIT COUNTY ... AND 247-8187 IN DURANGO.

ATKINS
COLORADO AVALANCHE INFORMATION CENTER
9192 4-15

AVALANCHE WARNING BULLETIN NO. 2
COLORADO AVALANCHE INFORMATION CENTER
NATIONAL WEATHER SERVICE DENVER, CO
4:15 PM MST SATURDAY MARCH 28, 1992

... AVALANCHE DANGER HIGH TO EXTREME ...

AN AVALANCHE WARNING REMAINS IN EFFECT FOR TWO AREAS..FIRST THE ELK AND WEST ELK ;MOUNTAINS AROUND ASPEN AND CRESTED BUTTE..SECOND..THE TEN MILE RANGE FROM HOOSIER PASS NORTH TO FRISCO AND THE VICINITY OF LOVELAND TO BERTHOUD PASSES.

DUE TO HEAVY MOUNTAIN SNOW IN THE LAST 20 HOURS THE BACKCOUNTRY AVALANCHE HAZARD IS RATED HIGH FOR ALL MOUNTAIN AREAS..BOTH ABOVE AND BELOW TIMBERLINE..ON ALL ASPECTS. THE HAZARD IS RATED EXTREME ON THE WEST SIDE OF THE TEN MILE RANGE AND IN THE ELK MOUNTAINS.

SINCE THE WARNING WENT INTO EFFECT THIS MORNING MORE THAN 40 AVALANCHES HAVE BEEN REPORTED TO THE CENTER..BOTH ABOVE AND BELOW TIMBERLINE ON ALL ASPECTS. SOME HAVE REACHED THE VALLEY FLOORS.

IN THE WARNING AREAS BOTH NATURAL AND TRIGGERED AVALANCHES ARE LIKELY. BACKCOUNTRY TRAVELERS ARE URGED TO AVOID SNOW LOADED SLOPES STEEPER THAN 30 DEGREES AT THIS TIME..AND STAY WELL AWAY FROM STEEP SLOPES ABOVE.

THIS STATEMENT IS OF PARTICULAR INTEREST TO PERSONS USING THE BACKCOUNTRY OUTSIDE OF DEVELOPED SKI AREA BOUNDARIES. WHERE NECESSARY SKI AREAS USE AVALANCHE CONTROL METHODS WITHIN THEIR BOUNDARIES.

FOR ADDITIONAL AVALANCHE INFORMATION CALL ... 236-9435 IN DENVER AND BOULDER ... 482-0457 IN FT. COLLINS ... 520-0020 IN COLORADO SPRINGS ...668-0600 IN SUMMIT COUNTY ... AND 247-8187 IN DURANGO.

LOGAN
COLORADO AVALANCHE INFORMATION CENTER
9192 5-2

AVALANCHE WARNING BULLETIN NO. 6
COLORADO AVALANCHE INFORMATION CENTER
NATIONAL WEATHER SERVICE DENVER, CO
4:30 PM MST MONDAY MARCH 30, 1992

... AVALANCHE DANGER MODERATES ...

AN AVALANCHE WARNING REMAINS IN EFFECT FOR TWO AREAS..FIRST THE WEST ELK MOUNTAINS AROUND CRESTED BUTTE AND KEBLER PASS..SECOND..THE TEN MILE RANGE FROM HOOSIER PASS NORTH TO FRISCO AND IN THE VICINITY OF LOVELAND PASS.

DUE TO HEAVY MOUNTAIN SNOWS SATURDAY AND SUNDAY AND WARM AFTERNOON TEMPERATURES THE AVALANCHE HAZARD IS RATED HIGH FOR THE NORTHERN AND CENTRAL MOUNTAINS AS WELL AS RED MOUNTAIN PASS..BOTH ABOVE AND BELOW TIMBERLINE..ON ALL ASPECTS.

SINCE THE WARNING WENT INTO EFFECT SATURDAY MORNING NEARLY 200 AVALANCHES HAVE BEEN REPORTED TO THE CENTER..BOTH ABOVE AND BELOW TIMBERLINE ON ALL ASPECTS. SOME HEAVE REACHED THE VALLEY FLOORS.

SUNDAY AFTERNOON A SKIER WAS CAUGHT AND KILLED IN AN AVALANCHE NEAR THE TOWN OF MONTEZUMA IN SUMMIT COUNTY.

IN THE WARNING AREAS BOTH NATURAL AND TRIGGERED AVALANCHE ARE LIKELY. BACKCOUNTRY TRAVELERS ARE URGED TO AVOID SNOW LOADED SLOPES STEEPER THAN 30 DEGREES AT THIS TIME..AND STAY WELL AWAY FROM STEEP SLOPES ABOVE.

THIS STATEMENT IS OF PARTICULAR INTEREST TO PERSONS USING THE BACKCOUNTRY OUTSIDE OF DEVELOPED SKI AREA BOUNDARIES. WHERE NECESSARY SKI AREAS USE AVALANCHE CONTROL METHODS WITHIN THEIR BOUNDARIES.

