

Snow and Avalanches in Utah

Annual Report 1999-2000

Forest Service Utah Avalanche Center

In partnership with:

Friends of the Utah Avalanche Center
National Weather Service
Utah Division of Comprehensive Emergency Management
Salt Lake County
Utah State University
Utah State Parks and Recreation

Copies of this report can be obtained by writing or calling:

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Or view online at:

www.avalanche.org

The Forest Service Utah Avalanche 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 nine 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 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 21).

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 advisories 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 advisories. People access these by:

- ♦ Recorded telephone 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 advisories entertaining so that people will remember what they hear and enjoy the experience enough to use the advisories 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 can get out in the mountains 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, four crews of avalanche forecasters operate in Utah, one in Logan, another in Salt Lake City, one on the Manti Skyline and a fourth 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 access the UAFC bulletin each season than any other avalanche advisory 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 UAC is operationally separated into four entities:

- Bear River drainage (Logan area – northern Utah and southeast Idaho)
- Wasatch Mountains (Ogden, Salt Lake, Park City and Provo area mountains)
- Manti Skyline (Fairfield Canyon – Wasatch Plateau)
- La Sal Mountains (near Moab)

Mike Jenkins heads the Logan operation with a staff of: Drew Hardesty and Spencer Logan. 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 and they are all Utah State University employees.

In Moab, Faerthen Felix is the program director with a part-time staff of Eric Trenbeath, (who works for Utah State University) and several volunteer workers. The Moab office is located in the Moab Ranger District on the Manti-Lasal National Forest. Faerthen also oversees the Manti Skyline forecast, which is issued by Craig Gordon and Eric Trenbeath, both Utah State University employees.

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 14th season, is the Co-Director along with Evelyn Lees. This season, Tremper spent most of his time working on Olympic-related avalanche problems while Lees oversaw the day-to-day operations. The rest of the very experienced staff include: Tom Kimbrough, Seth Shaw, Ethan Greene and Jeff Brown. All are Forest Service employees under the Intermountain Regional Office. The Salt Lake office is co-located with the National Weather Service at the Salt Lake International Airport.

Lastly, a private, nonprofit group, the Friends of the Utah Avalanche Center, contract the intrepid Bob Athey as a full time backcountry observer. Although Bruce Tremper and Evelyn Lees spend most of his time in the Wasatch operation, they oversee all three operations to insure consistency in quality.

The Utah Avalanche Center is a Forest Service program under the Intermountain Region and the Manti-La Sal National Forest, in partnership with Utah State University, the State of Utah Department of Public Safety, Division of Emergency Management, Salt Lake County, the National Weather Service and private contributions through the Friends of the Utah Avalanche 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://www.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@avalanche.org

Season Highlights

Weather and Snowpack

It was a very warm season with very stable snow. It was the seventh warmest winter on record at the Salt Lake Airport. The snow line remained about halfway up the mountain ranges for most of the season. High elevation areas experienced near normal snowfall but low elevation areas suffered a skimpy season.

Incidents and Accidents

On a positive note, only two avalanche fatalities occurred this season, which is below the 5-year moving average of 3.4 fatalities per year for Utah. This reflected the national trend of below normal avalanche fatalities. Nationally only 22 avalanche fatalities occurred this season (as of this writing). This is below the national average of 26. Low fatality numbers are attributed to the very warm winter experienced throughout most of the West, which creates stable avalanche conditions.

Media

The national and local media continued its fascination with avalanches. National television documentaries about avalanches continued to play on the Discovery Channel TBS and PBS. Most of these documentaries feature Utah Avalanche Center staff featured in a very positive light. In addition, Bruce Tremper was interviewed this season for yet another national TV avalanche documentary for the Discovery Channel and was the featured guest of the hour-long NPR radio program "Talk of the Nation" and Ethan Greene was interviewed by NPR's "The Savvy Traveler." The UAC staff logged 56 media contacts which include one national television interview, fourteen national television requests for information, two national radio interviews, seventeen national print interviews, five local television interviews, six local radio interviews and eleven local print interviews.

Education

Utah Avalanche Center staff taught 54 classes avalanche classes this season, directly reaching a total of 2242 people. These classes range from hour-long avalanche awareness classes to multi-day Level II classes. Each of these classes was specifically tailored to the group ranging from grade school and Boy Scout classes to professional ski patrollers and university scientists.

Snowmobile outreach

Thanks to a grant from the National Recreation Trails Program, we hired Craig Gordon and Eric Trenbeath, to do avalanche education and forecasting specifically for snowmobilers. They taught 18 snowmobile avalanche courses reaching 556 people and issued a weekend avalanche advisory for the Manti Skyline, a popular snowmobile area in central Utah. We hope that this will help to stem the rising tide of snowmobiler avalanche fatalities.

Use of UAC Products – Changing Technologies

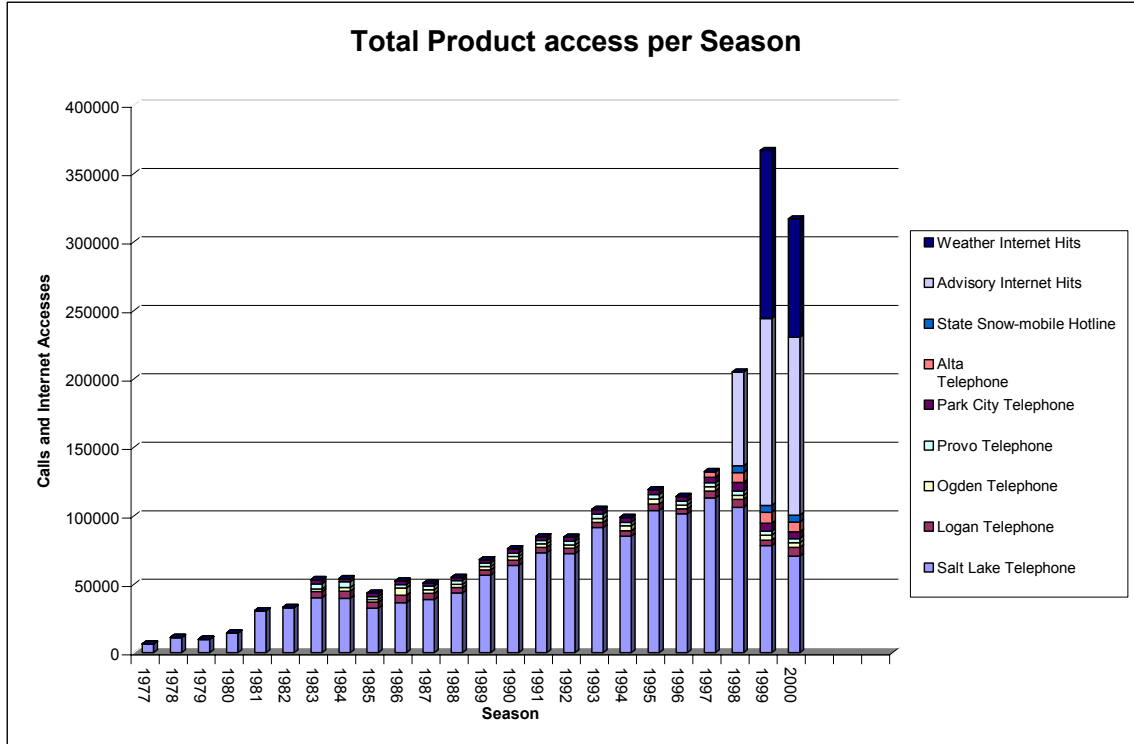
Because it was such a dry, warm year, public access of UAC products was down compared to previous years. With rain and green grass in town for most of the winter it's hard to get very excited about heading into the mountains. Still, the UAC avalanche advisory and mountain weather forecast received more use than for any other avalanche center in North America.

Because of the rise in popularity of the Internet, we have noticed in recent years, that more and more public access the advisories electronically than listen to the telephone recording. We live in an increasingly time-constrained society and now that over half the households have home Internet connections and most people have access to the Internet at work, we can expect the trend to continue. Other avalanche centers have noticed these trends as well.

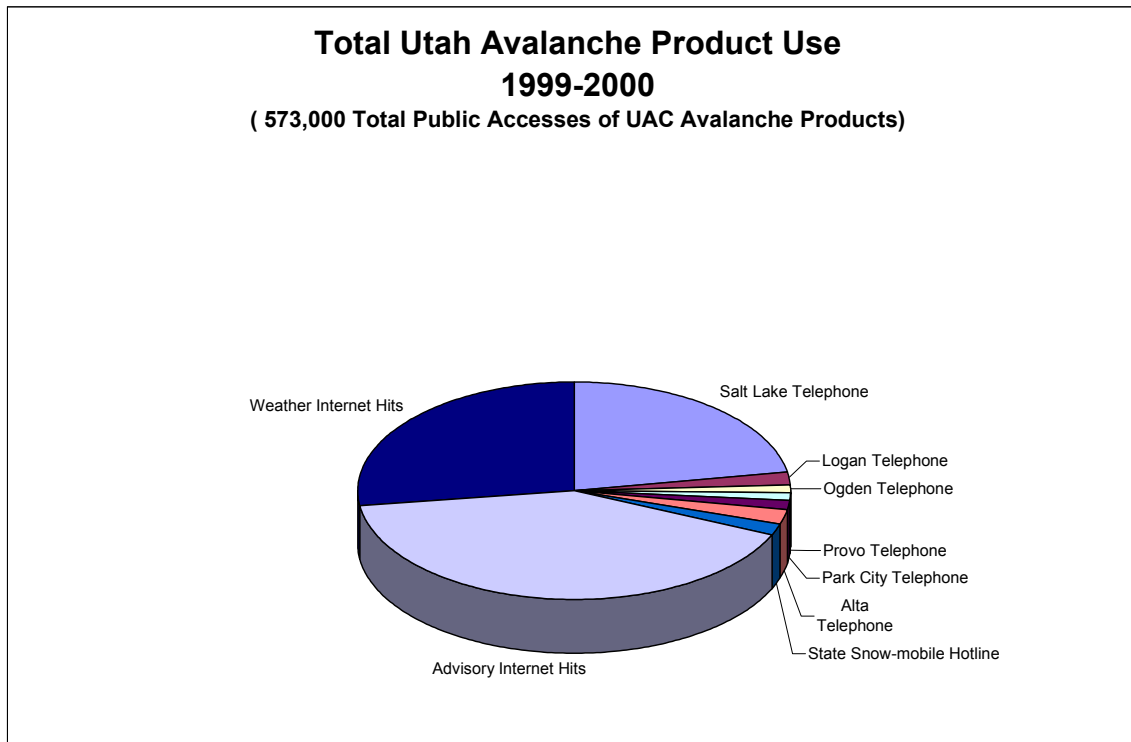
Technology has changed the way we do business. Although telephone recordings are more personal, about twice as many people access the advisories over the Internet. And a format that works for the telephone does not translate very well to the Internet. Web surfers rarely take the time to read a long-winded page of text. They would rather linger on graphics-intensive pages or bulleted, concise information. This is especially true with young, Internet and MTV-addicted audiences who are also the most likely people to get killed in avalanches. To effectively serve the public, we must change with the times.

This season, we have experimented with web pages that use icons, images and short, bulleted text to convey critical avalanche information. We are also experimenting with a GIS display of avalanche danger. The user sees a computer generated, oblique view of a mountain massif on which the avalanche paths and avalanche danger ratings are draped over the terrain. For instance, the forecast might call for a "high danger on all northwest through northeast-facing slopes above 10,000 feet steeper than 35 degrees." It's hard, especially for inexperienced users, to visualize exactly what this kind of terrain looks like or where they would find it. But when displayed graphically, it's easy to visualize. Avalanche danger is almost never the same in all parts of a mountain range. It varies by aspect, elevation, slope steepness, exposure to wind, anchoring and terrain shape—all very hard concepts to describe with words but very easy to describe with imagery.

