Snow & Avalanches in Utah

Utah Avalanche Forecast Center

Annual Report 1991-92

USDA Forest Service
Wasatch-Cache National Forest
Manti-La Sal National Forest
in partnership with
NOAA National Weather Service

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The Utah Avalanche Forecast Center is a cooperative effort between the USDA Forest Service, Wasatch-Cache National Forest, and the NOAA National Weather Service. Copies of this report can be obtained by writing or calling:

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The Utah Avalanche Forecast Center

The Utah Avalanche Forecast Center is a cooperative effort between the Wasatch-Cache National Forest and the National Weather Service. It is under the administration of the Salt Lake District of the Wasatch-Cache National Forest with offices located at the National Weather Service at the Executive Terminal Building at the Salt Lake Airport. The UAFC has three charters:

- Issue backcountry avalanche advisories to the public via a network of avalanche hotlines.

- Issue mountain weather forecasts for both the public and the cooperators in the UAFC information network, which includes the ski areas, the Utah Department of Transportation, and any other agencies in need of an accurate mountain weather advisories.

- Provide avalanche education to the public, through avalanche awareness multimedia lectures and short field courses. The UAFC also provides avalanche information to any interested party, which includes numerous requests from both the local and national media.

Backcountry avalanche forecasting in Utah is functionally separated into two entities--the Wasatch Mountains of northern Utah and the La Sal Mountains of southeastern Utah.

In northern Utah, the forecast covers primarily the northern Wasatch Mountains from the Utah-Idaho border near Logan to about Spanish Fork canyon south of Provo. Although very little use--and thus very little information--comes from outside this area, we also advise the public upon request for areas such as the Oquirrh Mountains, the Stansbury Mountains, the Uinta Mountains and Mt. Nebo area. The staff for this northern area includes director, Bruce Tremper, Brad Meiklejohn, Tom Kimbrough, and Evelyn Lees.

The second backcountry avalanche forecast area is the La Sal Mountains near Moab. In its fourth year of existence, Mark Yates and Craig Bigler operated the La Sal Avalanche Forecast Center under a Services Contract with the Manti-La Sal National Forest. This season report includes a season summary from both of these centers, although it concentrates on the Wasatch section because it receives a vastly higher amount of use.

The public accesses these forecasts via recorded telephone messages in the following locations:

Salt Lake City 2 1/2 minute forecast (7 lines)	364-1581
Salt Lake City 5 minute forecast (2 lines)	364-1591
Park City (one line)	649-2250
Logan (one line)	752-4146
Ogden (one line)	621-2362
Provo (one line)	374-9770
Moab (one line)	258-7669

Season Highlights

The winter of 1991-92 was the twelfth season of operation for the Utah Avalanche Forecast Center (UAFC). Noteworthy events of the winter include:

* Five backcountry skiers were killed in two separate avalanche accidents this winter. Four were killed in one avalanche in the La Sal mountains, the worst avalanche accident in Utah since 1926. This accident claimed the life of Mark Yates, director of the La Sal Avalanche Forecast Center.

* The first avalanche fatality in the Central Wasatch since 1987 claimed the life of one.

* There were 80 backcountry avalanche accidents and incidents in which 29 people were caught, 16 people were at least partly buried, 10 were completely buried, and 5 people were killed.

* Snow conditions were generally quite poor, as minimal snowfall created a shallow and unstable snowpack. Alta received 395" for the November to April season, the 10th driest winter in 47 years.

* UAFC education efforts reached local, state, national, and international audiences totalling 2,100 people through 36 presentations at avalanche slide shows, workshops, seminars, and conferences. Local, state, and national media coverage resulted in 30 newspaper articles and television and radio pieces.

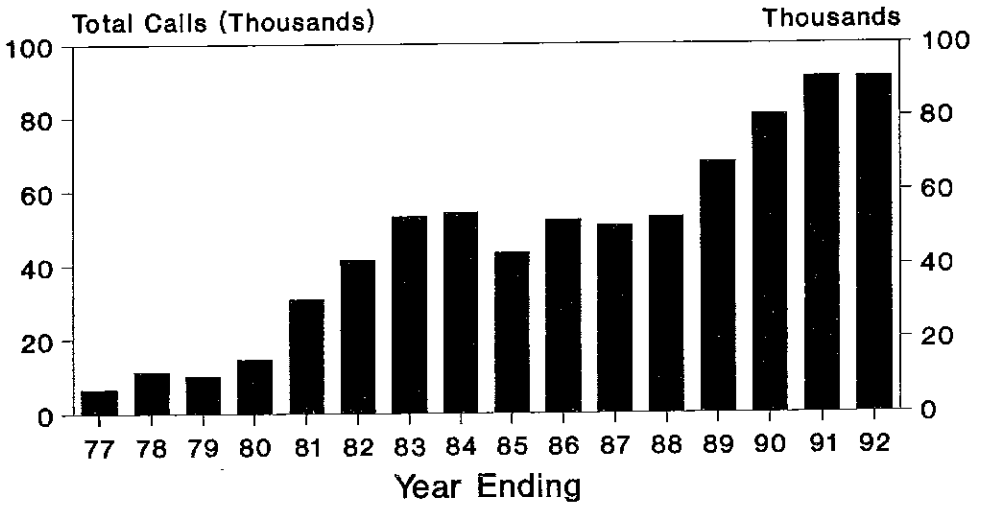
* The UAFC received 90,615 telephone calls for recorded avalanche and mountain weather information.

* The UAFC was incorporated into the US Forest Service National Avalanche Center.

* A staff of four operated the UAFC from October 24th through April 5th.

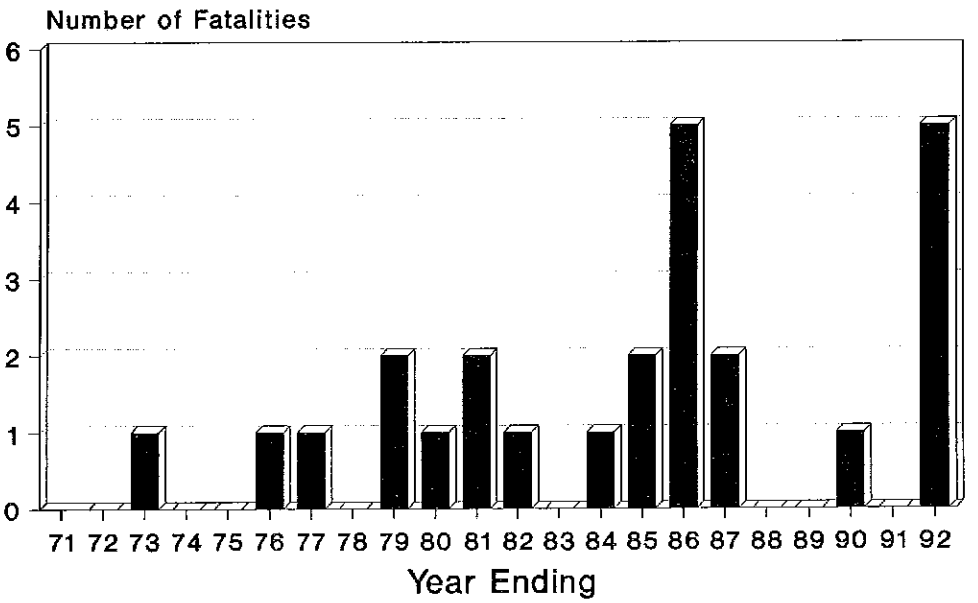
* Funds raised by the non-profit group Friends of the Utah Avalanche Forecast Center allowed for the purchase of a new digital voice announcer.

Total Calls to UAFC Recording
1977-1992



Because of the lack of snow, the total call rate to the UAFC recordings leveled off.

Avalanche Fatalities
UTAH 1971-1992



Utah avalanche fatalaties rose to record levels once again after a five year hiatus.

Introduction

From start to finish, the winter of 1991-92 was schizophrenic. In terms of snow, it is being referred to as "the winter that wasn't." Snowfall during December, January, and March was minimal, and taken as a whole, the winter stands as one of the driest on record. And warmest, as well, with temperatures in most of the winter months averaging above normal; the mountains never felt any cold air.

Yet despite the anemic character of the weather, the winter of 1991-92 brought the worst avalanche conditions to affect the western United States since 1986. As of early April, 17 avalanche fatalities had occurred throughout the west, with several additional bodies expected to be found when the snows melt. Utah experienced avalanche-related tragedy unlike any seen since the 1930's: five backcountry skiers were killed in two separate accidents, and the worst accident of the winter claimed the lives of four backcountry skiers in the La Sal mountains of southeastern Utah.

To some it might seem a paradox that avalanches could take such a heavy toll in a winter with little snow. Basic reasoning says you need snow to have avalanches, and more snow makes more avalanches. Yet it is the amount and frequency of snow that determines the kind and character of the avalanches that result. Frequent large snow storms create a deep and strong snowpack which produces avalanches within the new snow and are relatively easy to anticipate. Sporadic small storms interspersed with long dry spells create a shallow and weak snowpack which produces avalanches erratically and at depths clear to the ground. The rule of thumb "the thinner the snowpack, the worse the avalanche conditions" fits the winter of 1991-92.

As the season report for 1990-91 notes, here in Utah we have been "teetering on the brink of a disaster" for several years. There had been only one avalanche fatality in Utah during the four preceding winters, and the bubble seemed ready to burst. And burst it did, with the odds reasserting themselves in a painful way; five people were killed in avalanches in Utah this season, the worst winter since 1986. Mark Yates, founder and director of the La Sal Avalanche Forecast Center, was killed with three others in the worst avalanche accident in Utah since 1939. The fifth fatality in Utah this winter occurred in the closely-observed Central Wasatch, the first here since 1987.

Certainly the pain of losing friends and co-workers is real, and we sense, when confronted by the deadly reality of avalanches, our own mortality. Yet the Utah Avalanche Forecast Center program holds up well under scrutiny. The potential for avalanche disaster is nearly constant in the heavily-visited Wasatch, and we are fortunate that the results were not worse in a winter such as this. The high degree of public reliance on our service is often frightening, yet we have to remember that our job is to provide the public with information to use in making decisions, not to make their decisions for them. We can neither save lives nor lose them.

The Utah Avalanche Forecast Center is connected to a dense network of weather instrumentation, observers, and avalanche professionals in and around the Wasatch Mountains. The Wasatch Range may be the most closely observed mountains in the world, and the UAFC shares this benefit with the public. The avalanche and mountain weather information that we provide continues to be accurate, detailed, and timely.

The UAFC is in good shape; years of hard work have built a credible program which is supported by the USDA Forest Service and the public. Over 90,000 calls were made to the UAFC this winter for recorded avalanche and mountain weather information. By increments we have built a program we are proud of, and we will continue seeking ways to improve the services we provide to Utah's winter mountain users.

UAFC Operations this Year

Evelyn Lees Joins Staff

Joining Bruce Tremper, Tom Kimbrough, and Brad Meiklejohn this year at the UAFC was Evelyn Lees. Evelyn is a climbing guide for Exxum Guides in the Tetons of Wyoming, and has an impressive array of climbing experiences in Nepal, Tibet, Pakistan, Peru, Bolivia, Canada, Europe, Alaska and the lower 48. She has a dual degree in geology and soil, and has worked in Utah on cloud seeding and snow survey projects. Evelyn slid quickly and easily into the forecasting chair at the UAFC, and pleased us all with her sharp perception and bright enthusiasm.

Evelyn worked two office forecast days and two field days this winter, freeing Bruce to work on the video project. One of Evelyn's projects this winter was to bring avalanche education to the snowboarding community. She did a diligent job of setting up lectures, arranging advertising, and teaching beacon workshops, and we were pleased with the results. Evelyn is a welcome breath of fresh air, and has fit neatly into the UAFC program.

New Recording Machine

We finally broke down and replaced the rubber-band and duct-tape devices which powered a wobbly message out to the public. Those original Dictaphone multi-line announcers were workhorses for the first ten years of UAFC operation, and fielded nearly a quarter million calls over their lifespan. But progress won out, and there are no regrets.

With funds raised by the Friends of the Utah Avalanche Forecast Center, we purchased an Interalia digital voice announcer which functions easily and flawlessly. Not only is the message clear, but each caller hears the entire forecast from the beginning, not from some random point on the loop tape. This new device allows us to increase the length of the public message to nearly 4.5 minutes, a capacity we used on occasion this winter.

We are exceptionally pleased with operation of this machine, and plan to have additional memory installed during the summer of 1992 to allow us to put the longer and more detailed 5-minute recording on the same machine.

National Avalanche Center

At the initiative of Doug Abromeit, Winter Sports Specialist on the Salt Lake Ranger District, the Utah Avalanche Forecast Center has become part of a US Forest Service Center of Excellence. The National Avalanche Center, as it is called, will function as a resource base for Forest Service avalanche activities, as well as a training and educational facility for Forest Service snow rangers and avalanche forecasters. The National Avalanche Center is an extension of Doug Abromeit's work to consolidate and coordinate the military weapons avalanche control program. We are optimistic that the National Avalanche Center will provide the UAFC with expanded opportunities in the near future.

New Weather Station

As part of our effort to improve the weather instrumentation throughout the Wasatch Range, the UAFC donated a Campbell Scientific micrologger to Brighton Ski Resort. This unit was coupled with weather instrumentation and installed at the top of Brighton's new Crest Express chairlift. Bruce assisted with the installation, and the set-up worked well throughout the winter, but the wind data proved to be rather useless. The site does not seem to be well-exposed, and as a result the wind data is not an accurate reflection of winds on the surrounding ridges.

Japanese Exchange

All the previous work in establishing a U.S.-Japan cooperative agreement, during the last couple seasons, began to show fruits this season. The agreement formalizes a synergistic cooperation between the Japanese government and Forest Service, the Center for Snow Science at Alta, and the Department of Civil Engineering at the University of Utah. In the fall, Doug Abromiet attended an avalanche conference in Japan where he presented a paper on the use of explosives and military weapons for avalanche control. Dr. Rand Decker presented Bruce Tremper's paper intitled Avalanche Forecasting in the United States. Then in February, Bruce Tremper spent three weeks in Japan as a visiting scientist.

Bruce was on loan from the Forest Service to the Nagaoka Institute for Snow and Ice Studies. He traveled to several locations in Japan, evaluated the avalanche hazards and worked with local scientists and ski patrollers, training them in the technology of avalanche forecasting.

Bruce returned from Japan with three Japanese scientists in tow. They stayed at the Alta upper guard station where they observed avalanche forecasting and control work in Little Cottonwood Canyon. They were also able to obtain valuable field data from several technical projects on which they are currently studying. These include first, a probe of the snowpack, which when inserted into the snowpack, samples not only reflectivity of the snow using laser light transmitted through a fiber optic cable, but resistance to penetration, temperature, and free water content (as measured by a dialectic constant).

Their second project involved measuring the heat emitted by an avalanche using infrared sensing equipment.

Finally, they were able to observe the site where a fixed pylon will be constructed this summer. Then next season, they will return and mount various instruments on the pylon to measure avalanche impact pressures and flow properties. The pylon will be placed in an avalanche path on Mt. Baldy at Alta.

Video Project

Bruce Tremper continued work begun last season on an avalanche education video. The video is funded by a combination of a Challenge Cost Share Grant from the Forest Service Intermountain Region Office, private contributions and volunteer help from various organizations including Wasatch Backcountry Rescue.

The video is designed to be an extension of the video "Avalanche Awareness, a Question of Balance", which was produced in Colorado several years ago. It will be approximately an hour in length. It features interviews from some twenty avalanche experts from throughout North America which will be intercut with remote footage shot in Utah specifically for the project, as well as numerous shots purchased from other sources around both North and South America.

We have already used a couple of rough-cut segments of the video in various avalanche education seminars throughout the season with rave reviews. For instance, Bruce Tremper delivered a talk at the National Avalanche School in Colorado on safe travel techniques. He used a 38 minute rough-cut segment specifically designed for the talk as he narrated the action. After seeing the effectiveness of video for teaching avalanche classes, we hope to continue with these types of projects in the future.

The video will be completed by fall.

Season History - Northern Wasatch Mountains

Early Season

The Year in Review

A better start to winter the Wasatch has hardly ever seen. No early-season depth hoar, no agonizing wait for winter, just deep snow all at once. The first snows fell on October 23rd, followed by 52 inches between the 26th and 29th. The UAFC issued the first forecast of the season on the 24th of October, and was in full swing by the end of the month. The first backcountry avalanche incident was reported on the 2nd of November.

The first week of November saw warm and wet weather turn the snowpack to slop, then to ice as the temperatures cooled. The resulting crusts proved to be important bed surfaces for later avalanches. Light snow on the 14th and 15th added to the problem by providing a weak layer, and the capper, a slab, arrived on the 18th in the form of two feet of new snow. The UAFC issued the first avalanche warning of the season on the 18th. Another two feet of snow fell from the 20th to the 22nd, and from the 21st to the 23rd there were 7 backcountry avalanche incidents. The most serious took place in Day's Fork when a backcountry skier was buried for 5 minutes and suffered a broken lower leg. Another 2 feet of light snow finished the best month of the year with 120 inches.

December

The pattern continued into early December with two feet of snow on the 1st and 2nd, then they turned the faucet off. A few more small storms came by during the month, but big winds of over 100 mph on the 12th took care of any good skiing that might have existed. These winds also created extensive hard slabs which figured in 5 backcountry incident near the middle of the month. The dreaded inversion settled in for a long stay, and the mountain snowpack began to weaken while valley dwellers stewed in the murk. The month ended on a positive note, with a foot of light snow, and a total of 57 inches for December.

January

By early January the snowpack had gone rotten to the core, and hiking or skiing was similar to wallowing in a sandbox. The scenario looked bad, and was bad when 15 inches of snow arrived in the Wasatch. The UAFC issued the second avalanche warning of the season on the 7th, and between the 5th and the 9th there were 7 avalanche incidents in the backcountry. On the 5th, a famed mountaineer was caught in two avalanches while climbing Mt. Timpanogos, but he blithely stroked his way out of both and continued on. The month fizzled from the mid-point on, with a total of 42" representing the third driest January in 47 years.

El Nino

By early February climatologists had figured out that El Nino sea surface warming was controlling the winter weather pattern across North America, with the resulting split flow diverting weather north and south of Utah. No snow fell between the 15th of January and the 8th of February, and the UAFC posted a low avalanche hazard for 24 consecutive days through that period. At the same time, the general consensus was that we were looking at the weakest snowpack we had ever seen in the Wasatch. It had been a long downhill slide from the great beginnings in November.