FOR ADDITIONAL AVALANCHE INFORMATION CALL ... 236-9435 IN DENVER AND BOULDER ... 482-0457 IN FT. COLLINS ... 520-0020 IN COLORADO SPRINGS ...668-0600 IN SUMMIT COUNTY ... AND 247-8187 IN DURANGO.

THE NEXT AVALANCHE BULLETIN IS SCHEDULED FOR 11 AM TUESDAY.

TOEPFER
COLORADO AVALANCHE INFORMATION CENTER
9192 5-6

AVALANCHE WARNING TERMINATION ... BULLETIN NO. 7
COLORADO AVALANCHE INFORMATION CENTER
NATIONAL WEATHER SERVICE DENVER, CO
11:55 AM MST TUESDAY MARCH 31, 1992

... WARNING TERMINATED ...

VERY LIGHT WINDS AND MILD TEMPERATURES ARE ALLOWING THE NEW SNOW TO STABILIZE. WE DO NOT EXPECT ADDITIONAL AVALANCHE RELEASES. SO THE AVALANCHE WARNING FOR THE TWO MOUNTAIN AREAS...THE WEST ELK MOUNTAINS AROUND CRESTED BUTTE AND KEBLER PASS...AND THE TEN MILE RANGE FROM HOOSIER PASS NORTH TO FRISCO AND IN THE VICINITY OF LOVELAND PASS HAS BEEN DROPPED.

THE DANGER HAS NOT ENTIRELY PAST. TRIGGERED AVALANCHE RELEASES BY BACKCOUNTRY TRAVELERS ARE STILL LIKELY IN THESE TWO AREAS. THE BACKCOUNTRY HAZARD IS RATED HIGH. BACKCOUNTRY TRAVELERS SHOULD CONTINUE TO USE EXTRA CAUTION AND AVOID SLOPES 30 DEGREES AND STEEPER.

FOR THE REST OF THE COLORADO MOUNTAINS THE HAZARD IS MODERATE WITH POCKETS OF HIGH ABOVE TREELINE ON ALL ASPECTS.

SINCE THE WARNING WAS POSTED SATURDAY MORNING 229 AVALANCHES WERE REPORTED TO THE CENTER.

THIS IS THE LAST BULLETIN ON THIS AVALANCHE SITUATION.

THIS STATEMENT IS OF PARTICULAR INTEREST TO PERSONS USING THE BACKCOUNTRY OUTSIDE OF DEVELOPED SKI AREA BOUNDARIES. WHERE NECESSARY SKI AREAS USE AVALANCHE CONTROL METHODS WITHIN THEIR BOUNDARIES.

FOR ADDITIONAL AVALANCHE INFORMATION CALL ... 236-9435 IN DENVER AND BOULDER ... 482-0457 IN FT. COLLINS ... 520-0020 IN COLORADO SPRINGS ...668-0600 IN SUMMIT COUNTY ... AND 247-8187 IN DURANGO.

ATKINS
COLORADO AVALANCHE INFORMATION CENTER
9192 5-7

LETTERS and NEWSPAPER ARTICLES

This appendix includes a collage of letters and cards commenting on the service provided by the Avalanche Center, and a sampling of newspaper stories which helped the Center dispense information to the public.

April 22, 1992

Avalanche Center
10230 Smith Road
Denver, CO 80239

Gentlemen:

I want to drop a note to you to tell you how totally I rely on your weather and avalanche reports for my skiing weekends. I find your reports to be much more in depth and detailed for the mountains (but not necessarily more accurate, as I'm sure you and the Weather Bureau work together) than my weather band radio reports. Please keep up the good work and reports. Although I am a "young" senior, I plan to keep the skiing up for many more years.

Sincerely,

Lyn Kimbrough

Lyn Kimbrough
(not the KOA Lynn Kimbrough)

jim bedford
san miguel county commissioner
box 604
telluride, co 81435

4.23.92

Colorado Avalanche Information Center
10230 Smith Road
Denver, CO 80239

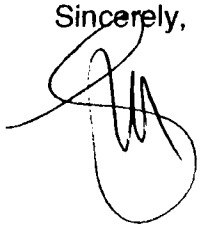
Dear Avalanche Folks:

Thanks for another great season! I am one of your fans! Your continued clear and area-specific reporting adds to the safety and welfare of all citizens and visitors to the mountains of Colorado.

Our local radio station, KOTO-fm, broadcasts reports each season from your service. As you know, in our area there have been a number of deaths due to avalanche in the past. This year, there was one death, and only a few incidents which caused no bodily harm. And you are aware this was a huge season for snow in the Telluride area. This was a monster year for avalanches around here. I really believe that if your service is expanded, and certainly continued, that we can get Colorado avalanche deaths down to zero. I only wish we could get fools to hear and understand the dangers that you warn about are no joke, and tthat they take those warnings seriously.

Please let me know if you need any support for your efforts. Keep up the good work, and I hope to hear you during next snow season.