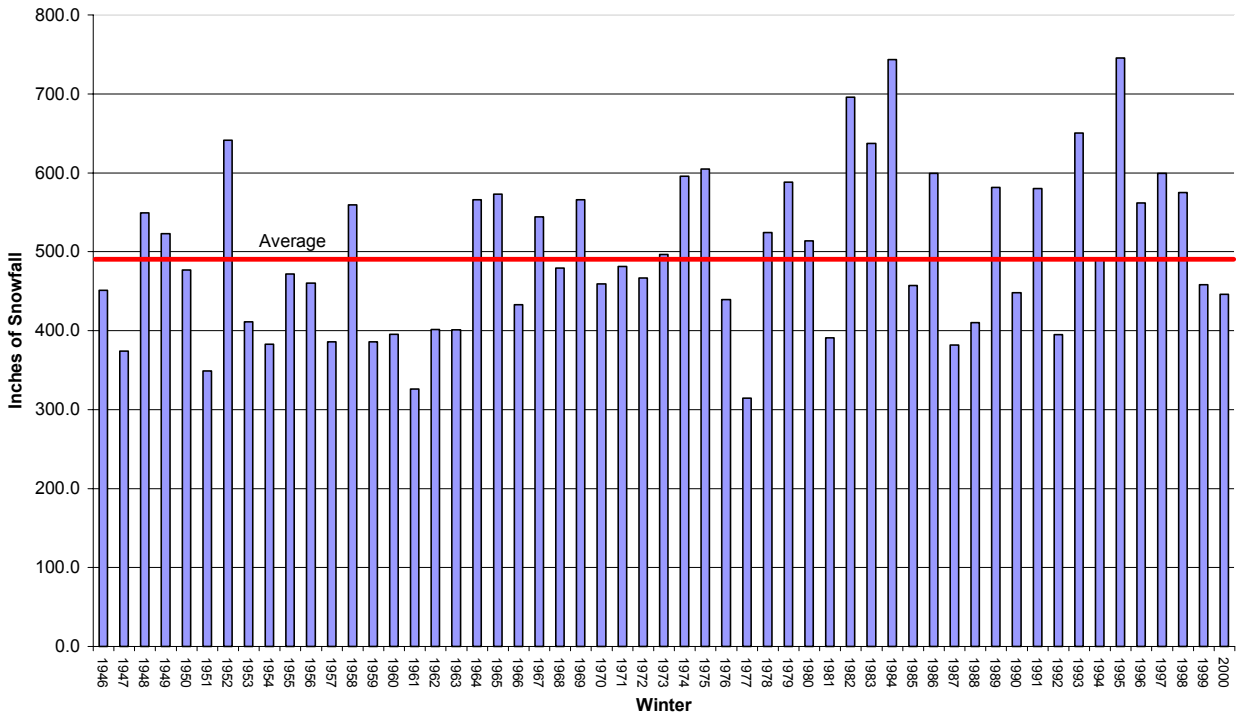
The development of this kind of display has so far proved to be too expensive and complex for our meager budget and limited time, but we hope that we will finally have a version suitable for public display by the 200-2001 season.



Use of UAC products has fallen slightly this season due to the warm, dry winter. As Internet access of the products increases, call counts



Alta November - April Snowfall



Season History – Northern Utah

Like most places in the west, it wasn't much of a winter. It was slow to start, soon to end and it fell asleep a couple times in the middle. In addition, at least at the Salt Lake Airport, it was the seventh warmest winter on record. The snow line hovered about halfway up the mountains for most of the winter and significant snow fell in Salt Lake City only a couple times. Down in the valleys the grass remained green for much of the winter with rain more common than snow—nearly as miserable as a winter in Seattle. Elevation was the key. Higher elevation areas ended up with a near normal snowpack but low elevation areas suffered throughout the winter. As a final insult, April set a record for the percentage loss of snowpack through melting.

Also, because of the warm temperatures, the snowpack was solid and stable for an uncharacteristically large percentage of the winter. There were only two avalanche fatalities in Utah, one in southern Idaho and only one injury—much below normal for Utah.

November:

November set the tone for the early season of this below average winter. As late as November 15 there was almost no snow on the ground at Alta. Several small storms in the second half of the month added up to about 30 inches of snowfall, with 20 inches on the ground at the Guard Station at the end of the month. The east side of the range and

the Ogden and Provo Mountains fared even worse. Snowbasin and Sundance were not open in November and Park City lost the America's Opening World Cup races, which it has reliably hosted for a number of years, because it was too warm to even make artificial snow. On the positive side, the lack of snow equaled a lack of avalanches. In some years, the early part of the season is a dangerous time, with many people eager to get out despite unstable snow conditions. This year, with the lack of snow, people just weren't getting caught. The month ended with 32 inches of snowfall at the Alta Guard Station.

December:

The snow pack difference between the Cottonwood Canyons and other parts of the range became more prominent during December. Alta had slightly above average snowfall for the month, at 97 inches, finishing with about 40 inches on the ground at the Guard Station. This provided decent backcountry touring conditions at mid and upper elevations in the central Wasatch. The eastern side of the range had about half as much on the ground. Sundance in the southern Wasatch was able to open with the aid of snowmaking. In the Ogden Mountains, poor Snowbasin was still constructing their new snowmaking equipment and they lost the entire Christmas season.

Storms in the first two thirds of the month finally produced a few avalanches but conditions were never too serious and no avalanche accidents occurred. There was no precipitation during the final 10 days of the century, giving a restful Holiday Season to the Wasatch avalanche workers.

January:

The thin snowpack during November and December provided ideal conditions for developing the dreaded depth hoar, or sugar snow, near the ground, especially outside of the Cottonwood Canyons where thin snow provided the perfect metamorphic conditions. Then the clear weather at the end of December added a layer of weak snow to the surface of the pack. The missing ingredient was a blanket of more cohesive snow on top of the various weak crystals. The first 11 days of the new millennium provided just that blanket.

Most areas around the Wasatch just about doubled their snow pack during this period, although that is not saying much for this skimpy season. Unfortunately, the avalanche danger also increased dramatically. Human triggered slides became more common and on January 11 tragedy struck. On the 10th the danger rose from "moderate" to "considerable" and, on the morning of the 11th, to "high." In a very tragic accident, a married couple, skiing the lifts at The Canyons, decided to leave the boundaries of the resort and triggered a large avalanche in the backcountry. They failed to pick up their young child at the day care that night, and a search team located night and their bodies the following afternoon.

A couple of warm storms with high elevation rain/snow lines helped stabilize the deeper weak layers in the snowpack during the second half of January. But there always seems to be a trade-off. The warmth also formed slick and hard sliding surfaces. Fortunately a long series of human-triggered slides occurred almost daily, but had no unhappy endings, despite a few close calls.

At the month's end, winter had returned to the Wasatch—albeit briefly. The snow line was down to the valley floor and the Alta Guard Station snowfall total for the month hit 114 inches, 18 inches above average.

February:

For the month of February, the much-anticipated and well-funded IPEX project set up in the National Weather Service office. IPEX (Intermountain Precipitation Experiment) funded by a consortium of federal and university entities, was designed to intensively study winter storms in Utah for the month of February—not coincidentally, the same month as the Olympic Games. Dozens of scientists descended on the National Weather Service office, which we share, armed with a truckload of computers, a portable Doppler radar and storm chaser aircraft—most of which sat idle for during the first half of February. The normally reliable computer models forecasted several storms that failed to materialize over the Great Basin. The scientists in charge of the operation were looking rather pale as their expensive equipment collected deeper and deeper layers of dust waiting for the first February storm.

At last a series of storms arrived that became the largest snow producer of the winter, although—and it goes without saying—relatively warm for Utah. They didn't provide quite the usual "greatest snow on earth" but the warmth did reduce the avalanche danger by speeding the stabilization process within the new snow.

The weak early season snow, still hiding underneath the January and February deposits tossed in isolated wild cards. Occasionally someone would trigger a slope that would break down into these deep layers, a fact that we grew tired of repeating in our avalanche advisories. Several people had close calls from these deep slab avalanches and on February 19 a snowmobiler was killed just north of the Idaho border as a large avalanche broke to the ground.

This season's snowiest month finally pushed the total depth at the Alta Guard Station over the 100-inch mark with a well above average 119 inches.

March:

The winter began tapering off in March. One decent storm arrived on the 8th and 9th of the month, along with several weaker systems evenly spaced over the remaining weeks. Temperatures were rather warm (of course) and the high sun angles triggered shallow wet slides as skies cleared after the storms passed but generally avalanche activity was at a minimum.

Snowfall numbers remained slightly below average 88 inches for Alta. The total depth at the Guard Station dropped below 100 inches on March 22, beginning an inexorable decline.

April:

Following the tapering off period in March the winter came to an early close in April. April is often a wet month in Utah, but not this season. Only 15 inches of snow fell at Alta, over 50 inches less than normal, off by 78 percent. So what else is new?

The sunny days did provide a fine melt-freeze cycle and mostly cool nighttime temperatures gave good corn snow skiing and boarding for the first half of the month. The warm winter also had increased snow pack densities increasing the quality and distribution of the corn. But there was the inevitable trade-off; the hot sun had baked off most of the southerly facing slopes by the end of the month.

For a seemingly short and warm winter the final numbers weren't that bad. The average total snowfall at Alta is right at 500 inches. This year's inches added up to 446, only down by 11%. But the numbers were very elevation dependant. The lower elevation resorts had significantly below normal snowfall, especially at their base.

The snowpack in April melted at a record pace. Which didn't surprise anyone.

Season History – La Sal Mountains – by Faerthen Felix**September**

Labor Day's customary snow appears a couple of days later than expected, and much heavier than is usual: 8" instead of the expected dusting. Taken as a sign of things to come, this harbinger hits the nail on the head with the timing of winter's arrival, which was considerably later than normal. In fact, we wouldn't see another snowflake until late November. When winter finally arrives, will it be as heavy as the early snow predicts?

October

The summer lingers, not that anyone seems to mind. Perpetually cloudy July and August gave us more than our annual precipitation needs, so the late-season sun is embraced by everyone. Surprisingly, there is no new snow in the mountains this month, and the September snow gradually fades away, leaving a clean (and stable) slate for winter's eventual arrival.

November

A spectacular Indian Summer persists and, pleasant as it is, it begins to feel unnatural and creepy as the end of the month approaches. Finally, a trace of snow touches the high mountains on the 20th, followed by 9" on the 22nd. Temperatures remain mild, so the snow settles rapidly rather than faceting into a dangerous weak layer. Some skiing and sledding can be done on the Geyser Pass road, but the pack is far too shallow to allow backcountry turns or avalanches.

New staff arrives at the MLSAFC for the season. Peter Hawkins from the University of Bath joins us as our intern, and Eric Trenbeath takes on the role of Assistant Forecaster and Snowmobile educator for Southern Utah.

December

Snow begins to gradually slink in as the month progresses, but it's more of a fan-dance tease than anything else. A trace falls on the 1st, 7" arrives on powerful winds on the 3rd and 4th, another trace on the 8th. It's always two steps forward and one back as the new snow settles, rots or blows away before it can fill in the ground surface texture. 4" on the 10th, 1" on the 12th, 4" on the 13th and 3" on the 20th provide enough snow to keep the roads covered above the parking areas. It's not enough to keep the 4WDs and ATVs out, so tempers flare as motorized and non-motorized recreationists find themselves in close proximity. On the positive side, the additional traffic helps pack the snow on the roads and keep it in place. New Year's Eve brings the last storm of the Millennium and 4" of new snow, but avalanche hazard remains spotty and confined to cross-loaded gullies way above timberline.

January

The New Year's Eve storm lingers and delivers another 19" before it's done. Some steep pockets run during the storm and on test slopes immediately after, but even with the copious new load the surface texture provides anchoring and the lack of a smooth bed-surface holds most of the new snow in place, despite weak facets on the ground. A bureaucratic snafu results in the MLSAFC Avalanche Forecasters being laid off on the 14th. The UAFC sends Forecaster Jeff Brown down from Salt Lake City to cover while the US Forest Service--led by Moab/Monticello District Ranger Glen Casamassa--performs miracles to resolve the problem. What could have served as a convenient excuse to axe the entire program turns into a great day for the MLSAFC as the District commits to create a permanent seasonal position for the Lead Forecaster.

During the administrative tempest, 5" of wet, heavy snow arrives on the 17th, ahead of a cold snap that finally creates a supportable base. Jeff presides over the season's first off-road turns as 2" falls on the crust on the 20th. The regular staff returns to 4" on the 21st and another 1" on the 23rd. Avalanche conditions become devious, considerable and widespread with the new snow load on the fragile buried slab. The straw that breaks the camel's back comes with 8" of new snow on the 25th and 26th and cold temperatures that chew away at the new snow bond. Large natural avalanches release on virtually all aspects, some stepping down to the ground. Plenty of slabs remain, just itching for human triggers, and fortunately, noone takes the bait. The month ends with 5" more falling on the 30th and 31st.