February

Our fears were confirmed when snow began to arrive, and the tedium of the previous month became a longed-for memory. A moist southwesterly flow brought more snow to the southern portions of the state than the north, and on the 12th the grim news of four dead in an avalanche in the La Sals reached us. As the storm strengthened, the entire western U.S. was engulfed in a major avalanche cycle. The UAFC issued, for the first time ever, a statewide avalanche warning, and on 5 consecutive days rated the avalanche hazard as extreme. The hazard remained at high or extreme for 27 days from the middle of February to the middle of March.

Doubtless we will never know of all the close calls and near-misses that happened during this period of severe instability, but we do know that 33 separate avalanche incidents or

accidents occurred in the Wasatch during what is now dubbed the "Second Valentine's Day Massacre". The first Valentine's Day Massacre took place in February of 1986, and is the landmark all other avalanche cycles in the western U.S. are measured against. In 1986 a major storm invaded the west in the middle of February, and initiated an avalanche cycle that was estimated to be a 1-in-100 to 1-in-200 year event.

Second Valentine's Massacre

The Second Valentine's Massacre was similar to the first, and with 14 people killed in avalanches throughout the western U.S. during a month-long period, ranks as one of the deadliest in recent history. However, here in northern Utah, the storms this year never reached the fury attained in 1986, and the avalanches, while large, widespread, dangerous, and persistent, never equalled the magnitude and destructiveness of the original Massacre. Nonetheless, it was a very significant and long-lasting avalanche cycle, and provided many important, if painful, lessons to the public and to Utah's avalanche workers.

Avalanches occurred on 27 consecutive days from the 11th of February through the 8th of March, and there were literally thousands of avalanches during this period. The majority of the slides were breaking out to the buried depth hoar or faceted snow, and typical fractures were two to four feet deep. However, there were numerous slides five and six feet deep, and one of the largest, in Mineral Basin, was nearly a mile wide! February ended with a total of 85" of snow for the month, but the avalanches continued on into March.

March

Warm but dry conditions started the month of March, and served to keep the snowpack unstable and the avalanches active. Spring came early and stayed, and brought with it a breed of avalanches rarely seen in Utah. We knew tales of corn slabs from distant times, but this year they became nearly common. A shallow surface refreeze of 1 to 4 inches over a soggy depth hoar snowpack seemed to be the recipe for these corn skier's nightmares. This kind of avalanche caught the attention of backcountry skiers in four separate accidents, two in the backcountry adjacent to Snowbird in March and two in the Uinta's in early April.

A brief lull in mid-March tempted us to relax, but it was merely a ruse. A small snowstorm on the 8th put down a few inches of snow, which, under clear skies, quickly transformed into a weak upper-level faceted layer. Surface hoar accompanied this ULTG and made a potent combination which resulted in numerous avalanche incidents through late March and early April. After years of watching the Wasatch it is apparent that the formation of this upper-level weakness is common in early to mid-March. This layer forms rapidly in new snow, especially on northeast facing slopes above 9000'. It seems that the amount of solar input on these slopes is just enough to induce intense near-surface temperature gradients which weaken a surface layer of low density snow. Upper-level faceted snow is a very potent weak layer, with a high amount of pore space, little grain bonding, and a very low coefficient of friction. In reviewing our records for late March and early April, there were approximately 50 avalanches reported to the UAFC which occurred on northeast facing slopes above 9000' and which were 1 to 2 feet deep. This layer of faceted snow was buried 1 to 2 feet deep during this period.

March finished with 49" for the month, nearly half the 45 year average. The snowpack in the Wasatch ranged from 30-60% of normal, and what little there was of it was melting fast. The decision was made to close the UAFC in early April due to lack of funds. In a cruel joke, just a couple days before our scheduled last day of operation, an extreme skier was killed in an avalanche on April 1st, on a radical slope in Mineral Basin on the northeast face of the east peak of the American Fork Twin Peaks. This avalanche failed on the thin layer of well-developed faceted snow, and the fracture was 1.5 to 2 feet deep.

Spring Meltdown

Cognizant of the persistent instabilities within the snowpack, the UAFC reluctantly ceased regular operations on April 5th, but issued sporadic updates as conditions required. A heat wave blasted the Wasatch in early April and provoked another round of avalanching, this time full-depth slides on northerly aspects, as the weak depth hoar became moist with melt water. Certain

drainages, like the dreaded Mineral Fork, experienced extensive avalanching of the entire snowcover. Cooler temperatures and a welcome snow storm allowed the Easter bunny one last chance at powder skiing, but not without keeping one eye over his shoulder.

The remainder of of April just melted away, and the month ended with 27 inches of snow. The season total, from November through April, was 395", the tenth driest in a 47 year period of record.

The winter of 1991-92 was all or nothing, warp speed or a dead standstill. There was no in-between, no relaxed mid-season powder, no comfortable corn skiing. The best of the season came in November and never was seen again. Up to the 12th of February the UAFC forecasters felt like Maytag repairmen, and after that we lived on adrenaline and fear.

La Sal Avalanche Forecast Center

In its fourth season of operations, the La Sal Avalanche Forecast Center (LSAFC) was rocked by tragedy. The founder and director of the program, Mark Yates, was, along with three others, killed in an avalanche in the La Sal mountains in February. This event touched all of us who had worked closely with Mark in establishing the LSAFC program and who were touched by Mark's boundless enthusiasm.

Mark Yates approached the Moab District of the Manti-Lasal National Forest in 1988 with a proposal for a local avalanche forecast office serving the La Sal mountains in southeastern Utah. The Forest Service liked the idea, and asked the UAFC to assist Mark Yates in establishing the La Sal Avalanche Forecast Center. Staff from the UAFC spent time with Mark, both in the Wasatch and in the La Sals, and in the UAFC office.

Under a Service Contract issued to Mark Yates by the USDA Forest Service, the LSAFC began operations during the 1988-89 winter season, and operated independent of the UAFC for three seasons. Mark had created an excellent program and was providing a great service for all the winter users of the La Sals. Mark was tireless in finding creative ways to share his joy of the mountains with the public. His loss has been felt deeply by all who knew him.

Craig Bigler, Mark's assistant at the LSAFC, was buried in the same avalanche which killed Mark, yet miraculously dug himself out. Craig has carried on the work of the LSAFC to finish the season, and has shown remarkable determination in the face of tragedy. We appreciate Craig's persistence, and his year-end report from the LSAFC is attached here.

Season History - La Sal Mountains

The fourth season of the La Sal Avalanche Forecast Center had a heady beginning with early snowfall and record numbers of phone calls and skier participation. Then things turned sour with a long drought. That finally ended, after 31 days, with a snowfall of 9 inches between Feb. 7-11. This turn of events spurred a tragic accident on Feb. 12. On that day six skiers closely associated with the center, including its director Mark Yates, relaxed our vigil in a quest for powder snow. The avalanche we triggered buried all of us. Four people, including Yates, perished.

The recorded message on mountain weather, snow, avalanche, and road conditions was updated daily, November 27 through Feb. 11. Brad Meiklejohn from the UAFC picked up the task Feb. 13-18. After that Craig Bigler prepared the forecast five days a week, through April 15, with seven days of UAFC staff participation and close coordination with them the rest of the time. A total of 3216 calls were made to the center this year, compared to 2,811 last year.

In January the Moab Ski Club was reestablished to give local skiers the opportunity to be acquainted with each other and a means to speak as one in the local political arena. The Club

also served as the springboard for the creation of the a Winter Hasty Team. This team was formally assembled and protocols established by Feb. 6, and performed its first official recovery Feb. 13-15, the fifteenth ironically being the day scheduled for a formal training exercise.

Backcountry recreation in the La Sals was headed for a remarkable record until the accident on Feb. 12 and unusually mild weather followed. One indication of increased usage was the need to install a third toilet at the Geyser Trailhead in December. Another was the surprising success achieved by Tag-A-Long Expeditions at marketing use of ski huts near Mt. Tomasaki and Dark Canyon Lake. But, then the tragedy seemed to seriously undercut enthusiasm for backcountry skiing, especially on the part of locals. A high avalanche hazard for several days after the tragedy probably encouraged locals and visitors alike to drop skiing for hiking and biking in the canyons. The mild weather made the transition from mountain to canyon even more attractive.

The season started early, with significant snowfall in October and the middle of November. Periodic snowfall in December through the first week of January brought trailhead snow depth to 45 inches, the most since the forecast program began, and kept participation at a very high level. For the first time a cadre of accomplished skiers and experienced backcountry explorers developed locally. Then came the 31 day drought, forcing backcountry explorers to work hard at finding the good places to ski and to learn a lot more about the geography of the mountains. Thirty-eight inches of snow fell in February. Forty-four inches fell during March. Water content of the snow was 110% of average at the end of March. Snow depth peaked at 61 inches at the trailhead and at 89 inches on Geyser Pass. An inch and a half fell on April 15, the first for the month.

A few avalanches were noted in December and early January. These were wind slabs mostly and a few new snow sluffs. During the drought the entire snowpack turned to depth hoar, stable until new snow fell on it. The first February snowfall triggered only a few sluffs and a couple of soft slabs slides out of steep chutes. One test slope collapsed. This activity occurred on north to east aspects. The skier triggered avalanche of Feb 12 slide on a NNE aspect. The heavy snow of Feb. 13-14 triggered massive natural avalanches on all aspects except south. The drier snow of Feb. 16-17 followed suit. Both of these cycles featured avalanches sliding on the old surface; no ground slides were noted except for sluffs at the tops of very steep chutes.

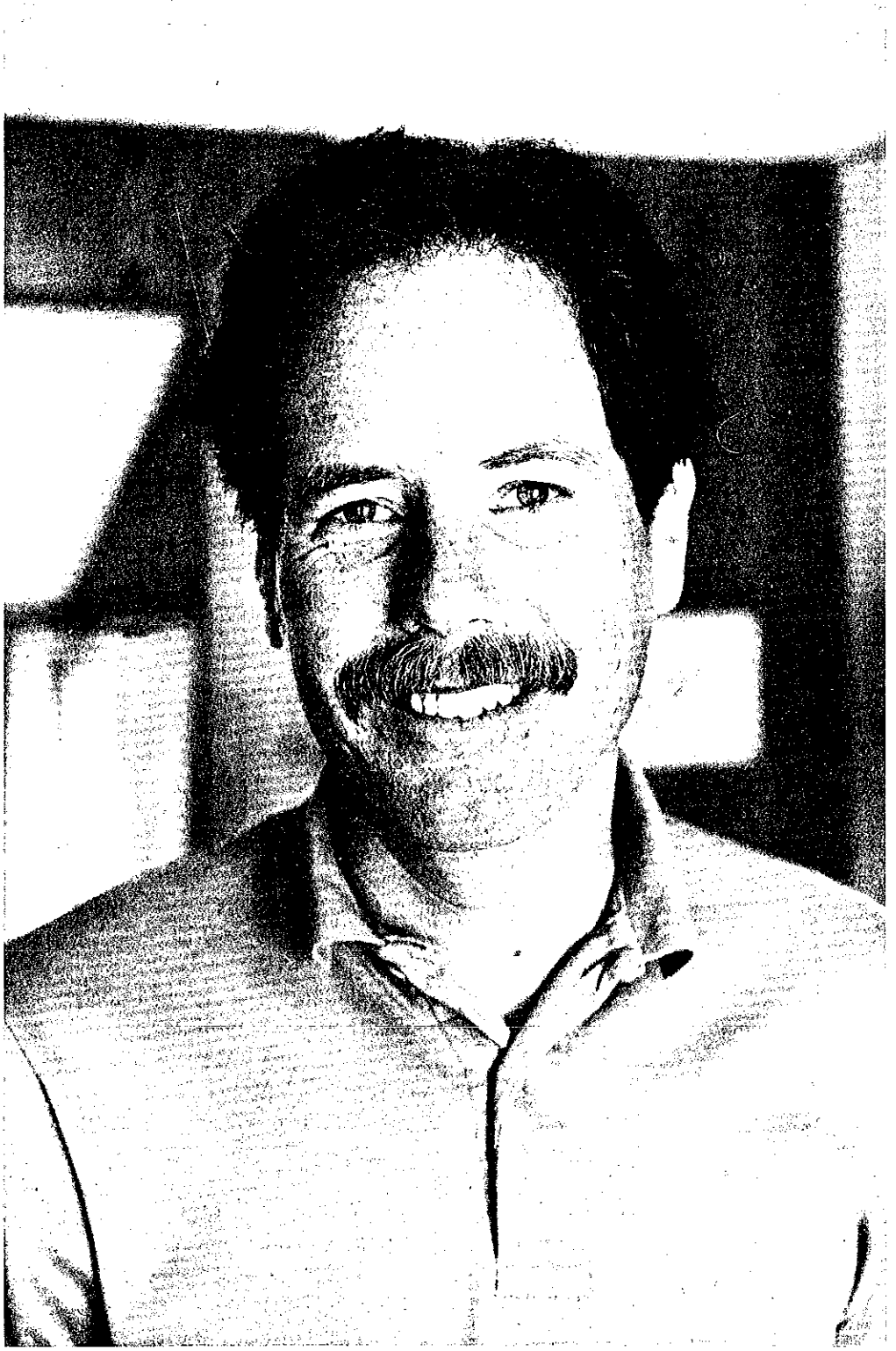
Some wind pocket slab slides happened on north aspects Feb. 23, March 3 and 20. One wet slide was observed on a SW aspect Feb. 28. A lot of point releases, roller balls, and surface slides were observed during the last ten days of March and the first week of April. In spite of loading from heavy winds in March, none of these stepped down below the snow that fell on March 20. Finally, on April 12 a point release high on the north side of Melenthin stepped down to the ground.

After the first two days beginning Feb. 29 my pleas for information from forecast callers initiated no response. Local skiers with knowledge enough to provide useful information had all gone biking, all of them being connected to the bike guiding industry. So I spent a lot of time in the parking lot talking to out of town skiers. I skied with a few of them. Many were able to provide useful information.

Grand County plowed the road to the Geyser Trailhead and San Juan County plowed the road to the Dark Canyon Trailhead on a timely basis. Tag-A-Long groomed the major trails.

Finally, I don't have a record of the PR work done by Mark. Of course he participated eagerly in a presentation about the center at the Regional Office, in the ski club, and with the formation of the hasty team. He also prepared a listing of ski slopes and avalanche areas to make communication easier. I truly miss him.

Submitted by Craig Bigler



Mark Yates 1954-1992

Avalanche Accidents and Incidents

Avalanches seem to wear two faces, and during four years of relative quiet here in Utah, avalanches smiled benignly. We have held our breath through these years, heads shaking in puzzlement at the numerous near-misses, at the blatant blunders forgiven so lightly. We liked to take credit for this serendipity, but knew that it was more a matter of odds and a matter of time.

This year avalanches wore the face of malice; there were five avalanche fatalities in Utah this winter, more than we have seen here since the disastrous winter of 1985-86. There were also more avalanche accidents than in any other year since the UAFC began keeping records. There were 80 separate avalanche incidents and accidents in the Wasatch alone, and 29 people were caught in avalanches, 16 were partly buried and 10 were totally buried and five killed. Thirty-three of these incidents occurred between Feb. 4 and March 5, and during this same period there were 14 people killed in avalanches around the western U.S. This period is now being referred to as the Second Valentine's Massacre, the first having occurred during an equally-deadly period in February 1986.

Two Dog Slide Accident

Of all the incidents during the winter, three stand out for the severity of the results. On Nov. 23rd a backcountry skier was caught, carried and buried in an avalanche in Day's Fork of Big Cottonwood canyon. This slide was on a path known as Two Dogs, which is infamous for the number of accidents which have occurred there. The name is derived from the fact that two pet dogs were killed on this slope in 1981 when a backcountry skiing party was caught in an avalanche. In 1977 this same slope was the scene of the first rescue in the U.S. where rescue tranceivers were used to recover a live victim. This winter, rescue beacons were again used effectively by party members to quickly recover the victim in 5 minutes. He escaped with a broken tibia-fibula.

La Sal Accident

The worst accident of the winter, not only in Utah but throughout the country, occurred in the La Sal mountains of southeastern Utah. On Feb. 12, Mark Yates, director of the La Sal Avalanche Forecast Center, accompanied by his assistant Craig Bigler, and four friends, skied to Talking Mountain cirque at the head of Gold Basin. As they were climbing up into the cirque they experienced a large collapse of the snowpack which released three avalanches in the bowl, two of which ran together and overwhelmed the party. All six were completely buried, but two, Craig Bigler and Steve Meleski, were able to dig themselves out and completed the recovery of their companions, who were all dead.

This was the first significant avalanche accident to occur in the La Sal mountains, and the worst avalanche accident in Utah since 1939. The tragedy drew special attention because Mark Yates was the director of the LSAFC, and because the group was composed of trained and experienced people. The US Forest Service did a thorough investigation to determine the circumstances and conditions surrounding the accident. Doug Abromeit was part a member of the Investigation Team, and Brad Meiklejohn was a Technical Specialist for the investigation.

The accident occurred after 10 inches of new snow had fallen over a five day period, this following a 31 day drought. The snowpack prior to the new snow consisted almost entirely of weak, cohesionless faceted snow, also called depth hoar. It was well-known, and accurately forecast, that when a sufficient load had built up over the weak snowpack that conditions would be quite severe. However, at the time of the accident, it did not appear that the critical point had been reached. There were some indications of instability, such as collapsing of the snowpack, but virtually no avalanche activity had been observed. It was believed by the La Sal forecasters that the rate of loading of the new snow was slow enough to allow the snowpack to absorb the stress.

However, faceted snow of all kinds, and depth hoar in particular, has a limited capacity to deform in response to compressive stress, and instead tends to store the stress and release it catastrophically through collapse. Collapse of a weak layer is an effective avalanche triggering mechanism, and collapses can travel and release avalanches at distances up to a mile away from the original point of disturbance. In this way, it is possible to trigger avalanches on steep slopes while you yourself are standing in a flatter area some distance away. In the case of the accident in the La Sals, the collapse traveled approximately 800' from a low angled slope to steeper slopes above and started the snow cover in motion.