Sincerely,



April 6, 1992

Colorado Avalanche Information Center
10230 Smith Road
Denver, CO 80239

Dear Sirs:

This letter is in response to your request for input on your avalanche reports. I use your avalanche information and mountain weather forecast every time I ski in the Colorado backcountry. Both your avalanche reports and your mountain weather forecasts are very complete and very useful. I have no suggestions for any changes, but perhaps your service could be more effective if more skiers knew about it. Is there some way to increase your publicity?

Keep up the good work!

Sincerely,

Dave Hill

David A. Hill
1850 Kohler Drive
Boulder, CO 80303

Congratulations on another successful year! Your reports are not only educational and useful for skiers, but the best weather forecasts available to all of us. Keep up the good work! We hear you on KVNF public radio, Pannier.

Joan + Abbott Fay

Dt 1694 FL. CO 80522

Avalanche picture taken from the town of Telluride, Colorado.

Photo: Bill Ellzey

DEAR AVALANCHE FOLKS,

YOUR SERVICE IS A Necessity to backcountry skiers such as Myself, I have found your weather forecasts & Stability evalutions to be very accurate. I ski in the Cameron Pass, Berthoud Pass & Lake City area on the average 2 times a week. Never been Caught thanks to (a great extent) your forecasts. Thanks much! - M

Mountain States Specialties, Inc.
7167 Valtec Ct. Boulder, CO 80301

Colorado Avalanche Info Center
10230 Smith Rd
Denver, CO
80239

Mike Roberts
Oakland, CA 94623
B16319

DURANGO, COLORADO

The cosmopolitan city of Durango was created in 1880 by the Denver & Rio Grande Railway as the gateway to the mining town of Silverton. It endures to this day.

Photo by Ken Raveill, © Terrell Publishing Co.

TERRELL 0790040

DEAR FOLKS,

GREAT JOB THIS YEAR ON THE AVALANCHE LINE! YOURS IS THE ONLY CALL I CAN MAKE IN THE MORNING WHILE EATING MY BREAKFAST. THINGS I LIKE THE MOST AND WOULD LIKE TO SEE/HEAR MORE OF ARE: (1) AREA SPECIFIC FORECAST, BOTH OF WEATHER & AVALANCHE. I'D RATHER HEAR MORE ABOUT THE SAN JUANS & LESS ABOUT NORTHERN MTNS. IF I WERE TRAVELING NORTH OR SOMEWHERE ELSE I'D CALL THERE TO GET MORE SPECIFIC INFO. (2) EDUCATIONAL INFO LITTLE "TIDBITS" OF THINGS TO LOOK FOR IN SNOW PACK OR TERRAIN OR UNDERSTAND ABOUT SNOW PHYSICS, ETC. YOU DO A GOOD JOB OF THIS - MORE WOULD BE WELCOME. A LONGER MESSAGE WOULD BE OK W ME. KEEP UP THE GREAT WORK Rob

AVALANCHE CTR.
10230 SMITH RD.
DENVER, CO
80239

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Tempe, Arizona 85285-4098
PRINTED IN HONG KONG
283

TOM SCHMIDT
ELDORADO SKIS
CO 80025-0394

Thanks for a great year of forecasting. My only suggestion would be to extend your season further into the spring. Your forecasts of weather and avalanche conditions are very valuable. Please keep the detailed weather forecasts.

Thanks

Tom

April 27, 1992

Dear Sirs,

I just wanted to drop you a line to let you know what a great job you are doing at the Avalanche Center. Myself and my friends are avid backcountry skiers and have been listening to the Avalanche Line for the past few years. We have found the weather reports and snowpack analysis to be very helpful and accurate. We often base our trips on the snowfall reports/predictions that you give on the phone.

We usually get started pretty early in the morning; before your morning report. It would be nice if you could get the morning recording on by about 6:00AM, especially on weekends. I know this may not be possible, since you have to gather so much information, but it is one change I would like to see. It would also be great if you could keep the line operating through May. Last year you suspended operations before all the big storms in May.

Anyway, keep up the good work.

Sincerely,
Pete Wynne
Louisville, CO.

Dear Knox's friends at the Avalanche Center —

You're recording ask's for comments on the Avalanche Information Line:

It is valuable! It is the best source of weather information that I can find. It is a quality source & I thank the Forest Svc.

Recommendation: how about continuing the phone line for the summer with info re thunder-storms, hail, winds. I would really appreciate summer mountain weather. Thanks!

Kathleen Brennan

Dear Knox Williams & fellow avalanche watchers —

Please accept this small contribution toward your efforts toward making my winter travels in the back country informed and safer!

During the past winter I've called to find out about avalanche conditions each time I went on a ski trip. I feel I owe something back to the system.

Thanks,

Linda Kettel
5025 Escapado Way
Colo Spgs Co 80917

Thanks again for your part in our ski season safer and more fun. We always check with the Avalanche Center before leaving home. We use your forecasts (always right) for deciding when and where to go and the snow condition reports are an important part in keeping us from an un-planned ride!

