Snow and Avalanches

Annual Report 2003-2004

Forest Service Utah Avalanche Center

In partnership with:

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

Cover photo:
Forest Service Utah Avalanche Center Director, Bruce Tremper, examines the fracture line of a recent avalanche in the Argenta slide path in Big Cottonwood Canyon. Photo by Matt Klick using Bruce Tremper's Camera.

All Other Photos in this report: Bruce Tremper

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www.avalanche.org and click on Salt Lake

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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.

How do people get caught?

In over 90 percent of avalanche fatalities, the avalanche was triggered by the victim or someone in the victim's party. Which is actually good, because it means that, 90 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.

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

Critical, up-to-date avalanche information.

Our avalanche advisories give the public critical avalanche information they need to make their life-and-death decisions in avalanche terrain and we 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.

The public can access these advisories in the following ways:

- Recorded telephone message updated each day
- Live interviews each day on three different public radio stations
- The Internet
- E-Mail

- 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 the History Channel and the Weather Channel and National Geographic re-aired a previous documentary. The Forest Service Utah Avalanche Center staff is featured in all of these documentaries.

Avalanche education:

We teach about 30 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 the public to take a more involved avalanche class offered by the private sector.

How we Help Solve the Problem:

Just because people read or hear the information doesn't mean they listen. Therefore, we try to make the advisories entertaining so that people will remember what they read and 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, personal 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.

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 weather and snow out 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 forecaster operates in Logan, four in Salt Lake City, one in the western Uinta Mountains and two others cover the Manti Skyline and the La Sal Mountains near Moab.

We believe in a strong field-based program.

Avalanche forecasting is just as much art as 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 forecaster 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 seldom have more than two forecast days in a row.

This is our philosophy and it seems to be working. More people access the FSUAC 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 Utahans, but also by the national and international media.

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

A Look Under the Hood

The UAC is operationally separated into four entities:

- Bear River Range (Logan area – northern Utah and southeast Idaho)
- Wasatch Mountains (Ogden, Salt Lake, Park City and Provo area mountains)
- Western Uinta Mountains (Mirror Lake Highway, Weber Canyon, Evanston WY, Daniel's Summit)
- Manti Skyline (Fairfield Canyon – Wasatch Plateau)
- La Sal Mountains (near Moab)

In his second season, Toby Weed staffs the Logan operation with Dave Kickert as an assistant. Kickert is employed by Utah State University. A generous contribution from the Utah State Parks funds this position.

Based in Moab, Evan Stevens and Max Forgensi forecast not only for the nearby La Sal Mountains but they also issue weekend forecasts for the Wasatch Plateau—Manti Skyline area. The Moab office is located in the Moab Ranger District on the Manti-Lasal National Forest and us supported by both the Moab Ranger district and a generous contribution from Utah State Parks.

Craig Gordon issues forecaster for the western Uinta Mountains and also does the lion's share of avalanche education for snowmobilers in northern Utah. This position is supported by a generous contribution from Utah State Parks.

Last, but not least, the vast majority of the backcountry use occurs in the Wasatch Range of northern Utah. A staff of four full time workers covers 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 18th season, is the Director. The rest of the very experienced Salt Lake staff include: Evelyn Lees, Drew Hardesty and Andrew McLean. All are Forest Service employees under the Wasatch-Cache National Forest. 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, contracts a number of "volunteer" observers, who are reimbursed for their expenses at around $10.00 per day. They also hire the intrepid Bob Athey as a full time backcountry observer and Brett Kobernik as a part-time observer.

The Utah Avalanche Center is a Forest Service program under the Wasatch-Cache National Forest 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 - (multi-line PBX system at the University of Utah)	(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
Western Uinta Mountains (courtesy of Utah State Parks)	(800) 648-7433
Alta (multi-line PBX system through the Town of Alta)	(801) 742-0830
Moab (single phone line)	(435) 259-7669
Manti Skyline (courtesy of Utah State Parks)	(800) 648-7433
Snowmobile hotline (courtesy of Utah State Parks)	(800) 648-7433

Radio Stations - live on-air reports each morning
KRCL 91 FM (7:50 am each morning)
KPCW 92 FM ((8:06 am each morning)
KCPW 105.7 FM (8:04 am each morning)

Internet:
http://www.avalanche.org (Avalanche.org is a non-profit avalanche web site run by the professional avalanche community in the U.S.)
http://www.wrh.noaa.gov/Saltlake (National Weather Service)
http://www.csac.org (Cyberspace Snow and Avalanche Center)

E-mail:
We offer daily automated e-mail of the advisories free of charge

To contact our office: (801) 524-5304 (phone)
(801) 524-4030 (fax)
e-mail: uac@avalanche.org

How We Generate Avalanche Advisories

We split our time more or less equally between the mountains and the office. For the Wasatch Range, A staff of four people rotate through the office in which one person comes in at 4:00 am to issue the forecast for the day while the others either head into the mountains to look at avalanche conditions, teach avalanche classes or come into the office at a more reasonable hour to work on various computer or education projects.

Field Day:
A typical "field day" might begin at 6:00 in the morning. Like most avalanche professionals, we click on our trusty NOAA weather radio shortly after getting out of bed for the latest weather forecast. Then, we fire up our home computer to look at the data from all the automated mountain weather stations. Like everyone else, we call our own avalanche advisory to get the latest information. Finally, after calling the forecaster for the day to check out, we jump in the car or on the bus and head for the mountains.

