

Snow & Avalanches in Utah



**USDA Forest Service
Utah
Avalanche
Forecast
Center**



**Annual Report
1998-99**

Forest Service Intermountain Region

In partnership with:

Friends of the Utah Avalanche Forecast Center
Utah Department of Public Safety
Salt Lake County

NOAA National Weather Service
Utah State University
Utah State Parks and Recreation

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**The Utah Avalanche Forecast Center is a Forest Service program under the
Intermountain Region Office and the Manti-La Sal National Forest, in partnership with the
Friends of the Utah Avalanche Forecast Center
Utah Department of Public Safety Division of Comprehensive Emergency Management
Salt Lake County, Cache County
National Weather Service and
Utah State University
Utah State Parks and Recreation
National Forest Foundation**

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www.avalanche.org**

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The Utah Avalanche Forecast Center

An overview

Our goal:

Help keep people on top of the Greatest Snow on Earth instead of buried beneath it.

Where do avalanche accidents occur?

Ninety eight percent of all avalanche fatalities occur in the backcountry—areas outside of ski area boundaries where no avalanche control is done. Ski areas and highway avalanche control crews routinely knock down avalanches with explosives before the public arrives each morning. They have done their jobs so well that they have almost completely eliminated avalanche deaths at ski areas and on highways. Since 1980, less than one percent of avalanche fatalities have involved general public on open runs at ski areas or on open highways.

What kind of people get caught in avalanches?

Ninety two percent of people killed in avalanches since 1985 have been recreationists, and they are almost always very skilled in their sport. In almost all cases their skill in their sport significantly outpaces their avalanche skills. Looking at the most recent 5 years of national data, nearly twice as many snowmobilers have been killed as any other user group, followed by climbers, backcountry skiers, snowboarders and miscellaneous recreationists such as hikers and snowshoers (see charts on page 16).

How do people get caught?

In over 95 percent of avalanche fatalities, the avalanche was triggered by the victim or someone in the victim's party. As Pogo says, "We have met the enemy and it is us." Which is actually good, because it means that, 95 percent of the time, we can avoid avalanche accidents through our route finding and snow stability decisions.

In summary, avalanche fatalities occur almost exclusively in the backcountry, almost always involve recreationists, and almost all avalanche incidents can be avoided if we choose.

How we help solve the problem:

We give backcountry travelers the weapon of knowledge. In order to avoid triggering avalanches, backcountry travelers need:

Critical, up-to-date avalanche information.

We issue daily recorded avalanche bulletins that give the public important avalanche information they need to make their life-and-death decisions in avalanche terrain. And we also forecast snow stability and weather trends into the future. Our information helps the public to decide what kind of terrain is safe, what kind is dangerous and we give them useful clues to look for when they venture into avalanche terrain.

We provide information on current avalanche conditions primarily through our avalanche bulletins. People access these by:

- ◆ Recorded message updated each day
- ◆ Live interviews each day on two different public radio stations
- ◆ The Internet
- ◆ Faxes sent out each morning to businesses and Forest Service offices
- ◆ In times of extreme or unusual avalanche conditions, we issue an avalanche warning that reaches all the broadcast and print media as well as NOAA weather radio.

Finally, we “preach the avalanche gospel” as much as possible to the local, national and international media. This season, for instance, several documentaries played on national television including National Geographic and several on the Discovery Channel and PBS. UAFC staff are featured in most of these documentaries.

Avalanche education:

We teach about 25 free, basic avalanche awareness classes each season. These not only give the public an overview of the avalanche problem, but also some basic avalanche skills. These classes encourage them to take a more involved avalanche class offered by the private sector.

Our Philosophy:

Just because people hear the information doesn't mean they listen. Even good information, if presented in a boring way, wastes the taxpayer's money because no one will remember it. Therefore, we try to make the bulletins entertaining so that people will remember what they hear and enjoy the experience enough to use the bulletins regularly. We try and use all the standard tools of effective writing and speaking such as using active voice, first person, examples and stories to illustrate points, humor where appropriate and reading the bulletins in a natural voice, like talking to a friend. The recorded bulletins are informal, chatty and funny, yet informative. It also makes our work fun.

We believe local forecasters do a much better job than distant forecasters.

Local people know local conditions better. They're out in it every day, they see it from their window and they talk with people on the street about it. Because of this, we believe that local people should issue avalanche bulletins for local areas, as long as they have the avalanche skills to do so. For this reason, three crews of avalanche forecasters operate in Utah, one in Logan, another in Salt Lake City and a third in Moab.

We believe in a strong field-based program.

Avalanche forecasting is more of an art than a science. And because of this, computers never have, and most likely never will, be able to forecast avalanche hazard as well as an experienced and skilled human being. Avalanche forecasting works best when the person putting out the forecast has an intimate, daily connection to the snowpack. We notice that the longer we

spend in an office, the more out of touch with the snowpack we become. Therefore we always put in one or more field days before our forecasting shift, and we never have more than two forecast days in a row.

This is our philosophy and it seems to be working. More people call the UAFC bulletin each season than any other avalanche bulletin in North America, and the number keep increasing by an average of 20 percent per year. The numbers of people going into the backcountry keep increasing exponentially, yet the death rate has risen more slowly. We also see an increasing demand for avalanche education and information, not only by Utahns, but by the national and international media.

We are very passionate about our work because it's more than a job, it saves lives.

Nuts and Bolts

The UAFC is operationally separated into three entities: the Logan area mountains, the La Sal Mountains near Moab and the Wasatch Mountains near the cities of Salt Lake, Ogden, Park City and Provo.

Mike Jenkins, Liz Hebertsen Darren McAvoy and Bruce Engelhard record the avalanche bulletins in the Logan area mountains on weekends and each Wednesday and the Salt Lake-based staff record the Logan bulletin on the remaining days. Mike Jenkins has taught a quarter-long avalanche class for Utah State University for a number of years and he has organized a fine consortium of local volunteers, graduate students and workers. Their office is located at Utah State University in the Department of Forest Resources.

In Moab, Faerthen Felix is the sole forecaster. The Moab office is located in the Moab Ranger District on the Manti-Lasal National Forest.

Last, but not least, the vast majority of the backcountry use occurs in the Wasatch Range of northern Utah. A staff of six full time workers cover the Ogden, Salt Lake City, Park City and Provo area mountains—arguably the most heavily used mountain range in the U.S. Bruce Tremper in his 13th season heads the operation along with a very experienced staff: Tom Kimbrough, Evelyn Lees, Seth Shaw and Carol Ciliberti. All are Forest Service employees under the Intermountain Regional Office. Lastly, a private, nonprofit group, the Friends of the Utah Avalanche Forecast Center, contract the intrepid Bob Athey as a full time backcountry observer. The Salt Lake office is co-located with the National Weather Service at the Salt Lake International Airport.

Although Bruce Tremper spends most of his time in the Wasatch operation, he oversees all three operations to insure consistency in quality.

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Forecast Center.

The public can access the bulletins in the following ways:

Telephone:

Salt Lake City - (24 phone lines)	(801) 364-1581
Logan (multi-line PBX system at Utah State University)	(435) 797-4146
Park City (multi-line PBX system at Park City Resort)	(435) 658-5512
Ogden (multi-line PBX system at Weber State University)	(801) 626-8600
Provo (multi-line PBX system at Brigham Young University)	(435) 378-4333
Alta (multi-line PBX system through the Town of Alta)	(801) 742-0830
Moab (single phone line)	(435) 259-7669

Radio Stations (live on-air reports each morning around 8:00 am)

KRCL 91 FM
KPCW 92 FM

Internet:

<http://www.avalanche.org>
<http://nimbo.wrh.noaa.gov/Saltlake>
<http://www.csac.org>

Fax:

We operate an automated fax distribution of the bulletin for selected businesses and Forest Service offices that post a hard copy for the public to read.

To contact our office: (801) 524-5304 (phone)
(801) 524-4030 (fax)
e-mail: uafc@wasatch.com

Season Highlights

- Five avalanche fatalities occurred this season in Utah, three snowboarders, one snowmobiler and one hiker. For the third season in a row, no skiers died in avalanches in Utah. As of this writing, one of two missing snowmobilers on the Wasatch Plateau was recovered in an avalanche path, but rescuers do not believe that avalanches killed either victim; so will not list either of these as avalanche deaths. Utah has averaged 4.2 avalanche deaths per season over the past five seasons.
- We know of at least 70 people who unintentionally triggered backcountry avalanches this season, of those, 50 were caught, 19 were partly buried, seven were totally buried and five killed. This only represents the incidents we heard about and we estimate that perhaps twice as many people triggered avalanches as these numbers suggest.
- Once again, more people accessed UAFC products than any other avalanche center in North America. The public called UAFC hotlines 109,521 times, which averages over 600 per day. Including the Internet, the public accessed UAFC advisories 246,000 times (averaging 1,366 times per day), and they accessed the mountain weather forecast 113,139 times (averaging 628 times per day). The call numbers are down from previous years because of the low snow year, but also because more and more people access UAFC products via the Internet instead of phone lines.
- We taught 50 avalanche classes, directly reaching 2,429 people. Most classes were free and open to the public. Audiences include snowmobile groups, skiers, snowboarders, snowshoers, hikers, hunters, Boy Scout troops, rescue groups and other people who use the backcountry in winter.
- Once again, UAFC staff was prominently featured in the media in a positive light. We conducted two different on-camera interviews for national television documentaries, provided avalanche information to 11 national television programs, were interviewed by seven national print media, eight local television programs, five local radio programs and 12 local print media. In addition national television documentaries produced in past years continued to air including National Geographic and several others on the Discovery Channel and PBS.
- Utah finished the season with a below average snowpack—significantly below average in some areas. The “La Nina” ocean currents created a significantly above average snowpack in the northern U.S. with a below average snowpack in the southern U.S. and unfortunately, Utah ended up just south of the dividing line.

Telephones and the Internet

Changing Times - Changing Technologies

This season, was an unusually low snow year, so we expected less people to call the recorded avalanche advisory than the previous above average snow years. But the call rate took a disproportionately huge drop. The recorded avalanche advisory in Salt Lake City totaled only a wimpy 76,880 calls this season compared to 106,000 last season and 113,000 the season before. The numbers have not been this low since 1990. But we think we can explain.

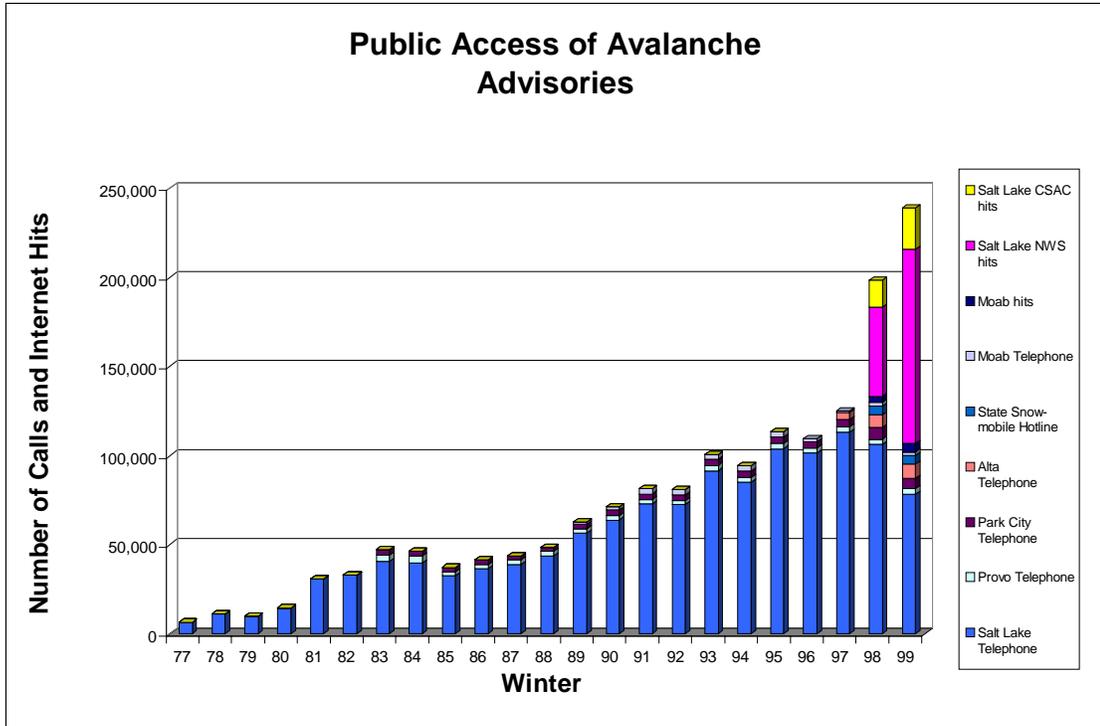
The Internet hits have been rising at the same rate the recorded telephone calls have been falling. This season, for the first time ever, more people got their forecast over the Internet than the recorded telephone message. And the mountain weather forecast proved to be even more popular than the avalanche advisory, with an average of 628 hits per day for the mountain weather forecast and 605 for the avalanche advisory, with nearly 200 additional daily subscribers to the advisory via the “proxy server” Cyberspace Snow and Avalanche Center. With an average of only 472 calls per day to the recorded advisory, nearly twice as many people get their information over the Internet than the telephone.

This has changed the way we do our business and it promises to change even more dramatically in future years. This season we unveiled the “Powder the Polar Bear” web page, in which our mascot, Powder the Polar Bear points to the avalanche danger level in the same way Smoky Bear points to the fire danger during the winter. It is a quick and easily digested way for the public to access avalanche information without having to read through the avalanche advisory for the bottom line.