Thanks, Again,

Bob, Rhea, David, Lauren, Nola Chavez, Steve Personius, Susan Rhea, Stephen Gibbens, Silver Miller, Elliot Granger, Dave Worley, Rob Williams

Avalanche Center
10230 Smith Rd
Denver, CO
80239

The Roller Coaster has been a thrilling Arnolds Park attraction for 60 years dating back to 1929. The park reopened in 1989 and this tradition continues today.

PO Box 1461
Idaho Springs, CO. 80452

April 9, 92

10239 Smith Road
Denver, CO. 80239

Dear Avalanche Information Center;

Here is a letter to compliment your phone service on the many years of service it has provided for me, and my fellow mountaineering companions. It really is the only reliable weather forcasting service for this type of sport. The local television stations are of limited service when it comes to gathering good, solid backcountry weather and snow conditions, as they are really only looking out for the intrests of skiiers at commercial areas and the weather which primarily affects Denver.

Your service is wonderful. It is great that updates are twice daily, as the weather up there can really alter in a 12 hour period! I do a lot of winter mountaineering and I really need snow reports that can give me an idea of exactly where the local problems will be with avalanche conditions. You can imagine how much easier it is to make a decision on the location of the weekend trip if the forecast is updated and the snow conditions are known by me.

My only suggestion to better your service is to get a recording device which is not so fuzzy!That is the only complaint I have had for the CAIC.

I am with the Colorado Mtn. Club and a lot of us use your number. I also recommend it to people who are not aware that the phone service exists.

Again, thanks for the fine service and hope to be relying upon you for a long time.

Sincerely,

Jennifer J. Lees

OUR OPINION

Learn to live

The opening of the Colorado Avalanche Information Center for the 1991-92 winter season alerts us that avalanche season is near.

Last year, though 2,242 avalanches were recorded in Colorado, center officials estimate that that number reflects a scant 10 percent of the actual total.

Thousands of avalanches occur during Colorado winter — it's one of the most dangerous regions in the country for snowslides.

While some go unnoticed, others are deadly; out of 16 people caught in Summit County slides, two died.

From all accounts, both people were seasoned winter recreationalists. One was an accomplished mountain climber and the other a longtime local who was experienced in winter camping and sledding.

No one expects to be caught in an avalanche.

But it happens — too often.

We're fortunate to have a valuable resource such as the Colorado Avalanche Information Center. Officials there record a 24-hour avalanche information message, which is updated as necessary. Current information on mountain snowpack and weather conditions advise callers of the avalanche hazard, which ranges from low to moderate to extreme.

Last season, in a new twist designed to attract computer buffs, the same information was made available via modem from the Travel Bank, a ski and travel computer bank.

As winter storms begin to track regularly through the central Rockies, we'll all become more aware of avalanche conditions. Mention of potential hazards will be peppered throughout print and broadcast news reports sooner than we think.

Before that busy time, we'd like to suggest that before heading into the backcountry, skiers should arm themselves with equipment and information essential to avalanche survival.

A free avalanche awareness seminar tonight at Beaver Run Resort is a good first step in that process.

Conducted by the avalanche information center, the session will examine basic avalanche awareness, how to avoid getting caught in an avalanche and basic avalanche rescue techniques.

We think that these few hours are the best investment skiers can make for a safe winter season.

The Summit Sentinel

Serving Summit County, Colorado Friday, November 15, 1991 25¢

Avalanche season:

Colo. Avalanche Info Center minimizes risk by informing public about slide probability

By Gail Carissimi
Sentinel Editor

Last winter, Summit County avalanches trapped 16 people — one-third of all those caught in Colorado.

Two of them died — one in a Dec. 2 climbing accident on the west side of the Ten Mile Range and one in a Mar. 17 sledding accident on Grizzly Peak near Loveland Pass.

While avalanche deaths are grim reminders of nature's fury, the slides are an inevitable fact of life during Colorado winter, according to the Colorado Avalanche Information Center.

Nick Logan, associate director of the avalanche center, said that officials there provide information in an attempt to minimize avalanche accidents.

The center, which opened for the season Tuesday, provides Colorado recreationalists and travellers with information — via telephone and computer bulletin board — about snowpack and mountain weather.

"We are watching the early-season storm pattern closely," Logan said. "This sets the tone for how the winter will shape up avalanche-wise."

Logan said that if the snowpack remains shallow for a long period, it turns into a weak and cohesionless base called depth hoar, or "sugar snow" — all too common in Colorado.

"If a weak layer becomes the foundation for our winter snowpack, numerous and large avalanches are inevitable and could occur at any time," Logan explained.

A slide last year swallowed ski tracks but caused no injury.

Though Logan said that the center does not break out avalanche data in a county-by-county format, he did say that the 2,242 slides reported last winter were likely only 10 percent of the actual number that occurred.