At the time the avalanche struck the party, they were stopped and discussing whether they should continue to climb or descend. They were arrayed in single file, as they had used climbing skins to ascend directly up the slope without traversing. It appears that the main motive for ascending into the cirque was for powder skiing, but Mark Yates was working that day to collect snow and avalanche information for the upcoming holiday weekend.

This event profoundly affected all of us at the UAFC, not only for its magnitude, but for its personal proximity. Mark Yates was a friend and co-worker, and several of the others were friends or acquaintances. Two of the party members had been in a three day avalanche workshop the UAFC had taught a month before. The reality of avalanches was never so powerfully felt until the day I dug my friends out of the snow.

The accident also demonstrated our own vulnerability as avalanche workers. Certainly mistakes were made in this accident, and we hope to not make the same ones, but there are plenty of other ways to err and not come home. Most of us have found ourselves in similar places, in similar situations, and our mistakes were forgiven on those days. The complexity of the natural world is far too great to grasp precisely, and perhaps we are arrogant to presume to predict or forecast avalanches to a high degree of accuracy. Our knowledge leads us up to the edge to peer over, but respect and humility suggest we take a few steps back.

American Fork Twins Accident

In contrast to the accident in the La Sals, the avalanche fatality here in the Wasatch on April 1st evoked much less introspection or compassion. While the former was a situation we could empathize with, the latter seemed a result of a blatant lack of respect for the conditions. The accident, the first avalanche fatality in the central Wasatch since 1987, occurred on the northeast face of the east peak of the American Fork Twin Peaks.

The victim, Mark Marria, 21, was a self-described extreme skier, intent on having his skiing exploits recorded on film. The objective of the day was to get some footage for an extreme skiing movie. They did not call the avalanche forecast, and other than a cursory snowpit, they did they take the time to carefully evaluate the stability of the slope. Two of the survivors later testified that Marria would probably have skied the slope regardless of what the snowpit showed. In fact, one companion chose not to ski the slope after looking at the snowpit. The slope Marria chose was radically steep, starting in a snowfield angled at 40 degrees and falling away to a narrow 50 degree chute through cliffs. The snowfield broke out as a slab when he was about a dozen turns down the upper snowfield. He was carried about 800' vertical feet, and buried 7' deep for 20 minutes. The coroner determined the cause of death to be traumatic asphyxia.

The best that can be said about this accident is that only one person was on the slope when it avalanched, and the other members of the group did an excellent job during the rescue. Additionally, the avalanche, including the rescue, was captured on film. This type of skiing is increasingly common, and perhaps this footage should be used to inject a dose of reality to this dangerous game.

The winter of 1991-92 taught many hard lessons to neophytes and veterans alike. We developed the ability to ski with one eye looking over our shoulder, and to hold our breath for weeks at a time. We never did have a chance to relax this winter; the mountain spirit seemed darker somehow. We learned respect, though, and perhaps a little humility, too.

Avalanche Accidents and Incidents, 1991-92

Date	Location	Details
11/2	Alta - Eddie's High	Skier-triggered avalanche
11/17	Alta - Baldy, Main Chute	Skier caught and carried
11/19	Day's Fork - Two Dogs	3 snowboarders nearly caught
11/21	Alta - Emma Ridge	Skier-triggered slide
11/22	Alta - Rocky Point	Triggered with a cornice
11/23	Logan - Tony Grove	Skier-triggered slide
11/23	Alta - Twin Lakes N. Glades	Triggered by moonlight skier
11/23	Brighton - Pioneer Ridge	Triggered by skiers
11/23	Day's Fork - Two Dogs	Skier caught, carried, totally buried. Recovered with beacons. Broke tibia-fibula.
11/23	Snowbasin - Monte Cristo	Triggered by snowmachiners.
12/8	Patsy Marley	Cornice broke, skier took a rough ride down a chute, lost a pole and ski
12/13	Willow Heights	Skier-triggered from flats
12/13	Rocky Point Chutes	Skier-triggered hard slabs
12/13	Reynold's East Face	Triggered by kicking cornices
12/14	Broad's Fork	One skier caught and carried
12/15	Kesler Peak	Skier-triggered
12/31	Silver Fork - Meadow Chutes	Large loose snow slide triggered by skier
12/31	Upper Days Fork	1 skier caught, skied out
1/5	White Pine	1 skier-triggered avalanche
1/5	Park City - Daly Canyon	Full-depth slide triggered by skier
1/5	Timpanogos - Primrose Cirque	1 skier caught twice, but swam out of both slides
1/6	Park West - Cinder Chute	Skier-triggered hard slab
1/6	Cardiff Fork	2 skier-triggered slides
1/7	Park City - Daly Canyon	Sympathetic 100' from skier
1/8	Park West - Murdock Peak	Sympathetic to skier on ridge
1/9	Snowbasin - Porky Cirque	Triggered by skier 70' away
1/15	Day's Fork - Two Guys	Ski-cut slide
1/23	Uinta Mountains	Slide triggered by snowmachiners
1/24	Bear River Drainage, Uinta Mountains	Triggered by snowmachiner, 1 snowmachiner caught and carried, two machines buried
1/31	Superior Peak	Large wet slide triggered by snowboarder
2/11	Ogden - Near N Ogden Pass	Several large wet slides triggered by skier
2/11	Park City - Daly Chutes	Triggered on 20 degree slope
2/12	Gold Basin, La Sal Mtns	6 skiers caught and completely buried, 4 killed

2/12	Maybird - Little Cottonwood	2 caught, 1 totally buried, 1 partly buried
2/12	Park City - Homelight	Sympathetic to skier
2/15	Ogden - Snowbasin backcountry	Triggered by hiking skiers
2/15	Ogden - Powder Mountain	One person caught, not buried
2/15	Peak 10,420'	Triggered by skier on ridge
2/15	Uinta Mountains	4 separate slides triggered by snowmachiners
2/15	Ant Knolls	Skier triggered several slides
2/15	Road between Heber and American Fork	1 snowcat caught and buried while doing grooming
2/17	Mill D North - Short Snort	1 skier-triggered slide
2/17	Beartrap	2 skiers caught, 1 broken leg
2/17	Claytons Peak - Great Western	1 skier caught, carried, buried to chest. Lost equipment
2/18	Snowbasin backcountry	Skier triggered, skied out of it
2/18	Cardiff Fork - Upper Ivory	Sympathetic to skier 200' away
2/19	Park West - Pointy Peak	Sympathetic to skier
2/20	Day's Fork	2-4' fracture 400 yards wide triggered by a cornice kicked off
2/21	Park West backcountry	Sympathetic to skier on ridge
2/22	Park West backcountry	Sympathetic to skiers
2/22	Park West - Sound of Music	Triggered by skiers
2/22	Logan - Bunchgrass Bowls	Triggered by snowmachiners
2/22	Ogden - James Peak	Heli-skiers triggered numerous avalanches
2/23	Park West - Murdock Peak	Skier caught, carried, completely buried, with only top of head exposed.
2/23	Park City - Daly Canyon	Triggered by snowboarder
2/23	Park City - W. Monitor	Triggered by kicked cornice
2/26	Uinta Mountains	Slide triggered by snowmachiners
2/26	10420'	Triggered by skiers
2/26	Alexander Basin	Triggered by skiers
2/26	Gobbler's Knob	Small wet slab caught one skier
2/27	Reynold's	Triggered with a collapse
3/1	Park West - Murdock	Skier-triggered slide
3/1	Park West - Pointy Peak	1 skier caught
3/1	Snowbird - Mineral Basin	Triggered by snowboarder on supportable crust
3/1	Logan - Steam Mill Canyon	Triggered by snowmachiners
3/3	Silver Fork - Davenport Hill	Skier-triggered slide
3/5	Day's Fork	1 skier caught in wet slab
3/15	American Fork Twin Peaks	4th person to ski slope triggered corn slab. Caught and carried, not buried
3/17	Main Day's	Skier-triggered by jumping on ridge
3/19	Park City - West Monitor	2 skier-triggered slides
3/20	Cardiac Ridge	Ski cut slide
3/25	Day's Fork	Skier-triggered slide

3/27	White Pine	Several skier triggered slides, including one which caught, carried, and partially buried a heli-ski guide
3/28	Sunset Peak	1 skier caught, carried
3/28	Sunset Peak	Slide triggered by hiking skier
4/1	Mineral Basin	1 skier on downhill equipment caught, carried, buried, killed
4/1	Tuscarora Chutes	Large point release triggered by skiers
4/1	Uinta Mountains	2 skiers caught, carried on a nasty ride, both buried to the waist
4/2	Uinta Mountains	Large wet slab triggered by skiers, nearly caught skiers
4/12	Silver Fork	1 skier caught, carried,

Backcountry Observer Program

In the early years of the program, the UAFC depended entirely on the staff to collect field data on existing snow and avalanche conditions. In those days, if we were not out there we didn't know what was going on, and considering the size of the forecast area, we frequently didn't know. In 1987 the UAFC formalized an observer program for two reasons: 1) to increase our knowledge of conditions in outlying areas, and 2) to draw local skiers into the program and improve UAFC credibility. The deal was, and still is, that qualified backcountry skiers would tell us what they saw on their tour and we would pay them $10.

At a distance of five years, we can say the program has been highly successful. This year the UAFC received 483 backcountry observations, 130 of which were made by UAFC staff, while the remaining 353 were made by our official observers, and by other interested people. Two of our observers, Bob Athey and Greg Dollhausen, combined for a total of 162 observations between them!

All of this information cost the US Forest Service a total of $2200, the best bargain the government ever got. An additional $580 was paid out to Bob Athey through the Friends of the UAFC account. Fortunately, after some snafus the previous season, the program ran simply and effectively.

Observer	Nov		Dec	Jan	Feb	Mar
Logan						
Kevin Kobe	7	7	3	4	4	
Ron Stagg	1	2	3	5	3	
Al Mauer	2	2	4	7	5	
Mark Hammond	3					
Mark Bowen	1		3			
Ogden						
Brad Bodily	2	2	2	3	3	
Brian Smith	2	2	2	2	2	
Park City						
Greg Dollhausen	15	13	12	15	19	
Rip Griffith	6	6	10	6		
Salt Lake City						
Bob Athey	16	19	19	17	17	
Totals	46	53	57	63	59	=278

Avalanche Education

In this business you always wonder how you got through last year knowing as little as you did. The maxim, "the more you know, the more you know you don't know" holds true here. As Bruce Tremper likes to say, "Statistically, avalanches come with about 6 cheap lessons. Then you get an expensive one. Trouble is, sometimes the expensive one comes first." This year even the greyest veterans did some learning, and for a few the lessons were not cheap.

Avalanche education is a long, slow process wherein you proceed from blissful ignorance to shear terror to prideful certainty to humble respect. Unfortunately, most people want to short-circuit the process to get at the pure knowledge, to know, exactly, what will happen where, when, and why. Only in our models and in our minds is life that simple.

Teaching the public about avalanches is the primary charter of the UAFC, whether through our daily advisories or slide shows and workshops. The Wasatch Front has perhaps the most avalanche-savvy population of any area in the country, and party talk of depth hoar and soft slabs is more common than politics. The mountains are a way of life here, and the UAFC is a lifeline for the city-bound.

The UAFC attacked avalanche education this year, and in 36 presentations reached a total audience of nearly 2,100. These presentations ranged from the standard one hour dog-and-pony shows to nerve-wracking technical presentations before scientists and engineers. Bruce and Brad perfected a tag team presentation for the rubber chicken circuit which consistently drew big crowds, while Evelyn gets a gold star for her efforts to reach the snowboarding community.

The staff of the UAFC, in conjunction with the Friends of the UAFC, put on its annual 3 day workshop at the Wasatch Mountain Club Lodge in Brighton. While the snow conditions

were very stable, the class filled rapidly with 26 eager and able students who seemed to appreciate and understand our message. Sadly, two of the students were later involved in the avalanche in the La Sals, and one of them, Jeremy Hopkins, was killed. In response to public interest in that accident, the UAFC gave a presentation at the University of Utah which discussed the La Sal accident as well as the other fatal accident of the winter.

Date	Forecaster	Location	Topic	No. People
11/9	Tremper	National Avalanche School	Safe Skiing	180
11/16	Tremper/ Kimbrough	Spruces	Beacon Workshop	60
11/19	Tremper/ Kimbrough	REI	Avi Awareness	150
11/25	Tremper	Black Diamond	Avi Awareness	20
12/13	Meiklejohn	Univ. of Utah Meteorology Dept	Avalanche Weather	30
1/7	Meiklejohn/ Tremper	REI	Avi Awareness	100
1/8	Meiklejohn	Utah State Univ.	Avi Awarness	50
1/9	Tremper	Weber State Univ	Avi Awareness	100
1/10	Lees/Kimbrough	Bureau of Recthenation	Avi Awareness	65
1/12	Meiklejohn/ Tremper	Highland High	Snowboard Safety	35
1/14	Tremper	Park City Jr High	Avi Basics	150
1/15	Tremper/ Meiklejohn	Univ of Utah Outdoor Recreation	Avi Awareness	50
1/16	Tremper	National Weather Service	UAFC Operations	25
1/18-20	Staff	Brighton	3 day workshop	25
1/18	Tremper	Sierra Club	Avi Awareness	10
1/24-26	Lees	Alaska Mtn Safety Center	3 day workshop	33
1/26	Lees	Spruces	Beacon workshop	8
1/27	Tremper	Nagaoka, Japan	Avi Forecasting and control	100
1/29	Meiklejohn	Canyonlands Field Institute	Avi Basics	30
1/30	Tremper	Tonigawa,Japan	Beacon Workshop	6
2/4	Tremper	Shinjo, Japan	Avi Forecasting	10
2/5	Lees	Univ. of Utah Museum of Nat. History	Avi Awarness	50
2/15,28	Lees	Utah Sate Univ	UAFC Operations	40
2/20	Kimbrough	Whitmore Library	Avi Basics	30

2/22	Kimbrough	Boy Scouts	Avi Safety		20
2/21-23	Meiklejohn	Alaska Mtn Safety Center	3 day workshop		30
2/23	Lees	Alta	Beacon workshop		20
2/27	Meiklejohn	Weber State U	Avalanche Mechanics		20
2/28	Lees	Utah State U	UAFC tour		8
3/6	Tremper	Univ of Utah	Snow dynamics		20
3/11	Tremper	Univ of Utah	Snow dynamics		25
3/21	Meiklejohn	Cold Regions Research and Engineering Laboratory Hanover, NH	Avalanche Mechanics		150
4/9	Staff	Univ of Utah	Moab Aval. Accident		250
				Total	**2100**

Media Contacts

Myths and misconceptions surround avalanches, and it is a constant struggle for the UAFC to correct and improve the public perception. The media provides us with an avenue of approach, but through our experience we have become quite leery that our words and message will be perverted by an uninformed editor to worsen, rather than improve, general knowledge of avalanches. We have in the past spent literally hours carefully describing to reporters the slab avalanche phenomenon, only to see the resulting articles talk about "ball-bearings" and "acts of God." The painfully inaccurate media pieces far out-number the marginally correct ones.

Through trial, error, and persistence, the UAFC has developed an excellent working relationship with certain local reporters such as Craig Hansell and Mike Gorell of the Salt Lake Tribune, and Doug Palmer of the Deseret News. We no longer feel the need to preview the copy on stories written by these individuals, as they have a thorough understanding of avalanches. We can count on these reporters to write timely and informative articles about the UAFC and about avalanche conditions and avalanche accidents throughout the winter.

At the other end of the spectrum, we are constantly assaulted and insulted by grossly inaccurate, sometimes hysterically funny, pieces which undermine the good work of the few. As an example, a Utah state office issued a two-part series on avalanches which may stand as the best of its genre. According to the piece, "snow do (sic) not accumulate on slopes steeper than 45 degrees ...once cracks begin, there is nothing to which the snow can adhere. It is poised as a bobsled on an icy run ...If an "air cushion" forms beneath the avalanche, its speed may exceed 400 mph ... Avalanches are more likely on sunny days because the sun helps destabilize packed snow ...an avalanche can be started by a bird, an animal, a snowball, or vibrations of sounds." Articles such as these, even if they contain some truth, work against our efforts to educate the public about avalanches.

Media attention seems to center around avalanche accidents and avalanche warnings issued by the UAFC, and predictably there was quite a bit of attention this winter. There were thirty separate newspaper articles in which the UAFC was featured or mentioned, and a similar number of radio and TV pieces.

Finally, the UAFC uses the media on a daily basis to spread our message out to the community. We have been appearing live on the Park City radio station KPCW every morning for over 10 years, and have done the same on the Salt Lake station KRCL for the past two years.

Bill Alder, Meteorologist-In-Charge at the SLC National Weather Service where the UAFC is located, has arranged to have the UAFC telephone numbers listed in the Salt Lake Tribune next winter.

Date	Forecaster	Agency	Topic
10/29	Kimbrough	SL Tribune	Early Season
11/5	Kimbrough	SL Tribune	Quotes of Note
11/18	Tremper	SL Tribune	UAFC
11/20	Tremper	SL Tribune	UAFC Operation
11/24	Tremper	Channel 2	Avi Accident
11/24	Tremper	Channel 4	Avi Accident
11/24	Tremper	Channel 5	Avi Accident
11/25	Tremper	SL Tribune	Avi Accident
11/26	Lees	KSL Radio	UAFC, Avi Safety
12/16	Tremper	USA Today	Mountain Weather
12/10	Lees	SL Tribune	New Staff Member
1/24	Tremper	Nagaoka TV, Japan	Avi Forecasting
1/31	Tremper	Tanigawa TV Japan	Snowpits
2/12	Lees	SL Tribune	Avi Warning
2/13	Soucie	SL Tribune	La Sal Accident
2/13	Soucie	Deseret News	"
2/13	Soucie	All TV Stations	"
2/13-16	Meiklejohn	All Media	La Sal Accident
2/14	Kimbrough	SL Tribune	Avi Warning
2/14	Kimbrough	Deseret News	Avi Warning
2/15	Kimbrough	KSL	Avi Warning
2/16	Tremper	Channel 5	Avi Warning
2/16	Tremper	Channel 2	Avi Warning
2/20	Meiklejohn	Anchorage News Alaska	Avi Safety
2/27	Kimbrough	Provo Daily	UAFC Field Work
4/1	Lees	SL Tribune	Avi Accident
4/5	Tremper	SL Tribune	End of Season

Budget

The budget provided to the UAFC by the US Forest Service this winter was $74,906, a sizable increase over the $62,406 operating budget for the 1990-91 season. Despite the increased funding, the UAFC was forced into its earliest closing ever on April 5 when the funds ran out. This, despite persistent instabilities within the snowpack and an avalanche fatality four days before operations ceased.