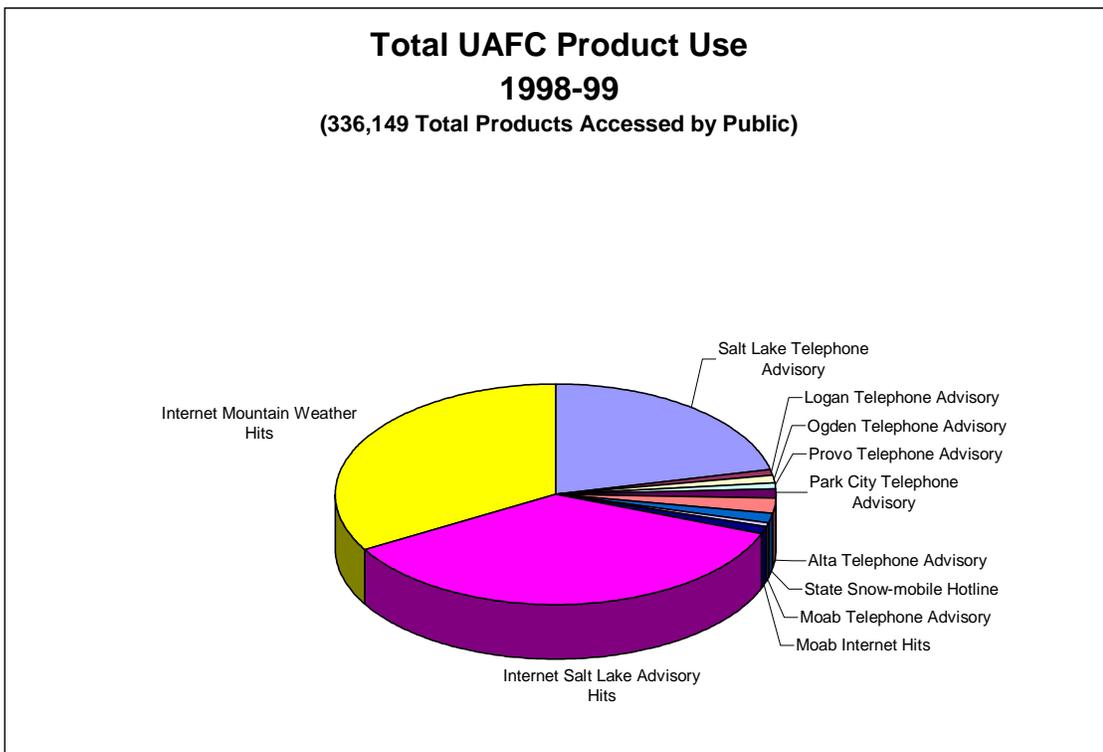
We want to give the public several levels of detail in their avalanche information. First, Powder the Polar Bear gives the bottom line—or danger at a glance. Second, we do live radio interviews each day on three different public radio stations and that gives the public an intermediate level of avalanche information. Finally, the written text of the avalanche advisory (or the recorded message) gives the most detail, designed for the more hard core users who need to know as much information as possible before going out.

Several years ago, our philosophy was to not give the public the bottom-line avalanche danger rating without first forcing them to listen to the details. We were afraid that they would abuse the information in its simple form. For instance, we were afraid they would hear “moderate danger” and, thinking it was safe, rush out into the backcountry and find one of the booby traps that we described on our more detailed report. But times have changed. We realize that as more and more people recreate in the mountains, each needs a different level of information. The person who wants to walk their dog up Mill Creek Canyon only wants to know the general danger level. A Boy Scout troop headed into moderate terrain for a camp-out wants an intermediate level of information because they can’t understand many of the more technical terms on the detailed advisory anyway. Then the hard core snowmobilers, skiers, boarders and climbers, who have taken avalanche classes and read the books, want to know all the details. Our customers are changing and we must find ways to change with them.

Future projects include an Internet-based GIS display of avalanche danger so that someone can zoom in on a map to see the rated avalanche danger, then click on a location to view additional information in any level of detail they desire.



Telephone access has dropped slightly but not nearly as fast as the rise of Internet access to UAFC products.



More people access the advisory via the Internet than the recorded telephone hotline. As technology changes, we expect that more and more people will use the Internet in lieu of the telephone. We will have to adapt to the changing technology.

Season History

Salt Lake, Ogden, Park City and Provo area mountains

by Tom Kimbrough

La Nina, El Nino, and all that

These weather brats are getting tiresome. Last year it was El Nino, this year it's La Nina. Like poorly disciplined kids, they get their own way despite our complaints.

El Nino tends to keep the storm track south of Utah and La Nina keeps it north of Utah. In either case, we are always caught in the limbo-land between the two patterns. Consequently neither El Nino nor La Nina ever mean very much to Utah. Sometimes we get it, sometimes we don't. This year we didn't. The La Nina storm track stayed just barely north of Utah, hitting Idaho and Wyoming hard but the magic line ended up around the northern Utah border. Everything south of there was dry. The most northerly mountains of Utah—the Logan area mountains—developed the deepest snow pack in the state and had consistently better backcountry conditions than the rest of the range.

Alta, located in the core of what we call the “central Wasatch,” had a below average winter with November, January and February exceeding average monthly snow totals, but not by much. December and March had less than half of average snowfall. No month hit 100 inches, a rare occurrence in the Wasatch. Not since the winter of 78-79 have we not had at least one winter month reaching 100 inches of snowfall.

The low snow year also fostered a glum attitude among the spoiled-rotton backcountry recreationists in Utah, especially having come off of above average snow years and unusually good snow conditions in five of the past six seasons. Plus, it hardly ever snowed in the valley, and human nature, being what it is, most people think the whole world is exactly like where they are, and few believed that the snow in the mountains was any good. There were lots of whiners, and our call rate took a huge hit this season because of the combination of low snow and also from more information dissemination being shifted to the Internet (see Information Dissemination section).

Season History

In the southern Wasatch and indeed, in the southern two thirds of Utah, drought conditions were the rule.

Unfortunately, the winter's lack of snow did not mean a dearth of avalanche accidents. With the pattern fitting recent trends, snowmobilers, snowboarders and one hiker accounted for all the fatalities; no backcountry skiers were killed. Another evident trend is towards avalanche accidents in areas outside of the heavily used Salt Lake section of the Wasatch Range. This probably reflects greater backcountry use in areas that saw little or no winter traffic five or ten years ago.

None of the victims were carrying avalanche beacons or rescue gear. While beacons and rescue gear does not guarantee safety and may even give a false sense of security, this equipment does indicate that the people are aware of the possible danger, a big step towards backcountry safety.

NOVEMBER

There was less than 10 inches of snow on the ground at the Alta Guard Station at the end of October. This changed quickly as a series winter storms moved through northern Utah during the first 10 days of the month. On Friday, November 5 a cold storm dropped 17" at Alta and we issued our first bulletin of the season.

The sports reporters talk about March Madness in basketball but that seems tame compared to Little Cottonwood Lunacy when the season's first snow arrives. Saturday dawned clear unleashing a hoard of hikers in the not-yet open ski areas of Alta and Snowbird. Many of these people are normally resort skiers and boarders that are not accustomed to thinking about avalanches.

Snowboarder fatality at Snowbird

On this first Saturday of the winter season literally hundreds of people were hiking up hill at Alta and Snowbird ski areas which were not yet open for the season (and consequently, no avalanche control). As the lower slopes became tracked out, they sought ever higher terrain despite an increasing wind that was rapidly increasing the avalanche danger. One group of 5 boarders, most of them from out of state, hiked up the Alta side of Mt. Baldy to reach the northwest face on the Snowbird side. This is a notoriously avalanche prone slope that produces large slides each year from control work. After four people had descended to mid slope, the 5th person down triggered an 18" deep wind deposit that dropped 500 vertical feet, overtaking most of the others below. Several of them were caught in the slide and one person was totally buried. None of them had avalanche beacons so they had to go for help. Members of the Alta and Snowbird patrols responded. The victim was located several hours after the slide. He had been killed by trauma from the rough ride through the cliffs.

Snowfall continued after this accident, adding up to almost three feet in Little Cottonwood with about two feet in Big Cottonwood and six to ten inches in other parts of the range.

After this unfortunate early start to the avalanche season November's weather tapered off to only a few dustings of new snow. The Little Cottonwood Lunacy had claimed it's due; there were no more avalanche incidents in the Wasatch until Christmas Day.

DECEMBER

Not exactly a great powder month. Alta received only 41 inches of snow, 46% of average. Temperatures were rather warm for December but a week of cold temperatures and clear skies shortly before Christmas put the finishing touch on the thin snow pack. The snow on all of the shady slopes turned almost completely to very weak, faceted crystals.

It's a bad feeling. When the snow pack gets as weak as it became in December we know people will die in avalanches. As soon as snowfall or wind deposits a layer of cohesive snow on top of the faceted snow the avalanche danger rises dramatically. We know its coming; we try to get the word out but we also know that a few people will make the wrong move and get nailed.

Tiny accumulations Christmas week provided a clue. A couple of days with less than 5 inches of new snow plus some wind produced several incidents but no one was hurt. A foot of new snow on New Year's Eve resulted in plenty of avalanche activity but we still knew that the big show was yet to come.

JANUARY

We also knew that the avalanche danger was rising in other parts of the state. Although we get very little avalanche information in central Utah it wasn't hard to extrapolate from the season's weather pattern that the Wasatch Plateau had a thin and weak snow pack, and that

would rock and roll when loaded with new or wind blown snow.

Two snowboarders killed on the Wasatch Plateau

There had not been much new snow but strong winds had swept the area. In an especially tragic accident, two teenage snowboarders near Fairview, Utah were looking for a place to make a few turns. They parked their car on the highway and walked across a flat area about 75 feet from the road to the edge of a drop off where they fractured a cornice. They fell onto the steep slope below, triggering an avalanche that buried them in a gully. Their snowboards were stuck in the snow just above the fracture, as if they had just taken a couple steps closer to the edge to have a look down the slope. No one saw them get caught but their car and the snowboards quickly led the search team to the avalanche and they soon found their bodies with a probe search.

Snowmobilers missing on the Wasatch Plateau

During this same period two brothers were snowmobiling on the Wasatch Plateau and did not return as scheduled. A search party found one of their snowmobiles but no sign of the two men. It is possible that one or both may have been involved in an avalanche but this is only conjecture until we have more evidence. As of this writing, one of the victims was located in an avalanche path; However, because of other evidence, most of the searchers believe it was not an avalanche accident, so we will not count them as avalanche fatalities

Mid January was the turning point. About 90 inches of new snow fell at Alta from January 15 through the end of the month. This was more like the Wasatch but the snow on the ground at the beginning of the period was more like Colorado or Montana. Forty inches of snow on the 20th and 21st pushed many slopes past the breaking point. With avalanche warnings in effect the danger hit extreme on the morning of the 21st. Numerous large slide ran spontaneously but most people were aware of the obvious danger and there were no serious incidents.

As the storms tapered off the following week more people ventured into the backcountry, triggering a number of slides but no one was badly caught or injured.

On January 27 a storm with a strong southerly flow hit the Wasatch. This type of storm often produces more snow in the southern parts of the range. In this case Alta received about a foot of snow while the Provo Mountains got double that amount. This was especially disturbing in light of the very thin and relatively weaker snow pack in this area. Warned of the problem by our Provo observers we increased the danger level in Utah County and other southern mountains.

Snowmobiler fatality on Mt. Nebo

Two extreme snowmobilers were high-marking on the east side of Mt. Nebo near Nephi, Utah on the 29th. One of them, a 31-year-old, descended into a steep bowl and was trying to climb back out of the bowl while his partner waited on top, and he triggered a large avalanche on a very steep east-facing part of the bowl. His partner descended onto the slope on foot and searched in vain for his partner. He had a cell phone but couldn't get a signal and he climbed to a place where he could get a signal and called for help. He then returned to the slide debris and eventually found the toe of his partner's boot sticking out of the snow near the edge of the avalanche debris. He dug him up and started CPR but he did not respond. The autopsy showed that he had died from trauma.

Interestingly enough, the victim owned an avalanche beacon but was not wearing it at the time. Also, of interest, he had bought a used track for his snowmobile three days before the accident, and he mentioned to the woman that waited on him that he had triggered and outrun an avalanche in the same area the previous week. The woman told him he should be more careful and he responded: "I know. I won't live long enough to be that old...I expect to be killed in an

avalanche.”

FEBRUARY

Although February did not bring Utah any large storms, the month was more consistently snowy than any other period of the winter. Alta's monthly total was 98 inches, 121% of average.

Hiker fatality near Lone Peak

The Wasatch snow pack was reasonably stable during the month but areas with thin cover had more deep-slab problems. Little Willow Canyon between Little Cottonwood and the “Point of the Mountain” fit this description and on February 6 a party of winter hikers attempting to climb Lone Peak triggered a slide. Unfortunately, one of their group had turned back because he was getting cold and wet. As he descended, the rest of the group unintentionally triggered the slide that overran him as he descended. The others unsuccessfully looked for him, then went down for help. Wasatch Backcountry Rescue quickly responded and an avalanche search dog located the young man's body several hours later, but he did not respond to CPR.

MARCH

Snowfall really tapered off in March. Normally a wet month, the Alta totals, at only 40 inches, were only 43% of average. There were two up-sides to the lack of snow. An excellent period of “corn” snow developed as the high sun angle melted the surface during the day and cool temperatures and clear skies hardened the snow at night.

The other advantage was very few avalanches during the month. One notable event was a close call with a snowmobiler in the Unita Mountains. The high-marking snowmobiler triggered a wet slab avalanche on a shady slope. He was able to grab a tree and hang on. His partner thought he might be near the tree and looked for him there. Digging down beside the tree provided an air channel for the buried person. Other snowmobilers arrived later and were able to dig him out, still breathing after over an hour's burial. In shock and with a broken leg, he was evacuated by helicopter.

APRIL

Several decent powder storms felt more like winter than spring in early April but the precipitation didn't last long. After a storm that dropped two feet on April 9, the weather reverted to the March pattern and the corn snow returned.