Logan said that because thousands of slides are unreported, the center is urging people to call the center collect when they witness — or even trigger — an avalanche.

"People think that they will get into trouble for causing an avalanche in the backcountry," Logan said. "This is just not the case — the backcountry is public land."

Please see SLIDE, PAGE 3

Backcountry safety tips

By Gail Carissimi
Sentinel Editor

It's never too early to think about avalanches.

Nick Logan, associate director of the Colorado Avalanche Information Center, offers three essential tips for backcountry skiers:

- *Never* ski alone in the backcountry.
- *Never* expose more than one person in a skiing party to an avalanche hazard.
- *Always* carry a shovel and an avalanche beacon.

Logan said that a shovel can mean the difference between life and death when someone caught in a slide ends up upside down. Skiers without a shovel are often not able to dig the person out fast enough with the tip of a ski or with ski poles; suffocation is a leading cause of avalanche deaths.

A free avalanche awareness seminar at 7 p.m. tonight in Beaver Run Resort's conference center will cover basic avalanche hazard recognition, safe winter travel techniques, how to avoid avalanches and basic avalanche rescue techniques.

Slide:

Continued from SLIDE, PAGE 1

Logan said that people who have "pertinent avalanche occurrence" information to share should call the center's direct line at 371-1080, — anonymously, if they wish — so that officials there can re-evaluate and update the avalanche hazard, if necessary.

Summit County residents can get a 24-hour phone recording about current avalanche conditions by calling 668-0600; computer buffs can access the Colorado Travel Bank by dialing 671-7669 on a computer modem and following the menu instructions on the monitor.

Learning the facts on Colorado's white death

By Dean Krakel
Rocky Mountain News Staff Writer

SHRINE PASS — Thoughts of death do not come easily on a day like this.

A foot of new snow blankets the crest of this 11,000-foot mountain pass in the Gore Range a few miles east of Vail. On the western horizon, 14,003-foot Mount of the Holy Cross juts into a cloudless, powder-blue sky.

Colorado Journal

Oblivious to beauty, John Brendza's eighth grade class from Minturn probes the snow with ski poles, searching for an avalanche victim.

Standing a shoulder's width apart, 13 students slide forward on cross-country skis.

They probe once to the right, once to the left, then move forward again. The line has passed unsuccessfully over this small snowfield twice.

"It's been 20 minutes," Brendza says. "Nick, what's the victim's chances?"

"If he is not dead, he's dying," answers Nicholas Logan. "The snow is hardening. An ice mask is forming over his face. Body temperature is dropping. Heart rate is slowing."

For nine years Logan has been an avalanche forecaster for the Colorado Avalanche Information Center in Denver. Today, he is teaching Brendza's class about avalanche awareness.

"Have you ever found a body?" another student asks.

Dean Krakel/Rocky Mountain News

Minturn Middle School students Ronnie Giles, left, and John Cox peer into a hole dug in a simulated search for victims during an avalanche-awareness field trip on Shrine Pass near Vail.

Logan's mustachioed face grows serious. For 20 years he was a Breckenridge ski patrolman "Yes," he says. "Six fatalities and a couple of real close calls."

As the students begin their third pass over the snowfield, there is a startling, muffled "WHUMP" as the snow settles.

"There's new, heavy, fresh snow atop an old, deteriorating base. This area is prime for sliding," Logan says.

Colorado averages four avalanche fatalities a year, Logan tells the group. In 1986-87, there were 11. Last year, there were six. This year, three have been killed and a third person is missing. However, he adds, about 50 people in Colorado are caught in avalanches every year.

"Many of these people survive," says Logan, "because they know what they're doing. They're able to anticipate problems and get out of harm's way. There's luck involved too."

"I've got something," says Ronnie Giles, stirring the snow with his pole. "It feels kind of spongy."

"Dig," commands Brendza.

For three years Brendza has been offering his Environmental Education students at Minturn adventures in the outdoors.

"Learning doesn't have to be boring," Brendza says.

Giles is now waist deep in snow and still furiously shoveling.

"I think this guy is dead by now," he says.

"You can't give up," Logan says. "The frustration you're feeling is very realistic."

Last year, Logan and his colleagues at the Avalanche Information Center carried the message about avalanche hazards to more than 2,200 people.

"With so many more people utilizing the backcountry, we say: 'If you're going to go into these steep areas here's what you should do,' "said Logan.

"I don't mind showing people pictures of the body laying there all blue anymore," Logan says. "That's the risk."

Moments later a shout sounds. It's Jorgen Ulvness in the probe line. A few shovelfuls of snow reveal the "victim." Unfortunately, there's no heartbeat. No breathing. Logan pronouces the victim — a sofa cushion — dead, but the lesson a success.

"How many of you think what you've learned today will come in handy someday?" Brendza asks the group.

All hands go up.

"What happens if you out skiing or snowmobiling with your friends and they want to do something you think is risky? What if they call you a wimp?" Brendza asks.

"I tell them I'm a living wimp," answers Delbert Gallegos.