Each year we are asked to pare away the excess of our program, to trim any fat, yet a quick look at the pie chart of our budget shows that there is no fat. This year there was no money for equipment, no money for computer maintenance or programming, no money for office

supplies, no money even for the catch-all category of "miscellaneous" which normally allows us to purchase as-needed material like film and books. An ever-increasing percentage of our budget is consumed by salaries alone which rise to match the cost of living while the budget does not. A comparison of the budget for 1992 and that for 1989 shows that the proportion of the budget consumed by salaries has risen 20% during the period.

Since its inception in 1980, the budgetary knife has never been far from the neck of the UAFC. There has never been a budget which has provided the UAFC with the means to function to its full capacity. Shear determination and commitment keep the program from sliding backwards from a status quo position. A funding level of $100,000 would be a reasonable level to operate at, yet that seems an impossible goal.

There appears to be no easy solution to this dilemma. The state appears unwilling to yield up any money, the ski areas likewise, and the Forest Service is left holding the entire purse. The Forest Service contributes generously, at a level equal to or above amounts given the other two regional avalanche centers in Colorado and the Northwest; no additional support seems likely from that quarter. We have pounded the streets, learning to hate the trade of fund raising.

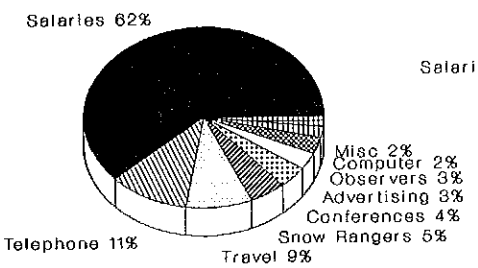
The notion of the UAFC playing an essential role in the National Avalanche Center is disconcerting given the current situation. We cannot provide the public with the basic services which form our charter, yet we hope to charge off in visionary new directions. There is some hope that a shift in our funding source to the Regional Office will remove us from the annual budgetary tea parties, but given past experience our optimism is tempered.

Friends of UAFC

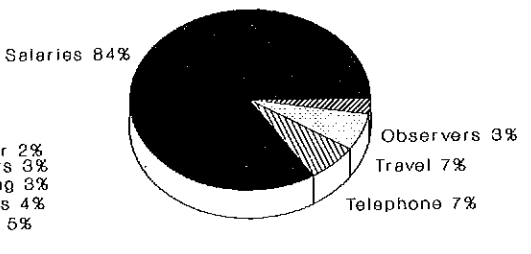
The Friends of the UAFC, established in 1991 as a tax-exempt fund raising body for the UAFC, again proved effective at filling the occasional financial void. The Friends held a ski swap early in the winter which raised nearly $3000, Brighton Ski Resort donated $2000, and numerous other contributors gave amounts from $5 to $600 throughout the season. Wendy Zeigler is the primary force behind the Friends, and we are quite grateful for her help.

The Friends of the UAFC were sponsors a three day avalanche workshop taught by staff from the UAFC at the Wasatch Mountain Club in Brighton and attended by 26 students.

Utah Avalanche Forecast Center
Budget Comparison 1989 and 1992



1989 Budget of $66,430



1992 Budget of $74,906

Future Directions

The UAFC made progress towards some of the "Future Directions" discussed in the 1990-91 Annual Report, but in others we made none at all. We did manage to acquire a new multi-line announcer, and presented Brighton with a micrologger, but we did nothing to improve the status of our observers, nor did we move towards establishing guidelines for operational avalanche forecasting.

There are many challenges which face the UAFC in the coming years. Some are immediate, such as the future of the La Sal Avalanche Forecast Center and improving the budget of the UAFC, and others less tangible but of equal importance, such as maintaining the credibility of the UAFC.

Staff Changes

Brad Meiklejohn will be leaving the UAFC after 7 years, and Bruce Tremper will shift into the areas of avalanche education and research. This will certainly change the complexion of the operations, and some effort will have to be made to maintain continuity. Throughout their tenure with the UAFC they have built a program the strength of which lies in its credibility. We hope that the UAFC will continue to attract and hold professionals with a commitment to quality.

Observer Program

The Observer Progam has been invaluable to the UAFC, and with the above-mentioned staff changes, will become critical to maintaining program credibility. These observers, especially Bob Athey and Greg Dollhausen, have performed valuable services for the UAFC with minimal compensation. I would hope that their importance to the program can be recognized and that their status financial and professional status can be improved.

La Sal Avalanche Center

The LSAFC was operating in a satisfactory way prior to the accident which killed Mark Yates and three others, and if the fourth person had been anyone but Mark the need for the program would only have been reinforced. Now, however, the future of the LSAFC is uncertain. We at the UAFC would like to make the LSAFC a satellite of our operation, and we would like to insure regular communications between the two centers. We would like to be involved in the selection and training of the future LSAFC director to ascertain their level of avalanche experience. In short, the LSAFC staff will work for the UAFC, and ultimately the USFS.

This last clause, that LSAFC forecasters be USFS employees, may be the stumbling block. This will mean that the USFS will have to create a new position, and will also have to fund that position. The LSAFC has operated as a contract for a total of $10,000 a year. From our point of view, a minimum of $20,000 will be needed to maintain a credible program.

If the program is to continue, one of the first priorities will be to purchase and install a weather station that can be accessed remotely through telephone modem. The UAFC is tied into over a dozen such sites throughout the Wasatch, and they are critical for forecasting avalanche conditions. The only weather data available in the La Sals is from a site which must be visited to collect the data. A site on top of Pre-Laurel has been selected for a weather station, and ideally the equipment for this site will be purchased this summer. The cost for this project will run about $5000-$10,000.

Weather Instrumentation

Significant gaps remain in our network of weather instrumentation throughout the Wasatch Range. Most notable is the nearly-total void of information about conditions in the Provo area mountains. There is one weather station at Sundance, but the data is frequently of poor quality and not representative of surrounding areas. There is no way of knowing snow amounts in the Provo area, and without question our forecasts are frequently inaccurate or incorrect. Similar gaps still remain in the Logan area, where precipitation data is lacking.

The UAFC should make a commitment to filling these gaps in the network, and should have $5000 earmarked for this purpose each year.

Role of the National Avalanche Center

We are hopeful that the inclusion of the UAFC in the National Avalanche Center will provide some opportunity for growth for the program as a whole and for staff members. We to like to see the UAFC funded directly from the Regional Office, as the scope of our operations has gradually broadened beyond the Wasatch Front. The UAFC is currently a nationally and internationally recognized program that can and does make significant contributions to avalanche knowledge and safety.

There are several areas where the UAFC, in conjunction with the National Avalanche Center could begin to make progress. First off, recent years have seen the formation of small, local avalanche centers in places like Moab, Utah and Bozeman, Montana, while numerous other places such as Ketchum, Idaho and Jackson, Wyoming have had similar programs for a number of years. The interaction between these centers and larger regional centers is sporadic and informal, and it might be beneficial to all to establish a network protocol for use during major avalanche cycles which affect entire regions.

Along the same lines, there currently is no set of guidelines or standard operating procedures for public avalanche forecasting, and little information sharing about who is doing what. We do not know exactly what state-of-the-art avalanche forecasting is or who is or is not doing it. It might be an effective role of the National Avalanche Center to intiate a process of program review or to establish general guidelines for program operation.

Given the events of this winter, I feel it is a critical time to define more clearly the protocol for field work, ie; who are we going with, why are we going, what are we doing, how do we go about doing it. My preference would be to define that for ourselves before it is done for us. The idea is not to create a rigid and restrictive structure, but merely to clarify for ourselves and for outside observers how we operate in the field.

These projects seem worthy for the National Avalanche Center, and hopefully forums such as the ISSW, AAAP, and the National Avalanche School can be useful to advance them.

Foccus on Snow-mobilers

The number of avalanche accidents in which snowmachiners are killed is on the rise around the country, and it seems likely that in the near future a snowmachiner will die in an avalanche in Utah. The sleds which are in use these days are powerful, high-tech machines, capable of climbing 40 degree slopes, and the popular game of "high mark" is played in avalanche terrain. Hill climbing has become a big money sport, with $50,000 purse events held around the country each winter. There are numerous snowmachiners in Utah who regularly ride on steep slopes, and we have heard tales of people who have triggered, and outridden, dozens of avalanches.

The UAFC has tried for years to find an avenue of approach to this group at risk, with little success. This winter, Bruce Tremper made some valuable inroads with the snowmobiling community by actually riding with a dedicated bunch of hill-climbers. Not only did he get some great footage for his video but gained their trust and was able to teach them something about avalanches.

This is certainly an area the UAFC should persue if we wish to reach the snowmachining community and to avoid avalanche fatalities among this user group.

Weather Forecasting

Due to budget constraints, there has been recent discussion about decreasing the responsibilities of the UAFC, and the area which has been targeted is weather forecasting. The UAFC does provide a detailed mountain weather forecast to the ski industry twice daily through the period of operation, yet does not receive any compensation or financial support from the ski resorts individually or the ski industry as a whole. For the sake of comparison, the Colorado Avalanche Information Center receives nearly $25,000 annually through Colorado Ski Country USA (the equivalent of Ski Utah) and from individual ski resorts.

The area of weather forecasting is a likely target, as it does consume a good portion of our time with seemingly little reward. However, the UAFC is co-located with the National Weather Service for several reasons, and one of them is that we relieve the NWS of the work load of providing specialized forecasts for the community of avalanche workers. The weather information needed for avalanche forecasting can be quite specific, and detailed and timely weather forecasts are critical.

The UAFC has done quite a bit to improve the quality of our weather forecasts, and although we are sometimes wrong, we like to think we are doing as well as the private weather services which several of the resorts subscribe to. We have direct access to a dozen remote weather stations, to all the NWS products, to satelite imagery, and to a large network of field observers. We have made our forecasts easy to access through a computer bulletin, and we our office is the only place in the country where select users can download NWS products onto their personal computers.

The use of a computer has made it much easier to issue weather forecasts than in the past when we repeatedly recited the same message to each of the avalanche forecasters who called in. If we were not issuing weather forecasts, these calls would likely go the NWS, and we would not be fulfilling our end of the bargain. The National Weather Service, and specifically Meteorologist-In-Charge William Alder, have been most generous in providing the UAFC with office space, computer facilities, photocopying services, mailing services, and access to all the NWS products and information. The estimated in-kind contribution which the NWS provides to the UAFC is on the order of $40,000 per year.

As many problems do, this one comes down to money. The UAFC is desparate to find additional funding sources, yet the doors remain closed to our requests. We are reluctant to drop any of our responsibilities yet our budgetary constraints may require it. One of the eternal solutions which has been raised is to hire a mountain meteorologist to work at the UAFC and to ask the individual ski areas to support such a person. A qualified mountain meteorologist would need a budget of $15-20,000 a season, so the the question is are there ten contributors willing to pitch in $2000 each for something many now get for free from the UAFC? Several of the larger ski areas now subscribe to private weather forecasting services, such as Weatherbank, for which they pay a fee of roughly $200 to $300 a month, so maybe these would be willing, but for the smaller areas money would be more difficult to find. And, in the end, this may not help the UAFC budget woes very much.

APPENDIX

MONTHLY CALL RATE - SALT LAKE SHORT RECORDING

	NOV	DEC	JAN	FEB	MAR	APR
1979-80	714	1,514	4,274	2,967	3,389	1,313
1980-81	2,200	4,800	6,257	7,277	6,887	3,135
1981-82	1,761	6,879	8,522	5,485	6,361	3,416
1982-83	2,741	6,804	7,614	7,731	9,911	5,339
1983-84	3,216	10,708	7,073	7,032	5,983	4,396
1984-85	2,827	5,704	5,260	8,399	7,122	3,021
1985-86	4,119	4,703	6,298	10,628	6,225	3,706
1986-87	3,903	3,911	10,022	8,201	8,364	3,406
1987-88	2,390	6,534	10,201	7,297	9,208	3,780
1988-89	6,200	11,484	8,603	9,678	9,050	3,472
1989-90	3,854	7,626	14,126	12,528	10,831	3,933
1990-91	5,800	11,813	12,789	8,864	13,087	5,964
1991-92	10,925	8,075	10,322	15,000	13,107	5,000

YEARLY CALL TOTALS - ALL AREAS

	SLC 3 MIN	SLC 5 MIN	LOGAN *	OGDEN *	PROVO *	PARK CITY *	MOAB	TOTAL
1976-77	6,522							6,522
1977-78	11,258							11,258
1978-79	9,924							9,924
1979-80	14,469							14,469
1980-81	30,736							30,736
1981-82	33,099							41,610
1982-83	40,355		4,357	1,890	3,671	3,042		53,315
1983-84	39,647		5,300	2,725	4,076	2,577		54,325
1984-85	32,476		4,652	1,706	2,278	2,386		43,498
1985-86	36,535		5,469	5,464	2,292	2,562		52,322
1986-87	38,841		4,693	2,587	2,518	2,121		50,760
1987-88	39,614	4,020	2,500	2,500	2,500	2,500		53,000
1988-89	48,488	8,033	2,500	2,500	2,500	2,500	1,100	67,621
1989-90	52,898	10,947	5,000	2,500	2,500	5,000	1,693	80,297
1990-91	62,814	10,160	5,000	2,500	2,500	5,000	2,811	90,785
1991-92	62,429	9,970	5,000	2,500	2,500	5,000	3,216	90,615

* Numbers since 1987 for Logan, Ogden, Provo and Park City are conservative estimats based on spot checks and yearly totals from past seasons.

TOTAL CALLS VERSUS TOTAL ALTA SNOW FOR THE SEASON

	CALLS	ALTA SNOW (IN.)
1976-77	6,522	314.5
1977-78	11,258	524.5
1978-79	9,924	588.0
1979-80	14,469	514.0
1980-81	30,736	391.0
1981-82	41,610	696.0
1982-83	53,315	637.0
1983-84	54,325	743.5
1984-85	43,498	457.0
1985-86	52,322	599.0
1986-87	50,760	378.0
1987-88	53,000	410.3
1988-89	67,621	581.5
1989-90	80,297	448.0
1990-91	90,785	580.2
1991-92	90,615	

BACKCOUNTRY AVALANCHE INCIDENTS

YEAR	TRIGGERED	AT LEAST CAUGHT	AT LEAST PARTLY BURIED	TOTALLY BURIED	KILLED
91-92	76	27	14	9	5
90-91	46	19	7	1	0
89-90	65	34	14	2	0
88-89	64	9	1	0	0
87-88	39	6	(1)	(1)	0
86-87	50	18	6	3	2
85-86	66	27	12	5	5
84-85	79	39	15	6	2
83-84	M	24	M	M	1
82-83	M	M	15	M	0
81-82	M	M	M	M	1
80-81	M	M	M	M	2
79-80	M	M	M	M	1
78-79	M	M	M	M	2
77-78	M	M	M	M	0
76-77	M	M	M	M	1
75-76	M	M	M	M	1
74-75	M	M	M	M	0
73-74	M	M	M	M	0
72-73	M	M	M	M	1

Summary of Forecast Hazard Ratings

Incidents by Hazard Category

	LOW	MODERATE	HIGH	EXTREME
8 YEAR AVG (1984-91)	6	25	17	2
1988-89	16	37	11	0
1889-90	4	25	35	1
1990-91	11	15	15	0
1991-92	4	20	36	8

NUMBER OF DAYS EACH HAZARD CATEGORY WAS USED

	LOW	MODERATE	HIGH	EXTREME	WARNING	DAYS W/ AVAL.	NO. AVAL.
OCTOBER	2	4	0	0	0	1	1
NOVEMBER	14	10	7	0	2	14	80
DECEMBER	16	11	4	0	0	12	155
JANUARY	17	9	5	0	1	11	780
FEBRUARY	9	1	14	5	6	19	470
MARCH	6	15	10	0	0	21	940
APRIL	0	2	3	0	0	10	120
TOTAL	64	52	43	5	9	87	2546

Examples of an Avalanche Advisories

ZCZC SLCWRKSNW SLR
TTAAOO KSLC DDHHMM

OHYO GOZAIMAS. WATAKSHI WA BRUCE TREMPER-SAN WITH BACKCOUNTRY AVALANCHE AND MOUNTAIN WEATHER INFORMATION FOR SUNDAY, FEBRUARY 16, AT 7:30 A.M. THE UTAH AVALANCHE FORECAST CENTER IS A PARTNERSHIP BETWEEN THE WASATCH-CACHE NATIONAL FOREST AND THE NATIONAL WEATHER SERVICE.

I HAVE JUST RETURNED FROM THREE WEEKS OF DOING AVALANCHE WORK IN THE SNOW COUNTRY OF JAPAN AND I AM VERY GLAD TO BE BACK. I WASN'T GLAD, HOWEVER, TO HEAR THE BAD NEWS WHEN I GOT OFF THE PLANE. FOUR PEOPLE DIED IN AN AVALANCHE NEAR MOAB AND ONE WAS A FRIEND AND A FELLOW AVALANCHE FORECASTER. AFTER SKIING AROUND IN THE WASATCH BACKCOUNTRY FOR THE LAST COUPLE OF DAYS IT'S CERTAINLY NO MYSTERY ABOUT HOW SUCH A THING COULD HAPPEN. THIS IS THE CLASSIC SETUP WHICH STRIKES FEAR IN THE HEARTS OF EVERY AVALANCHE WORKER. THE TWO MONTH DROUGHT, LEFT US WITH AN EXTREMELY WEAK DEPTH HOAR SNOWPACK. THEN IN THE LAST SEVERAL DAYS, A COUPLE OF FEET OF DENSE SNOW HAS BEEN PLOPPED DOWN ON TOP OF IT, WHICH IS KIND OF LIKE PUTTING A CAST IRON FRYING PAN ON TOP OF A BAG OF POTATO CHIPS. AS YOU NOTICE, TODAY WE ARE ADDING YET ANOTHER FRYING PAN TO THE PILE AND THAT, OF COURSE, MEANS BIG TROUBLE.