February

Dryer air and sun arrive to begin the month, but moist, heavy clouds soon gather over the mountains. Unfortunately, the atmosphere is too calm to wring much snowfall from them.. The threatening sky finally makes good as 2" of dense snow falls on the 8th. Valley rain turns to 2" of mountain snow on the 10th, another 1.5" on the 11th, 8" on the 12th and 2" on the 13th for a total of 1.5" of water equivalent. Trailhead temperatures rise into the 40's and winds become persistent, strong and southerly. Clinging like a warm, wet towel, the relentless clouds make for poor visibility as avalanche hazard climbs to high, making it very difficult to track which slopes moved and which are still treacherous. The new snow load helps mash instabilities out of the upper snow layers, but deep-slab

instability hangs around like an unwanted house-guest. The pernicious layers are facets growing on the ground and around the warm January crust that allowed us to begin leaving the road. Old snow surfaces also begin to be a problem as the temperature gradients across the interfaces slowly break down the bonds, creating razor-clean shears of varying strengths.

This month, Eric Trenbeath and Craig Gordon from the Salt Lake City office begin the first-ever weekend avalanche condition advisories for the Wasatch Plateau/Manti Skyline area. Local response is enthusiastic, although finding a commonly accepted name to refer to this large area proves to be difficult!

The *Pineapple Express* lingers through the next two weeks with oddly heavy, gray skies and strong southerly winds that reach 88 mph. This soggy, warm flow usually means big snowfall for us, but this year it lacks pizzazz. We receive only 13" from the 16th to the 18th, and another 9" on the 23rd and 24th, but this is enough to raise the snowpack depth to normal. Typical desert weather returns for a brief dose of dry, cold air and piercingly blue skies before the warm, lurking wetness returns to end the month.

March

Clear skies battle with the gloom as the month begins. 7" of snowfall by the 2nd, but the periodic sunshine bakes exposed areas into dense mush. Unstable layers persist in the snowpack, giving pause to anyone hoping for late winter descents of the big slide paths. Another 5" falls on the 5th and 6th. With continuing strong south winds, avalanche hazard lingers at considerable. 8" accumulates on the 7th and 8th and another 4" on the 9th. By mid-month, the higher sun begins to transform the snowpack to spring conditions. Sun crusts and corn replace settled powder and the MLSAFC moves to weekend-only updates as the budget gets tight and the snow pack weaknesses become stubborn to human triggers. A major winter storm arrives on the 20th, however, leaving 10" of dense snow in its wake. Avalanching begins in the new snow, and with powerful winds piling the heavy new snow onto steep, rocky slopes, some deep, climax avalanches release by the 22nd. Just like the lion and lamb March is famous for, by the 24th it's all over and the desert sun-seekers emerge from the Moab Diner again.

6" fall in menacing, stormy conditions between the 28th and 30th, wrecking the corn skiing but not raising the avalanche hazard significantly. The MLSAFC issues its last regular advisories on the weekend of the 31st. The staff dissipates to await the siren call of next year's snow: Peter returns to England, Eric heads for Nepal and Faerthen takes a Haute-Route tour.

The season ends with normal snow and water accumulations. With stronger than usual snow on the Wasatch Plateau, expanded education efforts and the responsible backcountry use of the La Sal Mountains, there are no avalanche fatalities nor reported burials on the Manti-La Sal National Forest this season--a pleasant change from the carnage of the past two years.

Avalanche Incidents and Accidents

Only two people died in avalanches this season in Utah, which falls below the 5-year moving average for Utah of 3.4. One snowmobiler was killed in southeast Idaho near Montpelier, which we are including in this report because it lies within the forecast area of the Logan branch of the Utah Avalanche Center.

But as usual, there were a number of close calls: A total of 43 people unintentionally triggered avalanches in the backcountry, 23 of these were caught in the avalanche they triggered, 8 were partially buried, 9 were totally buried and 3 were injured. In addition, there was, no doubt, many more that we did not hear about, especially in the more rural areas not covered by our advisories.

Even though this sounds like a lot of people, Utah averages close to 100 unintentionally triggered avalanches in the backcountry each season. This season's number of 43 is down for the year because the unusually warm winter kept avalanche conditions stable most of the winter, plus, backcountry use was probably also down because of conditions that more represented a maritime climate than Utah's "Greatest Snow on Earth." Finally, the winter didn't even get going until mid January. November and December are usually very dangerous months in Utah but this year we skated right through them with very little snow.

Nine total burials is the number that jumps out. Most total burials don't survive, so total burial numbers are usually about the same as the fatalities. But this season there was a number of lucky breaks. Also, some of the incidents may have been reported as total burials but they really had a hand sticking out, which we don't consider to be a total burial but it certainly feels like it to the victim and their friends, so it is often reported that way. With our time-constrained schedules, we usually lack the time to track down all the details of non-fatal accidents.

Squaretop Fatality

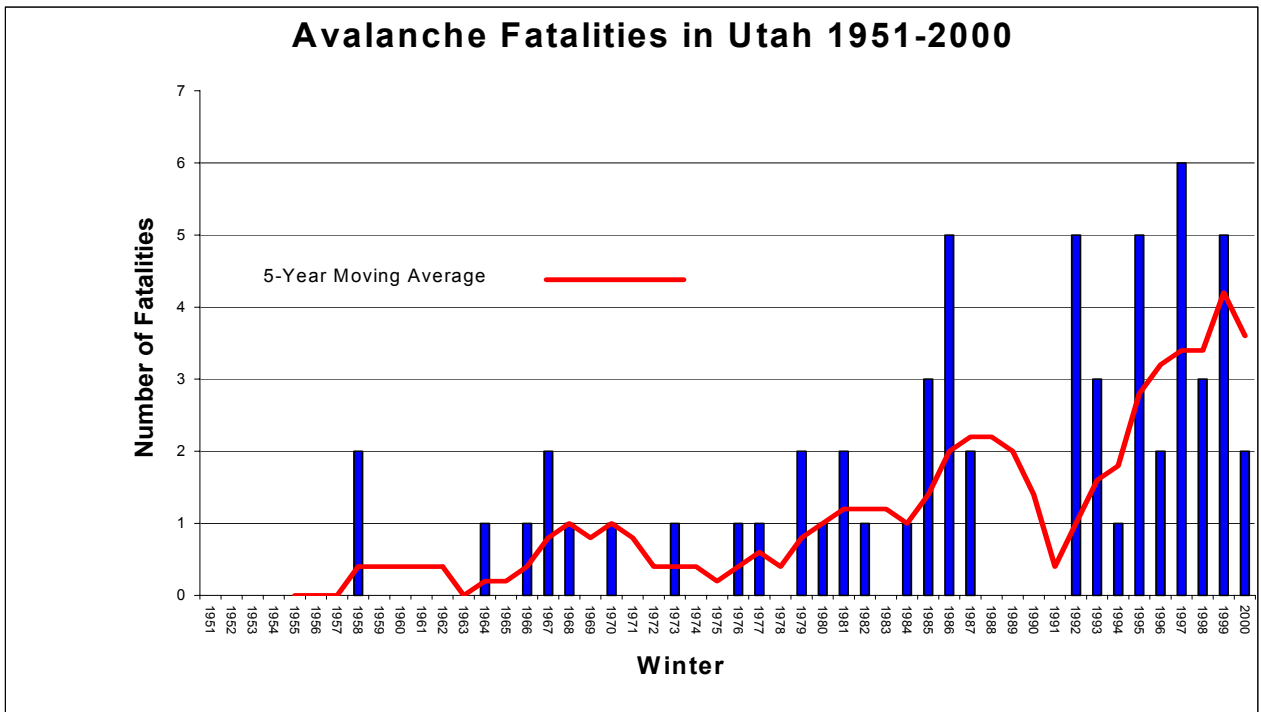
Squaretop Mountain is very dangerous backcountry avalanche terrain that borders the control boundary of The Canyons Resort near Park City. Skiers and snowboarders are free to leave the ski area boundary through access gates to travel onto public land surrounding the ski resorts. A married couple left their young child in day care that day and decided to enjoy some untracked backcountry powder. That evening, when they failed to pick up their child from day care, rescuers began to put the pieces together. At first, no one believed that they left the boundary because they stopped in to talk to the patrol before they left and the patrol tried to talk them out of it, citing high avalanche danger. When they left the patrol shack, they seemed like they had decided not to go, but for whatever reasons, they did. The next day an organized search team located both their bodies under avalanche debris after they triggered a large avalanche, both without beacons or shovels and both apparently skiing the slope at the same time. As in most avalanche fatalities, even a small amount of avalanche education would have saved their lives.

Fatality near Montpelier, Idaho

Two snowmobilers were high-marking a narrow gully below a steep, wind-loaded bowl in the mountains west of St. Charles, Idaho. One snowmobiler got his machine stuck and the other came up to help him when their weight triggered the avalanche. The one who came up to help was able to outrun the avalanche at over 80 mph, while his friend was buried. Neither had beacons or shovels. The surviving snowmobiler probed using tree branches for about 15 minutes before going for help. An organized rescue crew found the body of the missing snowmobiler the following day.

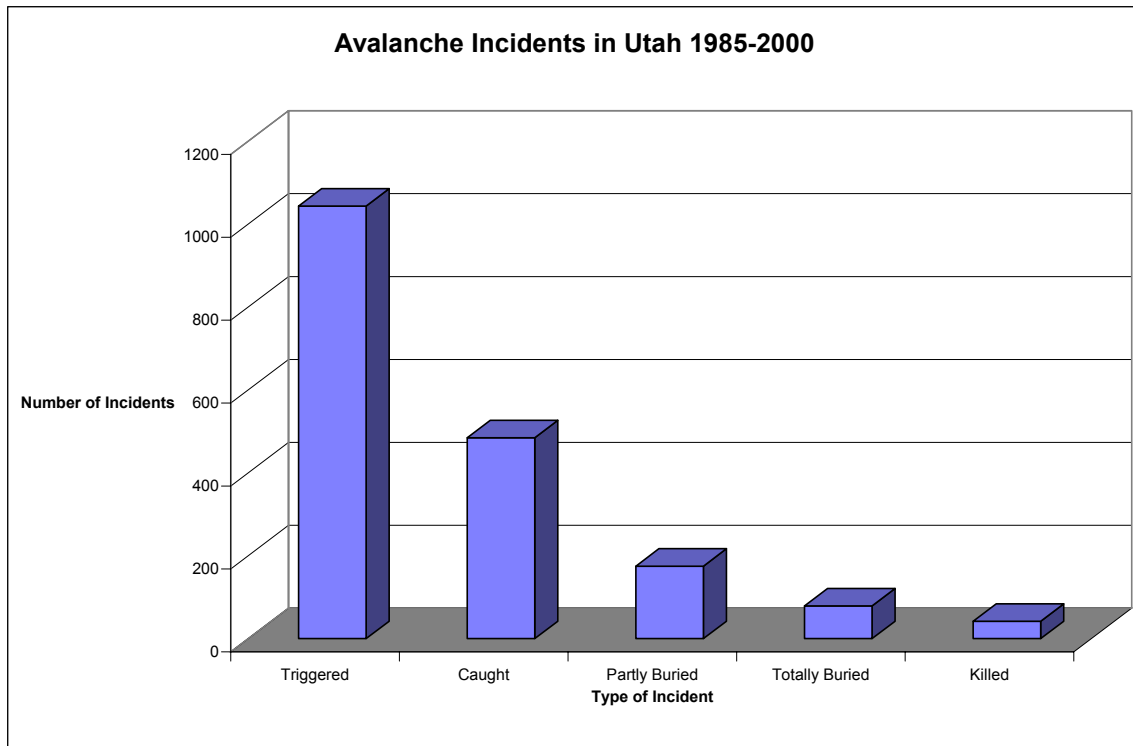
This exact setup is the common denominator in about two thirds of all snowmobile fatalities in the U.S. Once again, even a small amount of avalanche education would have saved his life: one-at-a-time, carry beacons and shovels, stay out of gullies, be cautious after recent snow and wind, call the avalanche advisory—all simple concepts, but without basic avalanche knowledge like the above two examples, eventually, there will be a story without a happy ending.

Our staff puts in many hours of unpaid overtime each season just to try and reach the people who really need avalanche education and information. But we obviously can't reach them all.