MAY

So what else is new? After a dry season, and after most ski areas were closed, winter finally began to kick in. Over one hundred inches of snow fell in the first part of May in Little Cottonwood Canyon and this brought many of the skiers and boarders out of the closet for one last fling.

Close call at Alta

On May 5th, Snowbird—the only ski area still in operation—decided not to open because of the dangerous avalanche conditions. Many of the disappointed skiers and boarders headed up the canyon to Alta Ski Area, which was closed for the season, and consequently no one was doing any avalanche control. It was sunny with great powder, dangerous avalanche conditions and hoards of mostly avalanche-ignorant people crawling all over a mountain with no avalanche control—the perfect setup for an avalanche accident. Someone triggered a slide high on Lone Pine and it descended into the crowded Corkscrew run and ran to within 200 feet of the bottom of the Collins lift. In all, eleven people were involved in the avalanche with three partial burials—and

one person with a twisted knee. Rescuers probed the debris because they didn't know if anyone else was caught.

This kind of avalanche incident tends to happen regularly each fall and each spring at the closed ski areas. Many people have to discover, the hard way, the critical importance of avalanche control at ski areas. Like many of the good things in life, we notice it only when it's missing.

Season History

Logan Area Mountains

by Mike Jenkins and Liz Hebertson

The winter of 1998-99 was dryer and generally warmer than normal. It turned out to be a classic "La Nina" with the jet stream typically on the Utah/Idaho border on a west-southwest flow. We benefitted from a few early season brush-byes that missed the Salt Lake Area Mountains. The season was characterized by small storms (no single storm event exceeded 14 inches) followed by one to two weeks of high pressure.

The first significant storms of the season occurred in November and early December resulting in a shallow early season snowpack totaling about 27 inches at 8700 feet by Christmas Eve. Two extremely cold, high pressure periods, one from December 2nd through the 9th, and another from December 17th -23rd resulted in snowpack layers becoming generally faceted with grain sizes 2-5 mm. Ten thousand foot minimum temperatures during the second period remained below 0 degrees, dropping down to -17 at their coldest. Daytime high temperatures were in the single digits.

A series of storms over the Holidays delivered 26 inches of new snow to mountains of the northern Wasatch. The snow arrived in 2-8-inch shots. This was enough to greatly improve conditions for backcountry travel, but also resulted in the first avalanche cycle of the season. Snow was relatively wet and heavy. Avalanching was widespread, with most avalanches running within faceted layers, and occurring at elevations above 9000 feet, on northerly aspects with slopes steeper than 35 degrees. Fortunately, few encounters between humans and avalanches were reported. A short period of cold temperatures following the holidays resulted in near-surface faceting and surface hoar development.

The most significant avalanche cycle of the season occurred between January 14th -24th. Total new snow was 47 inches with individual storms delivering 2 -14 inches and 4.7 inches of water. Avalanching was again widespread with large slab avalanches occurring in paths that had not previously run. These often stepped down into pre-holiday faceted layers. "Repeaters" also occurred during this time in steep, wind-affected terrain. Four human triggered avalanches occurred during this time, two by skiers and two by snowmobilers.

The mountains of the northern Wasatch received 26 more inches of new snow between February 4th and 9th. A short period of sub-zero temperatures and very strong SW winds followed this storm on February 9th. Sustained wind speeds reached 52 mph at 10,000 feet with gusts up to 80 mph. This resulted in the formation of sensitive wind slabs and cornices along northeast ridge lines and upper lee slopes. A skier triggered one large slab avalanche on a very steep northeast-facing slope during this time.

Large storms forecasted for mid February pooped out. Ten inches of 6% water content snow fell during the heaviest storm on February 21st. Strong southwest winds accompanied this event. We received one reported of a skier triggering a soft slab in a steep, low elevation, east-facing bowl. Small storms with southwest winds continued throughout February and into early March and

several additional human triggered avalanches were reported. Fourteen inches of snow fell on March 4th, 9th and 11th which brought the total snow depth to only 86 inches, the greatest total depth of the year.

Dry and mostly warm conditions prevailed throughout the remainder of March punctuated by a cold snap around the first of spring. During this period, the total snow depth fell to 80 inches. Some of the best conditions of the year occurred at the end of March and into early April. A nice cold front arrived on March 27th and several days of stormy weather dumped nearly 4 feet of additional snow. We ended our forecast season on Easter Sunday, April 4th with the greatest total snow of the year at 103 inches.

Although official record keeping ended on April 4th, it is noteworthy that snow continues to accumulate even as of this writing in early May. In sum, it was a mostly uneventful year in the Logan area mountains, but whenever our snow totals keep pace with Alta we feel we have done well.

Avalanche Incidents

There were eleven reports of human-triggered avalanches within our forecast area this season, with five people were caught—two snowmobilers, one snowboarder and two skiers. Both snowmobile incidents occurred on January 19 in Providence Canyon just south of Logan.

In the first incident, a party of snowmobilers crossed below a steep, north facing slope with cliff bands and triggered the slide. One was caught, carried downslope, through trees and completely buried with only his fingertips exposed. Members of his party located him quickly and dug him out. Fortunately, he was uninjured. The second incident occurred in the same area, but further upslope later in the day. The details are sketchy but apparently one young man was caught and partially buried. His friends helped dig him out.

A snowboarder was caught by a loose sluff in the Ogden area mountains on February 21st. While boarding a steep, northeast facing slope, the boarder triggered a slide that knocked him off his feet and carried him down toward a gully below. He swam to stay near the surface and by occasionally edging into the bed surface with his board, he got to the side where he grabbed a tree. He was buried up to his chest, but uninjured.

On February 20th a back country skier triggered a shallow wind slab (crown about 4") north east of Pebble Creek, Idaho (within our forecast area) that carried him down a steep chute and into a tree where he fractured his femur and was partly buried. Details of the incident are provided below as reported by Jeff and Kellie Rhoads of the Pebble Creek Ski Patrol.

Finally, the last incident occurred on April 2nd, the final weekend of forecasting. A skier in Wood Camp, in Logan Canyon, triggered and was caught in a wet slab avalanche.

Season History

La Sal Mountains

by Faerthen Felix

October

Labor Day came and went without the customary first visible snow of the season visiting the La Sal peaks. There was much discussion about what this might portend for the snow totals, but without a general consensus, we would have to wait to find out. Meanwhile, everyone enjoyed what seemed to be an endless summer. Winter finally arrived with a couple of good storms around the middle of the month, ensuring over a foot of snow on the ground for the start of the Forecast Season on November 15.

November

The month was dry and temperatures in the mountains stayed just at freezing, preserving the snow already on the ground. A couple of bold individuals put in some ski tracks in the shallow snow, but most recreationists stuck to the snow-covered roads. Mother Nature was stingy with precipitation this month; a promising storm on the 28th left just 3/4" of new snow at the Geyser Pass Trailhead, ending the month with 13" on the ground.

December

The dry spell continued through the month with disappointing storms delivering just 2" on the 8th and another 4" on the 20th. Turns could be had by sticking to deep old wind deposits where the faceted snow made for smooth turning, but the danger of bottoming out and hitting something hard loomed like the Sword of Damocles. A blast of arctic air entered the state the week before Christmas, breaking pipes in Moab and Castle Valley and permitting a short ice-skating season on Ken's Lake. Temperatures rose and a storm arrived in time to leave us 6" of light density fluff for New Year's Day. The new snow fell on weak surface hoar and well-developed facets, wrecking the smooth ice-skating and resulting in high avalanche hazard to end 1998.

January

The New Year's Eve snow was not enough to form a supportable base over the rotten snow on the ground, not even for snowboards. The dry weather pattern continued in January and most locals forgot about making turns and rode their bikes or went climbing as temperatures rose into the 50's in the valley. The weather began to change mid-month as snow began to dribble in. 1" on the 16th, 1/2" on the 17th, 3" on the 20th and 9" on the 21st triggered natural avalanching that tore out some of the rotten snow, but didn't finish the job. Another 6" fell by the 27th and winds blew strong from the southwest, building slabs that collapsed loudly and visibly as the first, second and even third tourer passed! The month ended with 28" of snow on the Geyser Pass Trailhead stake and total of 20.5" of snowfall for the month.

February

6" of new snow that accumulated between the 1st and the 11th finally covered the deadfall in the evergreens and built a supportable base for the season's first real skiing. Unfortunately, the skies dried up except for a trace of snow on the 15th. Still plagued by buried early season faceted crystals, the avalanche hazard remained spotty but considerable, dropping to moderate during the

last two weeks of the month. SNOTEL data put us at 54% of normal snow depth but 102% of normal water since October 1. The Geyser Pass Trailhead snow stake showed 28".

March

March came in warm and windy, removing the snow from all but protected northerly aspects of the high peaks and pushing the overnight freezing line above 9500 ft during the first. The month remained mild with storms bringing just 2" of new snow on the 8th, 1" on the 12th and 1" on the 13th. Temperatures in the valley climbed into the mid 70's by mid-month as Moab's spring invasion of sun-seekers began and the snow crept back into shady ravines. The newer snow stabilized, but underneath this strong slab the hollow faceted crystals persisted, casting a worrisome cloud over carefree spring descents. A passing cold front on the 26th left a morning dusting of new snow on the peaks and lowered temperatures for a few days, but winter seemed to be over early. The last week of the month was Apocalyptic: dry, hot and windy with Jeep Safari dust casting a grim haze over the desert...with just 24" on the Geyser Pass Trailhead snow stake on the 31st, I fear what August brings this dry year!

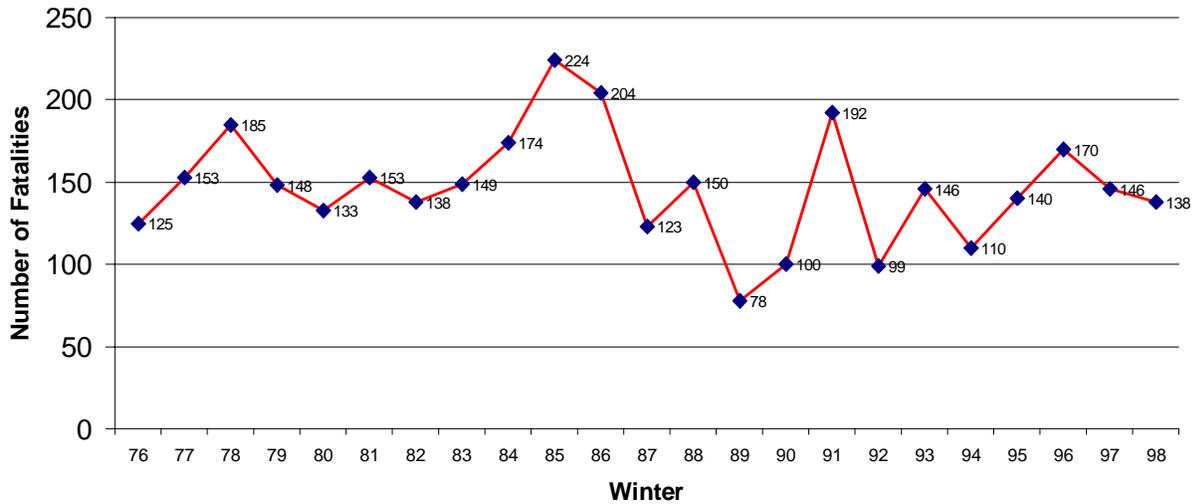
April

We awoke to a mountain dusting of new snow on the morning of the 1st. The 2nd brought much needed water to the desert and 14" of new snow to the La Sals, raising the Geyser Pass trailhead snow stake to 38". The winter storm track lingered, adding another 20" on the 5th and 1" on the 7th. By the 8th, warm temperatures settled the storm's 35" to only 17" and strong winds stained the snow pink with desert sand as far away as the San Juan Mountains. The County Road Department snow plowing funds were gone, so only the fit and determined could even reach the slopes. Unfortunately for Marshall Hannum and the few other hardy souls who made the trek, the rapidly settling snow was sticky and unskiable, making for a long hike back to the car.

The pattern seems well-entrenched, so spring should look more like winter than winter did this year, but the season funds are gone and interest in winter recreation has died in favor of golf, mt. biking and river running.

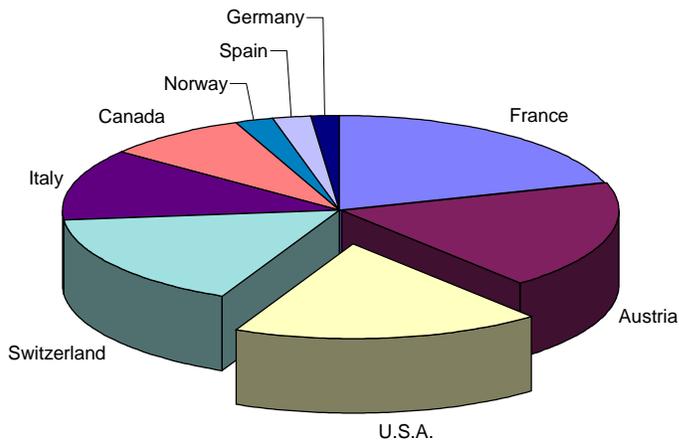
Avalanche Incidents and Accidents International Statistics

World Avalanche Fatalities 1976-98



Internationally, avalanche fatalities have remained relatively constant. In contrast, U.S. fatalities have been rising sharply.