IT'S THE KIND OF INSTABILITY WHERE ALL KINDS OF WEIRD THINGS WILL HAPPEN, LIKE TRIGGERING A STEEPER SLOPE ABOVE BY SKIING BY ON A FLAT VALLEY. OR YOU CAN TRIGGER A SLOPE BELOW FROM A FLAT RIDGE ABOVE. THIS HAPPENED YESTERDAY ON PEAK 10,420 WHEN A BACKCOUNTRY SKIER WAS DESCENDING THE RIDGE. THE WHOLE BOWL SLID OUT BELOW HIM, ABOUT 500 FEET WIDE. SEVERAL EXPERIENCED PATROLLERS HAVE BEEN TAKING RIDES THESE LAST FEW DAYS. AS YOU CAN SEE, THE BACKCOUNTRY IS A PLACE WHERE YOU SHOULD BE VERY, VERY CAREFUL RIGHT NOW. WHATEVER YOU DO, DON'T GET ON ANY SLOPE STEEPER THAN ABOUT 30 DEGREES WHICH FACES EAST, NORTH OR WEST BECAUSE YOU STAND AN EXCELLENT CHANCE OF TRIGGERING AN AVALANCHE. THE UNDERLYING SNOW ON THE SOUTH FACING SLOPES IS STRONGER BUT WITH THE NEW SNOW TODAY THEY MAY ALSO BE SLIDING. IN OTHER WORDS, THIS WOULD BE A GOOD DAY TO GO TO A SKI RESORT. PEOPLE WITHOUT GOOD AVALANCHE SKILLS SHOULD AVOID THE BACKCOUNTRY. WE ARE CONTINUING OUR AVALANCHE WARNING FOR ALL OF THE MOUNTAINS OF UTAH.

MOUNTAIN WEATHER:
WE SHOULD GET 8 INCHES TO A FOOT OF SNOW IN FAVORED AREAS TODAY AND PERHAPS THAT MUCH MORE AGAIN TONIGHT. THE RIDGETOP WINDS ARE BLOWING 20-30 FROM THE SOUTHWEST THIS MORNING, AND THEY SHOULD TURN WESTERLY TODAY AND NORTHWESTERLY BY TONIGHT, AND CONTINUE BLOWING IN THE 15-25 MPH RANGE. RIDGETOP TEMPERATURES ARE NEAR 18 THIS MORNING AND SHOULD DROP TO AROUND 10 BY TONIGHT. AT 8,000' THE HIGH TODAY SHOULD BE NEAR 25 WITH AN OVERNIGHT LOW NEAR 18. WE SHOULD CONTINUE TO GET SNOW OFF AND ON UNTIL SOMETIME TUESDAY OR WEDNESDAY WHEN A RIDGE SHOULD BUILD OVER US.

FOR MORE DETAILED MOUNTAIN WEATHER AND AVALANCHE INFORMATION CALL 364-1591.
TO REACH OUR OFFICE CALL 524-5304 (1-800-662-4140).

I'LL TALK TO YOU AGAIN THIS AFTERNOON.
THANKS FOR CALLING.
TREMPER
NNNN

ZCZC SLCWRKSNW SLR
TTAAOO KSLC DDHHMM

GOOD MORNING, THIS IS BRAD MEIKLEJOHN WITH BACKCOUNTRY AVALANCHE AND MOUNTAIN WEATHER INFORMATION FOR FRIDAY, APRIL 3, AT 7:30 PM. THE UTAH AVALANCHE FORECAST CENTER IS BROUGHT TO YOU BY THE WASATCH-CACHE NATIONAL FOREST IN PARTNERSHIP WITH THE NATIONAL WEATHER SERVICE.

THIS WINTER HAS TAUGHT US MANY HARD LESSONS ABOUT AVALANCHES, AND SCHOOL IS STILL IN SESSION. THERE WAS ONE PERSON KILLED IN AN AVALANCHE HERE IN THE WASATCH ON WEDNESDAY, AND ONE, PERHAPS TWO MORE PEOPLE KILLED IN AVALANCHES IN COLORADO ON THURSDAY. IN ADDITION TO THESE, THERE WAS ONE VERY CLOSE CALL ON THURSDAY HERE IN NORTHERN UTAH.

THE MAIN REASON FOR THE DANGEROUS CONDITIONS THAT HAVE PERSISTED IS THAT WE STILL HAVE A VERY WEAK SNOWPACK THROUGHOUT THE WESTERN UNITED STATES. THIS SNOWPACK HAS BEEN HANGING IN BALANCE FOR MONTHS, WITH EACH SNOWSTORM TIPPING THE SCALES FOR RENEWED INSTABILITY. NOW, INSTEAD OF ADDING THE WEIGHT OF NEW SNOW AND INCREASING THE STRESS ON THE SNOWPACK WE ARE DECREASING ITS STRENGTH WITH THESE WARM TEMPERATURES. CLEAR AND COLD NIGHTS HELP TO REFREEZE THE SURFACE, BUT THE REST OF THE SNOWPACK IS JUST MUSH. WE HAVE HAD SEVERAL LARGE AVALANCHES THIS YEAR WHERE THE SNOW SURFACE HAS BEEN FROZEN SOLID YET SLIDES HAVE RIPPED OUT 2-3' DEEP. YOU SHOULD REMEMBER THAT IT IS THE WEAKNESS OF THE WEAK LAYER, NOT THE STRENGTH OF THE SLAB, THAT IS THE DECIDING FACTOR.

THERE WAS ONE VERY CLOSE CALL ON THURSDAY IN THE UINTA'S WHEN A NW FACING BOWL AT 10,000' AVALANCHED 500' WIDE AND 1-2' DEEP. FORTUNATELY THERE WAS NO ONE ON THE SLOPE, BUT A FEW MINUTES EITHER WAY AND THERE COULD HAVE BEEN. AFTER A WINTER OF TERROR I KNOW YOU JUST WANT TO RELAX ON THE CORN SNOW, BUT DON'T LET YOUR GUARD DOWN IF YOU MUST GO SKIING.

LAST NIGHT'S LOW TEMPERATURES DID NOT GET BELOW FREEZING, WITH MOST STATIONS REPORTING ABOUT 35 DEGREES FOR A LOW. THE SKIES WERE CLEAR AND THERE MAY HAVE BEEN A SHALLOW SURFACE REFREEZE, BUT NOT ENOUGH TO MAKE THE SKIING GOOD OR STABILIZE THE SNOWPACK. THE TEMPERATURES WILL KEEP GOING THROUGH THE ROOF, AND WITH SOME CLOUD COVER EXPECTED TONIGHT, THE AVALANCHES WILL BEGIN TO ROLL.

CURRENTLY THE AVALANCHE HAZARD IS HIGH OR WIDESPREAD ON ALL SLOPES STEEPER THAN 35 DEGREES, WITH SPECIAL CONCERN FOR NORTHEAST, NORTH, AND

NORTHWEST FACING SLOPES BETWEEN 9 AND 10,000'. WE COULD SEE A VARIETY OF AVALANCHES TODAY, RUNNING FROM SHALLOW WET POINT RELEASES TO FULL-DEPTH CLIMAX SLIDES, AND THINGS WILL GET WORSE AS THE TEMPERATURES HEAT UP TODAY. SATURDAY WILL LIKELY BE WORSE AS WE WILL NOT HAVE A REFREEZE OF THE SNOWPACK TONIGHT. I RECOMMEND THAT YOU AVOID ALL SLOPES STEEPER THAN 35 DEGREES FOR THE NEXT 48 HOURS.

FOR THE WEATHER, AFTER REACHING HIGHS NEAR 50 ON THURSDAY, THE DOOR IS OPEN FOR RECORD HIGHS. WE WILL QUICKLY PASS 50 TODAY, AND MOVE WITHIN STRIKING DISTANCE OF 60. IF WE DON'T REACH 60 TODAY, WE WILL DO IT ON SATURDAY. TONIGHT'S LOWS WILL BE 35-45 DEGREES. THE RIDGE WINDS WILL BE 10-20 MPH FROM THE WEST.

HIGH PRESSURE IS BUILT STRONGLY OVER UTAH, AND WILL WEAKEN A LITTLE AS A WIMPY COLD FRONT APPROACHES FROM THE NORTHWEST. THIS FRONT WILL REACH US SATURDAY NIGHT, AND WE MAY BEGIN TO COOL OFF A BIT THEN.

WE WILL BE GIVING A PUBLIC PRESENTATION ON THE MOAB/LA SAL AVALANCHE ACCIDENT ON THURSDAY, APRIL 9TH, AT 7:30 PM. IT WILL BE IN THE BEHAVIORAL SCIENCES AUDITORIUM, ON THE U OF U CAMPUS, AND EVERYONE IS WELCOME.

AS OF THIS WEEKEND, OUR REGULAR FUNDING HAS RUN OUT. WE WILL TERMINATE THE REGULAR FORECASTS AFTER THIS SUNDAY, AND UPDATE THEM ONLY ON AN INTERMITTENT BASIS. IF YOU WOULD LIKE TO HELP, YOU CAN SEND A TAX DEDUCTIBLE CONTRIBUTION TO FRIENDS OF THE UAFC, 337 NORTH, 2370 WEST, SLC UT 84116. AND WE'D LIKE TO THANK ALL THOSE WHO HAVE ALREADY SENT IN THEIR CONTRIBUTIONS.

FOR MORE DETAILED INFORMATION ON AVALANCHE AND MOUNTAIN WEATHER CONDITIONS, CALL 364-1591.

TO REACH OUR OFFICE CALL 524-5304 (1-800-662-4140).

I WILL UPDATE THIS FORECAST THIS AFTERNOON BY 5 PM.

THANKS FOR CALLING.

MEIKLEJOHN
NNNN

Examples of an Avalanche Warnings

ZCZC SLCSABSLC CSW
TTAA00 KSLC DDHHMM

UTAH AVALANCHE FORECAST CENTER
NATIONAL WEATHER SERVICE, SALT LAKE CITY, UTAH

0600 HRS, TUESDAY, NOVEMBER 19, 1991

AVALANCHE WARNING

AN AVALANCHE WARNING IS IN EFFECT FOR THE WASATCH MOUNTAINS FROM SPANISH FORK CANYON NORTH TO THE IDAHO BORDER.

ONE TO TWO FEET OF NEW SNOW FELL YESTERDAY IN MANY AREAS OF THE WASATCH MOUNTAINS. THERE ARE WIDESPREAD AREAS OF UNSTABLE SNOW ABOVE 8,000 FEET. A HIGH HAZARD OF HUMAN TRIGGERED AVALANCHES EXISTS ON MANY SLOPES STEEPER THAN 30 DEGREES. PEOPLE WITHOUT GOOD ROUTEFINDING AND SNOW STABILITY SKILLS SHOULD AVOID BACKCOUNTRY TRAVEL AT THIS TIME.

THIS ADVISORY DOES NOT APPLY TO DEVELOPED HIGHWAYS OR SKI AREAS WHICH ARE CURRENTLY OPEN AND PERFORMING AVALANCHE CONTROL.

FOR RECORDED AVALANCHE INFORMATION. IN THE SALT LAKE AREA, 364-1581.....IN PARK CITY, 649-2250....IN LOGAN, 752-4146....IN OGDEN, 621-2362....IN PROVO, 374-9770. TO CONTACT OUR OFFICE....524-5304.

UTAH AVALANCHE FORECAST CENTER (USDA FOREST SERVICE/NATIONAL WEATHER SERVICE)

KIMBROUGH
NNNN

ZCZC SLCSABSLC CSW
TTAA00 KSLC DDHHMM

UTAH AVALANCHE FORECAST CENTER
NATIONAL WEATHER SERVICE, SALT LAKE CITY, UTAH

0600 HRS, SUNDAY, FEBRUARY 16, 1992

AVALANCHE WARNING

AN AVALANCHE WARNING REMAINS IN EFFECT FOR THE MOUNTAINS OF UTAH.

THERE HAS BEEN WIDESPREAD AVALANCHE ACTIVITY THROUGHOUT THE STATE OF UTAH FOR THE PAST SEVERAL DAYS. ADDITIONAL SNOW TODAY AND TONIGHT

SHOULD CONTINUE TO OVERLOAD A VERY WEAK PRE-EXISTING SNOWPACK AND PRODUCE AVALANCHES. A HIGH HAZARD OF HUMAN TRIGGERED AVALANCHES EXISTS IN NORTHERN UTAH WITH AN EXTREME HAZARD IN SOUTHERN AND CENTRAL UTAH. HUMAN TRIGGERED AVALANCHES ARE LIKELY AND SPONTANEOUS NATURAL AVALANCHES ARE POSSIBLE. BACKCOUNTRY TRAVELERS SHOULD AVOID ANY SLOPE STEEPER THAN ABOUT 30 DEGREES IN STEEPNESS AND AVOID ANY AVALANCHE RUN OUT AREAS.

THIS ADVISORY DOES NOT APPLY TO HIGHWAYS OR SKI AREAS WHERE AVALANCHE CONTROL IS NORMALLY CONDUCTED.

FOR RECORDED AVALANCHE INFORMATION. IN THE SALT LAKE AREA, 364-1581.....IN PARK CITY, 649-2250....IN LOGAN, 752-4146....IN OGDEN, 621-2362....IN PROVO, 374-9770. TO CONTACT OUR OFFICE....524-5304.

UTAH AVALANCHE FORECAST CENTER (USDA FOREST SERVICE/NATIONAL WEATHER SERVICE)

TREMPER
NNNN

Examples of Mountain Weather Forecasts

ZCZC SLCWRKMTN SLR
TTAA00 KSLC DDHHMM

****MOUNTAIN WEATHER FORECAST****
UTAH AVALANCHE FORECAST CENTER

SATURDAY, MARCH 7, 1992
0630 HRS.

SNOW AMOUNTS AS OF 6 AM RUN FROM 1-3", WATER AMOUNTS .05 - .20". WE DID HAVE SEVERAL CONVECTIVE CELLS DRIFT THROUGH THE WASATCH LAST NIGHT, AND THEY SEEM TO HAVE BEEN AT LEAST PARTLY RESPONSIBLE FOR THE PRECIP.

AS YOU MAY HAVE NOTICED, THE RIDGE WINDS HAVE SHIFTED TO THE SOUTHEAST AND HAVE DROPPED OFF SOME. THIS IS USUALLY A BAD SIGN FOR THE WASATCH AS IT KILLS ANY OROGRAPHIC LIFTING. THE LOW IS STILL TRACKING ABOUT AS EXPECTED, TRAVELING ALONG A WEST-EAST PATH TAHT WILL TAKE IT JUST SOUTH OF THE UTAH-ARIZONA BORDER. PRECIPITATION WILL PROBABLY BE HEAVY IN THE SOUTHERN MOUNTAINS, WHILE IN THE NORTH HERE WE WILL KIND OF DRIBBLE ALONG. OUR BEST CHANCE FOR MEASURABLE SNOWFALL WILL COME WITH CONVECTIVE BUILDUP, WHICH WILL START IN THE AFTERNOON AND COULD CONTINUE INTO THE NIGHT.

THERE IS PLENTY OF MOISTURE AROUND FOR THE NEXT 36 HOURS, BUT WE MAY HAVE TO WAIT FOR SOME COOLER AIR TO BE CARRIED DOWN ON A NORTHERLY TRACK BEFORE WE CAN WRING THE SNOW OUT. THE FLOW ALOFT WILL SWING FROM SOUTHEAST TO EAST TO NORTHEAST AND NORTH THROUGH THE WEEKEND, AND BY SUNDAY AFTERNOON THE COOLER AIR MAY START ARRIVING. SUNDAY AFTERNOON AND NIGHT MAY BE OUR BEST PERIOD FOR PRECIP. ALSO, THE EAST SIDE OF THE WASATCH MAY PICK UP SOME EXTRA MOISTURE FROM THE WRAP-AROUND EAST FLOW, AND CERTAINLY THE UINTAS WILL DO FAIRLY WELL.

THERE IS SOME QUESTION HOW THE FIRST OF THE WEEK IS GOING TO SET UP, BUT IT DOES LOOK LIKE WE WILL HAVE COOLER WEATHER THAN WE HAVE HAD IN A WHILE. CONSIDERING THE RECENT TEMPS, A RETURN TO NORMAL WILL FEEL LIKE AN ARCTIC OUTBREAK, SO I WILL JUST CALL IT "COOLER."
THERE IS A CHANCE THAT SHORT WAVES WILL COME DOWN ON THIS NORTH TO NORTHWEST TRACK AND KEEP OUR PRECIP GOING THROUGH MIDWEEK.

ONE BAND OF PRECIPITATION IS MOVING OUT OF THE WASATCH AS OF 6 AM, GIVING US MOSTLY CLEAR SKIES HERE IN THE VALLEY. THE NEXT APPARENT BAND IS WELL TO OUR SOUTH, SO WE MAY HAVE A LULL HERE FOR 4-6 HOURS BEFORE THE NEXT PERIOD OF CLOUDS AND SHOWERS.

LOCALLY HEAVY SHOWERS AND STRONG AND GUSTY WINDS WILL ACCOMPANY ANY THUNDERSHOWERS. I'LL LET YOU KNOW IF I SEE THEM COMING.

	5AM-5PM TODAY	5PM-5AM TONIGHT	5AM-5PM TOMORROW	5PM-5AM TOM NITE
FREE AIR (10,000')				
WIND DIRECTION	SE	E	NE	
WIND SPEED(MPH)	5-15	5-15	10-20	
TEMPERATURE(10,000')	26	20	24	
TEMPERATURE(8,000')	32	26	28	
WEATHER	S-,S	S-,S	S-,S	
CLOUD COVER	BKN/OVC	OVC	OVC	
SNOW LEVEL	6000'	5000'	5000'	
SNOW DENSITY	10%	10%	8%	
LIGHTNING	GOOD CHANCE--->			

QUANTITATIVE PRECIPITATION FORECAST (INCHES OF SNOW):

	TODAY 5AM-5PM	TONIGHT 5PM-5AM	TOMORROW 5AM-5PM	TOM NIGHT 5PM-5AM
SNOWBASIN	1-2	1-2	1-3	
PARK WEST	1-2	1-3	1-3	
PARK CITY/DEER VALLEY	1-2	1-3	1-3	
SOLITUDE/BRIGHTON	1-2	1-2	1-3	
ALTA/SNOWBIRD	1-2	1-2	1-3	
SUNDANCE	1-2	1-2	1-3	

MEIKLEJOHN
NNNN

ZCZC SLCWRKMTN SLR
TTAA00 KSLC DDHHMM

****MOUNTAIN WEATHER FORECAST****
UTAH AVALANCHE FORECAST CENTER

MONDAY, FEB 10, 1992
1500 HRS.