Incidents and Accidents 1999-2000								
Date	Location	Details	Triggered	Caught	Partially Buried	Totally Buried	Injured	Killed
06-Jan	Silver Fork	Skier triggered sympathetically	2					
07-Jan	McDonalds Draw	Skier triggered	1					
08-Jan	Sound of Music	Skier triggered	1					
10-Jan	Main Porter Fork	Skier triggered	1					
11-Jan	Square Top	2 skiers triggered large slide and killed	2	2		2		2
12-Jan	Emma One	2 snowshowers caught, 1 partially buried	2	2	1			
12-Jan	Park City, White Pine	1 snowmobiler caught	1	1		1		
12-Jan	Clayton Peak	Skier triggered	1					
13-Jan	Chalk Creek, Uintas	2 snowmobilers caught, 1 buried	2	2		1		
15-Jan	Superbowl, Uintas	Snowmobiler triggered	2	2		2		
17-Jan	Silver Fork	Skier triggered sympathetically	1					
22-Jan	Cardiff Fork	Suspected skier triggered	1					
24-Jan	Birthday Chutes	Skier triggered and caught	1					
29-Jan	Gobblers Knob	Skier triggered	1	1				
30-Jan	Flagstaff	Skier triggered	1					
30-Jan	Pink Pine Ridge	Skier triggered	1					
30-Jan	Ben Lomond Peak	Skier triggered sympathetically	1					
31-Jan	Chablis Bowl	Skier triggered sympathetically	1					
08-Feb	Thousand Pks Ranch	Last of 8 snowboarders triggers slide	8	1	1			
12-Feb	Bountiful Peak	Snowmobile triggered	1	1	1			
15-Feb	Square Top	Snowboarder triggered	1					
19-Feb	Saint Charles Canyon - Idaho - near Montpellier	Snowmobiler triggered and killed	2	2		1		1 (Idaho)
25-Feb	Snowbasin	In-bounds skiers	1	6	4	2	2	
27-Feb	Snowbasin	Ski patroller triggered in inbounds closure	1	1			1	
04-Mar	Chalk Creek, Uintas	Skier triggered	1	1	1			
12-Mar	Snake Creek	Skier triggered	1					
12-Mar	McDonalds Draw	Skier triggered	1					
16-Mar	Mineral Fork	Skier triggered full depth	1					
18-Mar	Box Elder Peak	Skier triggered sympathetically	1					
13-May	Superior Peak	Skier caught and injured in wet loose slide	1	1				
		Total	43	23	8	9	3	3

Note: the snowmobiler killed in southeast Idaho (near Montpilliar) is listed here as it is in the Logan Center's forecast area. These numbers include only unintentionally triggered avalanches. It does not include ski patrollers getting caught unless there was an injury, nor does it include intentionally triggered avalanches in the backcountry.



Avalanche Fatalities in Utah 1958-2000 - By Activity

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 patroller	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		
11-Jan-00	2	M/F	Squaretop	Skiers	2						

Total **60**
56 Males, 2 Females
 Shaded areas indicate greatest concentration of fatalities.

1958 season - Present	32	3	5	6	8	5	1
1990 season - Present	15	1	5	5	5	1	1
1995 season - Present	5	1	5	6	5	1	1

Avalanche Incidents in Utah 1951-Present

Season (year ending)	Triggered	Caught	Partly Buried	Totally Buried	Killed
1951					0
1952					0
1953					0
1954					0
1955					0
1956					0
1957					0
1958					2
1959					0
1960					0
1961					0
1962					0
1963					0
1964					1
1965					0
1966					1
1967					2
1968					1
1969					0
1970					1
1971					0
1972					0
1973					1
1974					0
1975					0
1976					1
1977					1
1978					0
1979					2
1980					1
1981					2
1982					1
1983					0
1984					1
1985	79	39	15	6	3
1986	66	27	12	5	5
1987	50	18	6	3	2
1988	39	6	1	1	0
1989	64	9	1	0	0
1990	65	34	14	2	0
1991	46	19	7	1	0
1992	76	27	14	9	5
1993	65	29	9	5	3
1994	74	42	5	3	1
1995	79	31	7	9	5
1996	51	15	3	2	2
1997	84	62	37	9	6
1998	96	57	17	8	3
1999	68	48	19	7	5
2000	42	22	8	9	2

present					60
present	1044	485	175	79	42
1985-2000 average fatalities per year					2.6
1990-2000 average fatalities per year					2.9
1995-2000 average fatalities per year					3.8

U.S. Avalanche Fatalities by Activity

Activity (detailed categories)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total 1986- 2000	Total 1990- 2000	Total 1995- 2000	Average 1986- 2000	Average 1990- 2000	Average 1995- 2000
Snowmobilers	0	2	0	0	1	2	2	2	9	7	5	6	14	12	5	67	65	49	4.5	5.9	8.2
Climbers	2	6	2	0	0	3	7	3	2	6	9	6	3	1	0	50	40	25	3.3	3.6	4.2
Backcountry Skiers	7	2	6	2	2	2	7	9	2	7	6	0	0	3	9	64	47	25	4.3	4.3	4.2
Out of Bounds Skiers	1	8	0	2	3	0	4	5	0	0	1	0	1	2	3	30	19	7	2.0	1.7	1.2
In Bounds Skiers	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0.1	0.0	0.0
Backcountry Snowboarders	1	0	0	0	1	0	0	2	0	1	3	1	4	7	1	21	20	17	1.4	1.8	2.8
Out of Bounds Snowboarders	0	0	0	0	0	0	0	1	0	2	1	0	0	3	0	7	7	6	0.5	0.6	1.0
Misc Recreation	0	3	0	0	1	1	2	4	0	1	2	7	4	4	2	31	28	20	2.1	2.5	3.3
Patrollers	2	0	0	1	0	0	0	1	0	1	1	0	0	0	0	6	3	2	0.4	0.3	0.3
Motorists/Highway workers	0	0	0	0	0	0	1	1	0	1	0	0	0	0	1	4	4	2	0.3	0.4	0.3
Residents	1	0	0	1	0	0	0	0	0	2	1	0	0	0	1	6	4	4	0.4	0.4	0.7
Others at work	1	0	0	0	0	0	1	1	0	0	1	2	0	1	0	7	6	4	0.5	0.5	0.7
Total	17	21	8	6	8	8	24	29	13	28	30	22	26	33	22	295	243	161	19.7	22.1	26.8

Activity (condensed categories)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Total 1986- 2000	Total 1990- 2000	Total 1995- 2000	Average 1986- 2000	Average 1990- 2000	Average 1995- 2000
Snowmobilers	0	2	0	0	1	2	2	2	9	7	5	6	14	12	5	67	65	49	4.5	5.9	8.2
Climbers	2	6	2	0	0	3	7	3	2	6	9	6	3	1	0	50	40	25	3.3	3.6	4.2
Skiers	10	10	6	4	5	2	11	14	2	7	7	0	1	5	12	96	66	32	6.4	6.0	5.3
Snowboarders	1	0	0	0	1	0	0	3	0	3	4	1	4	10	1	28	27	23	1.9	2.5	3.8
Misc Recreation	0	3	0	0	1	1	2	4	0	1	2	7	4	4	2	31	28	20	2.1	2.5	3.3
Others at work	1	0	0	0	0	0	1	1	0	0	1	2	0	1	0	7	6	4	0.5	0.5	0.7
Residents	1	0	0	1	0	0	0	0	0	2	1	0	0	0	1	6	4	4	0.4	0.4	0.7
Patrollers	2	0	0	1	0	0	0	1	0	1	1	0	0	0	0	6	3	2	0.4	0.3	0.3
Motorists/Highway workers	0	0	0	0	0	0	1	1	0	1	0	0	0	0	1	4	4	2	0.3	0.4	0.3
Total	17	21	8	6	8	8	24	29	13	28	30	22	26	33	22	295	243	161	19.7	22.1	26.8

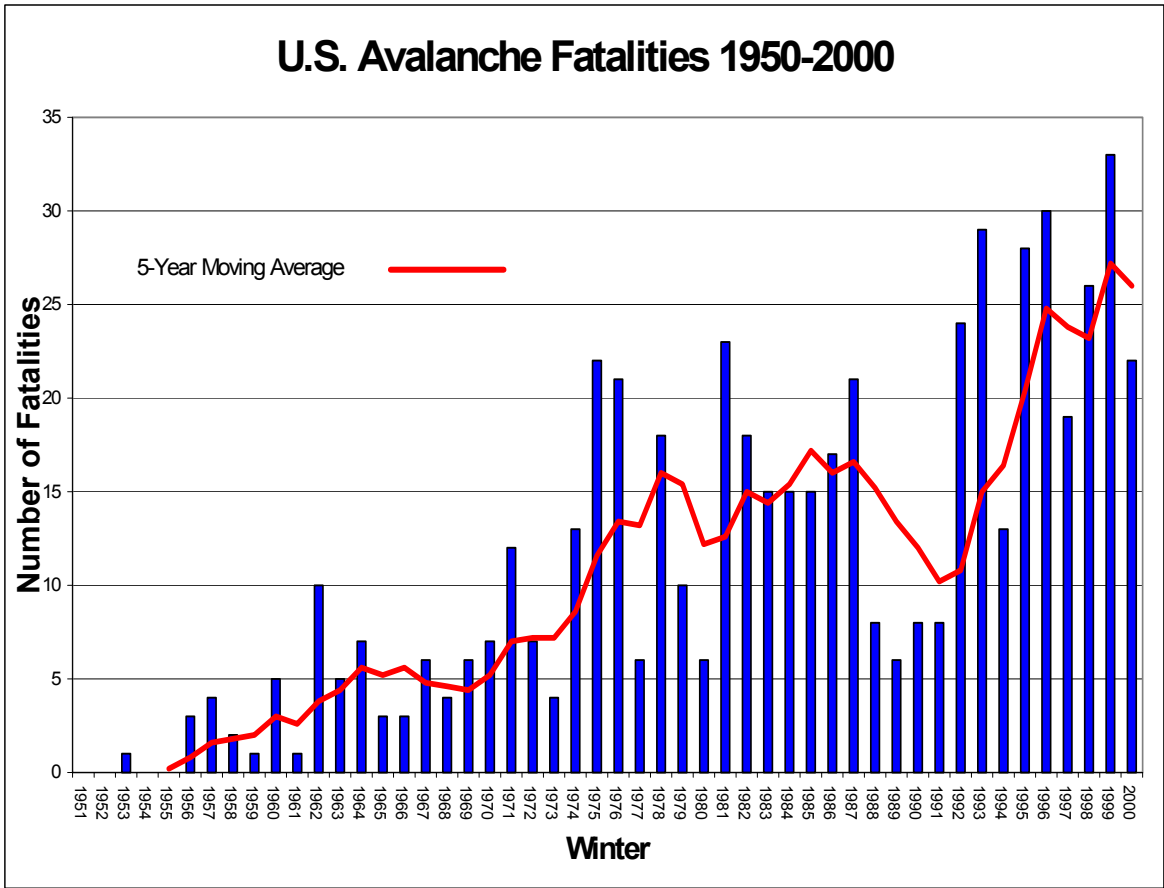
U.S. Avalanche Fatalities 1999-2000 As of May, 2000