The forecaster in the field usually travels on skis or snowmobile or both, using all the usual safety equipment like electronic avalanche beacons, shovels, probes, belay rope and cell phones. We seldom have a regular patrol area, but simply go to the area that concerns us the most, or to a place that we know is representative, where we can safely look at snow on a variety of aspects, elevations and terrain types. We almost always go into the backcountry—meaning areas outside ski area boundaries where no avalanche control is done. Field days are often very labor intensive affairs, using climbing skins on skis to huff-and-puff to the top of a mountain, take off the skins, ski down into another valley, put the skins back on again, go to another ridge, and so on. Along the way we dig a number of "snow pits" in which we systematically test the stability of the snowpack.

Field information comes from many different sources, but the most powerful information usually comes from snow pits we dig on a variety of different slopes, or better yet, from profiles dug at the fracture lines of recent avalanches. A snow pit, like the name implies, is a hole dug in the snow about a 5 feet deep and 5 feet wide. On a smoothed snow pit wall, we perform a variety of stress tests to determine the stability of the snowpack and document the shear properties of weak layers. We also look at the crystallography of the various layers—crystal type, size, strength, water content and density, as well as measure temperature profile. Practiced avalanche professional usually take about 15 minutes for each snow pit. We would rather dig several quick pits in several areas than

do one detailed pit in one specific area because we want to know the distribution of the pattern so we can communicate the pattern to the public.

We also test the stability of the snow in other ways, such as sawing off cornices, which bounce down the slope, we keep close track of the pattern of recent avalanches and we always pay very close attention to the present snow surface because it's much easier to map a layer of snow when it's still on the surface then after it's buried by the next storm. Finally, when we get home, we write up our observation, graph the snow pit profiles and e-mail them to the avalanche center and also leave a detailed message on our answer machine in the office, which the forecaster will hear early the next morning. Often, we post photos of the day on our web site as well. Finally, each evening, we often call the person who will forecast the next day and talk to them in more detail, catch up on news of the day and bounce theories off each other.

It takes years of experience and training to be an accomplished avalanche forecaster, not to mention to be able to do it safely. Most of our staff have degrees in some kind of physical science such as meteorology or geology. We also have a number of years experience doing avalanche control at ski areas, plus, all are accomplished mountaineers with many decades of accumulated mountain experience and several are veterans of mountaineering expeditions throughout the world including Nepal, South America and Alaska. Finally, we all stay in top physical condition so we can efficiently cover lots of terrain.

Office:

The forecaster for the day wakes up around 3:00 am—earlier on storm days—and arrives at our office, co-located with the National Weather Service near the Salt Lake Airport, around 4:00 am. There's only one avalanche person in the office, so the pressure and time constraint is intense.

First, the lead weather forecaster for the National Weather Service briefs us on the general weather setup and then it's time to jump on the National Weather Service computers and give the weather an even more detailed look, so it can be adapted to specific mountain areas. Then, we check our answer machines, faxes and e-mails for field observations not only from our staff, but from a dedicated corps of volunteer observers, ski areas, helicopter skiing companies and highway control programs. Next, the forecaster has to face a blank computer screen and type up a detailed picture of snow stability and mountain weather and customize the advisory for five different zones in northern Utah. After the advisory goes out via e-mail and on the Internet, we begin recording the advisories into six different telephone systems, each located in a different local calling area for northern Utah and each one customized for a different area. Finally, we, do three live radio interviews. By 8:15 am, we're done and we collapse with relief, take that bathroom break we've needed for the last couple hours and take a walk outside and watch the sun rise and hope that our information is accurate. An average of 800 people call the avalanche recording and four times that number get it over the Internet, and many thousands hear it on the radio.

Then, just when many people are eating their breakfast, we eat lunch. After lunch—or is it breakfast—there's never a lack of telephone calls to answer, reports to write, spreadsheets and web sites to update, computer projects and media contacts. Finally, we issue the detailed mountain weather forecast by about noon, then head home by 1:00 pm.

Season Highlights

- Four avalanche fatalities occurred during the 2003-04 season in two different accidents, which is slightly over our average. All of the fatalities occurred in the Wasatch Range and they occurred to inexperienced parties during large snow or wind storms when avalanche hazard had risen rapidly.

- Despite the four fatalities, only 59 unintentional human triggered avalanches occurred in the backcountry, which is much less than the average of 100.

- Demand for our products continues to grow at an average of 20 percent per year—50 percent increase for the past two seasons. This season, nearly a million requests for our products occurred, including the daily avalanche advisory, photos of avalanches, a list of avalanches, a mountain weather forecast, avalanche education material and media information.

- Utah experienced its seventh drought year in a row with most areas remaining around 70 percent of normal snowfall. As is often the case in drought years, the snow-blessed, Cottonwood Canyon resorts ended up with near normal precipitation.

- We taught 38 avalanche classes to a total of 1758 people.

- The media continued its interest in avalanches with a total of 41 media contacts. There were three interviews by national television including NBC Nightly News, CNN the History Channel and a re-airing of a previous interview by National Geographic. In addition, a documentary filmed last spring on avalanches featuring UAC staff aired on the History Channel. There were nine interviews by national print media, 14 interviews by local television stations, one national radio interview, three local radio interviews and 11 interviews by local print media.