Backcountry snowpack slip-slidin' away

By ALLEN BEST

Snow in the high country very well could be literally sliding right on into summer.

Already a record number of avalanches, 2,478, have been reported in Colorado this season, compared to the previous record of 2,242 last year. And Nick Logan, associate director of the Colorado Avalanche Information Center, warns "we aren't out of the woods yet."

His warning in particular goes out to backcountry skiers who normally find some of the best skiing conditions of the year in late April, May, and early June.

In some places the warm weather has consolidated the snowpack. In those areas, the typical point-source avalanches occur, beginning at a point and spreading slowly into a fan down a slope. Those avalanches, although potentially lethal, are fairly predictable. Generally, they don't occur until afternoon. And they move slowly although with great weight.

> "We're not out of the woods yet."
>
> —Nick Logan

But in much of the north-central mountains the snowpack remains much more fragile than is normally found this time of year. That is largely due to the many mid-winter weeks when almost no snow was recorded. Not all layers of snow have bonded together yet. Hence, even the relatively innocuous point dribble releases on sunny afternoons could trigger deep slab avalanches, says Logan.

ALTHOUGH LOGAN did not see the site of the avalanche that occurred on a southwest-facing slope three miles west of the Vail Pass summit last Saturday afternoon, his descriptions seems to describe what happened there. One motorist, Sim Ong, 30, of Augusta Maine, was hit by the slide and his car was mangled. Traffic on Interstate 70 was diverted through Leadville for several hours.

A large number of wet-slab avalanches have also been observed in Ten Mile Canyon, between Copper Mountain and Frisco, during recent weeks.

In the Vail Mountain area, more avalanche activity was observed this spring than has been seen in more than 20 years.

Jim Himmes, a Vail ski patrolman and a valley resident since 1968, said never before did he see so much of Super Bowl slide at any one time as it did in March. He also noted that Bowman shortcut on the Commando Run slid this year, and that all of the East Vail chutes ran at one time or another. They have all slid in the past, but never within a few weeks of one another.

One of those slides was triggered in King Arthur Chute by a California skier. Later, a Holiday Inn employee, Konrad Hodonos, told friends he was going to investigate the slide path, and he has not been seen since. Search efforts were called off after continuing high avalanche danger in the chute; Vail Mountain Rescue Group expects to renew the search in May, after more snow has melted.

If Hodonos was indeed killed by an avalanche, he was among five avalanche victims in Colorado this year. Two were skiers, one was a snowshoer, and one was a highway snowplower. Two occurred in the San Juan Mountains and two occurred along the Front Range.

Colorado averages four avalanche deaths a year, the most in the nation.

AS FOR SKIING in the backcountry during coming weeks, the Avalanche Information Center's Logan warns that more avalanches can be expected when spring storms deposit fresh snow on top of sun-baked snowpacks.

Also, when it doesn't get much below freezing at night, as has occurred recently, then wet-snow avalanches can occur earlier in the day.

But stay out of the backcountry? No, that's not what he's saying. "If you use good route-finding and good decision-making skills, I think you'll have a good time and be fine out there," he says.

Experience and some knowledge of snow physics, he adds, can go a long way in avoiding trouble. Also, take the standard gear, such as transceivers and shovels, he says. In case of an accident, they boost the chances for survival.

Skiing Is Believing

A massive avalanche north of Silverton, Colo. in the next valley over from where a slide recently buried two snowplow operators. One dug himself out; the other died. 1970s photo by Richard Armstrong

White Death in Colorado

by Claudia Carbone

"I am skiing in the backcountry when I get the strange feeling I'm not moving. Suddenly I realize things around me are moving *with* me. Then I hear my partner yell, "Slide!" I look uphill. There is a huge wave of snow 100-yards wide coming right behind me. I make a fast huge U-turn trying to get out of the way. The wave yanks a ski pole from my hand; I get into a tuck and head for the left flank. When it stops, my adrenaline is rushing; I'm all shaky and can't get my brain to talk my feet into making ski turns again." — Scott Teopfer, avalanche forecaster and 18-year ski patrol veteran.

Slab avalanches like the one Teopfer experienced — a broad, cohesive snow layer that breaks away from weak snowpack to which it never firmly adheres — account for 99 percent of avalanche deaths in Colorado, the leader of avalanche fatalities in the U.S. The other one percent is from much smaller and shallower loose snow avalanches. Of 737 people caught in snowslides since 1970, 78 have died, including three within a recent three-week period. To date, close to 2,000 slides have been reported in our mountains; probably more than that have never been witnessed.

With avalanche deaths increasing three-fold since 1950, the Colorado Avalanche Information Center was founded in 1983 to maintain data about weather and avalanches, and to inform the public about avalanche danger through the media and in talks to groups who live, work or play in our high country.