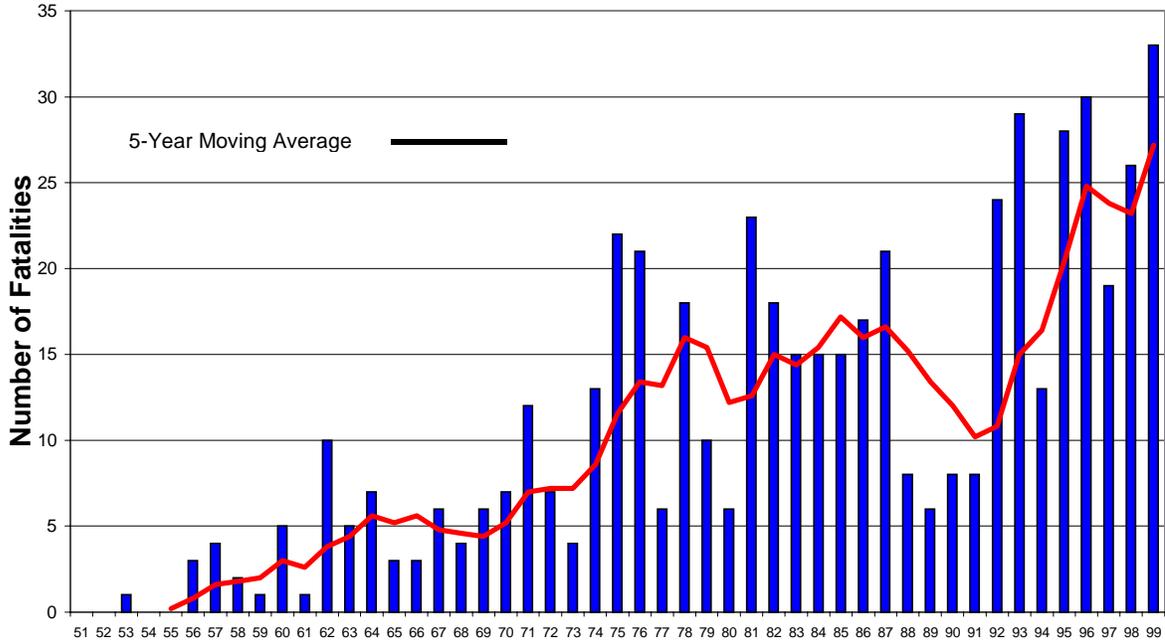
Avalanche Fatalities by Country - 1992-98



The U.S. is very close to Austria as having the second most avalanche fatalities in the world behind France.

National Statistics

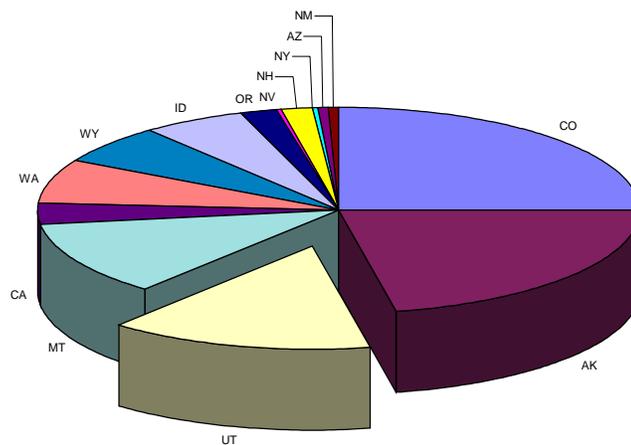
U.S. Avalanche Fatalities 1950-98



Winter

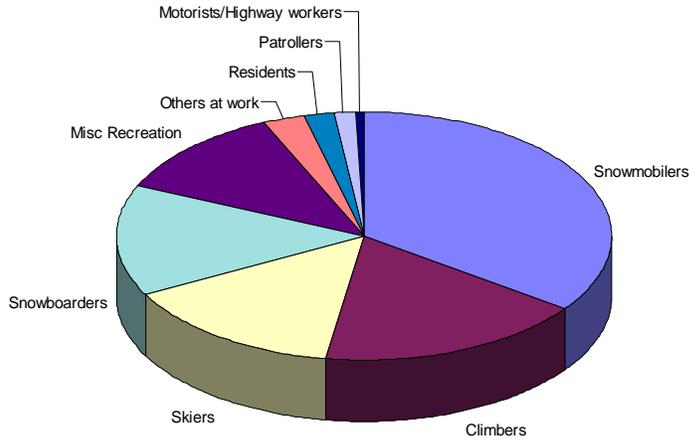
U.S. avalanche fatalities continue to rise in contrast to a steady number internationally. A record number of avalanche fatalities occurred this season in the U.S.--33 as of this writing.

Avalanche Fatalities by State 1991-1999



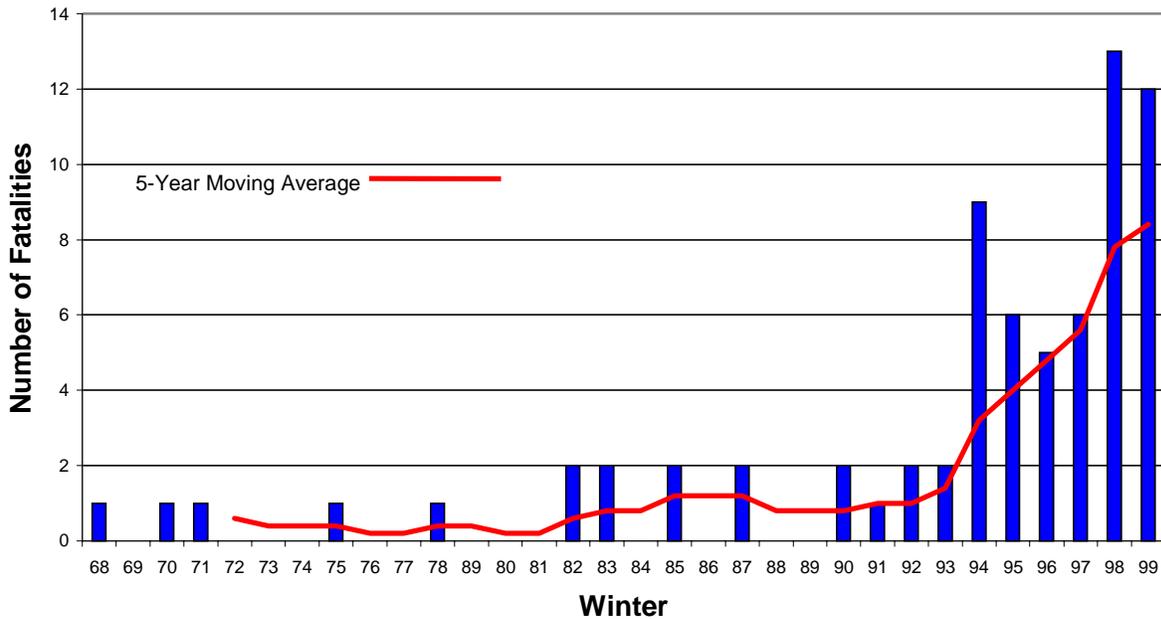
Utah usually runs neck-and-neck with Alaska for second place behind Colorado for the most avalanche fatalities. This season, Alaska had an unprecedented 13 avalanche fatalities.

**U.S. Avalanche Fatalities by Type
1994-1999
152 Total Fatalities**



Since 1994, there has been nearly twice as many snowmobiler fatalities as any other activity.

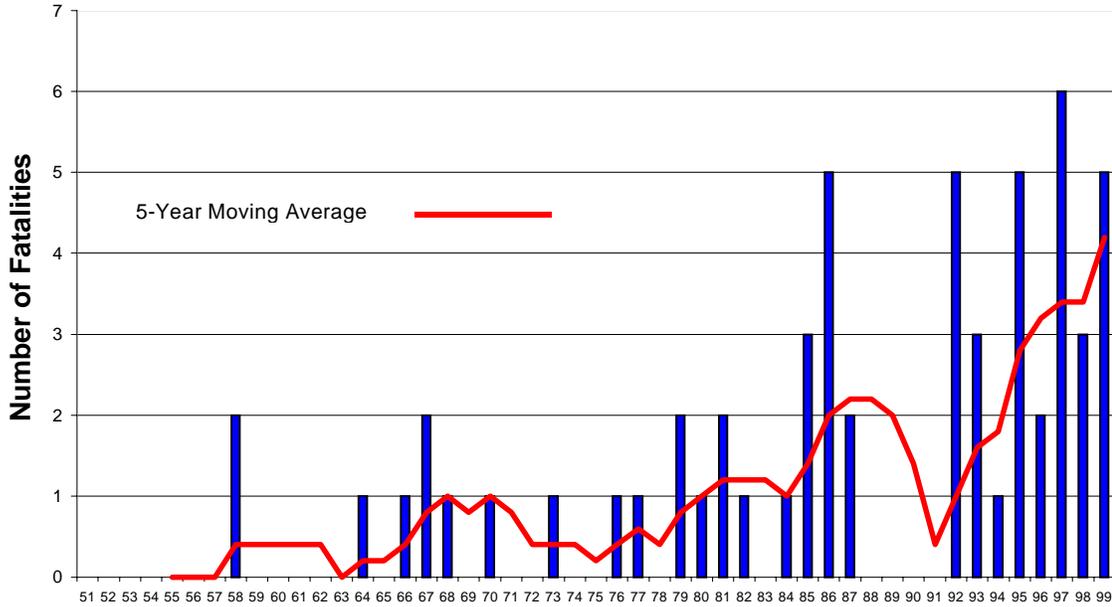
**U.S. Snowmobile Avalanche Fatalities by Year
1968-99**



Snowmobiler fatalities have taken a frightening jump since 1994, and the trend will most likely continue.

Utah Statistics

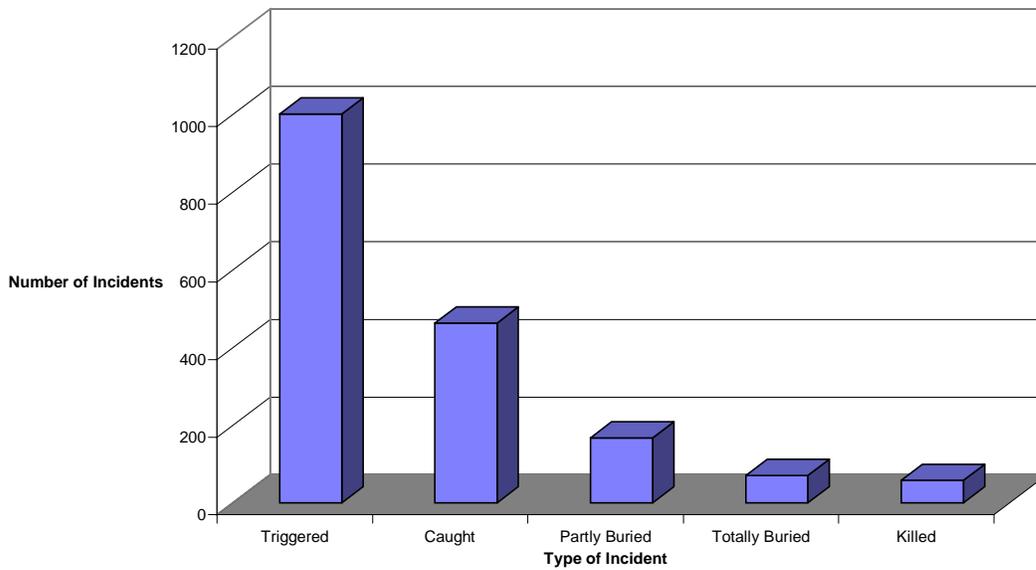
Avalanche Fatalities in Utah 1951-99



Winter

Avalanche fatalities in Utah continue to rise. In the past 5 seasons, Utah averages 4.2 deaths per season.

Avalanche Incidents in Utah 1985-99



Over the past 15 seasons, for each person killed in an avalanche, an average of 17 people unintentionally trigger avalanches, 8 are caught and 3 are partially buried.

Utah Avalanche Fatalities 1958-Present

Date	Deaths	Sex	Location	Activity	Skier	Climber	Snow boarder	Snow mobiler	Other Recreation (snowshoe, hiker, hunter)	Worker	Resident
9-Mar-58	2	Males	Snowbasin	Rescuer						2	
29-Mar-64	1	Male	Snowbasin	Worker						1	
31-Dec-65	1	Male	Park City	In-bounds skier	1						
12-Feb-67	2	Males	Pharaoh's Glen	Climbers		2					
19-Feb-68	1	Male	Rock Canyon	Hiker					1		
29-Jan-70	1	Male	Alta	In-bounds skier	1						
29-Jan-73	1	Male	Park West	In-bounds skier	1						
6-Jan-76	1	Male	Alta	Out of bounds skier	1						
3-Mar-77	1	Male	Snowbird	In-bounds skier	1						
19-Jan-79	1	Male	Helper	Worker						1	
2-Apr-79	1	Male	Lake Desolation	Backcountry skier	1						
11-Jan-80	1	Male	Evergreen Ridge	Out of bounds skier	1						
1-Feb-81	1	Male	Cardiff	Hiker					1		
1-Mar-81	1	Male	Millcreek	Backcountry skier	1						
22-Mar-82	1	Male	near Park West	Backcountry skier	1						
2-Jan-84	1	Male	Superior Peak	Backcountry skier	1						
22-Feb-85	1	Male	Near Powder Mountain	Backcountry skier	1						
19-Mar-85	1	Female	Park City	In-bounds wet slide	1						
13-Nov-85	2	Males	Sunset Peak	Backcountry skiers	2						
6-Jan-86	1	Male	Provo Canyon	Backcountry skier	1						
17-Feb-86	1	Male	Big Cottonwood Canyon	Backcountry snowboarder			1				
19-Feb-86	1	Male	Alta	In bounds skier	1						
20-Nov-86	1	Male	Sugarloaf, Alta	Hiker in unopened area					1		
15-Feb-87	1	Male	Twin Lakes Reservoir	Backcountry skier	1						
25-Nov-89	1	Male	Tony Grove Lake, Logan	Backcountry skier	1						
12-Feb-92	4	3-M/1-F	Gold Basin, La Sal Mtns	Backcountry vskiers	4						
1-Apr-92	1	Male	Mineral Basin, near Snowbird	Backcountry skier	1						
16-Jan-93	1	Male	Sundance (closed area)	Backcountry skier	1						
25-Feb-93	1	Male	Pinecrest, Emig. Cyn.	Backcountry skier	1						
3-Apr-93	1	Male	Wolverine Cirque	Backcountry skier	1						
18-Feb-94	1	Male	10,420 Peak, B.C.C.	Backcountry skier	1						
7-Nov-94	1	Male	Snowbird (pre-season)	Backcountry skier	1						
14-Jan-95	2	Males	Ben Lomond, near Ogden	Snowmobilers				2			
23-Jan-95	1	Male	Midway	Resident killed in roof slide							1
12-Feb-95	1	Male	Gobbler's Knob, B.C.C.	Backcountry skier	1						
2-Feb-96	1	Male	Solitude patroler	Worker						1	
27-Mar-96	1	Male	Maybird Gulch, L.C.C.	Backcountry skier	1						
7-Dec-96	1	Male	Bountiful Peak	Snowmobiler				1			
26-Dec-96	1	Male	Flagstaff Peak	Backcountry snowboarder			1				
11-Jan-97	3	Males	Logan Peak	Three campers					3		
25-Jan-97	1	Male	Provo Canyon	Climber		1					
17-Jan-98	1	Male	Near Coleville	Snowmobiler				1			
18-Jan-98	1	Male	Sanpete County	Snowmobiler				1			
26-Feb-98	1	Male	Near Weber State	hiker (possible suicide)					1		
7-Nov-98	1	Male	Snowbird (pre-season)	Snowboarder			1				
2-Jan-99	2	Males	Wasatch Plateau	Snowboarders			2				
29-Jan-99	1	Male	Mt. Nebo	Snowmobiler				1			
6-Feb-99	1	Male	Little Willow Canyon	Hiker					1		