New This Season and Plans for the Next

Andrew McLean joins the UAC Staff

Last season, long time forecaster Tom Kimbrough retired after 37 years as a professional avalanche forecaster, and this season, Andrew McLean began his first year as an avalanche forecaster at the Utah Avalanche Center. Andrew is perhaps Utah's most well-known backcountry skier. He pioneered many of the extreme ski descents in the Wasatch Range and wrote the book The Chuting Gallery, which is a guidebook to Utah's steep descents. In addition, as an understudy to the mountain legend (and ex-UAC staff) Alex Lowe, Andrew is the veteran of many ski mountaineering expeditions throughout the world including Antarctica, Tibet, Baffin Island and Alaska. Before he joined the UAC staff, Andrew worked as the product designer for Black Diamond Equipment in Salt Lake City and is credited with designing many of their most successful products. In addition, Andrew is one of the top randonnee rally racers in the U.S., which is a grueling 2-hour backcountry skiing event in which the racers ascend and descend several mountains on skis. Finally, Andrew brings much-needed computer skills to the job as well as a dry sense of humor and the respect of a young generation of mountain recreationists.

New Web Site

Our web site seemed so nice when we created it several years ago, but we have added so many new services and products, that navigation has become a nightmare. This summer, we plan to update the web site to a more modern design with a simpler navigation system. In addition, we are looking for ways to make the avalanche advisory more Internet-friendly, since 82 percent of our customers now access the advisory over the Internet as opposed to the recorded telephone advisory. We want to create an advisory that is more graphic-based and visually appealing, yet still easy for our forecasters to update.

Avalanche Education Program Being Developed for Youth Groups

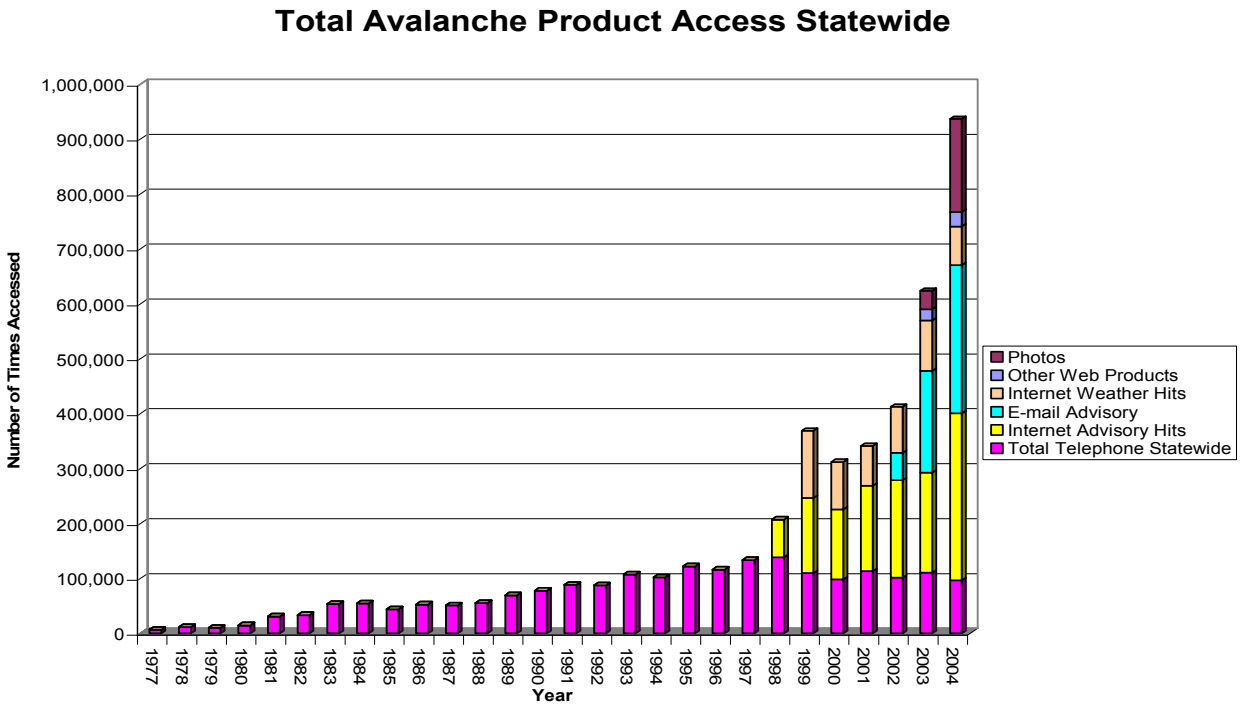
For the past several seasons, we have recognized the need for avalanche education in Utah schools and youth groups but we have never had the time or funding to make much of a dent in the problem. This past season, however, the tragic triple fatality at Aspen Grove in the Provo area mountains brought the problem to a head. Through diligent work, mostly by Craig Gordon, we managed to come up with enough funding to launch an avalanche education program in Utah schools and youth groups for the 2004-05 season. Most of the funding has come from Utah State Parks with the rest from The Backcountry Store, Friends of the Utah Avalanche Center and other partners yet to be determined. We plan to create a 15-minute introductory video and a 20-minute PowerPoint presentation. It will be a turnkey operation in which local ski patrollers, avalanche rescue personnel or an interested avalanche victim could play the video, tell their avalanche story and then finish with a basic PowerPoint presentation. This would occur at 50-minute school assemblies or other youth group meetings. The funding would pay for the development and management of the program and also a stipend for the presenters. The program is being administered by the Friends of the Utah Avalanche Center and UAC staff member, Craig Gordon, will provide the expertise for development.