According to Knox Williams, director of the center and co-author with Betsy Armstrong of "The Avalanche Book" (Fulcrum, $14.95), victims fall into three types: those who are totally unaware avalanche hazards exist; those who are aware and accept the risk but who lack experience to properly evaluate conditions; and those who are thoroughly skilled and experienced skiers or mountaineers capable of evaluating conditions, examining alternatives, and judging consequences. Surprisingly, two-thirds of the casualties are from the last two categories. The typical avalanche victim is a 31-year-old male who is a competent skier, climber or winter sportsman with no avalanche training.

Williams warns: avoiding avalanches is easier than surviving them. "Confronting an avalanche is like playing with snakes and swimming with sharks: if you do it long enough, you'll get bit." He advises learning to recognize avalanche areas: slopes with 30-45 degrees of pitch; signs of previous slides, like fracture lines and avalanche debris; damaged or wind-out trees — heavily wooded slopes usually do not slide. Other factors to consider are wind, rain, temperature, new snowfall, depth of snow, surface, weak layers, and settling — a lot for the average backcountry skier or hiker to weigh.

When traveling in danger areas, traverse above or below the slide path, sending one person at a time several hundred yards apart. Never, ever go alone! Carry shovels, rescue transmitters and ski poles that double as probes.

If the snow starts to move or break away under you, shout to your companions, then try to ski to the side where you can hug a tree or duck under a rock outcropping. If you start to go under, shed your gear, close your mouth and swim with the avalanche, always trying to thrust upward so when it stops, your hand or head might burst through the surface.

Suffocation is the primary cause of avalanche death. In addition to inhaling snow while being churned with the slide, the victim is plastered solid by snow that sets up like cement when it stops. The pressure prevents the victim from drawing a breath; if he is able to breath, the air freezes around the face, forming an "ice mask" that cuts off airflow.

Obviously, speed is crucial in rescues. If buried in a foot or more of snow for up to 30 minutes, chances of survival are 50/50; the odds decrease drastically with time.

It's for this reason the use of rescue dogs, a widespread practice in Europe, is beginning to emerge in the U.S. In Colorado we have Hasty, a 6-year-old Golden Retriever, and a member of Copper Mountain's ski patrol and Summit County Rescue. Hasty's sole purpose in life is to seek out people buried in snow or lost in the mountains.

Because there are no visible tracks after an avalanche, a trained dog will sniff out human scent percolating through snow even faster than a rescue beacon will pick up signals. After the command, "Hasty, are you ready to go to work? Search!", immediately, he sniffs the area and, upon locating a live body, will excitedly dig in the snow with tail and rear end wagging frantically. If the person is dead, he knows that through scent, too, and will dig, but less enthusiastically and with lowered tail. Hasty is trained to dig first to the head rather than the body.

"When we're up there throwing bombs and ski cutting (skiing through big slabs to stabilize snow), I'm glad he's up there," says patroller Kent Sharp, who has voluntarily been buried for one of Hasty's weekly training sessions. "He found me in 60 seconds. His sensitivity is incredible."

There is nothing as beautiful as new-fallen snow sparkling on a high mountaintop against a blue sky. But like a sleeping lion that wakes up with a roar, that idyllic scene can turn deadly in a matter of seconds. If you're serious about backcountry skiing, respect the mountains by equipping yourself with as much knowledge about their hazards as well as their pleasures. For starters, call the Colorado Avalanche Information Center at 371-1080 and read Williams' comprehensive and fascinating book.

Hasty, Copper Mountain's famous rescue dog, barrels through chest high snow in search of an avalanche victim. photo courtesy of Copper Mountain

Ski Briefs

Villagers: you are invited to participate in the most prestigious charity skiing event in the country this weekend at Arapahoe Basin and Breckenridge — the Jimmie Heuga Mazda Ski Express. You will have an opportunity to ski with America's ski sweetheart, Olympic champion Tamara McKinney, spokesperson for the Express, and to help in the effort to raise more than $1 million for the Jimmie Heuga Center, a research center for people with multiple sclerosis in Avon.

The nationally-prominent center — started by Olympic bronze medalist Heuga, who was stricken with MS at age 26 — has helped more than 700 people develop personal "reanimation" programs to re-enter the mainstream of life. Monies raised by the Ski Express help to fund a large portion of expenses for patients who come here from across the country.

The Ski Express has grown from a single ski marathon put together by Heuga's Olympic pals in 1985, to two-day major ski events in 33 resorts with participants from 21 states in this, its seventh year. Here's how it works: teams of three (with at least one female) will compete in a four-hour ski marathon Saturday on High Noon run at A-Basin with an hour lunch break. The next day at Breckenridge they will compete in a dual GS race down Country Boy on Peak 9. Winners will be determined by total vertical feet skied in the marathon (25 percent), results in the GS race (25 percent) and amount of money raised through donations by each team (50 percent). The minimum amount per team is $1,000. Anyone who can turn on skis is eligible.