Total 58

56 Males, 2 Females

1958 season - Present	30	3	5	6	8	5	1
1990 season - Present	12	1	5	5	5	1	1
Past 3 seasons	0	1	4	4	5	0	0

Shaded areas indicate greatest concentration of fatalities.

Utah Avalanche Forecast Center Annual Report - 1998-99

Incidents and Accidents 98-99

Date	Location	Details	Triggered	Caught	Partially Buried	Totally Buried	Injured	Killed
07-Nov	West Baldy	5 snowboarders caught, 1 killed , 1 injured	5	5	3	1	1	1
21-Nov	Gobblers	triggered sympathetically	1					
25-Dec	Gobblers	skier took ride	1	1				
28-Dec	Powder Park	skier triggered	1					
29-Dec	Gobblers	snowboard triggered, grabbed tree	1	1				
01-Jan	West Monitor	skier triggered, got out	1	1				
01-Jan	Flagstaff	2 skier triggered slides	2					
01-Jan	Emma 2	skier triggered	1					
01-Jan	Cardiff/Hellgate	skier triggered	1					
01-Jan	East Hellgate	skier triggered	1					
02-Jan	Fairview Canyon	2 snowboarders killed	2	2		2		2
04-Jan	Flagstaff Gully	2 boarders partially buried	2		2			
05-Jan	Tri County Peak	2 ob skiers caught, long ride, OK	2	2				
05-Jan	Snake Creek	sympathetic to skier	1					
05-Jan	Cardiff Fork	skier triggered	1					
17-Jan	Raymond shoulder	triggered sympathetically	1					
18-Jan	Pioneer ridge	4 caught, 3 partially buried, OK	4	4	3			
18-Jan	Garden City	skier triggered	1					
19-Jan	Timpanogos	sympathetic to skier	1					
19-Jan	Reynolds Peak	sympathetic to skier 300' away	1					
19-Jan	Providence Canyon	Snowmobiler buried with hand out	1	1	1			
20-Jan	Millicent Peak	natural, 5 caught, 2 partially buried		5	2			
20-Jan	Short Swing	skier triggered from side	1					
23-Jan	Mt Pleasant	snowmobilers triggered several from ridge	4					
24-Jan	USA Bowl(far right)	skier triggered	1					
24-Jan	Willow East Branch	skier caught, skied off slab	1	1				
24-Jan	Duchess Draw	4'-8'deep slab triggered w/ cornice	1					
24-Jan	Near Brighton	6' deep slab triggered by boarder, escaped to side	1	1				
26-Jan	Millicent Back Bowl	1 skier totally buried, 1 partially	2	2	1	1		
26-Jan	Red Pine/Maybird	1 skier caught, grabbed tree	1	1				
29-Jan	Mt Nebo	1 snowmobiler killed	1	1		1		1
29-Jan	Gobblers Knob	skier triggered, 4'-5' x 150'	1					
30-Jan	Windy Peak (Uinta)	skier sympathetic, 120 feet away	1					
30-Jan	Snake Creek	suspected snowmobile triggered	1					
30-Jan	Clayton Peak	snowmobile triggered	1					
31-Jan	Canyons Backcountry	skier triggered	1					
31-Jan	Argenta	skier triggered	1					
01-Feb	Rochester Ridge	several skier sympathetic	3					
06-Feb	Little Willow Canyon	1 snow hiker killed	1	1		1		1
13-Feb	Mineral Fork	skier triggered, 40' above skier	1					
14-Feb	Sunset Peak	snowboarder triggered	1					
17-Feb	Ski Resorts	many sensitive skier releases						
19-Feb	Near 9,990	snowboarder triggered	1					
21-Feb	Ogden area mountains	ssnowboarder caught in sluff grabbed tree	1	1				
27-Feb	Manti Canyon	1 snowmobiler buried, 2 partially	3	3	2	1		
10-Mar	Kessler East	skier triggered, post control	1					
20-Mar	Spring Canyon	snowmobiler trig, buried,broken leg	1	1			1	
01-Apr	Meadow Chutes	skier triggered, hurt shoulder	1	1			1	
01-Apr	Chablis Bowl	skier triggered, grabbed tree	1	1				
02-Apr	Wood Camp (Logan)	skier carried in wet slab	1	1				
03-Apr	Millicent Back Bowl	snowboarder trig. debris 4-5',all OK	1	1				
05-Apr	Primrose Cirque	snowboarder took short ride	1	1				
04-May	Alta (closed for season)	11 people caught, several partial burials, one twisted knee	1	11	5		1	
		Total	70	50	19	7	4	5

Changing Patterns of Backcountry Use

The rise of snowmobiling, snowboarding and snowshoeing and the changing geography of avalanche accidents.

Everyone who has used Utah's backcountry over the past 20 years, and especially the past 5 years, has noticed a dramatic increase in not only the numbers of people, but the kind of activity and the places where people have recreated. Back in the good-old days, wool-knickered, telemark skiers and the helicopter skiing company had the backcountry pretty much to themselves. There was plenty of room and the two groups shared the terrain relatively peacefully. Then, as equipment improved more and more skiers flocked into the backcountry to take advantage of the untracked (and free) powder and the easy access the Wasatch Range had to offer. More conflicts erupted between the helicopter companies and backcountry skiers as they both were squeezed into the same prime terrain in a relatively tiny mountain range.

Then, the new kids on the block showed up and changed everything. Snowmobiles suddenly became much more powerful, lightweight and utilized very efficient traction systems. Snowmobile sales have skyrocketed and snowmobile access to dangerous backcountry avalanche terrain has increased ten or twenty-fold in ten years. Modern snowmobiles can cover 100 times as much terrain in a day as a skier and they can go virtually any place a skier can.

The modern snowmobile has opened up vast amounts of backcountry terrain that only the hardest skiers could access just a few years earlier. Nearly all the mountains of Utah are now snowmobile playgrounds where just ten years ago, they were nearly empty in winter. For instance, the Monte Christo area east of Huntsville now has a parking lot as large as five football fields and is regularly filled each weekend. With the exception of a relatively diminutive Cottonwood Canyons area near Salt Lake City, snowmobiling is by far the most popular mode of backcountry winter recreation throughout the state. Although we have no reliable numbers, we estimate that throughout northern Utah perhaps twice as many snowmobilers are out during each weekend as skiers, and for most of the rural areas there are virtually no skiers, only snowmobilers.

At the same time, young armies of snowboarders now march far into the backcountry and compete with the skiers and helicopter companies for the same terrain. With the advent of the modern snowshoes and the split-apart board, snowboarders now cover the same terrain as the skiers, effectively doubling the amount of use in the easily accessible backcountry terrain, especially in the Cottonwood Canyons near Salt Lake City.

And then, there's the new sport of snowshoeing. Just a few years ago, you only saw snowshoes crisscrossed above the fireplace. But the new lightweight, high-tech snowshoes now allow anyone to go absolutely anywhere, and on many of the popular trails, especially near Salt Lake City, you see many more snowshoers than skiers.

We have certainly seen a huge shift in the patterns avalanche fatalities as well. Skier avalanche fatalities have dropped dramatically in the past few years, and these numbers are reflected nationally as well. Since 1994, only 14 percent of the U.S. avalanche fatalities have been skiers with 35 percent snowmobilers. And in the past three years only seven percent have been skiers with an astounding 40 percent snowmobilers. The last skier fatality in Utah was in 1996 (see table and charts). There has also been a corresponding increase in fatalities of snowboarders, snowshoers and hikers.

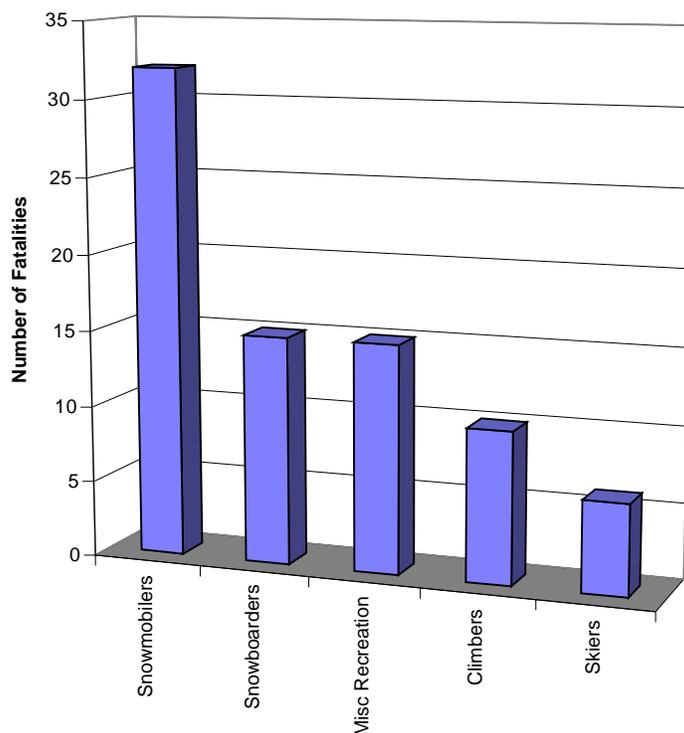
And the geography of avalanche fatalities has changed as well. Ten years ago when we plotted all the avalanche deaths on a map, nearly all of them fell within the Mill Creek and Cottonwood Canyons near Salt Lake City. Of the past 11 avalanche fatalities in Utah, only two

have been in the Salt Lake area mountains, the others have all been in rural areas of Utah—in obscure places we often had to look up on the map and still didn't exactly know how to get there.

Times have changed. And the Utah Avalanche Forecast Center has changed along with them. Instead of catering exclusively to hard-core backcountry skiers in the Salt Lake-area Mountains, we now spend an increasing amount of our field time in snowmobile terrain. About half our avalanche classes are tailored to snowmobile groups and even the traditionally skier-attended talks at REI are now filled with just as many snowboarders and snowshoers as skiers. We have abandoned the long-winded and technical 5-minute telephone advisory—used mostly by hard-core backcountry skiers. We have, instead, shifted our resources to the user-friendlier State Snowmobile Hotline, radio and the Internet. We don't like to cut services in one area in order to add services in another, but without additional funding we have no choice but to spend the resources where they will save the most lives.

The real solution, of course, is more money. Use of UAFC products continues to increase exponentially each year as our funding remains relatively constant. Luckily we have some Olympic funding which has helped to temporarily fill the void, but the real answer is for a dramatic—and long term—increase in funding. Otherwise, we will continue to fall farther behind and avalanche fatalities will continue to increase.

U.S. Avalanche Fatalities 1997-99



In the past three seasons in the U.S., snowmobilers account for more than twice as many avalanche fatalities as any other activity. During the 80's and early 90's, skiers led the list but in the past three seasons, skiers account for only seven percent of the national total. No skiers have been killed in Utah for the past three seasons.