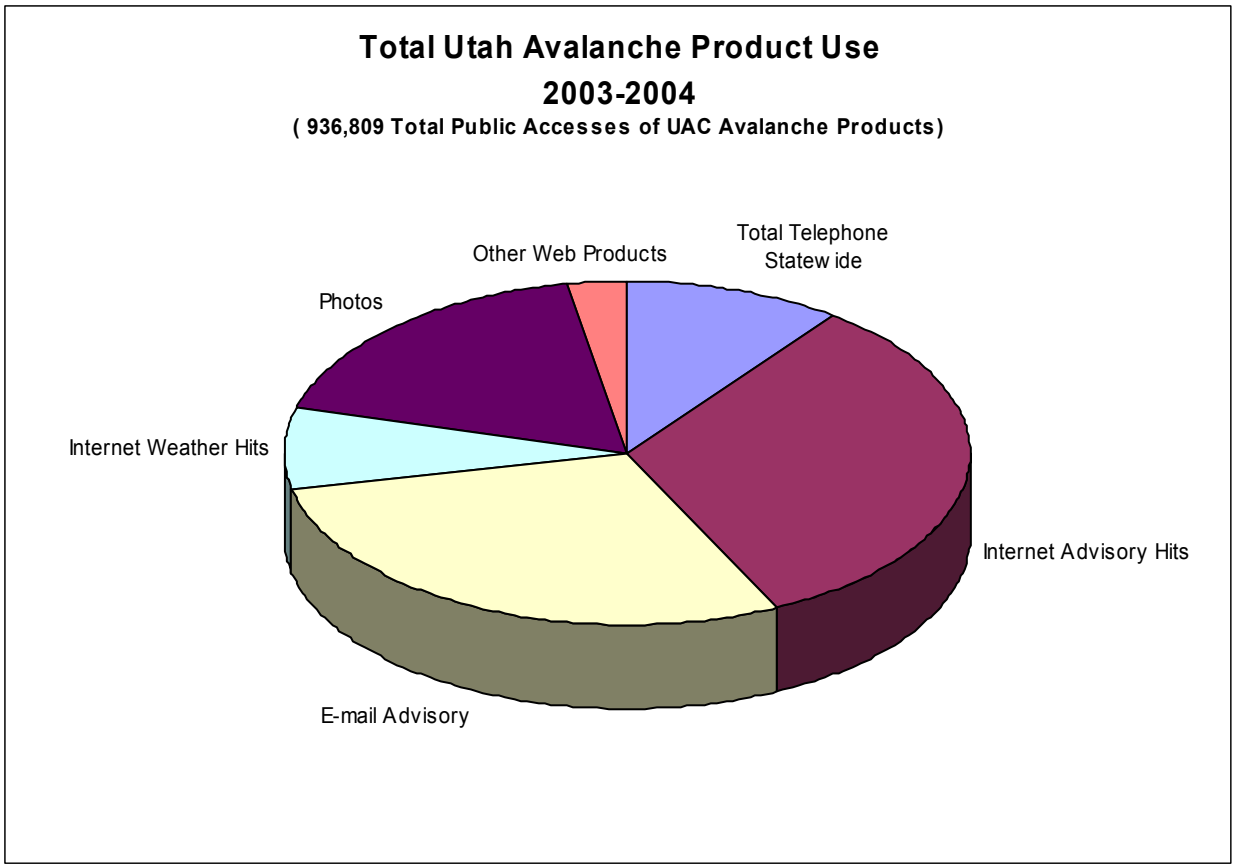
Access to Utah Avalanche Center Products

The number of requests for our products continued the long term trend of about 20 percent increase per year. Beginning in 1998, we began to distribute our products on the Internet in addition to the time-honored daily recorded telephone advisory. Since that time, we have seen an explosion in the number different types of products requested with a 50 percent increase over the past two seasons. The landscape of avalanche products available and how they are distributed has changed dramatically in the past half-dozen years.

Over the Internet, we now offer not only the text of our recorded telephone advisory, but a mountain weather forecast, a list of backcountry avalanches, photos of avalanches, avalanche incidents and avalanche lessons, snowpack profiles, terrain maps, graphs of avalanche statistics, avalanche education primers and a media packet. The photos, especially, have been extremely popular, and provide invaluable avalanche educational as well. It's one thing to hear or read about a human-triggered avalanche 3 feet deep and 300 feet wide, and it's quite something else to see photos of size and destruction, along with a narrative of what happened and why. Armed with digital cameras, we often return from the field and we post photos and a narrative of avalanche conditions on the web that same evening or the next morning. It has proved to be a very powerful tool.

Seven years ago, 100 percent of our customers accessed the advisory via the recorded telephone message and this season, only 14 percent get the advisory over the telephone while 45 percent access it through the web site and 40 percent receive the advisory as a free, automated daily e-mail. Because of this, it's important to adapt avalanche information to the medium of the Internet, namely making the advisory more graphic-based with smaller, bulleted information. We have added so many new products to our web site that we have outgrown the original design and navigation has become cumbersome. For next season, we plan to completely redesign the web site as well as the avalanche advisory. The plan is to make it much more graphic-based and visually appealing.





Distribution of UAC products continues its exponential growth. We see a clear trend that people prefer to access advisory and mountain weather forecasts through the Internet rather than the phone lines. Only 18 percent of our customers still access the forecast via the recorded telephone advisory. The Internet also allows us to offer more products, such as e-mail of the advisory, posting photos on the web and a list of avalanches.

Season Summary – Weather, Snow and Avalanche Incidents

Like most of the West, we had a relatively relaxing year with a mostly stable snowpack. Despite this, we had four fatalities in two different incidents involving inexperienced groups during large snow or wind storms when avalanche danger rapidly increased. In contrast to the past several seasons, snow began early and never let up until mid winter, giving us a deep, stable snowpack without depth hoar, which is always something to celebrate in the western U.S.