So get your ski buddies together, solicit family, friends and businesses who would like to make a tax deductible contribution to MS and the JHC. You can sign up as late as Saturday morning at registration from 8-10 — as long as you have the $1,000 donation. It is great fun — there is also a cocktail party and dance at the Keystone Conference Center and you get two breakfasts, a lunch and, of course, lift tickets. You could qualify for the national finals at Vail and a chance to ski for a Mazda four-wheel-drive of your choice! Call 800-367-3101 and ask for Jean Winthers.

AVALANCHES: PLAYING A DANGEROUS GAME

Skiers on back-country slopes risk 'white death'

Photo by Richard Armstrong

IN ROCKIES: A midwinter avalanche rumbles down the slopes of San Juan Mountain Range outside of Silverton, Colo.

By Jana Mazanec
USA TODAY

DENVER — Larry Ryan was snaking through virgin powder on a sun-drenched mountain slope far from commercial ski runs. Then, without warning, the ground shook and snow crashed in with a roar.

Suddenly, Ryan was swimming in a sea of white, buried in "white death" — the term for avalanche-driven snows that melt from friction and then harden around victims like concrete.

"I knew I was trapped," Ryan, 31, says. "Everything goes through your head that you'd ever learned, experienced, talked of."

As it turned out, Ryan joined skiing's most exclusive club. He survived an avalanche, a rare ending to an increasingly not-so-rare event in these Rocky Mountains.

In search of greater challenges and fewer crowds, more and more skiers are wagering their lives to ski the nation's pristine back-country slopes — and more are losing. The avalanche death toll has climbed from five a year in the late 1960s to 11 in recent years.

Seventeen already have died this season.

"It's a numbers game," avalanche forecaster Dale Atkins says. "The more people, the more accidents."

The game is deadliest in Colorado, claiming a third of the nation's avalanche victims. Of the 384 people to die in avalanches since 195[illegible] all but a handful have been in the West, where lack of moisture weakens snowpacks.

One Colorado skier died just last week, after being buried in snow for at least seven minutes. He'd been skiing with a dozen people — one with a baby strapped to his back. The others all survived.

Most victims — 78% — are back-country skiers, and it's ski buffs who are trying to fight the rising casualty rate. They've developed equipment — such as homing beacons for skiers to carry. They've set up hot lines warning skiers away from dangerous areas. And they teach avalanche seminars; participation has doubled since the mid-1980s.

All of which helped save Ryan's life.

On that February 1990 day outside Crested Butte, Ryan was skiing with friend Chad Meerbergen. They followed recommended guidelines by not skiing the slope together; Meerbergen was standing aside as a "lifeguard" in case anything went wrong.

When it did, burying Ryan in three feet of snow, Meerbergen used his avalanche beacon-finder to home in on the signal coming from a similar device worn by Ryan.

Beneath the snow, Ryan was losing his breath. "They tell you not to panic, but my mouth was full of snow and I was trying to clear it with my fingers," he says. He managed to bring his left hand near his face to clear his airway, so full of grit-like snow that he vomited.

Five minutes and a thousand prayers later, Ryan felt Meerbergen touch his hand, but he couldn't hear him screaming his name. Finding Ryan blue-faced and bloody, Meerbergen dug so furiously that he hit Ryan's chest with his shovel.

But then it was over. Neither said much. "We just hugged each other," Ryan recalls.

Equipment saved his life. Aside from the beacons, both men carried collapsible shovels and pole probes. Ultra-cautious back-country skiers even dig snow pits to "read" snow layers and measure danger before skiing.

But not all skiers are willing to spend that kind of time, and some ignore the equipment for financial reasons. Beacons alone go for $200.

Charlie Campbell had never worn a beacon. He put one on for the first time in 1981, when he and three friends were tracking up a five-mile wide glacier on the way to the summit of Mount St. Elias on the Alaskan/Canadian border.

A startling boom signaled an avalanche near the peak. Five miles away, Campbell watched it break loose and careen down the mountain, moving at incredible speed. Desperately skiing away, he looked around just as a 40-foot wall of white thundered over him.

Campbell woke up face down and saw a faint blue light. He tried to clear an air pocket near his face, but his arms were jammed in the snow's grip. He gasped for air, but his mouth was full of ice.

"I thought, 'You're a dead man,'" Campbell, 40, says. "I gave in. I didn't fight. I thought about my wife and how sad it was that I'd never see her again. Then I passed out."

Ten minutes later, he was freed by the others, who had traced his beacon.

He's worn one ever since.

Avalanche toll

Since last year, 17 people have died from avalanches; 384 have died since 1950, when Colorado's Avalanche Information Center began keeping records.

	1991-92 deaths	Since 1950
Colo.	5	126
Wash.	2	55
Alaska	0	40
Calif.	2	35
Utah	5	31
Idaho	0	25
Mont.	1	20
Wyo.	2	20
Nev.	0	9
Ore.	0	7
N.H.	0	7
Maine	0	4
N.M.	0	3
N.Y.	0	2

By Nathan Bilow, AP

CLOSE CALL: Larry Ryan, who survived an avalanche in Colorado, says specialized training and a homing beacon saved his life.