UAFC Avalanche Education 1998-99			
Date	Staff	Event	No. people
30-Sep	Tremper	ISSW	200
30-Oct	Tremper	U of U W x Workshop	100
17-Nov	Shaw	Black Diamond, SLC	100
18-Nov	Shaw,Bodily	Black Diamond, Ogden	100
1-Dec	Staff	REI	275
3-Dec	Ciliberti	U of U	25
3-Dec	Tremper	REI beacon clinic	20
4-Dec	Tremper	Kirkhams	15
8-Dec	Tremper	USFS Bozeman clinic	20
9-Dec	Jenkins/Hebertson/Logan	USU Basic Avalanche	12
15-Dec	Staff	REI	275
15-Dec	Kimbrough	AAI	30
24-Dec	Felix	USFS Manti-La Sal NF	30
7-Jan	Tremper	Sundance/Uinta F.S.	15
7-Jan	Felix	Moab public	11
8-Jan	Felix	Moab public	17
8-Jan	Jenkins/Engelhard	Brighton Basic Avalanche	13
9-Jan	Felix	Moab public Geysers Pass	15
9-Jan	Athey,Clapier	Beacon Clinic	15
12-Jan	Tremper	Ogden Snowmobile Club	60
13-Jan	Lees	Timp Snowmobile Club	30
15-Jan	Jenkins/Hebertson	Rescue Dog Workshop - Brighton	8
16-Jan	Athey, staff	Avalanche Workshop	26
19-Jan	Jenkins/Hebertson	Basic Avalanche - Montpelier, ID	43
20-Jan	Jenkins/Hebertson	Basic Avalanche - Soda Springs, ID	78
20-Jan	Felix	USFS Ephraim RD	8
20-Jan	Felix	Sanpete County SAR	18
21-Jan	Jenkins/Hebertson	Basic Avalanche - Pocatello, ID	6
22-Jan	Hebertson/Logan	USU Basic Avalanche	14
26-Jan	Kimbrough	Judge High School	150
29-Jan	Felix	Price UT public	21
31-Jan	Jenkins/Tremper/Ciliberti	Natl. Ski Patrol Advanced Class	52
2-Feb	Hebertson/McAvoy	Basic Avalanche - American Falls, ID	45
6-Feb	Felix	Boy Scouts	50
9-Feb	Felix	Moab info Center	8
12-Feb	Jenkins	Advanced class - Teton Pass WY	6
15-Feb	Felix	Boy Scouts Leadership Team	
18-Feb	Tremper	North Face Camp	20
19-Feb	Jenkins	Peterson Equipment - Logan	20
20-Feb	Hebertson	Boy Scouts - Morgan, UT	18
?	Hebertson	Logan Middle School	20
22-Feb	Tremper	U.S.F.S. Rangers	100
24-Feb	Tremper	U.S.F.S. Rangers	100
25-Feb	Shaw	North Face Camp	22
26-Feb	Tremper	AK Mtn Safety Center	35
3-Mar	Kimbrough	Kamas Sno-Mo Club	15
3-Mar	Jenkins	Basic Avalanche - Powder Mt.	43
5-Mar	Hebertson	Peterson Equipment - Logan	20
11-Mar	Tremper	Morgan County SAR	35
15-Mar	Kimbrough	Alta Grammar School	50
16-Mar	Felix	Utah Parks and Rec Annual Meet - St. George	20
Total			2429
			50 Classes

Media Contacts

We have known for years that very few of the people killed in avalanches in Utah have ever called the UAFC hotline before heading out. Because of this, it's important to reach the large numbers of relatively avalanche-unaware people heading into the backcountry. Since we operate on such a modest budget, the media is the only practical way to reach large numbers of people who are out of the avalanche information loop.

Once again, UAFC staff were featured prominently in the media. Program director, Bruce Tremper was interviewed by two international television documentaries, which will play on the Discovery Channel and on PBS. In addition, several other documentaries filmed in previous years continue to see air time. In total, UAFC staff appeared on two national TV documentaries, and provided information or were interviewed by eleven national television programs, 7 national newspaper and magazines, 8 local television programs, 5 local radio shows and 12 local print media.

While we continued to respond to as many media inquires as possible, this winter, media contacts were down from previous seasons for two reasons: first, due to a lack of funding, we lost our information assistant, so many callers ended up talking to an answering machine rather than a person. Secondly, with less afternoon office staffing, afternoon media requests were often not answered until the next morning, which lacked the necessary timeliness.

As you would guess, the catastrophic avalanches in Europe caused huge interest in avalanches in the news media on both sides of the Atlantic. Every avalanche tragedy in the Alps spawned calls from news agencies from Nephi to England. The Utah Avalanche Forecast Center became an important information resource for both the national and local news media during this tragic series of events.

Utah Avalanche Forecast Center Annual Report - 1998-99

UAFC Media Contacts 1998-99

Date	Staff	Agency	Subject	Naional Television Interview	National Television Information requests	National Print Media	Local Television Interviews	Local Radio Interviews	Local Print Interviews
28-Nov	Lees	K-Talk Radio	Avy awareness				1	1	
21-Nov	Lees	U of U TV	Avy awareness						1
10-Nov	Kimbrough	SL Tribune	Avy fatality						1
11-Nov	Kimbrough	SL Tribune	Avy fatality					1	
12-Nov	Tremper	Local radio	Avy fatality						
30-Nov	Tremper	Assoc Press	Fund raising			1			
01-Dec	Felix	Channel 6 Mbab	Open for season				1		
03-Dec	Felix	Mbab Times-Independent	Open for season						1
15-Dec	Tremper	Discovery Channel	Avalanches	1					
21-Dec	Kimbrough	Tooele paper	Avy danger						1
30-Dec	Felix	Mbab Times-Independent	Avy Awareness Week						1
01-Jan	Felix	Mbab Happenings	Avy Awareness Week						1
04-Jan	Shaw	KSL radio	Avy awareness					1	
04-Jan	Shaw	KSL TV	Avy awareness				1		
07-Jan	Felix	Channel 6 Mbab	Avy Awareness Week				1		
13-Jan	Tremper	Assoc Press	Funding			1			
20-Jan	Tremper	Fox 13 News - on camera	Avy warning				1		
25-Jan	Tremper	KBYU TV - on camera	Olympics				1		
26-Jan	Shaw	Park Record	Current conditions						1
26-Jan	Kimbrough	SL Tribune	Current conditions						1
01-Feb	Shaw	Tooele	Mt Nebo Fatality						1
07-Feb	Shaw	SL Tribune	Current conditions						1
08-Feb	Kimbrough	Fox TV News	Current conditions					1	
08-Feb	Shaw	Ski News TV	Current conditions				1		
09-Feb	Shaw	NBC News	General aval info		1				
16-Feb	Shaw	CBS News	General aval info		1				
16-Feb	Tremper	Granada TV national documentary - on camera	General aval info	1					
16-Feb	Shaw	Cyberwest mag	U.A.F.C.			1			
17-Feb	Tremper	BYU newspaper	Avalanche awareness						1
17-Feb	Tremper	Ski Utah TV	Avalanche awareness				1		
17-Feb	Tremper	Washington Times	Avalanche awareness			1			
17-Feb	Tremper	CBS	Video footage		1				
17-Feb	Tremper	NBC	Video footage		1				
25-Feb	Lees	NBC	European avalanches		1				
26-Feb	Lees	K-talk radio	European avalanches					1	
26-Feb	Lees	MS NBC	European/US avalanches		1				
28-Feb	Felix	CNN.com	Avi awareness info for broadcast		1				
01-Mar	Felix	Mining Company.com	"Best of the Net" award		1				
15-Mar	Tremper	History Channel	General aval info		1				
16-Mar	Kimbrough	Wall St. Journal	General aval info			1			
16-Mar	Kimbrough	Snowmobile magazine	General aval info			1			
17-Mar	Tremper	S.L. Tribune	Avalanche rescue						1
08-Apr	Kimbrough	New York Times	General aval info			1			
18-May	Tremper	Discovery Channel	Info on avalanche research		1				
30-May	Tremper	Nash Entertainment TV	Avalanche Information		1				

Total 2 11 7 8 5 12
45 Total Contacts

Volunteer Observer Program

Observation numbers are down this year but not because of a lack of diligence on the part of our volunteer team. Dry conditions for the first half of the winter accounts for the decrease. Low avalanche danger during much of November, December and the first half of January made backcountry reports rather redundant. With the thin snow cover, skis and boards suffered plenty of damage and touring partners were sometimes hard to find. Utah's fabled powder was just that. When snowfall finally arrived and avalanche conditions became more interesting, observation numbers increased accordingly.

This is not to say that our observers weren't out there during the dry spell. They were still gouging their P-tex on a regular basis but the need for observations was a little less.

New members to the team this year were Todd Leeds and Tom Moyer. Both contributed much to the operation. Eric Trenbeath was in Central America for most of the winter but after his return in March he began regular reporting.

Brad Bodily conducted two avalanche classes for Weber State University this winter. Bob Athey and Bruce Englehard were instructors at the Friends of the Forecast Center's three-day workshop.

Bob Athey is the backbone of the backcountry observation program. He is out most days during the winter. His message on the answering machine often clarifies the forecaster's thinking at 5:00 a.m. His inquiring mind and powerful legs are essential to our operation. As he is paid directly by the FUAFC his observations are not tabulated below.

The return for each dollar paid to these people represents about an hour's time for a highly trained and experienced winter mountaineer. Their dedication to the safety of all backcountry travelers is greatly appreciated by our entire staff.

Observers paid by the Friends of the Utah Avalanche Forecast Center

Observer	Observations	Cost
Scott Burch	19	\$190
Joey Dempster	16	\$160
Greg Gagne	15	\$150
Craig Gordon	34	\$340
Todd Leeds	33	\$330
Tom Moyer	23	\$230
Eric Trenbeath	5	\$50
Shawn Wagner	23	\$230
Total	168	\$1,680

Observers paid by Forest Service

Brad Bodily	10	\$100
Greg Dolhausen	24	\$240
Bruce Englehard	12	\$120
Rip Griffith	21	\$252
Phil Lowry	26	\$260
Brian Smith	3	\$30
Total	96	\$1,002
Grand Total	264	\$2,682

Budget

Avalanche forecasting in Utah is the epitome of a successful partnership. Although the Utah Avalanche Forecast Center is a Forest Service program, statewide, only 24 percent of the money come from Forest Service base operating funds and only 21 percent in the Wasatch. The rest of the money comes from private, state and county funding. Most of the entities that benefit from avalanche forecasting contribute to the cause, such as private citizens, the State of Utah, Salt Lake County and Utah State Parks (see graph on page 31). Some Forest Service Olympic funds also go to increased UAFC staffing to begin “ramping up” for the Olympic Games and this money is not considered as part of the Forest Service base funding.

Future:

Although most every Forest Service program would like more funding, it’s clear that demands of UAFC services continue to increase much faster than funding. For instance, most avalanche fatalities used to occur almost exclusively in the Salt Lake area mountains, and in recent years they have become more equally distributed throughout all the mountains of Utah, mostly because of the huge increase in snowmobiling. Another forecaster is desperately needed in the Wasatch Plateau and ideally there should be a full time forecaster in both the Logan and the Uinta area mountains. We would like to find funding for these positions but there are no good prospects at this time. As usual, fundraising is nearly a full time job and we must balance our time with job number one—providing public avalanche information and avalanche education.

Wasatch (Ogden, Salt Lake, Park City, Provo)

Where the Money Comes From

Forest Service Base Operating Funds	31,000	FUAFC Funds (independent of Forest Service)	20,000
State of Utah Comprehensive Emerg. Mgt.	25,000		
Forest Service 2002 Funds	21,000		
FUAFC *	20,000		
Salt Lake County	20,000		
State Parks Snowmobile Funds	10,000		
Total Funds to Forest Service	127,000		
Total Wasatch	147,000		

Where The Money Goes

Forest Service Expenditures

FUAFC Expenditures

Staff Salary and Benefits	94,995	FUAFC Direct Expenditures (independent of Forest Service)	20,000
Deficit from FY 98 (State payment failure)	9,000		
Telephones	7,510		
Equipment and Supplies	4,500		
Travel	4,000		
Printing	2,000		
Stickers and Posters	2,000		
Observers	1,002		
Contract Computer Programming	1,000		
Training	1,000		
Total Forest Service Expenditures	127,007		20,000
Total Wasatch Expenditures	147,007		

In-Kind Support

National Weather Service (office space, computers, telephone, weather forecasting)	40,000		
Park City Ski Area (avalanche hotline distribution on telephone system)	1,000		
Weber State University (avalanche hotline distribution on telephone system)	1,000		
BYU (avalanche hotline distribution on telephone system)	1,000		
Utah State Parks (avalanche hotline distribution on telephone system)	1,000		
Total	44,000		

* Friends of the Utah Avalanche Forecast Center which is a private, non-profit group that raises funds for avalanche forecasting and avalanche education in Utah

Logan Avalanche Center (Wellsville and Bear River Ranges and southeast Idaho)

Where the Money Comes From

FUAFC *

Utah State University

FUAFC (Salt Lake Chapter)	6,000	USU Salary Release for Mike Jenkins	10,000
FUAFC (Logan Chapter)	475	Utah State University (IORT)	5,000
Avalanche Course Income	705		
Caryover	1,373		
Subtotal	8,553		15,000
Total Logan budget	23,553		

Where The Money Goes

Utah State University Expenditures

FUAFC Expenditures

Salary for Mike Jenkins	10,000		
Salary for Liz Hebertson	2,500		1,800
Salary for Bruce Engelhard			2,100
Salary for Darren McAvoy			1,400
Salary for Spencer Logan	1,500		
Telephone	210		43
Computer	200		
Meetings	897		652
Weather Station	1,659		326
Supplies	70		155
Subtotal	17,036		6,476
Total Logan Expenditures	23,512		

* FUAFC = Friends of the Utah Avalanche Forecast Center, a private, non-profit group

La Sal Avalanche Center (Moab area)

Where the Money Comes From

Forest Service Base Operating Funds	13,364	FLSAFC Funds (independent of Forest Service) *	3,474
Total La Sal budget	16,838		