November

It snowed nearly every day in November piling up 150 percent of normal snow. The month started with 2-3 feet of new snow that gave most areas good coverage. Unfortunately, a thick layer of surface hoar formed on the first weekend and the next storm promptly buried it. Many people received an education in the sensitive and persistent nature of surface hoar. The closest call—and the closest call of the season—occurred when a well-known, hard-core snowmobiler triggered an avalanche on Logan Peak in the Logan Area Mountains and was buried 3 feet deep, directly under his still-running snowmobile. His friends heard the snowmobile and dug it out and found him underneath. He was buried for about 10 minutes. Afterwards, his friends brought him down to his cabin he owns in the area, where he warmed up. Interesting enough, he is the owner of S&S Power, one of the world's premier amusement ride manufacturers and they had recently built the world's fastest roller coaster in Japan. Perhaps he finally found a ride exciting enough for him.

Fortunately, the surface hoar settled out surprisingly fast and most of November was one of the finest early season snowpacks anyone could remember with mostly stable snow and very good turning and riding conditions.

December

The honeymoon continued through December with 164 percent of normal snow. Several perfect snow storms arrived before Christmas—light snow followed by several clear days. The notable exception was light rain on the 13th combined with howling winds, which deposited a dirty brown layer of dust blown in from southern Utah. We called it the "snirt" layer—a cross between snow and dirt—and it was a distinctive marker in our snow pits through the rest of the season. These thin rain crusts are often problematic because they grow faceted snow above and below them, and they concentrate mechanical energy around the crust as well. But temperatures remained warm and snow continued to pile on, limiting the faceting around the crust and it never produced too many avalanches.

The Big Christmas Snow Storm

The two-month party of stable powder snow ended as Christmas brought a whopper of a snowstorm, which piled up 3-4 feet of snow in the valley and 5-6 feet in the mountains, most coming in just two days. It was the second largest snow storm ever recorded in Salt Lake, which nearly brought the town to a standstill. For several days afterwards, most streets remained unplowed and many areas went without power. Unless people manically shoveled twice per day for those two intense days, parking spaces and sidewalks remained hopelessly buried until spring.

Aspen Grove Fatalities

The day after Christmas, near Aspen Grove area in the Provo area mountains, despite an avalanche warning in effect, fourteen different people were playing in the runout of one of the largest avalanche paths in Utah. The natural avalanche descended nearly 4,000 vertical feet, catching six people and completely burying three snowboarders in their early 20's, none wearing beacons. The debris covered an area the size of 22 football fields with a likely search area of 11 football fields to a depth of 10-25 feet. In a gruesome event that dominated the media for a number of days, one body was recovered with a probe line two days after the accident and the other two bodies melted out in spring.

Several other close calls occurred during or just after the big Christmas storm with seven unintentional human triggered avalanches in the backcountry.

January High Pressure

On New Year's Day, a huge wind storm arrived in the afternoon, which created widespread areas of sensitive wind slabs but they settled out fairly quickly. Then, after a small snow storm, the snow spigot finally turned off, and for most of January, choking smog built up in the valleys while extensive layers of near-surface, faceted snow and surface hoar formed in the mountains. We went for 20 days straight without any reported avalanches or avalanche incidents in the backcountry.

February

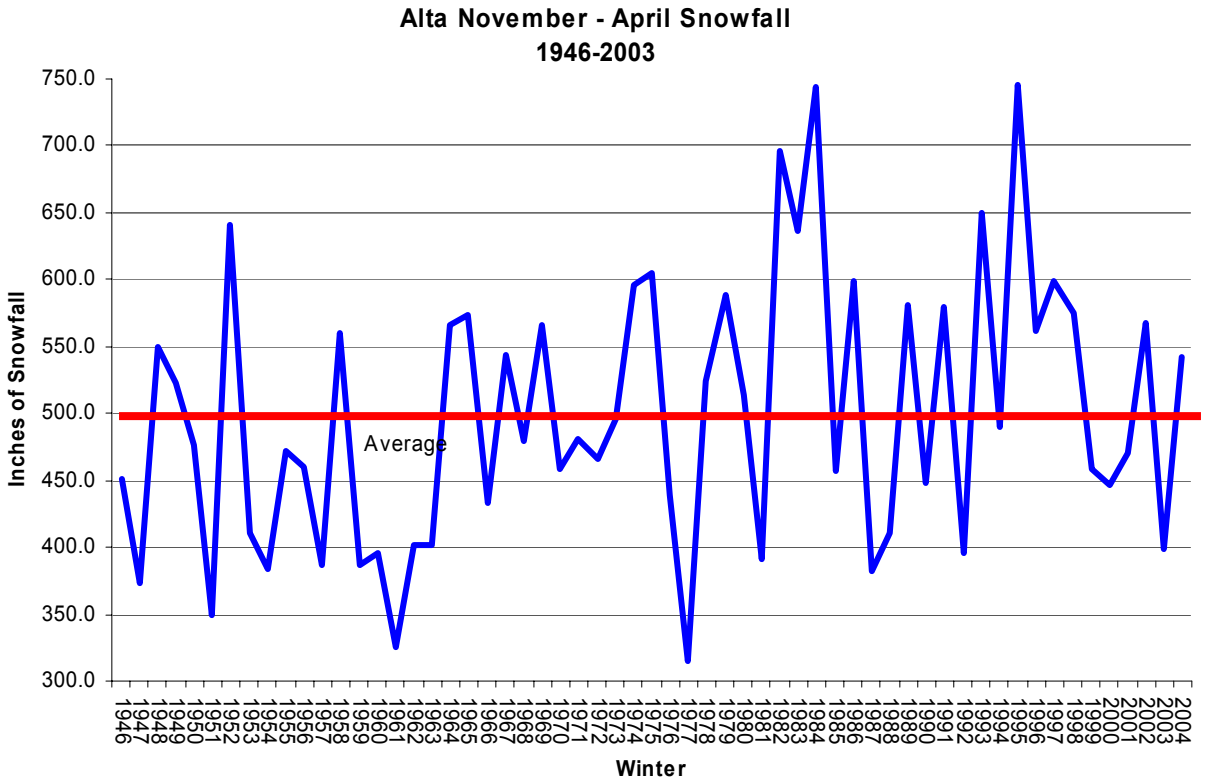
The February storms teased us along as none of them added enough of a load to send us into a major avalanche cycle. The thin snowpack areas had developed a thick layer of faceted snow during the January drought and we continued to warn people about thin snowpack areas, such as the east side of the Wasatch Range and lower elevations. Although there were several close calls from hair-trigger snow in the thin snowpack areas, no serious incidents occurred.