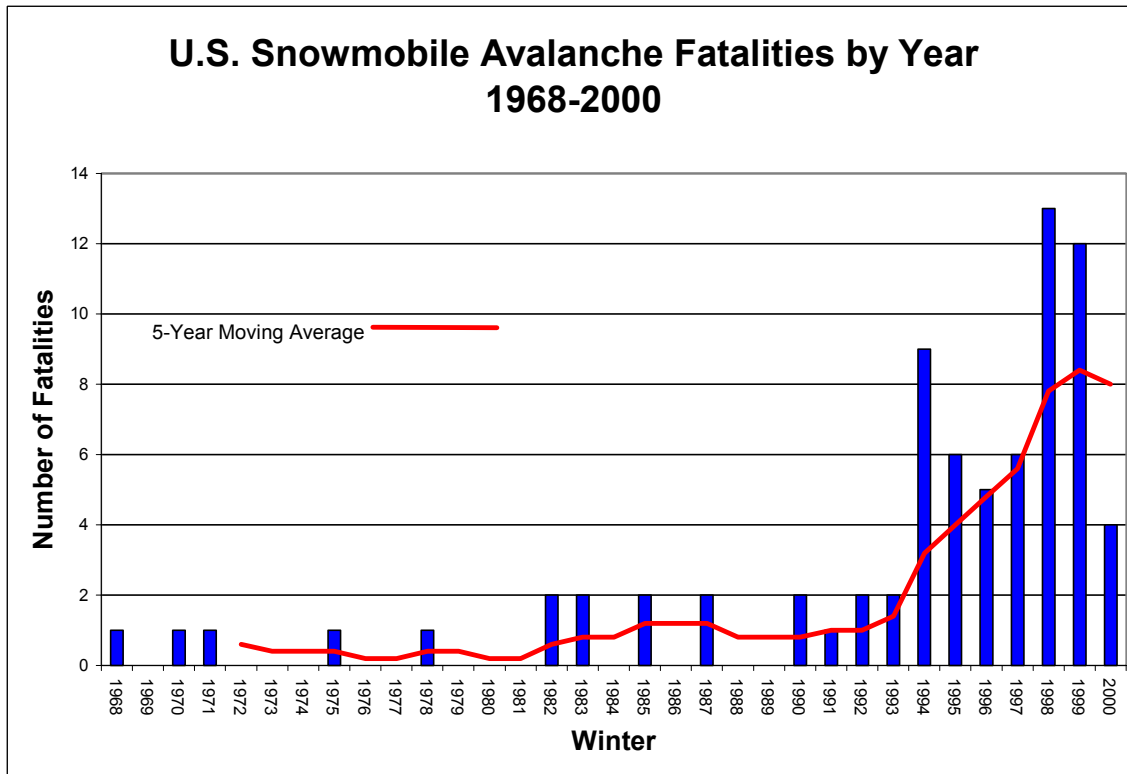
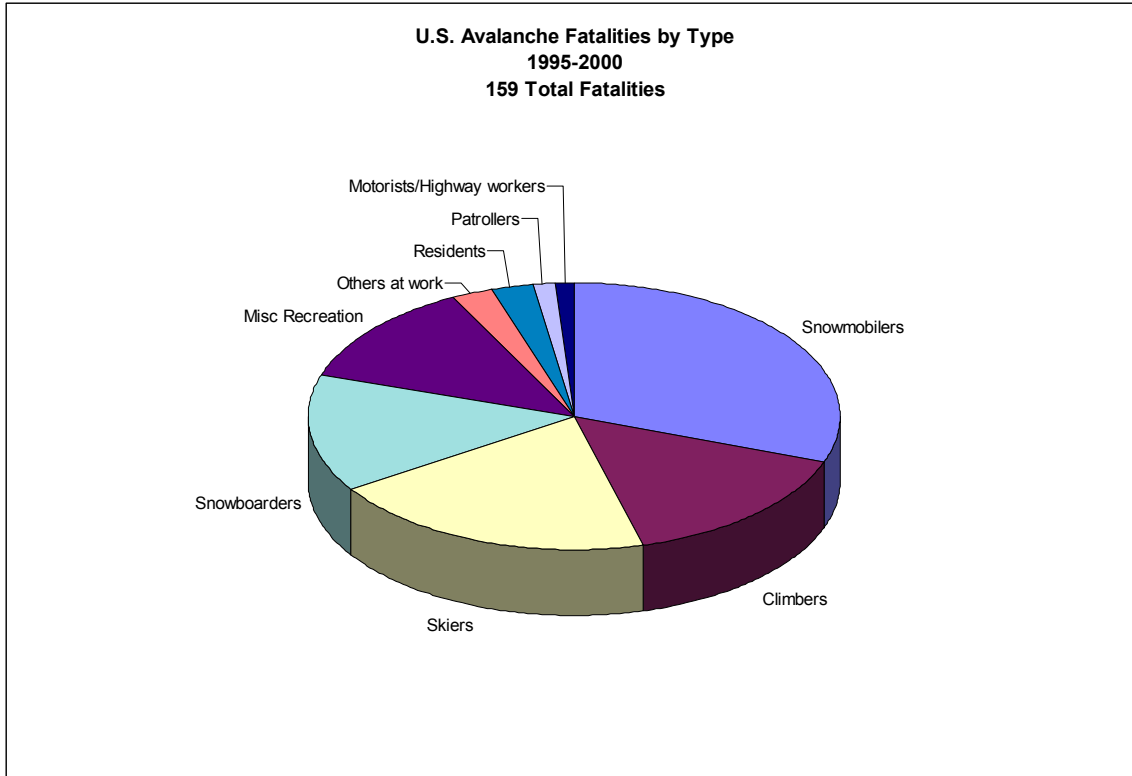
Date	Location	Number	State	User Group	Description
11/26/99	Big Sky	1	MT	Skier	2 skiers caught, 1 buried and killed before area opened
12/14/99	Cameron Pass	1	CO	Skier	1 skier caught, buried and killed
12/18/99	West of Eldora, CO	1	CO	Hiker	Missing hiker suspected killed in avalanche
12/21/99	Quandary Peak	1	CO	Skier	1 skier caught, partly caught, buried and killed
12/26/99	Hatcher Pass, in the Talkeetna Mountains	1	AK	Snowmobiler	1 snowmobiler caught, buried and killed
1/11/00	Squaretop Mountain near Park City	2	UT	Skiers	Husband and wife, out of bounds skiers caught, buried and killed in large avalanche
1/16/00	Crystal Mountain	1	WA	Skier	2 skiers in closed area, 1 buried and killed
1/23/00	Jones Pass, West of Empire	1	CO	Snowshoer	3 snowshoers caught, buried, 1 killed
1/25/00	near Arapahoe Basin	1	CO	Snowboarder	Backcountry snowboarder caught, buried and killed
1/25/00	Hurricane Gulch, near Aspen	1	CO	Skier	Backcountry skier caught, buried and killed
1/26/00	Cordova	1	AK	Residents	3 houses destroyed, 3 persons hit, 1 killed
2/1/00	Seward Highway, south of Anchorage	1	AK	Worker	3 Bulldozer operators clearing road caught, one killed
2/19/00	St. Charles Canyon near Bear Lake	1	ID	Snowmobiler	2 snowmobilers caught, 1 buried and killed
2/19/00	Wright Peak, in the Adirondack High Peaks	1	NY	Skier	6 skiers caught, 5 injured, 1 buried and killed
2/20/00	Mount Washington; Gulf of Slides Area	1	NH	Skier	2 skiers caught, 1 buried and killed
3/18/00	Maroon Creek, near Aspen	2	CO	Skier	3 Skiers caught, 2 buried, and killed
3/19/00	Selkirk Mountains west of Bonners Ferry	1	ID	Snowmobiler	1 snowmobiler caught, buried and killed
3/22/00	Gildart Peak, Swan Range in NW Montana	1	MT	Snowmobiler	1 snowmobiler caught, not buried and killed
4/8/00	Summit Lake near Pason	1	AK	Snowmobiler	1 snowmobiler caught, buried and killed
4/8/00	Talkeetna Mountains	1	AK	Skier	1 backcountry skier caught, buried and killed

Total **22**

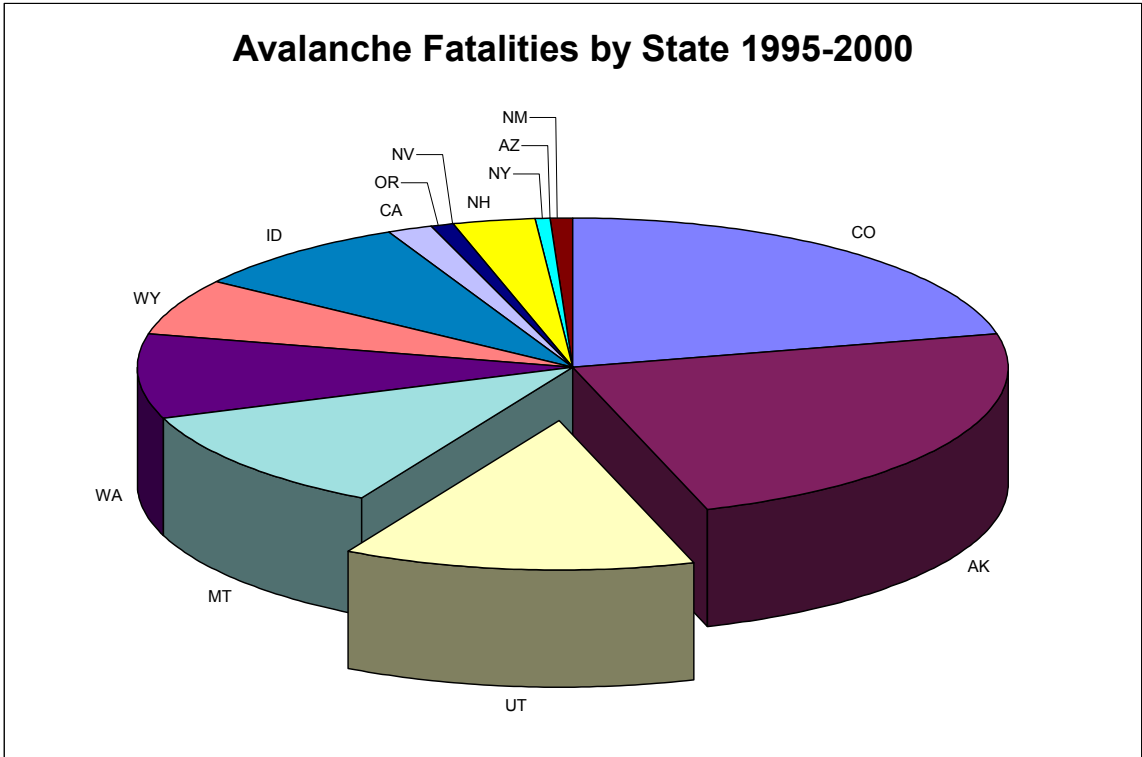
State	Number
Colorado	8
Alaska	5
Utah	2
Idaho	2
Montana	2
New Hampshire	1
New York	1
Washington	1

Activity	Number
Skier	12
Snowmobiler	5
Snowboarder	1
Snowshoer	1
Hiker	1
Resident	1
Worker	1