Where The Money Goes

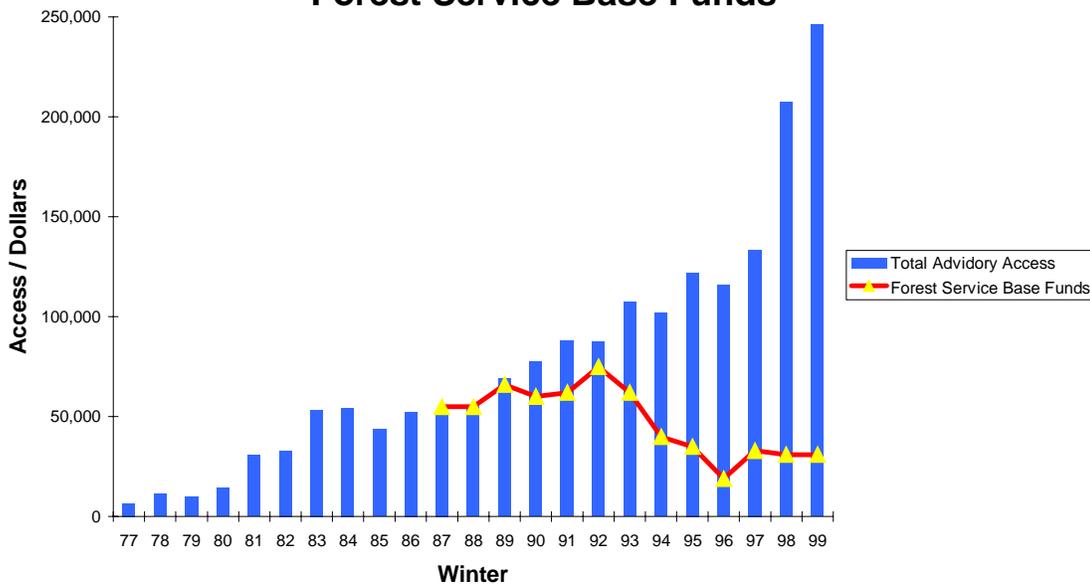
Forest Service Expenditures

FLSAFC Expenditures

Staff Salary and Benefits	10,352	FLSAFC Expenditures (independent of Forest Service)	3,474
Vehicle	1,646		
Travel	995		
Total Forest Service Expenditures	11,998		
Total La Sal Expenditures	15,472		

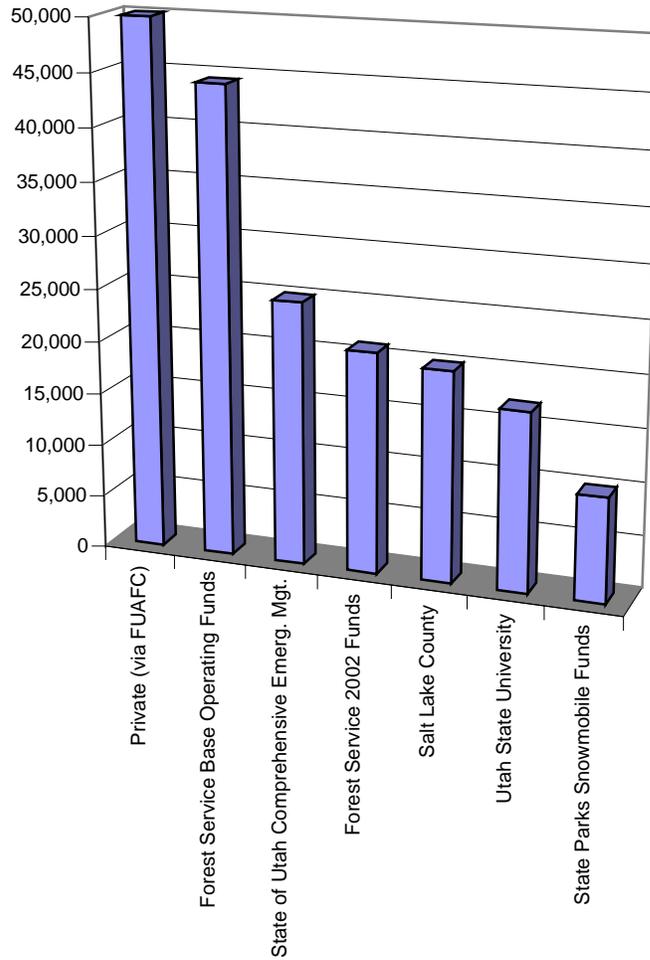
* FLSAFC = Friends of the Lasal Avalanche Forecast Center, a private, non-profit group and branch of the Salt Lake FU

Wasatch Total Advisory Access vs. Forest Service Base Funds



For the Wasatch, although Forest Service base funding has dropped over the past 10 years, demands for services have skyrocketed. The formation of funding partnerships has made up for the shortfall.

Total Utah Funding



Total Utah Funding

Private (via FUAFC)	50,000
Forest Service Base Operating Funds	44,364
State of Utah Comprehensive Emerg. Mgt.	25,000
Forest Service 2002 Funds	21,000
Salt Lake County	20,000
Utah State University	17,036
State Parks Snowmobile Funds	10,000

Utah Total

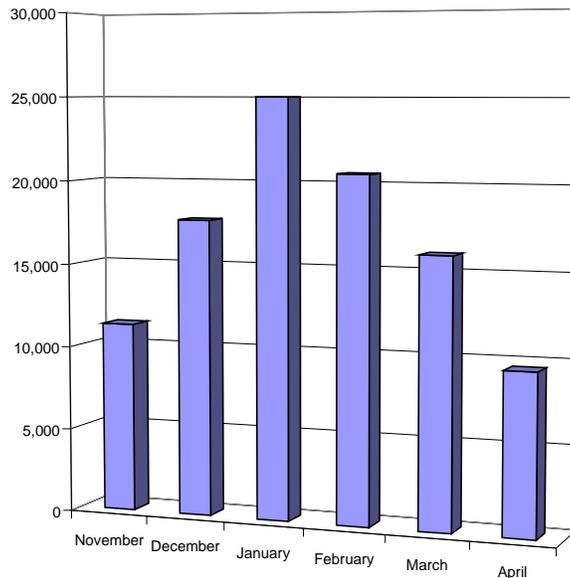
187,400

Appendix

Monthly Calls to UAFC advisory in Salt Lake City

Year	November	December	January	February	March	April	Total
1979-80	714	1,514	4,274	2,967	3,389	1,313	14,171
1980-81	2,200	4,800	6,257	7,277	6,887	3,135	30,556
1981-82	1,761	6,879	8,522	5,485	6,361	3,416	32,424
1982-83	2,741	6,804	7,614	7,731	9,911	5,339	40,140
1983-84	3,216	10,708	7,073	7,032	5,983	4,393	38,405
1984-85	2,827	5,704	5,260	8,399	7,122	3,021	32,333
1985-86	4,119	4,703	6,298	10,628	6,225	3,706	35,679
1986-87	3,902	3,911	10,022	8,201	8,364	3,406	37,806
1987-88	2,646	7,235	11,296	8,080	10,196	4,186	43,639
1988-89	7,229	13,390	10,031	11,285	10,552	4,048	56,536
1989-90	4,651	9,204	17,049	15,120	13,072	4,747	63,843
1990-91	7,250	14,766	15,986	11,080	16,359	7,455	72,896
1991-92	12,670	9,365	11,970	17,396	15,200	5,799	72,399
1992-93	17,621	17,622	19,421	17,676	12,651	6,369	91,358
1993-94	6,663	12,251	19,743	22,517	14,615	9,281	85,072
1994-95	13,310	16,442	24,414	18,170	18,838	12,647	103,821
1995-96	7,685	16,785	29,074	22,398	16,189	9,338	101,469
1996-97	15,689	23,769	28,431	18,537	15,998	10,645	113,069
1997-98	9,529	16,672	27,407	25,453	17,746	9,464	106,267
1998-99	10,402	14,932	15,805	18,344	11,414	5,982	78,391
Average 1994-99	11,323	17,720	25,026	20,580	16,037	9,615	100,603

Average number of calls to UAFC advisory 1994-99



Utah Avalanche Forecast Center Annual Report - 1998-99

Telephone Access											
Year	SLC 3-minute	SLC 5-minute	Total Salt Lake Telephone	Logan Telephone	Ogden Telephone	Provo Telephone	Park City Telephone	Alta Telephone	State Snow-mobile Hotline	Moab Telephone	Total Calls
77	6,522		6,522							0	6,522
78	11,258		11,258							0	11,258
79	9,924		9,924							0	9,924
80	14,469		14,469							0	14,469
81	30,736		30,736							0	30,736
82	33,099		33,099							0	33,099
83	40,355		40,355	4,357	1,890	3,671	3,042			0	53,315
84	39,647		39,647	5,300	2,725	4,076	2,577			0	54,325
85	32,476		32,476	4,652	1,706	2,276	2,386			0	43,496
86	36,535		36,535	5,469	5,464	2,292	2,562			0	52,322
87	38,841		38,841	4,693	2,587	2,518	2,121			0	50,760
88	39,614	4,020	43,634	4,000	2,500	2,500	2,500			0	55,134
89	48,488	8,033	56,521	4,000	2,500	2,500	2,500			1,100	69,121
90	52,898	10,947	63,845	4,000	2,500	2,500	3,000			1,693	77,538
91	62,814	10,160	72,974	4,000	2,500	2,500	3,000			2,811	87,785
92	62,429	9,970	72,399	4,000	2,500	2,500	3,000			3,216	87,615
93	79,248	12,136	91,384	3,676	3,034	3,134	3,419			2,763	107,410
94	71,880	13,204	85,084	4,110	3,500	2,610	3,663			3,000	101,967
95	90,052	13,770	103,822	4,879	3,746	3,000	3,640			2,842	121,929
96	89,965	11,529	101,494	3,729	2,744	2,813	3,338			1,794	115,912
97	113,069		113,069	5,215	3,000	3,000	4,000	4,000		1,056	133,340
98	106,267	8,579	106,267	5,797	3,000	3,000	7,000	7,000	5,000	2,000	139,064
99	78,391	0	78,391	3,950	3,500	3,000	5,680	8,000	5,000	2,000	109,521

Internet Access							
Year	Moab hits	Salt Lake NWS hits	Salt Lake CSAC hits	Total Advisory Access telephone + internet	Mountain Weather NWS Hits	Mountain Weather CSAC Hits	Total UAFC Product Access
77				6,522			
78				11,258			11,258
79				9,924			9,924
80				14,469			14,469
81				30,736			30,736
82				33,099			33,099
83				53,315			53,315
84				54,325			54,325
85				43,496			43,496
86				52,322			52,322
87				50,760			50,760
88				55,134			55,134
89				69,121			69,121
90				77,538			77,538
91				87,785			87,785
92				87,615			87,615
93				107,410			107,410
94				101,967			101,967
95				121,929			121,929
96				115,912			115,912
97	?	?	?	133,340	?	?	133,340
98	3,500	50,000	15,000	207,564	?	?	207,564
99	4,559	108,948	23,148	246,176	113,139	9,489	368,804

Numbers which look like rounded numbers are estimates of call counts based either on previous years when call counters were installed or on spot checks during the season. The advisory and the mountain weather forecast are posted on the National Weather Service Internet server in Salt Lake City. The Internet hits listed are the total number of times the product was accessed. We have also listed hits on Cyberspace Snow and Avalanche Center (CSAC) which is probably the most popular "proxy server" meaning that they re-package the advisory and mountain weather forecast and post it on their own web page to make it look like their own product.

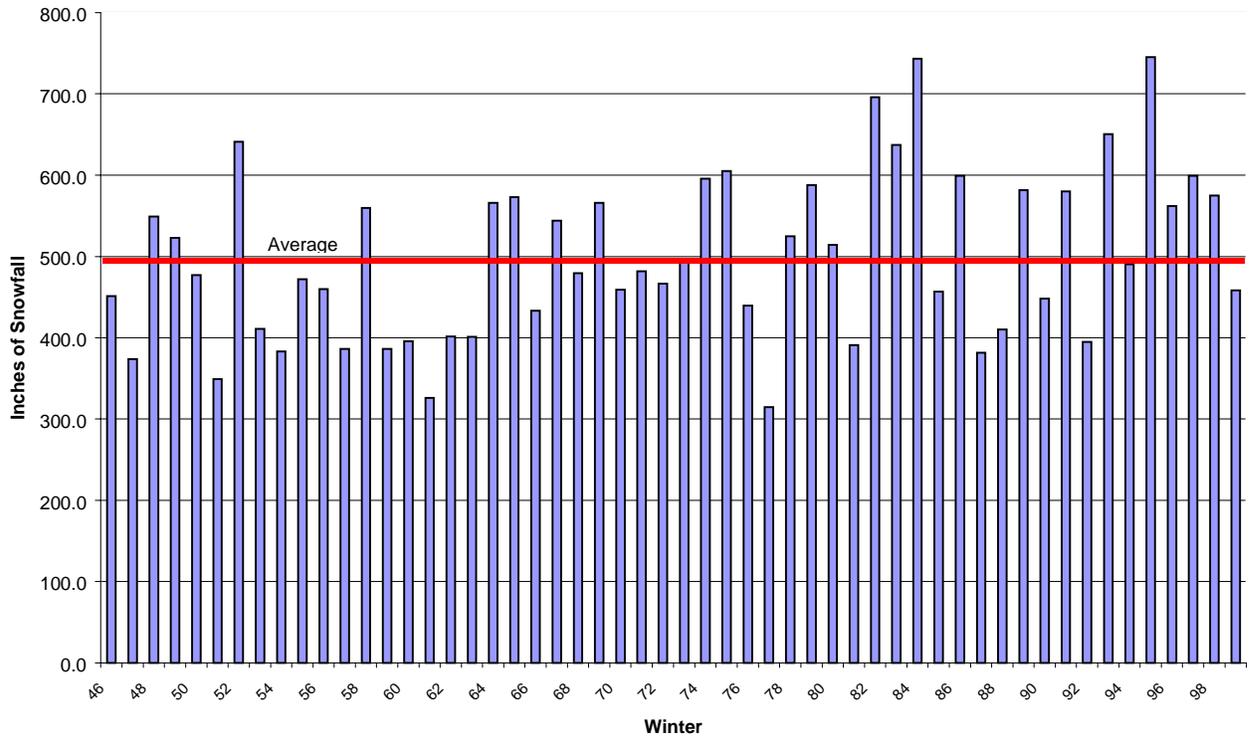
Avalanche Incidents in Utah 1951-Present