THE WEATHER OVER THE WESTERN STATES AND ON OUT INTO THE PACIFIC IS VERY MESSY AND COMPLEX THIS AFTERNOON. PRECIPITATION IS WIDESPREAD SOUTH AND WEST OF THE WASATCH AND IS NOW STARTING AT SUNDANCE. THE DYNAMICS ARE TYPICALLY WEAK AND DIFLUENCE IS EVIDENT OVER NORTHERN UTAH. BUT AT LEAST THE MOISTURE IS ABUNDANT. NONE OF THIS WEATHER HAS FLATTENED THE RIDGE OVER THE GREAT BASIN MUCH, HENCE THE WEAK DYNAMICS AND DIFLUENCE. THE SOUTHERN JET IS QUITE STRONG UNDER THE STRONG LOW IN THE PACIFIC AND CROSSING INTO ARIZONA AND NORTHERN MEXICO. THIS IS STARTING TO DRAG IN SOME MORE MOISTURE FROM LOW LATITUDES BUT IT ISN'T LIKELY TO GET THIS FAR NORTH. ALL THIS SUPPORTS THE IDEA OF SOME LIMITED ACCUMULATIONS OVER THE NEXT 12 -24 HOURS.

IT IS UNCLEAR TO ME JUST HOW MUCH CLEARING, IF ANY WE WILL GET TOMORROW. THE BASIC PATTERN, A MOIST BUT WEAK SOUTHWEST FLOW, SHOULD REMAIN UNCHANGED AND INDEED ANOTHER DISTURBANCE HAS DEVELOPED TODAY IN

CENTRAL CALIFORNIA. COULD THAT ONE KEEP A LITTLE ACTION GOING HERE TOMORROW AFTERNOON? ANYWAY, BY THURSDAY, THE MODELS BRING IN ANOTHER SHORT WAVE WITH ABOUT THE SAME CHARACTERISTICS AS THIS ONE. THEN YET ANOTHER SHOWS UP ON SUNDAY.
OUT ON THE 10 DAY LIMB, A RADICALLY DIFFERENT PATTERN EVOLVES, WITH UTAH BACK IN THE NORTHWEST FLOW.

	5AM-5PM TODAY	5PM-5AM TONIGHT	5AM-5PM TOMORROW	5PM-5AM TOM NITE
FREE AIR (10,000')				
WIND DIRECTION	SW	SW,W	NW,SW	SW
WIND SPEED(MPH)	15-35	15-30	10-20	5-15
TEMPERATURE(10000')	30	15	20	15
TEMPERATURE(8000')	35	20	30	20
WEATHER	S-	S	S-	
CLOUD COVER	BRK>OVC	OVC	OVC>BRK	SCT
SNOW LEVEL	6+K	5K	5K	
SNOW DENSITY	10%	6%	5%	

QUANTITATIVE PRECIPITATION FORECAST (INCHES OF SNOW):

	TODAY 5AM-5PM	TONIGHT 5PM-5AM	TOMORROW 5AM-5PM	TOM NIGHT 5PM-5AM
SNOWBASIN	1-3	1-3	0-2	
PARK WEST	T-2	1-3	1-3	
PARK CITY/DEER VALLEY	1-3	1-3	0-2	
SOLITUDE/BRIGHTON	1-3	2-4	1-3	
ALTA/SNOWBIRD	1-3	2-4	2-4	
SUNDANCE	1-3	1-3	0-2	

KIMBROUGH
NNNN

Letters of Support

There is no greater source of satisfaction than to have someone come up to you at the market, or at a movie, or in the backcountry and say "You guys (and gal) are doing a great job, and you've probably saved my life". And this happens more than you can believe. Letters pour into the office, some with checks, all with glowing praise for the UAFC. It really makes a person proud to be part of this program.

I believe firmly that there are few Forest Service programs which are as widely-appreciated and as heavily-utilized as the Forecast Center. The UAFC is a white hat for the Forest Service, and the Forest Service should be pleased to have their name attached to the Utah Avalanche Forecast Center.

William Bryan Dixon
169 East 100 North #E
Logan, UT 84321

November 3, 1991

Utah Avalanche Forecast Center
337 North 2370 West
Salt Lake City, UT 84116

Dear UAFC,

As we enter the winter and I start skiing again, I begin to think about avoiding the all-too-frequent avalanche dangers that come with the sport. And, once again, I easily recall the forecast telephone number for the UAFC because I have used it so many times before. Were it not for the excellent products you put out, the reliability of your information and the easy telephone access to the forecasters (for those uncertain times and conditions) skiing and winter travel would be more intimidating, more dangerous and much less enjoyable.

The daily forecast provides a distillation and synthesis of mountain snowpack and weather information. Since I work away from the mountains all week I can call the forecast midweek and stay current on changes in the Wasatch snowpack. The weather data let me assemble my own forecast about future changes in stability and the reports of avalanche activity give me a critical insight which I would not otherwise have.

Although the UAFC moved away from teaching university courses in the early 1980s, they are still an important source of avalanche education. It is only after the weekend or semester-long university course and much time in the backcountry, that one really synthesizes education and experience into reliable, accurate hazard assessments for a particular slope on a particular day for a particular group and situation. Avalanche education is a continuing process, as anyone with years of winter experience will admit. The UAFC provides this continuing education imbedded in the forecasts, and when asked, shows up in the community for lectures and fieldwork. How else could we get this kind of exposure to the state-of-the-art?

The UAFC was my first tutor in avalanche science and hazard assessment when it was started by Barry Mathias, Duain Bowles and Peter Lev in the early 80's. They set the standard for excellence which has prevailed to this day. Through the years, everyone I have met at the Center - Al Soucie, Sue Furgeson, Pat Lambrose, Brad Meikeljohn, Bruce Tremper, and Tom Kimbrough - has been professional, friendly, and eager to serve. None of them have been hampered by ego or unwilling to answer even the most inane question. When I taught avalanche courses at Utah State University, members of the UAFC were always willing to help on particular field sessions, and showed an uncanny ability to relate to any group they were in.

Ironically, it seems as if the success of the Center could be its very undoing. Even though each year the numbers of skiers, snowboarders and winter enthusiasts increases, and more people going into more remote and hazardous terrain, the number of accidents - and particularly fatalities - seems to decrease. THIS IS SUCCESS! I hope the sources of funding in the Forest Service recognize this success and find a way to keep the Center active.

Could it be too much to ask that the Center be expanded, perhaps to include more education, scientific exploration, and even local rescue organization and help? I would like to see more "out-reach" in the form of courses and local seminars - even if only two or three times a season. There is no one who understands the snowpack in these Wasatch mountains as well as the UAFC, and this knowledge should be made available. Short Friday night-Saturday field sessions on special topics would be welcome. The forecasters need to get out into the areas away from Salt Lake City more often, to understand our mountain situations better and improve the geographical specificity of their forecasts. With the UAFC's demonstrated competence in electronic data exchange, perhaps we could develop a PC/modem accessible system for weather data, snowpack analyses, and avalanche reports. There is still so much that could be done.

In all, I think you have done a remarkable job. Mine may be only one letter, but I meet dozens of skiers each year who have discovered and used the UAFC. They uniformly comment on its excellence and usefulness. Keep up the good work, and don't let the myopic bean counters kill your enthusiasm. You are appreciated and important.

Best regards,

Bryan Lizo

April 9, 1991

Utah Avalanche Center

Thank You all for your early-morning reports, all winter. You provide good information. & appreciate your accuracy and forthrightness.

Sincerely,

Matthew Wallace

5035 Wanderhoe
SLC 84117

DIRECTOR
CENTER FOR SCIENCE EDUCATION

WEBER STATE UNIVERSITY

SCHOOL OF
NATURAL SCIENCES
OGDEN UTAH 84408-2509
801-626-6160

January 16, 1991

Bruce Temper
Utah Avalanche Forecast Center
337 North 2370 West
Salt Lake City UT 84116

Dear Bruce:

Thanks for helping us get this year's S4 program off to a great start. Student responses to your presentation on avalanches has been uniformly enthusiastic and positive. I particularly enjoyed the mix of science information with real life experiences and practical applications. Your extensive knowledge and enthusiasm for your subject carried easily to the students. The questions afterward showed that the students were interested in the subject and that you had held their complete attention.

Thanks again for your presentation. Please let me know when your avalanche safety video is available so we can get a copy for the Center for Science Education.

Sincerely,

Richard N. Vineyard

THE UNIVERSITY OF UTAH

March 26, 1992

Mr. Bruce Tremper
Avalanche Forecast Center
Executive Terminal Building
337 North 2370 West
Salt Lake City, UT 84116

Dear Mr. Tremper;

I would like to take this opportunity to forward a word of thanks for the excellent lectures and video presentations given to our students enrolled in the "Avalanche and Snow Mechanics" course this past Winter quarter. The feedback from the class participants was very enthusiastic.

The Geography Department and the University deeply appreciate this type of cooperation with the U.S. Forest Service and the Avalance Forecast Center.

Sincerley,

George F. Hepner, Chair

Department of Geography
270 Orson Spencer Hall
Salt Lake City, Utah 84112
(801) 581-8218

Campus Recreation

THE UNIVERSITY OF UTAH

January 16, 1992

Mr. Bruce Tremper
Mr. Brad Michelsohn
Avalanche Forecast Center
337 N. 2370 E.
Salt Lake City, UT 84116

Dear Bruce and Brad,

I want to take this opportunity to thank you both for the wonderful presentation you did for us last night. I appreciate the work that you and your organization do to educate the public about the dangers of avalanches and back country travel.

I would like to work with you again next winter to set up at lease one presentation, and possibly two, one in December and maybe one in February. If there is anything we can do to help you in the future, please feel free to give me a call at 581-8516.

Thanks again for your help in making this event a great success.

Sincerely,

Rob Jones

Rob Jones
Coordinator, Outdoor Recreation
and Rental Program

Administrative Office
S114D Van Cott Hall
Salt Lake City, Utah 84112
(801) 581-3760

Informal Programs
Einar Nielsen Fieldhouse
(801) 581-8898
HPER E-214
(801) 581-3797

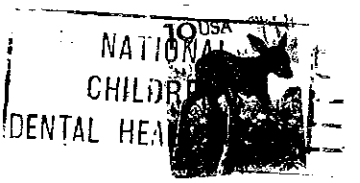
Intramural Program
HPER E-214
(801) 581-3797

Outdoor Program
Building 420
(801) 581-8516

BRAD, BRUCE, TOM & EVELYN

THE AVALANCHE FORECASTING TEAM
UTAH AV. FORECAST CENTER
337 NORTH
2370 WEST
EXEC. TERM. BLDG.
SLC, UT. 84116

Just wanted to drop you a line to thank you for a wonderfully educational and exceptionally fun 3 day weekend. The Avalanche Course has been a highlight to my winter as I feel much better knowing I know more now about the critical elements of avalanche than I did before. You all did a spectacular job with all of the information and communicating it to us, so we would absorb it and not fall asleep. I commend you on your stellar performance that weekend and thank you again for a really fun time. See you out on the slopes if it would quit being springlike! Cordially, eva miller



LA SAL MOUNTAINS AND COLORADO RIVER
Castle Valley, Utah
• John Telford

To all the folks who conducted the avalanche course in Brighton last weekend,

UAFC
337 N 2370 W
SLC, UT 84116

Thank You!

It was a fun, very practical educational experience. It reassured me of things I already knew and gave me tons of new info. Hope to see ya all in the mts. someday.

Pete Graves
Rustler Lodge, Alta

Media Articles

The Salt Lake Tribune **RECREATION** Monday, November 18, 1991 C5

Avalanche Forecasters Help Save Skiers With Accurate, Entertaining Forecasts

By Mike Gorrell
THE SALT LAKE TRIBUNE

With a little levity, the Utah Avalanche Forecast Center informs backcountry skiers of the deadly serious threat of snow slides.

Only one avalanche-related fatality has occurred in the last four years, a period in which telephone calls to the center's recorded message increased 10 percent annually. Nearly 80,000 callers heard daily updates on backcountry skiing conditions last year.

While the center cannot claim full credit for the low fatality rate, forecasters Bruce Tremper, Brad Meiklejohn and Tom Kimbrough feel their "spoonful-of-sugar" approach has helped.

"Our philosophy is to make the advisories not only accurate and detailed, but also entertaining. Instead of sounding like a bureaucratic recording couched in cover-your-rear jargon, we tell it like it is . . . We aim to take the mystery out of avalanches, to give the public useful information it can use to make life or death decisions."

Earlier this season, for example, Kimbrough informed callers of a moderate slide threat above 9,000 feet on wind-exposed slopes steeper than 35 degrees. He also warned that "a disproportionate number" of accidents occur early in the season when people are not yet thinking avalanche. "Remember, if there is enough snow to ski on, there is enough snow to avalanche and kill you."

Then he added, "There is still one more day of hunting season left, so you might consider skiing with one of those orange hats."

A cooperative effort of the Wasatch-Cache National Forest and the National Weather Service, the center is entering its 12th season. In the last 10 years, the average fatality rate was 1.4 per year.

There was only one close call among 46 human-triggered backcountry avalanches; 19 people were caught by those slides and seven were partially buried.

A near-tragedy happened in Summit Park last January. An off-duty Park City patroller and a snowboarder were skiing between two switchbacks when an avalanche broke loose on a northwest-facing, 40-degree slope. The skier escaped harm by grabbing onto a tree. But the snowboarder was carried 200 feet and buried. He partially dug himself out before his partner pulled him free. The victim had to leave his boots locked in the shattered snowboard's bindings.

Alta was almost the site of a calamity last April, after the resort closed. "Some of the locals were jumping into all kinds of ridiculous places," the center report said. "One notorious local-establishment owner triggered two large and scary avalanches in two days — one on the Baldy Chutes, perhaps the most radical slope in a canyon full of radical slopes. This one came close to hitting other backcountry skiers on the more reasonable slopes below."

Forecasters acknowledge the low accident rate seems surprising — "the odds suggest we are teetering on the brink of a disaster" — considering that hundreds of thousands of skiers enter the Wasatch Front backcountry each year. In Colorado, it is a rare year when fewer than five people die.

Several factors contribute to the better record here. Geography is a key one. Colorado's more-massive mountains develop unstable snowpacks that linger for prolonged periods and, when they give way, pour down slide paths that "are the stuff of movies — steep, long and unapproachable."

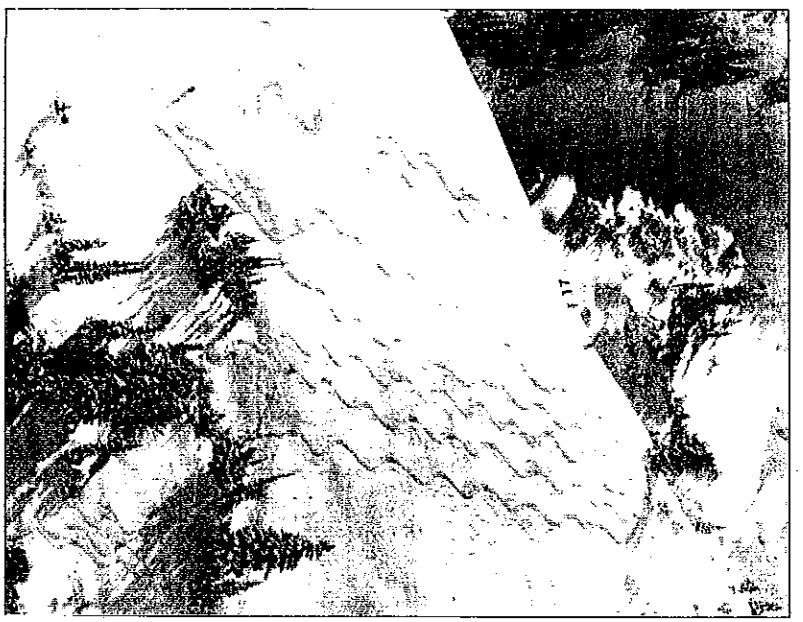
The focus in Utah, by contrast, is on a long, relatively narrow range filled with weather instruments. "Scarcely a snowflakes slips by without being reported," the center report said. Moreover, that information is evaluated by "more avalanche professionals per square mile than any other place in the world."

Kimbrough traced academic interest in avalanches to the pioneering research of Montgomery "Monty" Atwater, the snow ranger at Alta after World War II. "He was the first person in the U.S. to think about them systematically. He looked at what happened on the mountain, how weather affected the snowpack."

Knowledge about avalanches should increase this year. A new sensor for wind speed and direction was installed on Mt. Ogden, while in southeastern Utah, the forecast center for the La Sal Mountains now has three years of experience and is helping teach an avalanche course through the Canyonlands Field Institute.

Daily updates on backcountry avalanche conditions are obtained by calling the following numbers:

From Salt Lake City: 364-1581, 364-1591
From Park City: 649-2250
From Logan: 752-4146
From Ogden: 621-2362
From Provo: 374-9770
From Moab: 258-7669



Backcountry skiers should consult the Utah Avalanche Forecast Center's hotlines before venturing into the backcountry.

Craig Hansell/The Salt Lake Tribune

Tribune 11/25/91

The Salt Lake Tribune **RECREAT**

Craig Hansell/The Salt Lake Tribune

Tom Kimbrough of the Utah Avalanche Forecast Center orients his beacon to another signal to prepare for possible accident.

Know About Avalanches

By Craig Hansell
THE SALT LAKE TRIBUNE

An avalanche can threaten the lives of backcountry skiers. Understanding the natural causes of this winter phenomenon is not only interesting but can help insure skiing safety.

Avalanches occur when the mass of a snowpack exceeds its anchor.

"You can make an avalanche on almost any slope depending on the size of the trigger," said Utah Avalanche Forecast Center Director Bruce Tremper. "Most slides occur on slopes 35 degrees or steeper but the bull's-eye is pretty much 38 degrees.

"An expert run at a ski resort is about 35 degrees and 40 degrees is the steepness of the steepest run at a ski resort," Tremper said.

Snowpack stability is a balancing act between stress and strength. As they accumulate, snow crystals are susceptible to such influences as temperature, humidity and wind.