But finally, on February 26th, a big wind storm overloaded many slopes, and in Empire Canyon, a low elevation slope just on the outskirts of Park City, a snowshoer visiting from Houston, Texas triggered a small avalanche in a narrow, wooded, low elevation gully and was buried about four feet deep without a beacon. Local residents just a few hundred yards down the road responded and recovered him but it was too late.

March and April – Record Warmth and Little Snow

March is usually the snowiest month of winter for Utah but other than one storm in the first week, nearly no snow fell all month. Combined with record high temperatures, the mountain snowpack not only lost a record amount of snow in March, but it lost an incredible 400 percent more than any previous March on record. April was disappointing as well and both months finished with a little over half the average snowfall for the month. Thus, the season ended with a whimper.

We finished the season with four fatalities—slightly over average—yet because of the stable snowpack, we recorded only 56 unintentional human triggered avalanches in the backcountry, which is nearly half our yearly average of 100. Despite this, demands for our products continue to grow rapidly with around a million accesses, in-



Although most of the Northern Utah has experienced six years of drought, the Cottonwood Canyons (below) always seems to end up not far from their normal. One reason may be that the past several seasons were unusually warm and the Cottonwood Canyon resorts are higher elevation than most areas, so they were less affected by the warm temperatures.

Snowfall at Alta 1945- Present

Season	Year ending	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total
1944-45	1945	---	57.0	19.5	67.0	---	57.0	
1945-46	1946	109.0	83.0	84.5	50.0	69.0	55.5	451.0
1946-47	1947	69.0	63.0	61.0	53.0	68.0	60.0	374.0
1947-48	1948	118.0	80.0	46.0	66.0	165.0	74.0	549.0
1948-49	1949	71.0	160.0	132.0	58.0	97.0	5.0	523.0
1949-50	1950	39.0	137.0	133.0	34.0	109.0	25.0	477.0
1950-51	1951	60.0	66.0	112.0	58.0	53.0	0.0	349.0
1951-52	1952	67.0	156	115.0	105.0	163.0	35.0	641.0
1952-53	1953	44.0	65.0	112.0	40.0	93.0	57.0	411.0
1953-54	1954	50.0	107.0	54.0	57.0	101.0	14.0	383.0
1954-55	1955	37.0	53.0	134.0	129.0	60.0	59.0	472.0
1955-56	1956	86.0	112.0	103.0	72.0	33.0	54.0	460.0
1956-57	1957	36.0	50.0	86.0	41.0	97.0	76.0	386.0
1957-58	1958	74.0	79.5	83.5	131.5	80.0	111.0	559.5
1958-59	1959	38.0	47.5	81.0	107.0	84.5	28.0	386.0
1959-60	1960	22.0	39.5	59.0	155.0	92.0	28.0	395.5
1960-61	1961	75.0	40.0	1.0	62.0	113.0	35.0	326.0
1961-62	1962	46.0	82.5	86.0	110.0	35.0	42.0	401.5
1962-63	1963	31.0	17.0	85.0	39.0	93.0	136.0	401.0
1963-64	1964	55.0	53.0	108.0	68.0	**183.0**	99.0	566.0
1964-65	1965	95.0	141.0	150.0	66.0	44.0	77.0	573.0
1965-66	1966	69.0	69.0	73.0	103.0	70.0	49.0	433.0
1966-67	1967	53.0	84.0	168.0	72.0	61.0	106.0	544.0
1967-68	1968	22.0	131.0	39.0	84.0	70.0	133.5	479.5
1968-69	1969	87.5	132.6	113.0	148.0	35.0	50.0	566.1
1969-70	1970	56.0	70.0	103.5	60.5	79.0	90.0	459.0
1970-71	1971	79.0	142.0	58.0	73.5	87.0	42.0	481.5
1971-72	1972	64.5	159.0	94.5	45.0	47.0	56.6	466.6
1972-73	1973	----	122.0	64.5	77.0	124.0	109.0	496.5
1973-74	1974	90.9	128.2	104.5	91.0	45.0	136.0	595.6
1974-75	1975	25.5	146.5	104.0	88.0	151.0	90.0	605.0
1975-76	1976	94.0	67.0	74.5	69.0	93.0	42.0	439.5
1976-77	1977	13.5	17.0	50.5	73.5	129.0	31.0	314.5
1977-78	1978	53.0	106.5	99.5	92.5	85.0	88.0	524.5
1978-79	1979	62.5	96.0	78.5	86.0	71.0	94.0	588.0
1979-80	1980	79.5	27.0	143.0	112.5	123.0	29.0	514.0
1980-81	1981	40.0	34.0	73.0	82.0	110.0	52.0	391.0
1981-82	1982	47.0	184.0	143.0	85.0	164.0	73.0	696.0
1982-83	1983	66.0	165.0	75.5	68.0	150.0	112.5	637.0
1983-84	1984	143.5	**244.5**	42.0	104.0	85.0	124.5	743.5
1984-85	1985	112.5	105.0	44.0	61.5	99.5	34.5	457.0
1985-86	1986	132.0	62.0	56.0	112.7	100.0	135.7	599.0
1986-87	1987	73.0	12.3	96.0	73.0	104.0	23.5	381.8
1987-88	1988	30.0	91.0	105.1	39.75	115.5	29.0	410.3
1988-89	1989	172.5	124.5	70.75	97.5	64.75	52.0	581.5