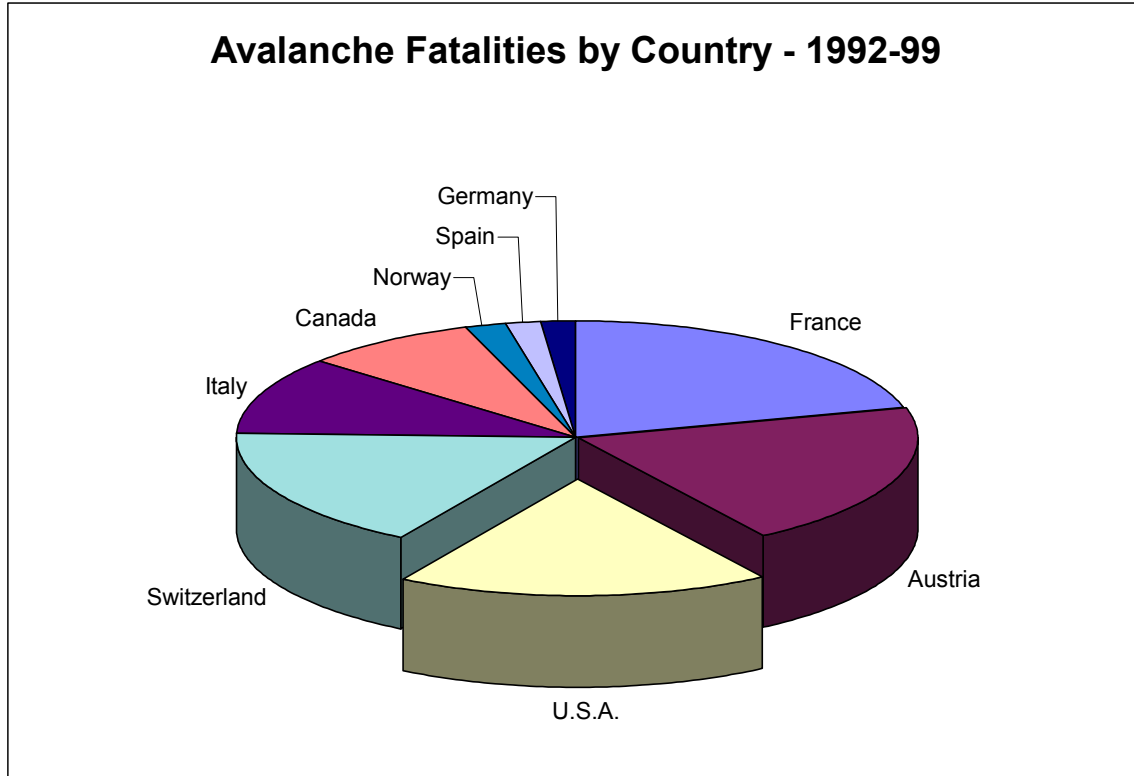




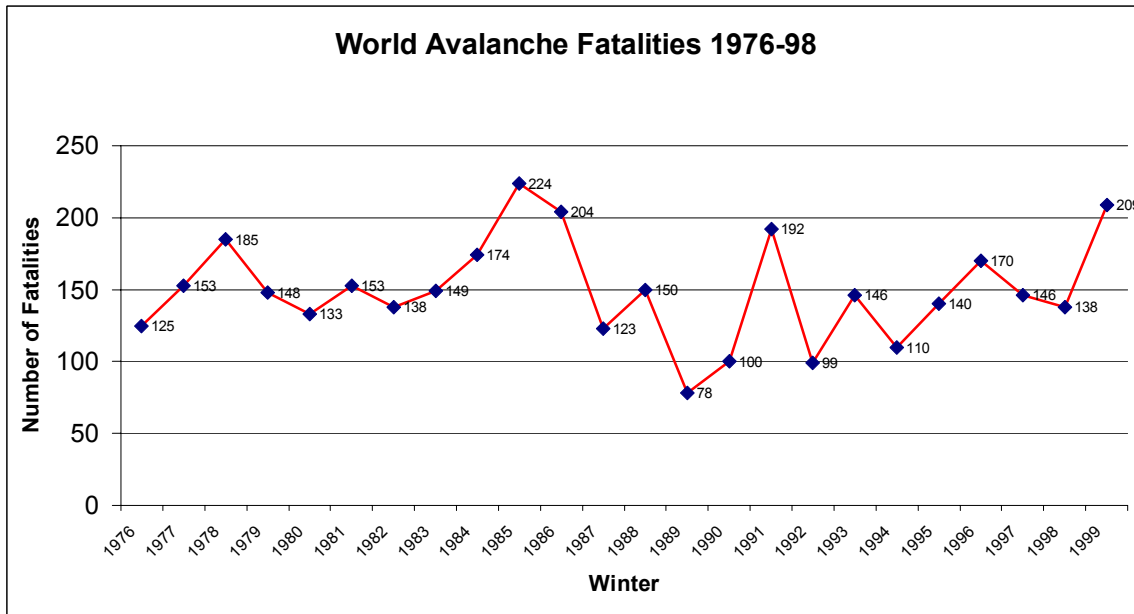
Snowmobilers account for about twice as many fatalities as the any other activity.



Utah usually ranks near Alaska for the second place behind Colorado in the dubious race for avalanche fatalities. In the 1998-99 season, Alaska had 12 fatalities which put Utah firmly in third place.



Before last winter, the U.S. ranked second only to France. During the 1998-99 season, Europe had an unprecedented avalanche cycle in which many dozens of people were killed.



Worldwide, avalanche fatalities have remained relatively stable, while in the U.S. the numbers have been rising rapidly.

Avalanche Education

Back in the old days...avalanche education was simple. There was only three people working at the Utah Avalanche Center, of which two of us taught about two thirds of the avalanche classes in Utah, and virtually all of those classes were for backcountry skiers.

What a difference fifteen years makes. Nowadays the Utah Avalanche Center has eleven staff spread throughout the state from Logan to Moab and we teach about 50 classes per year to snowmobilers, skiers, climbers, snowboarders, snowshoers, search and rescue groups, ski patrollers and Boy Scout troops.

The public has an insatiable thirst for avalanches and avalanche classes, and even with so many of us, demands for classes always outpace our capacity to teach them. Good avalanche instructors have always been hard to find, but through example, more and more novice instructors have learned from the recognized experts and it seems that suddenly there are quite a few good instructors around. All these years of teaching avalanche classes has begun to pay off. Like compounding interest, with some patience and hard work, good things tend to grow through time.

We feel that avalanche education is an important part of our business, but we must always remember that it's not our primary business. Job number one is to issue high quality avalanche advisories and mountain weather forecasts. In all of our "spare time" we teach avalanche classes. Yet we found time for over 50 classes this year. Many of these were taught on unpaid overtime with late nights driving back from distant places.

This season we were able to make a quantum leap in education. Thanks to a grant from the National Recreation Trails Program, were able to hire two excellent avalanche teachers, Craig Gordon and Eric Trenbeath, who concentrated on avalanche education for snowmobilers. Together they taught 18 classes to snowmobile groups reaching 556 people—quite good for their first year of doing snowmobiler outreach.

Snowmobilers are the new kids on the avalanche block. The sudden advances in snowmobile power, weight reduction and traction systems have allowed snowmobiles to access dangerous avalanche terrain right after storms and go virtually any place a skier can go. Plus, a snowmobile can cover 100 times the amount of terrain as a skier. So it's no wonder why snowmobilers account for nearly half the avalanche fatalities each season in the U.S.

However, the "avalanche culture" has traditionally grown up around skiing and climbing, and most of the technology and innovations come from Europe where snowmobiles are not allowed. Therefore, it has often been difficult transfer avalanche knowledge and technology into the snowmobile community. Craig and Eric have done a good job of bringing avalanche knowledge into a new community—a community that desperately needs the knowledge.

Avalanche Education 1999-2000

Date	Staff	Location / Group	Course	No. people
11/10/1999	Shaw	Black Dimmond, Ogden	Avi Awareness	30
11/11/1999	Shaw	Black Dimmond, Salt Lake City	Avi Awareness	50
11/16/1999	Staff	REI Salt Lake City	Avi Awareness	150
11/17/1999	Jenkins/Hebertson	Snowbasin Ski Patrol	Level I Refresher	40
11/20/1999	F.Felix	CEU Price/UDOT plow drivers	Avi Awareness	40
11/20/1999	Gordon / Trenbeath	Price Safety Fair	Avi Awareness	30
11/23/1999	Brown	Dear Valley	Avi Awareness	45
12/03/1999	Shaw	Wasatch Touring	Avi Awareness	8
12/06/1999	Gordon	Kamas High School Snowmobile Club	Avi Awareness	12
12/08/1999	Tremper	Wasatch Mountain Club class	Avi Awareness	70
12/10/1999	Jenkins	PC Ski Patrol - Summit Co SAR	Level I Refresher	10
12/13/2000	Gordon	Coalville Middle School Snowmobile Club	Avi Awareness	71
12/14/1999	Staff	REI	Avi Awareness	200
12/14/1999	Kimbrough	American Avalanche Institute	Level II	20
12/15/2000	Jenkins	Cache Valley Highmarkers	Avi Awareness	40
12/16/1999	Jenkins	Pebble Creek Ski Patrol refresher	Level I Refresher	10
12/17/2000	Jenkins	Level I, Canyons Ski Patrol	Level I Refresher	16
01/04/2000	Tremper	REI Salt Lake City	Level II	200
01/08/2000	Tremper	Utah County SAR	Avi Awareness	70
01/11/2000	Kimbrough	Tibble Fork/Plesant Grove/Timp Cave	Avi Awareness	20
01/11/2000	Tremper	National Avalanche School Phase II	Phase II field session	35
01/11/2000	Trenbeath	Montecello Ranger District	Avi Awareness	22
01/11/2000	F.Felix	Telluride, CO/Telluride Avalanche School	Level I	45
01/12/2000	Gordon	American Fork Timp Runners Snowmobile Club	Avi Awareness	35
01/13/2000	Lees / Greene	University of Utah, Snow Hydrology	Snow Science	30
01/14/2000	Brown	Moab	Avi Awareness	18
01/14/2000	E. Trenbeath	Monticello/USFS	Avi Awareness	20
01/15/2000	Gordon / Tremper	Summit County SAR	Avi Awareness	40
01/15/2000	F.Felix, J.Brown, E.Trenbeath	Moab/Moab Info Center	Avi Awareness	19
01/15/2000	Trenbeath	Geyser Pass Trailhead - private group	Avi Awareness	14
01/16/2000	Gordon	Summit County SAR field session	Level I	17
01/20/2000	Jenkins/Logan/Hardesty	Level I, Logan area open enrollment	Level I	19
01/21/2000	Tremper	U of U Geography Dept	Snow Science	35
01/21/2000	Gordon	Requested by a group involved in large slide and a group lost in Uinta Mountains	Avi Awareness	27
01/15/2000	Jenkins/Hardesty	Level II Weber Co. SAR	Level II	35
01/25/2000	Gordon	Midway Boy Scout group	Avi Awareness	79
01/26/2000	Gordon	Carbon County Recreation	Avi Awareness	54
01/26/2000	Jenkins	Ellis Elementary 5th graders	Avi Awareness	60
01/26/2000	F.Felix, J.Brown, E.Trenbeath	Moab/GPTH	Level I	14

01/28/2000	Greene	Silverton Avalanche School Level 1	Level I	200
01/28/2000	F.Felix	Silverton, CO/Silverton Avalanche School	Level I	67
01/29/2000	E.Trenbeath	Mt.Pleasant/Skyline Snowriders	Avi Awareness	10
02/04/2000	E.Trenbeath	Spring City Canyon/Sanpete SAR	Avi Awareness	22
02/05/2000	Tremper/Jenkins	National Ski Patrol	4-day "Rocker" course	60
02/05/2000	E.Trenbeath	Castledale/Emery Co. SAR	Level I	44
02/06/2000	Gordon	Brighton Ski Resort	Refresher	41
02/20/2000	Jenkins/Hardesty	Level I Logan area open enrollment	Level I	7
02/21/2000	E.Trenbeath	Miller Flat Trailhead/Carbon County SAR, State Parks Rangers	Level I	12
03/01/2000	Tremper	National Snow Rangers Workshop	Olympic Avalanche	50
01/15-17/2000	Staff	Friends of the Utah Avalanche Forecast Center, Level I	3-day Level I	30
01-08-00 01-09-00	F.Felix	Price/Pacificorp Safety Fair	Avi Awareness	30
01-28-00 01-30-00	F.Felix, P.Hawkins	Price/Carbon County Rec	Avi Awareness	54
02/19-21/2000	Brown	Alaska Mountain Safety Center	3-day Level I	30
03/07/2000	Jenkins	Beaver Mountain	Avi Awareness	25
05/17/2000	Tremper	Youth group at National Weather Service office	Avi Awareness	10
Total People				2442
Total Talks				54

UAC Media Contacts 1999-2000

Date	Staff	Agency	Subject	Naional Television Interview	National Television Information requests	National Radio Interviews	National Print Media	Local Television Interviews	Local Radio Interviews	Local Print Interviews
07/12/1999	Tremper	Warren Miller Entertainment	Making avalanche documentary for Discovery Channel - wanted information		1					
07/12/1999	Tremper	Atlantic Monthly	Impact of Olympic Games				1			
08/12/1999	Tremper	Backcountry Magazine	List of avalanche classes				1			
08/12/1999	Tremper	National Geographic Television	Looking for accidents with happy endings		1					
08/19/1999	Tremper	Outside Magazine	Interview about outdoor careers				1			
09/09/1999	Tremper	Discovery Channel - Grenada TV	Wanted photos for book				1			
09/12/1999	Tremper	KCPW	Interview about fundraiser						1	
09/12/1999	Tremper	KDYL	Interview about fundraiser						1	
09/20/1999	Tremper	Rock 99 Radio	Interview about fundraiser						1	
09/29/1999	Tremper	Salt Lake Tribune	Interview about snowmobiles							1
10/13/1999	Tremper	Park City Record	Wanted photos for article							1
10/15/1999	Tremper	Discover Magazine	Interview about avalanche fatalities last season				1			
11/01/1999	Felix	Sport's Guide (UT); Rocky Mt. Sports (CO); Sports, Etc.; Windy City Sports (IL); Metro Sports; Twin City Sports (MN)	Avalanche Awareness				5			
11/05/1999	Lees	PC Local TV	Preseason Avalanche Information					1		
11/10/1999	Tremper	Discovery Channel - Grenada TV	Questions about buildings in avalanche paths		1					
11/18/1999	Tremper	Outside Magazine	Tips on how to stay alive in avalanche terrain				1			
11/23/1999	Tremper	Outside Magazine	Olympics and avalanches				1			
11/28/1999	F.Felix	Moab Happenings (Dec)	La Sal Mts. Winter Recreation; Avalanche Awareness							1
12/03/1999	Tremper	National Geographic - Grenada TV	Information on avalanches		1					
12/03/1999	Trenbeath Hawkins	Brochure Rack Card	Snowmobile-Specific Avalanche Awareness							1
12/05/1999	Brown	Standard Examiner	Building snow caves							1
12/06/1999	Shaw	National Geographic Adventure	Avalanche Facts				1			
12/06/1999	Tremper	Outside Magazine	Information of Forest Service funding of avalanche centers				1			

Media

The national and local media continued its fascination with avalanches. National television documentaries about avalanches continued to play on the Discovery Channel TBS (National Geographic) and PBS. Most of these documentaries feature Utah Avalanche Center staff, all portrayed in a very positive light. In addition, Bruce Tremper was interviewed this season for yet another national TV avalanche documentary for the Discovery Channel and was the featured guest of the hour-long NPR radio program "Talk of the Nation" and Ethan Greene was interviewed by NPR's "The Savvy Traveler." The UAC staff logged 56 media contacts which include one national television interview, fourteen national television requests for information, two national radio interviews, seventeen national print interviews, five local television interviews, six local radio interviews and eleven local print interviews.