Season	Triggered	Caught	Partly Buried	Totally Buried	Killed
51					0
52					0
53					0
54					0
55					0
56					0
57					0
58					2
59					0
60					0
61					0
62					0
63					0
64					1
65					0
66					1
67					2
68					1
69					0
70					1
71					0
72					0
73					1
74					0
75					0
76					1
77					1
78					0
79					2
80					1
81					2
82					1
83					0
84					1
85	79	39	15	6	3
86	66	27	12	5	5
87	50	18	6	3	2
88	39	6	1	1	0
89	64	9	1	0	0
90	65	34	14	2	0
91	46	19	7	1	0
92	76	27	14	9	5
93	65	29	9	5	3
94	74	42	5	3	1
95	79	31	7	9	5
96	51	15	3	2	2
97	84	62	37	9	6
98	96	57	17	8	3
99	70	50	19	7	5
Total	1004	465	167	70	58
Total 85-present	2004	926	334	140	39

Snow fall at Alta 1945 - Present

Season	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total
1944-45	---	57.0	19.5	67.0	---	57.0	
1945-46	109.0	83.0	84.5	50.0	69.0	55.5	451.0
1946-47	69.0	63.0	61.0	53.0	68.0	60.0	374.0
1947-48	118.0	80.0	46.0	66.0	165.0	74.0	549.0
1948-49	71.0	160.0	132.0	58.0	97.0	5.0	523.0
1949-50	39.0	137.0	133.0	34.0	109.0	25.0	477.0
1950-51	60.0	66.0	112.0	58.0	53.0	0.0	349.0
1951-52	67.0	156	115.0	105.0	163.0	35.0	641.0
1952-53	44.0	65.0	112.0	40.0	93.0	57.0	411.0
1953-54	50.0	107.0	54.0	57.0	101.0	14.0	383.0
1954-55	37.0	53.0	134.0	129.0	60.0	59.0	472.0
1955-56	86.0	112.0	103.0	72.0	33.0	54.0	460.0
1956-57	36.0	50.0	86.0	41.0	97.0	76.0	386.0
1957-58	74.0	79.5	83.5	131.5	80.0	111.0	559.5
1958-59	38.0	47.5	81.0	107.0	84.5	28.0	386.0
1959-60	22.0	39.5	59.0	155.0	92.0	28.0	395.5
1960-61	75.0	40.0	1.0	62.0	113.0	35.0	326.0
1961-62	46.0	82.5	86.0	110.0	35.0	42.0	401.5
1962-63	31.0	17.0	85.0	39.0	93.0	136.0	401.0
1963-64	55.0	53.0	108.0	68.0	183.0	99.0	566.0
1964-65	95.0	141.0	150.0	66.0	44.0	77.0	573.0
1965-66	69.0	69.0	73.0	103.0	70.0	49.0	433.0
1966-67	53.0	84.0	168.0	72.0	61.0	106.0	544.0
1967-68	22.0	131.0	39.0	84.0	70.0	133.5	479.5
1968-69	87.5	132.6	113.0	148.0	35.0	50.0	566.1
1969-70	56.0	70.0	103.5	60.5	79.0	90.0	459.0
1970-71	79.0	142.0	58.0	73.5	87.0	42.0	481.5
1971-72	64.5	159.0	94.5	45.0	47.0	56.6	466.6
1972-73	----	122.0	64.5	77.0	124.0	109.0	496.5
1973-74	90.9	128.2	104.5	91.0	45.0	136.0	595.6
1974-75	25.5	146.5	104.0	88.0	151.0	90.0	605.0
1975-76	94.0	67.0	74.5	69.0	93.0	42.0	439.5
1976-77	13.5	17.0	50.5	73.5	129.0	31.0	314.5
1977-78	53.0	106.5	99.5	92.5	85.0	88.0	524.5
1978-79	62.5	96.0	78.5	86.0	71.0	94.0	588.0
1979-80	79.5	27.0	143.0	112.5	123.0	29.0	514.0
1980-81	40.0	34.0	73.0	82.0	110.0	52.0	391.0
1981-82	47.0	184.0	143.0	85.0	164.0	73.0	696.0
1982-83	66.0	165.0	75.5	68.0	150.0	112.5	637.0
1983-84	143.5	244.5	42.0	104.0	85.0	124.5	743.5
1984-85	112.5	105.0	44.0	61.5	99.5	34.5	457.0
1985-86	132.0	62.0	56.0	112.7	100.0	135.7	599.0
1986-87	73.0	12.3	96.0	73.0	104.0	23.5	381.8
1987-88	30.0	91.0	105.1	39.75	115.5	29.0	410.3
1988-89	172.5	124.5	70.75	97.5	64.75	52.0	581.5
1989-90	76.0	49.0	107.5	100.5	84.0	31.0	448.0
1990-91	109.5	91.0	82.8	49.7	110.9	136.3	580.2
1991-92	133.4	57.2	41.8	85	50.1	27.5	395.0
1992-93	118.8	119.2	165.3	102.9	63.0	81.2	650.4
1993-94	40.7	64.85	122.7	134.05	47.2	80.8	490.3
1994-95	205.9	73.8	199.7	56.3	128.9	80.7	745.4
1995-96	57	53	187	104	82	79	562
1996-97	78.3	164.8	141.5	91	53.8	69.7	599.1
1997-98	46.3	81.8	128.9	156.6	92.3	69	574.9
1998-99	76.5	43.1	105.3	98	46.5	89	458.4
Average	72.3	91.0	96.0	82.9	89.9	66.6	499.9
Maximum	244.5	199.7	155	156.6	136.3	745.4	0
Year of Max	94	83	95	97	64	91	95

Alta November - April Snowfall



Utah Avalanche Fatalities- 1950-present

Date	Deaths	Sex	Location	Activity	Skier	Climber	Snow boarder	Snow mobiler	Other Recreation (snowshoe, hiker, hunter)	Worker	Resident
9-Mar-58	2	Males	Snowbasin	Rescuer						2	
29-Mar-64	1	Male	Snowbasin	Worker						1	
31-Dec-65	1	Male	Park City	In-bounds skier	1						
12-Feb-67	2	Males	Pharoah's Glen	Climbers		2					
19-Feb-68	1	Male	Rock Canyon	Hiker					1		
29-Jan-70	1	Male	Alta	In-bounds skier	1						
29-Jan-73	1	Male	Park West	In-bounds skier	1						
6-Jan-76	1	Male	Alta	Out of bounds skier	1						
3-Mar-77	1	Male	Snowbird	In-bounds skier	1						
19-Jan-79	1	Male	Helper	Worker						1	
2-Apr-79	1	Male	Lake Desolation	Backcountry skier	1						
11-Jan-80	1	Male	Evergreen Ridge	Out of bounds skier	1						
1-Feb-81	1	Male	Cardiff	Hiker					1		
1-Mar-81	1	Male	Millcreek	Backcountry skier	1						
22-Mar-82	1	Male	near Park West	Backcountry skier	1						
2-Jan-84	1	Male	Superior Peak	Backcountry skier	1						
22-Feb-85	1	Male	Near Powder Mountain	Backcountry skier	1						
19-Mar-85	1	Female	Park City	In-bounds wet slide	1						
13-Nov-85	2	Males	Sunset Peak	Backcountry skiers	2						
6-Jan-86	1	Male	Provo Canyon	Backcountry skier	1						
17-Feb-86	1	Male	Big Cottonwood Canyon	Backcountry snowboarder			1				
19-Feb-86	1	Male	Alta	In bounds skier	1						
20-Nov-86	1	Male	Sugarloaf, Alta	Hiker in unopened area					1		
15-Feb-87	1	Male	Twin Lakes Reservoir	Backcountry skier	1						
25-Nov-89	1	Male	Tony Grove Lake, Logan	Backcountry skier	1						
12-Feb-92	4	3-M/1-F	Gold Basin, La Sal Mtns	Backcountry vskiers	4						
1-Apr-92	1	Male	Mineral Basin, near Snowbird	Backcountry skier	1						
16-Jan-93	1	Male	Sundance (closed area)	Backcountry skier	1						
25-Feb-93	1	Male	Pinecrest, Emig. Cyn.	Backcountry skier	1						
3-Apr-93	1	Male	Wolverine Cirque	Backcountry skier	1						
18-Feb-94	1	Male	10,420 Peak, B.C.C.	Backcountry skier	1						
7-Nov-94	1	Male	Snowbird (pre-season)	Backcountry skier	1						
14-Jan-95	2	Males	Ben Lomond, near Ogden	Snowmobilers				2			
23-Jan-95	1	Male	Midway	Resident killed in roof slide							1
12-Feb-95	1	Male	Gobbler's Knob, B.C.C.	Backcountry skier	1						
2-Feb-96	1	Male	Solitude patroler	Worker						1	
27-Mar-96	1	Male	Maybird Gulch, L.C.C.	Backcountry skier	1						
7-Dec-96	1	Male	Bountiful Peak	Snowmobiler				1			
26-Dec-96	1	Male	Flagstaff Peak	Backcountry snowboarder			1				
11-Jan-97	3	Males	Logan Peak	Three campers					3		
25-Jan-97	1	Male	Provo Canyon	Climber		1					
17-Jan-98	1	Male	Near Coleville	Snowmobiler				1			
18-Jan-98	1	Male	Sanpete County	Snowmobiler				1			
26-Feb-98	1	Male	Near Weber State	hiker (possible suicide)					1		
7-Nov-98	1	Male	Snowbird (pre-season)	Snowboarder			1				
2-Jan-99	2	Males	Wasatch Plateau	Snowboarders			2				
29-Jan-99	1	Male	Mt. Nebo	Snowmobiler				1			
6-Feb-99	1	Male	Little Willow Canyon	Hiker					1		

Total 58

56 Males, 2 Females

1958 season - Present	30	3	5	6	8	5	1
1990 season - Present	12	1	5	5	5	1	1
Past 3 seasons	0	1	4	4	5	0	0

Shaded areas indicate greatest concentration of fatalities.

U.S. Avalanche Fatalities by Activity

Activity (detailed categories)

Year	86	87	88	89	90	91	92	93	94	95	96	97	98	99	Total	Total	Total
	86-99	94-99	97-99														
Snowmobilers	0	2	0	0	1	2	2	2	9	7	5	6	14	12	62	53	32
Climbers	2	6	2	0	0	3	7	3	2	6	9	6	3	1	50	27	10
Backcountry Skiers	7	2	6	2	2	2	7	9	2	7	6	0	0	3	55	18	3
Out of Bounds Skiers	1	8	0	2	3	0	4	5	0	0	1	0	1	2	27	4	3
In Bounds Skiers	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Backcountry Snowboarders	1	0	0	0	1	0	0	2	0	1	3	1	4	7	20	16	12
Out of Bounds Snowboarders	0	0	0	0	0	0	0	1	0	2	1	0	0	3	7	6	3
Misc Recreation	0	3	0	0	1	1	2	4	0	1	2	7	4	4	29	18	15
Patrollers	2	0	0	1	0	0	0	1	0	1	1	0	0	0	6	2	0
Motorists/Highway workers	0	0	0	0	0	0	1	1	0	1	0	0	0	0	3	1	0
Residents	1	0	0	1	0	0	0	0	0	2	1	0	0	0	5	3	0
Others at work	1	0	0	0	0	0	1	1	0	0	1	2	0	1	7	4	3
Total	17	21	8	6	8	8	24	29	13	28	30	22	26	33	273	152	81

Activity (condensed categories)

Year	86	87	88	89	90	91	92	93	94	95	96	97	98	99	Total	Total	Total
	86-99	94-99	97-99														
Snowmobilers	0	2	0	0	1	2	2	2	9	7	5	6	14	12	62	53	32
Climbers	2	6	2	0	0	3	7	3	2	6	9	6	3	1	50	27	10
Skiers	10	10	6	4	5	2	11	14	2	7	7	0	1	5	84	22	6
Snowboarders	1	0	0	0	1	0	0	3	0	3	4	1	4	10	27	22	15
Misc Recreation	0	3	0	0	1	1	2	4	0	1	2	7	4	4	29	18	15
Others at work	1	0	0	0	0	0	1	1	0	0	1	2	0	1	7	4	3
Residents	1	0	0	1	0	0	0	0	0	2	1	0	0	0	5	3	0
Patrollers	2	0	0	1	0	0	0	1	0	1	1	0	0	0	6	2	0
Motorists/Highway workers	0	0	0	0	0	0	1	1	0	1	0	0	0	0	3	1	0
Total	17	21	8	6	8	8	24	29	13	28	30	22	26	33	273	152	81

U.S. Fatalities by State

STATE	85-86	86-87	87-88	88-89	89-90	90-91	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99
CO	4	11	5	4	4	6	9	12	1	9	7	1	6	6
AK	0	6	2	0	1	1	2	7	2	6	8	4	3	13
UT	5	2	0	0	1	0	5	3	1	5	2	6	2	5
MT	2	1	0	0	1	0	1	1	6	3	3	1	7	2
CA	2	0	0	0	1	0	2	1	0	2	0	0	1	1
WA	2	0	1	0	0	0	2	0	0	1	0	5	2	4
WY	2	0	0	0	0	0	2	1	1	1	3	2	1	2
ID	0	1	0	0	0	0	0	2	0	0	3	3	3	0
OR	0	0	0	1	0	0	0	1	2	0	0	0	1	0
NV	0	0	0	1	0	0	1	0	0	0	0	0	0	0
NH	0	0	0	0	0	1	0	0	0	0	3	0	0	0
NY	0	0	0	0	0	0	0	1	0	0	0	0	0	0
AZ	0	0	0	0	0	0	0	0	0	1	0	0	0	0
NM	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Total	17	21	8	6	8	8	24	29	13	28	30	22	26	33

Last 14 Winters	Last 8 Winters	Last 3 Winters
85	51	13
55	45	20
37	29	13
28	24	10
10	7	2
17	14	11
15	13	5
12	11	6
5	4	1
2	1	0
4	3	0
1	1	0
1	1	0
1	1	0
273	205	81