One degree temperature difference in 10 centimeters of snow is enough to change the snow crystals from the interlocking variety to depth hoar or temperature-gradient crystals that are not well bonded. The interlocking tentacles melt away leaving unconsolidated crystals that do not bond well.

If, as in last week's avalanche cycle, the crystals are covered by new snow, the increasing weight acts like a sleeping dragon awaiting the mass of new snow to overcome the anchor.

Once the snowpack's stress exceeds its strength, gravity takes command to reduce that stress. It can be a natural release or a human triggered avalanche.

There are an estimated 10,000 avalanches a year in the Wasatch Mountains.

"At least 1,000 are large, scary avalanches big enough to kill somebody," said Temper.

Tremper divides avalanches into three cycles.

The depth-hoar cycle runs from early in the season until January. The midwinter cycle has direct-action avalanches that occur in the top few layers of new snow. The spring season wet-slide cycle occurs when melt water pools up on an ice lens or in fine grained snow and lubricates the snowpack.

Tremper said the major factor affecting avalanches is wind.

In 15 minutes, wind can transport enough snow onto the lee side of a ridge to make the area unsafe.

"Wind accounts for most avalanches people get caught in and 95 percent of the time the victim triggers the slab avalanche. People are always saying avalanches are so unpredictable. I disagree. Avalanches occur for a reason. It is just a matter of developing your avalanche eyeballs, digging down, listening and looking for clues to instability."

There is an advantage to knowing what is under your skis as you head into the backcountry. Knowing the slope as well as the history of the snowpack is an advantage for safe snowboarding, snowmobiling or skiing.

Sunday, Mar. 1, 1992 Central Utah's Newspaper for 119 Years - Provo, Utah

Forecaster tries to tame killer avalanches

By PATRICK CHRISTIAN
Herald Staff Writer

BIG COTTONWOOD CANYON — With his backcountry skis on, professional avalanche forecaster Tom Kimbrough stomped on a mountain ridge triggering a roaring thunder avalanche that fractured a few feet to my left.

On the forested, steep 35-degree slope, the collapsing snow ripped out a 200-foot swath almost three feet deep and even pulled out some of the flat ridge we were on.

Menacingly, it took out a section of our ski tracks behind us.

Kimbrough let fly a couple of improbable expletives, the first I'd heard from him all day.

At 53 years old, the avalanche forecaster had seen lots of avalanches — and been in a couple himself — but he didn't seem at all comfortable with what he was seeing up Mill D North Fork near Reynolds Peak.

"I'm afraid someone is going to be killed up here this Saturday," he said.

It's all in a day's work for Kimbrough to tour the snow-blanketed Wasatch Mountains from Logan to Provo in order to evaluate the threat of avalanches.

Forecasts by Kimbrough or three other professional forecasters of the Forest Service's Utah Avalanche Forecast Center are available by local phone recordings in Logan, Ogden, Provo, Salt Lake City and Park City. In the Provo area, the daily recorded forecast can be accessed by calling 374-9770. Calling it can save your life.

On Thursday, Kimbrough planned to ski to Reynolds Peak to survey a jumbo avalanche on its northeast slope.

On Saturday, a group of backcountry skiers had called the center's 1-800-662-4140 call-in line to report they had tried to collapse the slope from above but it had held.

Fortunately they still decided not to ski the 30-plus degree slope and instead took a tamer way down. When they reached the valley area near Dog Lake, they noticed the slope had collapsed in a large avalanche.

Herald photo by Patrick Christian

Avalanche forecaster Tom Kimbrough uses an instrument to simultaneously measure the slope angle and compass bearing of a collapsed slope. He makes his readings near the avalanche fracture zone near the 9,422-foot summit of Reynolds Peak north of Big Cottonwood Canyon.

Since the danger an avalanche forecaster faces every day was recently underlined by the death earlier this month of Mark Yates, who directed the Moab Avalanche Center, I wanted to chronicle a day in the life of these important forecasters. I was invited to accompany Kimbrough on a field tour.

We met in Big Cottonwood Canyon and started skiing up Mill D North Fork trail climbing the 2.2 miles to the flat meadow at Dog Lake.

Where the trail passed by the first steep slope, Kimbrough stopped to study the avalanche threat.

He skied up the short, but steep slope to some trees and I followed.

Using a mountaineering shovel, Kimbrough dug a snow pit and tested the stability in the layer between the latest snowfall and previous snowfalls. With a soft paintbrush he brushed the length of the hole making various strong and weak layers more prominent.

He used his snow saw to cut a column in the pit and then applied scant pressure on the column before it broke at the weak layer, indicating a dangerous instability.

At one point the snow around us collapsed with a threatening woompf, and the snow beneath our feet dropped maybe one-half inch.

Collapses are often immediate antecedents to full-blown avalanches, and even an experienced hand like Kimbrough admitted feeling umcomfortable when the snow moves beneath his feet.

"A collapse is really an avalanche," said Kimbrough. He said sometimes a collapse just moves down and sometimes it moves down and out in a full-blown slide.

Before we got off the slope, Kimbrough expanded the pit to about the length of his skis, then using his saw, he cut a column big enough to hold him and his skis. The depth of the column extended into the weak layer.

He wanted to test the effects of the weight of a skier on the column.

Stepping onto the column, it held his weight, but in a jump, intended to imitate the pressures a skier might exert in a turn, the column broke and slid at the weak layer. If he had not isolated the column from the entire slope, it all could have slid. The results

(See FORECAST, Page A2)

FORECAST:

(Continued from Page A1)

showed the slope was extremely dangerous.

From Spruces Campground to Reynolds Peak was about 2.2 miles — all up.

Reaching the meadow near Dog Lake, we could see the avalanche Kimbrough had come to study.

It had broken near the summit and was more than 200 yards wide and had probably run about a quarter of a mile.

It was a killer. Kimbrough said it was unlikely anyone could have survived it.

We hiked from the meadow up the rough surface of the avalanche to the 9,422-foot summit of Reynolds Peak. Along the zigzag climb, Kimbrough studied the avalanche.

"Looks like there was a fatality," Kimbrough said holding up a groundhog whose skull had been crushed in the slide.

Near the fracture line at the summit, Kimbrough dug into the zone where the avalanche broke loose.

He used an instrument that simultaneously measured slope angle and compass bearing of the slope. He used a pocket microscope to view the snow crystals that were remarkably different at the weak layer compared to the rest of the snow.

Standing at the summit, Kimbrough said — "Well here's my office."

He said he likes his job because he gets out in the mountains two to three times a week and is helping people whose lives might be saved by the recorded reports his evaluations result in. "I think it's honorable work."

While we were still surveying the panorama at the summit, a pair of golden eagles circled overhead. We suspected they were mates.

We began skiing down the ridge to avoid collapsing any slopes. Off the summit, on a lower ridge, was where Kimbrough triggered the avalanche we watched cascade just to our left.

Rather than ski out the way he had planned, we skied down the avalanche path to study it and to see if it had crossed the Mill D North Fork trail. Another fatality. We saw a small red stain. Kimbrough said a squirrel had probably been killed by the large blocks of snow that slid.

The slide hadn't reached the trail. It had stopped in some thick trees, piling six feet deep near the bottom.

One-at-a-time, we carefully picked our way down the rest of unreleased slope through some thick trees. And we were relieved when we reached the trail below, and skied the two miles back to our vehicles.

It had been an exciting time for me, but just a day's work for a professional avalanche forecaster.

From a nearby ranger station he phoned in his finding for Friday's recorded forecast.

Two Skiers Trigger Avalanche; Slopes Dangerous After Storm

By Mike Gorrell
THE SALT LAKE TRIBUNE

Two skiers saw first-hand Wednesday just how dangerous back-country avalanche conditions have become after the state's first big snowfall in a month.

And with more storms forecast before a three-day weekend, the Utah Avalanche Forecast Center is concerned other recreationists might not be as fortunate as those untouched skiers. The center has issued a warning that the avalanche hazard is high.

Center forecaster Evelyn Lees said the skiers spied a natural avalanche in the mountains outside Park City, where 1½ feet of snow fell between Monday evening and Wednesday morning.

After checking it out for a few minutes, one skied down the slope parallel to the slide path without making a turn. Nothing happened. His companion followed, injecting a few turns into the descent. That set off an avalanche 300 feet wide that missed both skiers.

"That was an example of how sensitive the snow was," Ms. Lees said. "There have been lots and lots of avalanches from Provo to Park City, just about everywhere."

In the last stormless month, the snowpack lost much of its cohesiveness. "We call it sugar snow. If you grab a handful, it's like giant sugar crystals," Ms. Lees said. "You have all this weak snow with up to 2 feet of snow on top of it, and then it just goes."

She was not surprised avalanches occurred Wednesday on steep, higher-elevation slopes that are generally in the shade or susceptible to extra loading from the wind. But it was unusual, and illustrative of the widespread danger, that slides also were reported at lower elevations and on slopes comparable to steeper intermediate runs at ski resorts.

"We're telling people that if they don't have good route-finding and avalanche-stability skills, to stay out of the back country," Ms. Lees said. "Go ski at the resorts. They're probably wonderful."

Back-country skiers are not the only ones at risk. Snowmobilers and snowshoers also could trigger slides in these conditions. Gullies are particularly dangerous, she added, and will become more so with additional snow.

More is coming, said National Weather Service meteorologist William Alder. A moist southwest air flow was expected to produce 2 to 4 inches in the mountains by this morning and to add another 8 to 12 tonight and Friday morning. Another storm is likely to pass through Saturday and Sunday.

The first impulse in the series dropped 1½ to 2 feet of snow at ski resorts outside of Provo, Salt Lake City and Park City, and 8 or 9 inches in the mountains above Ogden. The southern mountains received a foot to 18 inches.

2/13/92

ION Monday, December 23, 1991 C7

Lees Shares Her Avalanche Expertise

By Craig Hansell
THE SALT LAKE TRIBUNE

Evelyn Lees has approached her job from both the ground up and the summit down.

The 35-year-old Maryland native is the newest member of the Utah Avalanche Forecast Center team. This experienced snow scientist carries impressive credentials.

With a dual degree in geology and soil from Oregon State University, Lees has lived in Salt Lake for nine years. Instead of studying the stratigraphy of rocks, Lees now examines the stratigraphy of snow layers and how well they bond together.

She began her meteorology work in the Tushar Mountains and on the Wasatch Plateau working with the Utah cloud seeding project collecting snow samples and doing water-content research.

Lees is married to Utah native Rick Wyatt who has long been active in the avalanche forecast business. Wyatt is now the head Utah Department of Transportation forecaster for Little Cottonwood Canyon.

Lees and Wyatt have climbed in Nepal, Tibet, Pakistan, Peru, Bolivia, Canada, Alaska and Europe as well as in the lower 48 states.

She said she prefers long alpine climbs to strictly rock climbs but owns impressive credentials in both.

Evelyn Lees

Lees lists a route called Black Elk on War Bonnett Peak in the Wind River Mountains of Wyoming and another in Black Canyon near Gunnison, Colo., as favorite climbs. But one of her favorites is a knife edge called Condoriri in Bolivia. Lees has climbed to 25,500 feet on the north face of Mount Everest in 1987.

"That is where I learned about avalanches, on big mountains," said Lees. "The biggest avalanche I have ever seen was on Nanga Parbat in Pakistan. It started up high, crossed a valley and ran up the other side. The avalanche path must have been 8,000 feet long. The dust cloud alone was 3,000 feet high — enough to bury Snowbird from top to bottom."

Although she began skiing with her parents when she was about four and even spent a week in Switzerland at an early age, she credits Utah with providing her with a skiing career.

She keeps busy with the details of keeping Utah backcountry users safe. Lees is quick to point out the secret to mountain travel is not getting caught in avalanches in the first place.

"Thirty percent of the [avalanche] cases don't survive the ride," Lees said of the need to avoid the hazard rather than deal with it after the fact.

She said the increasing number of snowboarders and some of the terrain they pick for their recreation is of increasing concern.

The Utah Avalanche Forecast Center and Wasatch Backcountry Rescue is trying to make snowboarders as well as the rest of the winter backcountry users aware of safe route finding and the need to be equipped with beacons.

Salt Lake Tribune

Utah Quotes of Note

"The premise is you accept everything the weirdo has to say because the weirdo just might be the wave of the future."

— Salt Lake County Commissioner Michael Stewart, explaining the meaning of Salt Lake County's new First Amendment Park.

"We decided the commute on I-15 in bumper-to-bumper traffic would be more annoying than driving in from Grantsville. Every time I get on I-15 I feel I made the right choice."

— Leonora Midgley, on the Wasatch Front's snarled traffic conditions.

"I'm glad they've given my family work, but I feel wronged. I'm like a jackass who's fed until he is no more good, then gets set loose to the wolves in the hills."

— Pedro Corona, exhausted by 43 years of toil as a migrant worker.

"It looked like snow, but it felt like rain. I won't tell you what it skied like."

— Tom Kimbrough, Utah Avalanche Forecast Center forecaster, on a midweek storm that brought mostly rain to the mountains.

Avalanche Survivor Didn't Have Time To Think as Snow Sucked Him Under

By Mike Gorrell
THE SALT LAKE TRIBUNE

Thoughts of an avalanche were far from James O'Reilly's mind Saturday when he started his second run in the deep powder in the Day's Fork area of Big Cottonwood Canyon.

As soon as he was caught in one, he did not have time to think.

"It started moving so fast I didn't have a chance," he said Sunday, recounting the experience from a bed at LDS Hospital where he was being treated for a fractured lower-leg bone.

"I was just going for a ride. It was so deep it just grabbed my skis and pulled me down."

Mr. O'Reilly, a Rhode Island native who now lives and works at Alta's Rustler Lodge, does not remember what happened after he started moving involuntarily with the snow.

"I came to just as I was being dug out, once my head got cleared. I was kind of relieved that I was still breathing and conscious."

So were his companions — Pete Groves, Eric Whitney, Amy Katz and Kevin Payne.

■ RELATED NEWS
• Learning about what causes avalanches is not only interesting, it can help ensure skiing safety.
Page B-7

"It was the most intense thing they had ever seen," Mr. O'Reilly said, relying on their comments since he was indisposed at the time. The others lost sight of Mr. O'Reilly in the cloud of snow that accompanied the onset of the avalanche. But when the slide stopped 200 yards below the break, they saw his backpack through the heavy chunks of snow in the runoff zone.

Experienced skiers, they had shovels and avalanche transceivers. They dug Mr. O'Reilly out and notified authorities, who transported him by medical helicopter to LDS Hospital.

Not yet noon, it was a rotten way to end a good morning of skiing early in the season.

"The snow was sweet. It really was," Mr. O'Reilly said of his first run a short distance away in Toledo Bowl. "It was dried from the [cold temperatures of the] night before. It was shreddable snow."

When his group hiked back up the ridge separating Big and Little Cottonwood canyons, they moved to a north-facing slope already skied by three people who were just starting their ascent for a second shot of powder.

Mr. O'Reilly's companions each found a line of untracked snow. "Everyone else had a great run," he said. He traversed the ridge to a favorable spot about 20 yards to the left of the others' tracks and started to make his turns when the avalanche gave way.

Much to his surprise.

"It was a very close shave indeed," said Tom Kimbrough of the Utah Avalanche Forecast Center, saying the break occurred on top of a layer of snow turned crusty by rains 10 days earlier.

The avalanche hazard is high today on steep north-, northwest- and northeast-facing slopes steeper than 35 degrees above 8,000 feet, Mr. Kimbrough said. There is a moderate threat on east- and west-facing slopes as well.

Al Hartmann/The Salt Lake Tribune
James O'Reilly manages a smile despite a close scrape with a wall of thundering snow. He escaped with a fractured lower-leg bone.

Tribune 11/25/91

Utahns Endure Avalanche, Frozen Roads

By Mike Gorrell
THE SALT LAKE TRIBUNE

Frozen freeway overpasses proved treacherous but not injurious for motorists Tuesday morning in northern Salt Lake County.

A group of skiers and snowboarders also narrowly escaped injury when they triggered an avalanche in Big Cottonwood Canyon just over the ridge from Alta.

The traffic accidents and snowslide occurred in the wake of a storm that dropped up to 2½ feet of snow in the Wasatch Mountains and as much as an inch of rain in the valleys.

The storm's last hurrah was intensified Monday night by the "lake effect," in which storms pick up extra moisture from the Great Salt Lake and drop it while passing over the colder land surface.

The phenomenon was most pronounced in the western Salt Lake Valley, generating 8 inches of snow in Herriman, 5 in Copperton, 4 in Kearns and 3 in Magna. It also produced 0.17 inch of rain at Salt Lake City International Airport.

Some of that moisture froze when the temperature dropped to 32 degrees just before sunrise, turning overpasses on Interstates 80 and 215 into ice rinks.

A dozen accidents resulted, including five that required people to be taken to hospitals for treatment of minor injuries, said Utah Highway Patrol Sgt. Phil Vigil.

The avalanche occurred about 20 feet below the ridge separating Big and Little Cottonwood canyons, said Bruce Tremper of the Utah Avalanche Forecast Center.

Two skiers had descended the steep, north-facing slope, known as "Two Dog slide path" because two dogs were killed by an avalanche there about eight years ago.

When a snowboarder attempted to follow his companions, he unleashed an avalanche two feet deep and 150 feet wide.

"It was exactly the kind of slope we were warning people to stay away from . . . but these [people] just jumped in. It's typical of what is laying and waiting out there," he added.

Widely scattered rain is possible Friday in northern valleys. Southern Utah will be dry and warming.

Deseret News 2-13-92

Avalanche kills 4 skiers in mountains near Moab

■ La Sals: 2 others dig out and ski for help. All are members of a team that checks for avalanche danger.

By Douglas D. Palmer
Deseret News staff writer

Four skiers were killed and two escaped death in an avalanche Wednesday afternoon at the top of the Gold Basin area of the La Sal Mountains southeast of Moab.

The avalanche occurred about 3 p.m. at about the 11,000-foot level of the basin, located about 25 miles southeast of Moab.

Names of the victims, members of an avalanche checking team, had not been released, pending notification of next of kin, a dispatcher for the Grand County sheriff's office said at 9:30 a.m. Thursday.

But Jerry Shaw, district ranger, Moab Ranger District of the Manti-La Sal National Forest, said one of the victims was an avalanche forecaster.

Shaw said the individual's family had been notified but that he was not free to release the victim's name.

All six individuals were buried by the slide, with two of them being able to free themselves. But it was too late to revive the other four by resuscitation, Shaw said.