1990-91	1991	109.5	91.0	82.8	49.7	110.9	**136.3**	580.2
1991-92	1992	133.4	57.2	41.8	85	50.1	27.5	395.0
1992-93	1993	118.8	119.2	165.3	102.9	63.0	81.2	650.4
1993-94	1994	40.7	64.85	122.7	134.05	47.2	80.8	490.3
1994-95	1995	**205.9**	73.8	**199.7**	56.3	128.9	80.7	**745.4**
1995-96	1996	57	53	187	104	82	79	562
1996-97	1997	78.3	164.8	141.5	91	53.8	69.7	599.1
1997-98	1998	46.3	81.8	128.9	**156.6**	92.3	69	574.9
1998-99	1999	76.5	43.1	105.3	98	46.5	89	458.4
1999-2000	2000	30.0	97.0	100.0	119.5	84.0	15.5	446.0
2000-2001	2001	88.0	71.0	66.2	79.5	53.0	112.0	469.7
2001-2002	2002	137	86.1	100.9	53.4	142.2	48.1	567.7
2001-2003	2003	42	78.7	26	84.1	93.8	74.8	399.4
2003-04	2004	110	151	74.3	130	62	43.5	570.8

Average		**73.1**	**92.1**	**94.1**	**83.8**	**89.6**	**66.0**	**499.1**
Maximum		**205.9**	**244.5**	**199.7**	**156.6**	**183**	**136.3**	**745.4**
Year of Max		**94**	**83**	**95**	**97**	**64**	**91**	**95**

Avalanche Incidents and Accidents

Because of a very stable snowpack the number of avalanche incidents and accidents was dramatically lower than the past several seasons. We were aware of only 59 unintentional human triggered avalanches in the backcountry, of which 39 were caught, six partially buried, five totally buried and four killed. In contrast, last season we had nearly triple the number of avalanche incidents. Despite this, the number of fatalities—four—was near Utah's annual average.

Close call with a snowmobiler in the Logan Area Mountains.

A well-known, hard-core snowmobile rider on Logan Peak had a very close call on November 11th when he triggered an avalanche and was completely buried directly under his snowmobile. He was not wearing a beacon, so his partners dug out his still-running snowmobile and luckily found him underneath. He was buried about ten minutes. Afterwards, his friends brought him down to his cabin he had built in the area, where he warmed up. It's safe to say that the victim was accustomed to scary rides as he is the owner of S&S Power, one of the world's premier amusement ride manufacturers and they had recently built the world's fastest roller coaster in Japan.

Triple fatality at Aspen Grove on Mt. Timpanogos 12-26-2003

Every few years, Utah has an avalanche incident large enough and shocking enough to dominate the media for many days and linger in the consciousness of the local community for many years. This was one of those incidents.

It occurred the day after Christmas after a huge snow storm laid down around five feet of snow in the

mountains. It occurred near Aspen Grove, which is a popular, winter trailhead on the east side of Mt. Timpanogos in the Provo Area Mountains just past Sundance Ski area at the end of a dead-end road. Several large avalanche paths terminate near the parking lot and it has been the scene of many close calls in the past. With a large snow storm on a holiday weekend, it was only natural that people wanted to get into the backcountry to try out their new Christmas toys. The runout apron of the huge Elk Point avalanche path terminates only a few hundred yards from the Aspen Grove trailhead and a total of 14 people were snowshoeing, snowboarding and skiing at the bottom, directly beneath with any avalanches that might descend from above. Elk Point avalanche path descends nearly 4,000 vertical feet from the high, steep peaks above and the starting zones of several large avalanche paths all drain down into the area where the accident occurred.

We had issued an avalanche warning that day because of the large amounts of new snow. Late in the day, it appears that the avalanche released on its own, high above them, and the slab avalanche propagated across several large avalanche paths. Although we were never able to access the fracture line directly and visibility was poor following the accident, we estimate that the fracture was 4-5 feet deep with a total fracture line length of close to a mile. The resulting huge volume of snow funneled together through a narrow gap in the cliffs, where five snowboarders were hiking up, and then the avalanche fanned out on the gentler apron, about 11 acres in size. Three of the five snowboarders were completely buried and killed.

It was amazing that more people were not killed. In addition to the five snowboarders high up in the narrow part of the gully, two skiers were tucked in beneath a protective cliff, off to the side, when the avalanche roared past them. In addition, two other people were lower and to the side of the apron. One was able to scramble off to the side and the other was caught and carried down the mountain and mostly buried. Finally, a family of five was near the terminus of the avalanche path and they were close enough to be knocked down by the air blast of the avalanche.