12/08/1999	Tremper	Outside Magazine	Wanted information on helicopter controversy. Declined to be interviewed but gave him list of others to interview.				1			
12/10/1999	Tremper	Discovery Channel - How To Survive	Wanted avalanche footage		1					
12/15/1999	Shaw	KPCW	Avalanche conditions					1		
12/20/1999	Tremper	Discovery Channel	Wanted avalanche footage		1					
12/20/1999	Felix	Channel 6 Television	New LSAFC Season					1		
12/30/1999	Felix	Moab Happenings (Jan)	La Sal Mts. Winter Recreation; Avalanche Awareness							1
01/10/2000	Tremper	Pacific Coast Video	Wanted avalanche footage		1					
01/12/2000	Greene	Channel 4 TV News	Square Top avalanche accident					1		
01/12/2000	Greene	Fox TV News	Square Top avalanche accident					1		
01/12/2000	Greene	Salt Lake Tribune	Square Top avalanche accident							1
01/12/2000	Greene	KPCW	Square Top avalanche accident						1	
01/13/2000	Greene	Fox TV News	Search in the Uinta Mtns					1		
01/14/2000	Tremper	Discovery Channel	Interview in field	1						
01/17/2000	Trenbeath	Sanpete Valley Radio	Avalanche Awareness; Wasatch Plateau Advisories						1	
01/21/2000	Tremper	Environmental News Network	Questions about avalanches		1					
01/24/2000	Tremper	Pacific Coast Video	Wanted locations to shoot avalanches in motion		1					
01/24/2000	Tremper	NBC	Statistics on largest avalanche disaster in recent years		1					
01/29/2000	Tremper	Wasatch Wave Magazine	Information on avalanches							1
02/03/2000	Tremper	Learning Channel - Vantage Point Productions	Looking for avalanche footage for educational program		1					
02/09/2000	Greene	Savvy Traveler	Avalanche information			1				
02/12/2000	Tremper	Inside Tracks Magazine	Avalanche information				1			
02/15/2000	Shaw	Tooele Transcript	Avalanche conditions							1
02/22/2000	Tremper	NPR Talk of the Nation	Hour interview on avalanches			1				
02/23/2000	Shaw	Inside Tracks Magazine	Avalanche information				1			
02/24/2000	Tremper	National Geographic	Checking information for script		1					
02/26/2000	Tremper	CBS TV	Information about avalanches		1					
02/28/2000	Brown	Standard Examiner	Snowbain incident							1
03/06/2000	Tremper	Fox TV	Information about avalanches		1					
03/07/2000	Shaw	Grant W.	Avalanche warning for S Utah							1
Total				1	14	2	17	5	6	11
Total Contacts				56						

Budget

Like all avalanche centers in the U.S., demands for services greatly outpace the funding to provide the services. Therefore, we all spend much more time than we would like looking for money. The Utah Avalanche Center is the epitome of a successful partnership between the Forest Service and other funding partners such as State, County, private funds and grants. For instance, in the Wasatch, only about 20 percent (one fifth) of the funding comes from base Forest Service operating funds.

A private, non-profit group called the Friends of the Utah Avalanche Forecast Center raises about \$40,000 each season. About half of that money is donated to the Forest Service to pay for forecaster salaries and the Friends of UAFC spend the rest outside the Forest Service on observers, avalanche education and equipment. The FUAFC raises money through an annual fundraising party, a ski swap, video sales, avalanche classes, sponsorships and soliciting donations. We are lucky to have such a hard-working and dedicated board. Many thanks to Colleen Graham, Katherine Bloss, Mark Holbrook, Peter Donner, Karen Kelly, Nancy King, Wendy Zeigler, Al Soucie, Brad Barber, Ted Wilson and all the volunteers who help during the fundraisers.

The Utah Avalanche Center also receives about 20,000 per year from the Forest Service 2002 Planning Team, which is preparing for the 2002 Olympic Games. UAC Co-Director, Bruce Tremper works full doing Olympic avalanche related work. All of the Olympic avalanche projects will directly benefit the Utah Avalanche Center (see section on Olympics).

The Logan center operates completely outside the Forest Service and is funded and housed by Utah State University with support from a grant from private funds from FUAFC. The Logan Ranger District supplies housing during winter months for one forecaster.

Future:

Doug Abromeit and Karl Birkeland of the Forest Service National Avalanche Center are working hard to organize avalanche centers and increase Forest Service funding for all avalanche centers. But this will not likely happen before next season. In the mean time, the American Association of Avalanche Professionals (AAAP) is making a concerted effort at fundraising from private sources on a national level and has recently agreed to serve as a national "Friends of" organization for avalanche centers. Utah Avalanche Center seasonal forecaster Jeff Brown, has been recently elected as the Executive Director of AAAP and will head up AAAP fundraising efforts.

Our heads are constantly swimming with great ideas for better ways to communicate critical avalanche information to the public, better and more avalanche education and expanded coverage. All it takes is time and money.

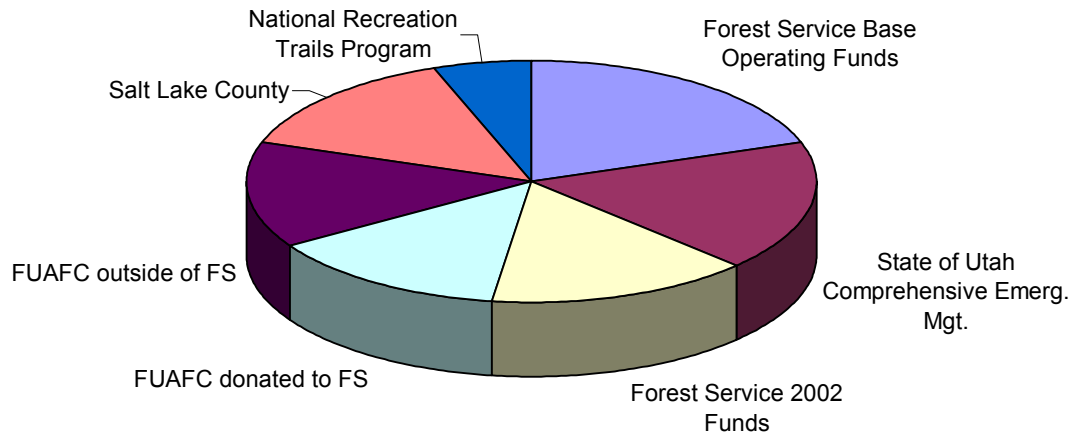
Wasatch (Ogden, Salt Lake, Park City, Provo)**Where the Money Comes From**

Forest Service Base Operating Funds	28,000
State of Utah Comprehensive Emerg. Mgt.	25,000
Forest Service 2002 Funds	21,000
FUAFC donated to FS	20,000
FUAFC outside of FS	20,000
Salt Lake County	20,000
National Recreation Trails Program	8,000
Total Wasatch	142,000

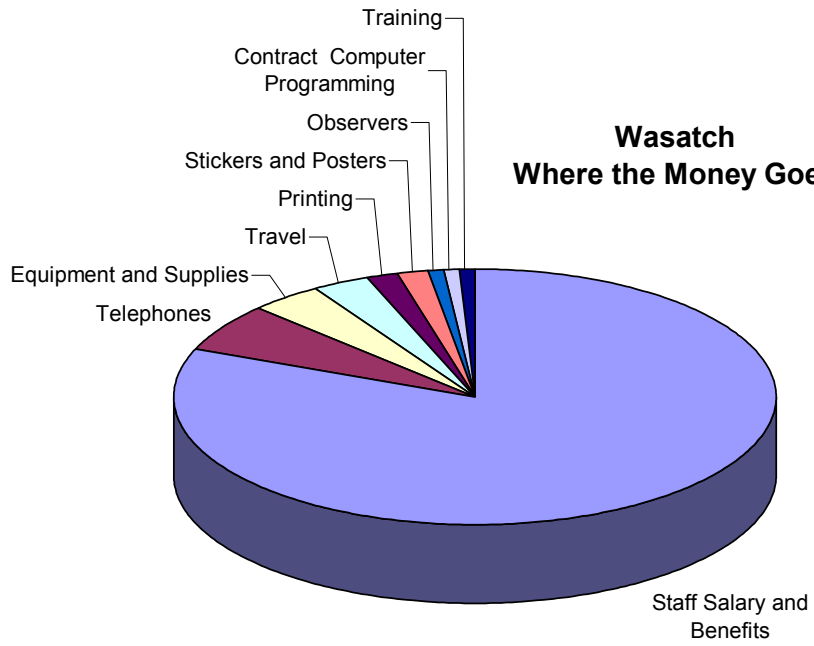
Where The Money Goes**Forest Service Expenditures****FUAFC Expenditures**

Staff Salary and Benefits	99,000	FUAFC Direct Expenditures (independent of Forest Service)	20,000
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	122,012		20,000
Total Wasatch Expenditures	142,012		

**Wasatch
Where the Money Comes From
\$142,000 Total**



**Wasatch
Where the Money Goes**



La Sal Budget

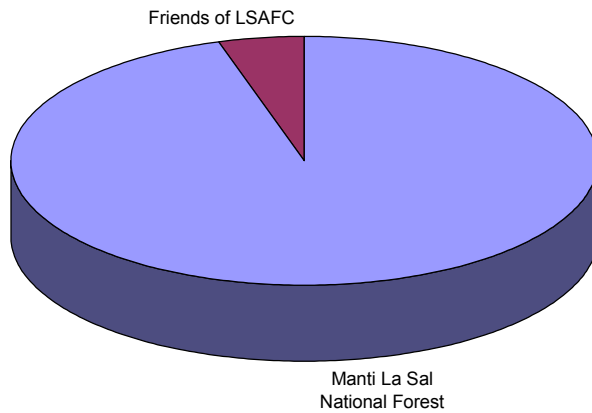
Where the Money Comes From

Manti La Sal National Forest	13170
Friends of LSAFC	670
Total	13840

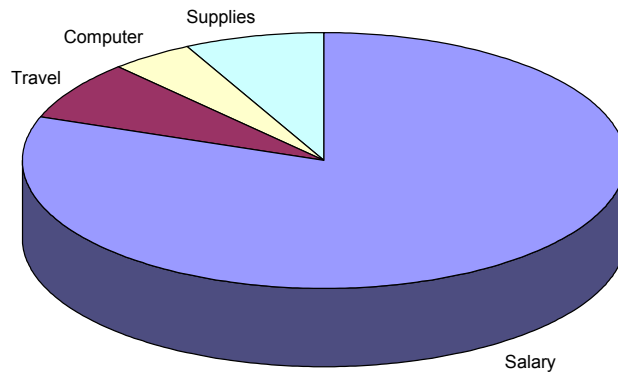
Where the Money Goes

Salary	11158
Travel	1047
Computer	612
Supplies	1023
Total	13840

La Sal
Where the Money Comes From



La Sal
Where the Money Goes



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
		Utah State University	3,810
			13,810
Total Logan budget	19,810		

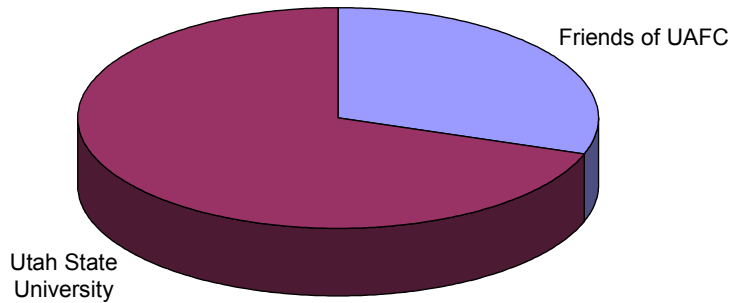
Where The Money Goes

Utah State University Expenditures

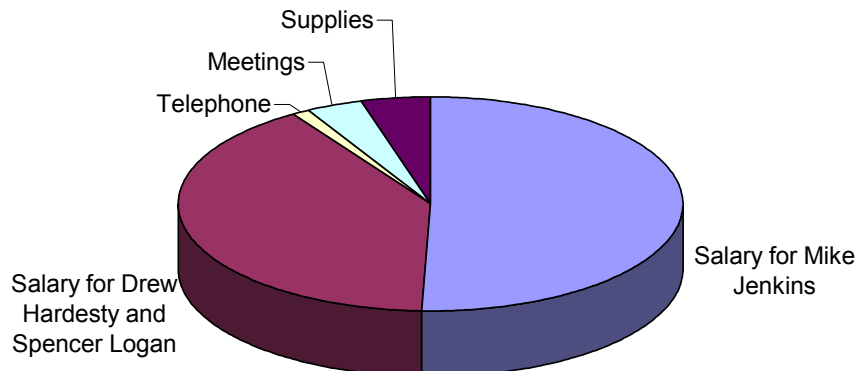
Salary for Mike Jenkins	10,000
Salary for Drew Hardesty and Spencer Logan	8,000
Telephone	210
Meetings	700
Supplies	900
Subtotal	19,810
Total Logan Expenditures	19,810