The two individuals who escaped death in the slide were able to ski to Moab to notify the sheriff's office about 8 p.m. Wednesday.

Shaw said the six individuals, all residents of Moab, were experienced backcountry skiers and all were experienced in working avalanches, Shaw said.

A rescue party was preparing to leave for the area. A helicopter was dispatched for the rescue operation but was unable to fly because of poor weather conditions, Shaw said.

The avalanche area is located in San Juan County, but the rescue effort is being directed by Grand County Sheriff Jim Nyland.

Meanwhile, the Utah Avalanche Forecast Center at the Salt Lake office of the National Weather Service, which was notified of the tragedy Thursday morning, confirmed that two other skiers Wednesday spied a natural avalanche in the mountains outside of Park City, where 1½ feet of snow fell between Monday evening and Wednesday morning.

After checking it out for a few minutes, one individual skied down the slope parallel to the slide path without making a turn. Nothing occurred. The skier's companion followed, making a few turns into the descent. That triggered an avalanche 300 feet wide that missed both skiers, according to the avalanche forecast center.

Al Soucie, an avalanche forecaster at the Salt Lake office, said the danger of avalanches remains high in many areas of Utah. An avalanche warning was issued for the Wasatch Mountains from Spanish Fork Canyon through the mountains east of Ogden.

New snow amounts, up to 2 feet, falling on a weak snowpack and increased ridgetop winds have rapidly increased the danger.

Slide Kills Four; Crews Can't Reach Bodies

Tribune Feb 14 92

■ Continued from A-1

He couldn't see anybody and started searching," said Forest Service investigator Evan Lowry. "He located [Mr. Yates by the signal emitted by his emergency locater] and started digging him out when he saw the shovel of the other guy [Mr. Bigler] come out of the snow."

The two survivors eventually found their companions buried deeper under the snow, uncovered them and applied cardiopulmonary resuscitation, but to no avail. "They stayed there a considerable time," Mr. Lowry said, before skiing back to their vehicle on Geyser Pass road. They reported the tragedy to the Grand County Sheriff's Office by 8:30 p.m. Wednesday, five hours after it occurred.

"Hasty teams" from Grand and San Juan counties, the Forest Service and U.S. Bureau of Land Management launched their recovery effort at 7 a.m. Thursday. It was quickly frustrated as thick black clouds enveloped the La Sals down to the 8,000-foot level.

The dense cloud cover was too dangerous for a BLM helicopter to leave its launch pad at Moab. An attempt to reach the slide site from the ground also was beat back by 6 to 10 inches of new snow and 40-mph winds that piled snow deep on the slopes, aggravating the threat of further avalanches.

Mark Yates

"The situation was just too risky to keep going," said Mr. Shaw. "They were concerned about the life and safety of the team."

Brad Meiklejohn of the Utah Avalanche Forecast Center in Salt Lake City said that if the clouds clear this morning, rescuers hope to fly to Gold Basin in the BLM helicopter.

Retrieving the bodies could be dangerous and time consuming. Before any rescuers are placed on the ground, Mr. Meiklejohn said, avalanche-control explosives will be dropped into the unstable snowpack to release any potential slides. That snow could cover the victims and delay recovery.

The deaths are the first avalanche fatalities ever in the La Sals and the first in Utah since February, 1987, said Mr. Meiklejohn's associate, Al Soucie.

Their office labeled the avalanche threat statewide "extreme" going into the President's Day weekend and warned skiers, snowmobilers and other outdoor recreationists to stay away from slopes that seem remotely dangerous.

Mr. Yates provided avalanche forecasts in the La Sals for four seasons. Also an instructor for the Outward Bound wilderness program, he and his wife, Mary, moved to Moab from Missoula in 1979. He leaves behind two small children.

"He was real positive about life. He loved to teach people and share the country with them. He'd teach them outdoor skills and how to be comfortable in the outdoors," said friend Sheri Griffith, Moab. "I'll miss his smile."

"They were all excellent skiers [but] Mark [Yates] was THE guy," said Moab's Bill Groff. "He was the best of the best," added Peter Haney, Moab.

Ms. Loveridge was an outdoors and fitness enthusiast. She was a river-running guide during the summer for Moab-based Tag-A-Long Tours and Travel Agency, taking numerous trips through Cataract Canyon. She also taught aerobics at Moab Fitness Center, was a rock climber and a photographer.

"She was a fitness-crazed person," said tour-company owner Bob Jones. "She had a real full life. It seems like things like this happen to the real special people," said fitness-center owner John Fogg.

Mr. Turk moved to Moab five years ago from San Diego and reportedly worked in Los Alamos, N.M. as an engineer. He did construction jobs, emphasizing solar architecture, and was a painter and environmentalist.

Mr. Hopkins moved to Moab last fall, and apparently also worked for Outward Bound. "He was a soft-spoken person, but I understand he was hell on skis," said Connie Blaine of the Moab Ski Club. The victims were key members of the club.

Tribune correspondent Vickie Barker contributed to this report.

Utah Avalanche Kills Four; Crews Can't Reach Bodies

By Craig Hansell and Mike Gorrell
THE SALT LAKE TRIBUNE

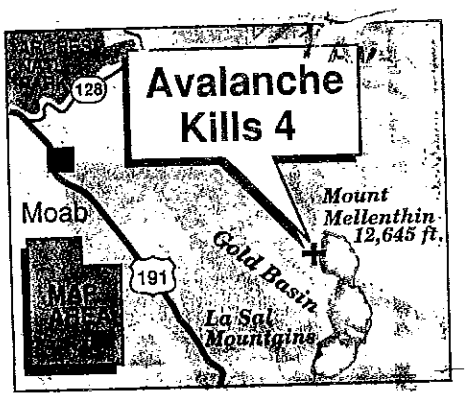
Rescue crews are counting on a break in the weather today to recover the bodies of four skiers killed in an avalanche Wednesday in the La Sal Mountains southeast of Moab.

A blizzard Thursday compounded already-dangerous snow conditions in the La Sal and prevented rescuers from reaching the bowl where the snowslide buried the victims and two companions who managed to dig themselves out and escape uninjured.

The six were in the mountains preparing for an avalanche workshop this weekend and assessing the avalanche hazard after a storm, the first in a month, dropped about 8 inches of snow on top of a slick, hard-packed base.

The group's leader, and a victim, was Mark Yates, 37, Moab, the La Sal Avalanche Forecast Center director. The other victims, all experienced backcountry skiers from Moab, were identified as Maribel Loveridge, 31, William Turk, 38, and Jeremy Hopkins, 26.

The group was standing on a slope in Gold Basin, a high mountain bowl beneath the highest La Sal peaks, when a slide broke off to their left. That release set off a larger avalanche on a steep slope [illegible]



er up. They had no time to escape.

The survivors said they heard a crack and the settling of the snow and then the next thing they knew it was on top of them, said Jerry Shaw, Forest Service district ranger in Moab.

"It was bad luck," said Doug Abromeit, director of the Salt Lake City-based National Avalanche Center.

The slide, 50 feet wide and 300 yards long, also swept over Steve Meleski and Craig Bigler, 54, assistant forecaster under Mr. Yates for four years.

Mr. Meleski freed himself. "He hollered for help.

See A-2, Column 1

The Salt Lake Tribune, Friday, February 14, 1992

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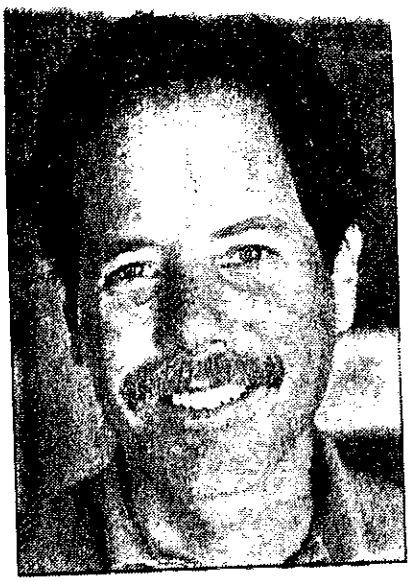

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Tribune correspondent Vickie Barker contributed to this report

10

DESERET NEWS, SATURDAY, MARCH 7, 1992 E 1

Deseret News file photo

An avalanche in 1983 dealt the church, just visible behind the Powder Ridge sign, a fatal blow.

Alta Catholics hope to rebuild their church — this time out of avalanche danger's way

By Patty Henetz
Deseret News staff writer

Wrecked by huge avalanches twice in 10 years, Our Lady of the Snows Catholic Church was definitely in the wrong place at the wrong time.

But Alta wants a church and needs a community center, so the town, the Catholic Diocese of Salt Lake City and the U.S. Forest Service pored over avalanche maps and found a spot for a new church that is likely to escape the fate of its predecessor.

Built by a philanthropic Alta resident around 1960, the first Our Lady of the Snows was a wood-frame chapel perched on a little knoll below the massive snowfields on Alta's south side.

In December 1973, an avalanche blew out the church's stained glass windows and filled the building with snow before rolling downhill to damage a wing of the Alta Lodge, destroy dozens of cars and injure a canyon resident. The church carried insurance including an act-of-God clause that covered most of the cost of rebuilding.

In May 1983, another huge avalanche lumbered down the south-facing slopes, this time dealing the church a fatal blow. The diocese ordered the building demolished and the site scraped clean.

Sunday Masses continued in lodges and the town library, but some townspeople, notably business owner Joan Collins, hoped the church could be rebuilt.

At first, the money was slow coming. But when Collins was killed in a skiing accident in 1989, her family asked that money be sent to the church fund. Many people responded, revitalizing hopes the chapel would finally be rebuilt.

This time, the church will be safer, if not invulnerable.

The new building site is on U.S. Forest Service land tucked below a stand of trees between Forest Service buildings and the Shallow Shaft restaurant. The church will be concrete and built into the hillside.

"We've been told the building could be buried but not destroyed," said the Rev. John Norman, principal of St. Joseph's High School in Ogden and Alta's priest for the past eight years.

About $80,000 of the total $200,000 needed to complete the church, which will be called Our Lady of the Snows Chapel and Community Center, has been donated. All the necessary permits and environmental studies have been completed, so construction could begin this spring if the money is in hand.

Fund-raising events, including a dinner and drawing for weeklong vacation packages at Alta and Snowbird, are planned for spring, and fund-raisers are still seeking donations.

Once the church is built, it will be available to the town for community functions and to other denominations for services, including weddings.

"It won't be a traditional church with pews in a row. It would be an integral part of the Alta community. Alta doesn't really have a place that is a community center," the Rev. Norman said.

Avalanche Kills Skier As Camera Watches

By Stephen Hunt
THE SALT LAKE TRIBUNE

SNOWBIRD — A man skiing a steep back-country slope Wednesday for an amateur movie project was killed in an avalanche while a cameraman captured his death on film.

Mark D. Marria, 21, Alta, was skiing the northeast face of the east American Fork Twin Peak and had made 15 to 20 turns when he apparently triggered a huge avalanche about 10 a.m.

The four other members of the film project — which included a cameraman, skiers and snowboarders — watched as the avalanche carried Mr. Marria down the mountainside, said Utah County sheriff's Sgt. Jim Tracy. No one else was involved in the slide.

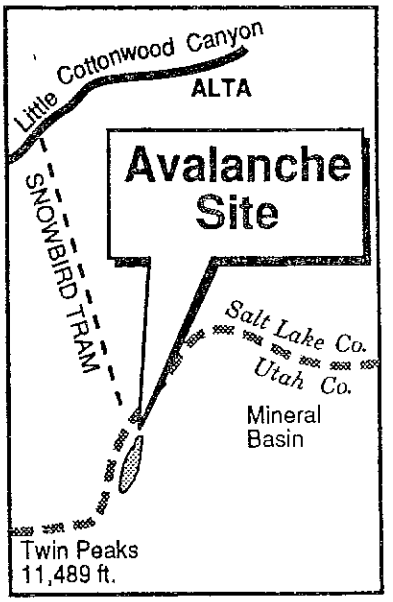
The sheriff's office confiscated the 16mm film and planned to develop it so the cause of the avalanche could be determined, Sgt. Tracy said.

The snow slide occurred in Utah County, outside the Snowbird resort. It started at about 11,000 feet, above Mineral Basin, the big bowl directly south of Snowbird's Hidden Peak tram terminal.

The slide reportedly broke 2 to 3 feet deep, was 150 to 200 feet wide and ran downhill for about 1,000 feet on the 40-degree slope, which is roughly as steep as Alf's High Rustler run at Alta.

The avalanche carried Mr. Marria over a band of cliffs and onto a lower snowfield, where the snow also broke into an avalanche. At the end of the slide zone, Mr. Marria was buried under 7½ feet of snow.

Members of the film crew and others skiing in the area located the victim using avalanche beacons and probe poles. About 10 people began digging him out and were soon joined by ski-patrol members, Sgt. Tracy said.



Pat Shugart, a Snowbird ski-patrol supervisor, said he and other ski-patrol members responded to the slide area after spotting the upper fracture line of the avalanche from ski-patrol headquarters on Hidden Peak.

Mr. Shugart said the ski patrol knew the film crew was in the area of the avalanche because they signed releases before leaving the resort area.

After extricating the victim from the snow, ski-patrol members performed cardiopulmonary resuscitation until a medical helicopter arrived. Mr. Marria had been buried about 20 minutes.

Mr. Marria was flown to LDS Hospital, where he arrived at 11:22 a.m. with no breathing or heartbeat, said hospital spokesman Jess Gomez. He was pronounced dead 19 minutes later.

The Utah State Medical Examiner determined the man died of asphyxiation, Sgt. Tracy said.

The film crew had just returned from Steamboat Springs, Colo., where they had been working on the ski film, Sgt. Tracy said. Crew

See B-2, Column 4

Fatal Avalanche Near Snowbird Captured on Film

■ Continued from B-1

members included people from Idaho, Colorado, Maine and Salt Lake City, he said.

Rusty Martin, Snowbird vice president of communications and marketing, said it is not unusual for people to "go out and get some hot footage and try to sell it to someone."

The avalanche hazard Wednesday was listed by the Utah Avalanche Center as moderate in areas similar to where the fatal slide occurred.

This is Utah's fifth avalanche fatality of the year and the 15th avalanche fatality nationally, according to Evelyn Lees with the Utah Avalanche Center.

The Utah Avalanche Center will present a program at 7:30 p.m. April 9 in the University of Utah Behavioral Sciences Auditorium describing the LaSal Mountains avalanche that killed four backcountry skiers, including LaSal Avalanche Forecaster Mark Yates, in February.

Reporter Craig Hansell contributed to this report.

Tribune 4/4/92

Film Shows Skier Who Died On Slope Triggered Avalanche

By Stephen Hunt
THE SALT LAKE TRIBUNE

Mark D. Marria enjoyed skiing steep terrain.

On Wednesday morning, the 21-year-old Alta man died in an avalanche while skiing a backcountry mountain slope experts describe as "extremely radical."

The expert skier and some friends were making a ski movie on the northeast-facing slopes of the American Fork Twin Peaks, south of Snowbird, when the avalanche occurred.

Mr. Marria, who was financing the movie project, was being filmed as he skied the 40- to 50-degree slope. He made 16 turns when the snow fractured 2 to 3 feet deep and carried him 1,000 feet down the mountain, said Dave Ream, U.S. Forest Service ranger.

Mr. Marria was buried under 7½ feet of snow. He was under the snow about 20 minutes before his companions located him using avalanche beacons and uncovered him.

The victim was flown to LDS Hospital, where he was pronounced dead.

After viewing the 16mm film, the Utah County Sheriff's Office concluded Mr. Marria triggered the avalanche.

Sgt. Jim Tracy said Mr. Marria had no opportunity to ski out of the slide once it started.

"It broke above and below and all around him," Sgt. Tracy said. Within five seconds, the skier disappeared in a cloud of snow, he said.

Assured that Mr. Marria's death was accidental, Utah County investigators have closed the case, and the film will be returned to the owners.

Local experts say the area where Mr. Marria died — a slope outside the Snowbird resort — was not a safe place to be on Wednesday.

According to Bruce Tremper of the Utah Avalanche Forecast Center, most local skiers only venture into that area when the snow is extremely stable. "The present snowpack certainly does not fit that description," he said.

The forecast center had been calling the avalanche hazard "moderate" for areas similar to where the avalanche occurred. That indicates a possibility of skier-triggered slides in localized areas.

"If you were looking for an avalanche Wednesday, this was exactly the kind of place you'd expect to find one," Mr. Tremper said.

Worst Avalanche Season on Record Comes to Merciful End in Utah Mountains

By Craig Hansell
THE SALT LAKE TRIBUNE

The February avalanche in the LaSal Mountains that claimed four lives was the single worst loss of life in any American avalanche this season.

Record keepers would probably need to go back to mining days to find an avalanche that claimed more lives in Utah. This season, Utah and Colorado have recorded five avalanche deaths each. Not since 1986 has the death toll been that high in a season.

Colorado Avalanche Center director Knox Williams says 17 avalanche-related deaths have occurred this season. The average number of avalanche fatalities during the 1980s has been 17 per year.

The February avalanche in the LaSal Mountains that killed four skiers, including avalanche forecaster Mark Yates, was Utah's first fatal slide since Feb. 14, 1987.

"It has been a unstable year because we have had a thin snowpack," said Utah Avalanche Center director Bruce Tremper. "It is actually the opposite of what people think. A thin snowpack creates weak layers. That is the reason why the snowpack is unstable."

The 45-year average snowfall at Alta from Nov. 1 to April 30 is 485 inches. This year, 367 inches of snow has fallen. That is history's fourth worst snowfall. The least snow was a 314.5 season total during the 1976-77 drought.

Tremper said the 30-day period from Feb. 4 to March 5 was especially dangerous. Nationwide, 14 people died in avalanches during that time with the LaSal avalanche creating the most fatalities.

As of April 1, the Utah Avalanche Center's funding has ended for the season. Friends of the Utah Avalanche Center headed by Wendy Ziegler, 2557 E. Valley View Drive, Holladay, Utah, 84117 are actively soliciting tax-deductable donations to keep it open.

The Utah Avalanche Center is a joint venture of the National Forest Service and the National Weather Service. Recorded phone reports have been available over 12 phone lines statewide.

Last year, 80,000 calls were fielded by the center and that number increases about 10 percent per year.