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

**Logan
Where the Money Comes From**



**Logan
Where the Money Goes**



Avalanches and the Olympics

The coming Olympic Games in February of 2002 are now just a year and a half away. It's coming down to crunch time. For the past three seasons, we have been doing Olympic planning and development, and this past season we have put at least some of the infrastructure in place. Olympic planning and development has taken place thanks to an extra \$70,000 per season from the Forest Service 2002 Planning Team. This past season, UAC Co-Director has been working nearly full time on Olympic avalanche planning and development and will most likely work full time on Olympic avalanche-related issues for the next two seasons. These are some of the many projects we have accomplished so far:

Increased staffing for the Forest Service Utah Avalanche Center

This season, Evelyn Lees was hired as the co-director of the UAC on a term position that will expire after the Olympic Games. She has taken over much of the day-to-day operations of the UAC, which frees up Bruce Tremper to spend most of his time on Olympic-related issues. Since Evelyn's salary is covered by Olympic dollars it has allowed us to add another two seasonal forecasters, Ethan Greene and Jeff Brown. Avalanche forecasting is a very complex job which requires at least a couple years of on-the-job training before a new hire feels comfortable operating in an unsupervised environment.

Provo Canyon Weather Station

A new weather station has been installed in Davis Canyon, which is one canyon east of Bridal Veil in Provo Canyon. It sits in a wind-protected flat clearing in thick trees at about 8500' directly between two large avalanche paths. It should be an excellent site to monitor snow conditions in the Cascade Ridge massif.

Swiss Snowpack Evolution Model

The data from the Provo Canyon weather station along with data from two other similarly configured sites at Snowbasin will drive a Swiss snowpack evolution computer model so that forecasters can graphically see the evolution of the snowpack in a remote location. After a season or two of testing at Snowbasin, the weather stations will be moved to remote locations for 2002. This season, Karl Birkeland from the Forest Service National Avalanche Center, along with Martin Gassner from the Swiss Institute of Snow and Avalanche Research are testing the model with data from Snowbasin as well as from Provo Canyon.

The weather stations and the Swiss model are a partnership between the Forest Service National Avalanche Center, the Swiss Institute of Snow and Avalanche Research, Salt Lake Organizing Committee (SLOC) Utah Department of Transportation, Sundance Resort, Snowbasin and Wasatch Powderbird Guides (who provided the helicopter transportation for the installation and maintenance).

Web Site Development:

We made major improvements to the Utah Avalanche Forecast Center web site and the Avalanche.org web site and will continue development up until 2002. We want to

provide the public with several levels of avalanche information as far as detail and complexity, and create a simpler, easily understood visual interface. These changes should be in place by the fall of 2000. Developments include:

An icon-based display will communicate the type of avalanche conditions to the public in a graphical, easily understood way.

A GIS display of avalanche terrain and avalanche data will graphically display avalanche terrain and the danger ratings for various kinds of terrain. Faerthen Felix, of the La Sal Avalanche Center initiated this project and continues its development this summer.

A revamped web page will display the text of the avalanche advisory along side the icon-based display and the GIS maps.

We have added a media packet of basic avalanche facts and frequently asked questions. We hope this will lead to more accurate avalanche stories by the media, as well as save us considerable time in answering questions.

We are installing an automated e-mail server so that the public can sign up for automated e-mails of the advisory or mountain weather forecast and we are installing a fax program to fax our products to local shops, hotels and resorts.

Avalanche Terrain Mapping:

Bruce Tremper has mapped avalanche terrain around venues periphery and buffer zones and assisted snow safety personnel from venues to map avalanche terrain within venues. Both SLOC and the Utah Olympic Public Safety Command can use these maps to establish boundaries and coordinate law enforcement patrols of venue perimeters.

Media:

We have compiled video footage of potential avalanche related stories for NBC and other media. We sent a CD ROM of Forest Service Olympic related stories to NBC including avalanche stories. We have updated a written media packet and is currently available at www.avalanche.org.

Swiss Nearest Neighbors Computer Model:

In a partnership with the Swiss Institute for Snow and Avalanche Research in Davos, Switzerland, the Forest Service National Avalanche Center has installed a "nearest neighbors" computer model at Snowbasin. This computer model searches all past snow and weather records to find past days that closely match current conditions. By displaying the avalanche activity from similar days in the past, forecasters can better anticipate current avalanche conditions. It is quite a sophisticated model that has been widely implemented in Europe. After testing for a season at Snowbasin, with sufficient funding, we will implement the model for the Utah Avalanche Forecast Center. Karl Birkeland, of the Forest Service National Avalanche Center is overseeing this project.

Display of Automated Weather Stations:

We continue to partner with the National Weather Service and the University of Utah Cooperative Institute for Regional Prediction in developing a comprehensive display of automated weather stations in the Intermountain West. This "mesonet" is a very

powerful tool to track and database weather information for a variety of professionals and the public at www.met.utah.edu.

We have also installed a sophisticated computer program by Randy Trover to display, graph and database automated weather data and SNOTEL data on computer screens at the Forest Service Utah Avalanche Center offices. Much of the graphical display from this program will be available on the Internet for use by the public, Olympic visitors and Olympic workers.

Example of an Avalanche Advisory



Forest Service Utah Avalanche Center / National Weather Service

In partnership with:

Friends of the Utah Avalanche Forecast Center, Utah Department of Public Safety Division of Comprehensive Emergency Management, Salt Lake County, Utah State Parks

Avalanche advisory

TUESDAY, JANUARY 11, 2000, 7:30 AM

Good morning. This is Seth Shaw with the Forest Service Utah Avalanche Forecast Center with your backcountry avalanche and mountain weather advisory. Today is Tuesday, January 11, and its 7:30 in the morning. This forecast is sponsored by a generous donation to the Friends of the Utah Avalanche Forecast Center by Kirkhams, where you can always rent before you buy. Check out their wide selection of ski, snowshoe, and safety equipment at 3125 S State in SLC.

Current Conditions:

Last night the mountain picked up a few more inches of dense snow and the winds continued to blow hard out of the WSW, around 30 to 40 mph. In the past 24 hours most mountain locations received 6 to 12 inches of 12 % to 18 % density snow, in many places the first half of that snow was graupel with denser snow falling on top of it. In the past 10 days the Alta guard station has received over 5 inches of water equivalent. I'd say we are getting close to a major avalanche cycle.

Avalanche Conditions:

I'll start with some of the avalanches I know about. Starting in south, there were several slides to the ground on the NW face of Spanish Fork Peak in the Provo mountains. The largest of these was reported to be 400 feet wide. The starting zone was near the ridge at around 10,000. Near Sundance at a lowly 6,300 on a north aspect, a 200 wide slab spontaneously broke out on wet facets on the ground, it sympathetically pulled out another slide 150 away. In the Ogden Mountains at a closed ski resort a snowcat triggered a slide 3 to 5 feet deep to the ground on a ENE aspect, the slope angle was a measly 33 degrees.

There were numerous human triggered and natural avalanches in the Salt Lake and Park City-area mountains yesterday. These have been mostly new wind slabs from one to three feet deep.

The weak layers out there read like a chapter out of an avalanche text. You got your wind slabs, graupel layers, density inversions, buried surface facets, rain and rime crusts, and last but certainly not least, depth hoar trying to support this whole wobbly mess. Oh yeah, and rapid warming could be a player today, especially at lower elevations. Don't be the straw that breaks the poor beasts back. As always, recent avalanches or cracking and collapsing of the snowpack are sure signs of instability.

The only way to be certain to avoid the avalanche dragon in the backcountry today is to stay on slopes 30 degrees or less steep. Wind sheltered slopes will be much safer than wind deposited slopes. Wind scoured slopes will be the safest. Also be aware of the slope angle above you and on adjacent slopes. It will be possible to trigger a steeper slope from low angle terrain and if it goes to the ground it could pull the low angle slope with it.

In general west facing slopes will be wind scoured and east facing slopes will be wind deposited but you will need to judge each slope individually.

Now that I've painted a grim picture, I should retract a little bit. I think most of the human triggered activity in the Salt Lake area mountains today will be newly formed wind slabs or on the graupel layer that fell yesterday and will require a slope of 35 degrees or steeper to get it to move. Personally though, I would stay off the steep stuff for fear of the deep slab, especially outside of Big and Little Cottonwood Canyons where the underlying snowpack is weaker.

Bottom Line:

Today there is a **High danger** of human triggered avalanches on wind loaded slopes 35 degrees and steeper, that means both human triggered and natural avalanches are likely. There is a moderate hazard on steep wind sheltered slopes, meaning that human triggered slides will be possible. Be on the lookout for cross loading around sub ridges and gullies and in unusual places including loading down off the ridges.

Weather:

Continued strong WSW winds with light snowfall, gusts will be in the 50s on higher ridges. The mountains should pick up a few inches of snow today, mostly this afternoon. Tonight it should snow another 5-10 inches. Today the 8,000 foot high temperature should be around 38 degrees and near 30 degrees at 10,000 feet. A few showers will linger into Wednesday. Thursday and Friday we will get a break with another storm on the weekend.

I will do an afternoon update on our longer forecast advisory by 1pm this afternoon. You can access this number by dialing 801-364-1591

Snowmobile: The Utah State Parks Department has funded two part time snowmobile avalanche educators. They are available to provide free avalanche education for snowmobile groups. For more information call the Utah Avalanche Forecast Center at either (801) 524-5304 or 800-662-4140.

There is still space available in the Friends of the Utah Avalanche Forecast Centers January 15 17, 3 day avalanche class. For more information, contact customer service at REI at 801-486-2100.

You can get this advisory and other avalanche and mountain weather **info on the net at:** www.csac.org. Click on Salt Lake City to get specific information for our area.

To report snow and avalanche conditions, especially any avalanche activity call 801-524-5304 or 1-800-662-4140.

The information in this advisory is from the U.S. Forest Service, which is solely responsible for its content. The advisory describes general avalanche conditions and local variations always occur.

Ethan Greene will update this advisory by 7:30 Wednesday morning.



Forest Service Utah Avalanche Center / National Weather Service

In partnership with: Friends of the Utah Avalanche Forecast Center, Utah Department of Public Safety Division of Comprehensive Emergency Management, Salt Lake County, Utah State Parks

Northern Utah Mountain Weather Forecast

Tuesday, January 11, 2000

0600 MDT

Today:

Continued strong WSW winds and light precipitation, 2-4". The Logan and Ogden mountains should pick up 3-6" today. Tonight a cold front will move through northern Utah giving the mountains another blast of snow, say 5-10" with higher amounts possible.

Light snow lingering into Wednesday morning. Thursday and Friday will be partly cloudy with periods of high clouds.

Extended:

Next storm looks like about Saturday night.

	Tuesday	Tuesday night	Wednesday	Wednesday night
10,000' Wind Direction	WSW	WNW	WSW	WSW
10,000' Wind Speed (free air)	40-50	35	25-35	20-30
10,000' Temperature F (free air)	23	10	10	18
8,000' Temperature F	35	20	28	15-20
Cloud Cover	BKN-OVC	OVC	SCT-BKN	SCT
Precipitation	Light snow	Snow	Light snow AM	
Rain/Snow line	7,000	Valley		
Lightning	No	No	No	No

Quantitative Precipitation Estimate (Inches)

Logan Mountains	3-6	4-8	2-4	
Powder Mountain	3-6	4-8	2-4	
Snowbasin	2-5	4-8	1-3	
Canyons Resort	2-4	4-8	1-3	
Park City/Deer Valley	2-4	5-10	1-3	
Solitude/Brighton	2-4	5-10	2-4	
Snowbird/Alta	2-4	5-10	2-4	
Sundance	1-3	4-8	1-2	