Of the five snowboarders high in the narrow gully, the initial wave of the avalanche carried them far down the apron and partially buried two of them. Both dug themselves out and then another wave of the avalanche hit one of the snowboarders and carried him farther down the slope and partially buried him again. The other three snowboarders were completely buried and killed. Since none of them had beacons, it was impossible to find them in time to save their lives.

Rescue crews faced a grim situation when they arrived. The avalanche debris covered a total of 11 acres on the apron where the 14 people were recreating and if you added the runout of an adjacent lobe of the same avalanche path that ran at the same time, the debris covered 22 acres. In addition, the probe poles of the rescuers are 10-15 feet long and almost all the avalanche debris was deeper than their probes. Since the victims had climbed up high into the choke of the apron, when the avalanche hit them, the debris spread out as it descended, meaning that they could end up virtually anywhere in the 11 acres of debris. Despite heroic effort of the rescuers over a number of days, with such deep, dense avalanche debris, the avalanche rescue dogs could not find the victims and probing for them was a needle-in-a-haystack situation. The first victim was found with a probe line two days after the accident and the other two victims melted out in spring.

Snowshoer fatality In Empire Canyon near Park City 2-26-2004

The snow drought during January created widespread areas of weak snow on all the shady slopes and ones with a shallow snowpack. When snow began to fall again in February, we continued to warn people about shallow snowpack areas where new snow was overloading layers of surface hoar, near surface faceted snow and depth hoar near the ground. The east side of the Wasatch Range is historically a shallow snowpack area because it

is on the downwind side of the range. The accident occurred on a low elevation slope on the east side of the range where the snowpack was especially thin and weak.

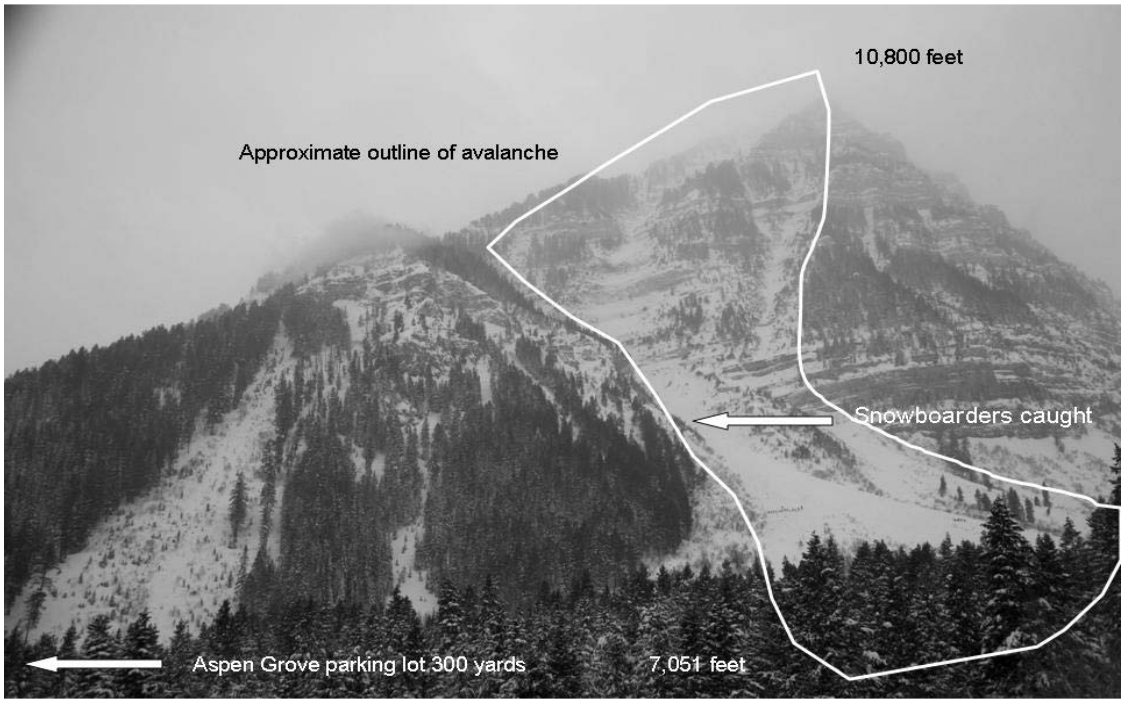
On The day of the accident, heavy snow combined with strong wind created a rapidly-rising avalanche danger. The victim—a visitor from Houston, Texas—and his local friend decided to go snowshoeing in Empire Canyon, which is a popular area to walk dogs or get some other exercise and it's just on the outskirts of Park City, down at an elevation of 7,600' in a backcountry area between the ski runs of Park City and Deer Valley resorts. On their way home towards the end of the day, they descended a narrow, small, wooded, side gully next to one of the mine buildings and they triggered a very small avalanche about a foot deep and 70 feet wide, which descended about 60 vertical feet into the gully where they walked. Neither wore beacons or shovels. The victim's friend looked for him in vain and local residents from a few hundred yards down the canyon responded with probe poles and quickly found the victim buried about four feet deep. He did not respond to CPR.

Interestingly enough, when UAC Director, Bruce Tremper visited the scene six days later to take photographs, while he was investigating the accident site, snowboarders triggered a larger slide less than 100 yards away from the original slide. Apparently, no one was injured but they had to dig out some buried equipment at the bottom.

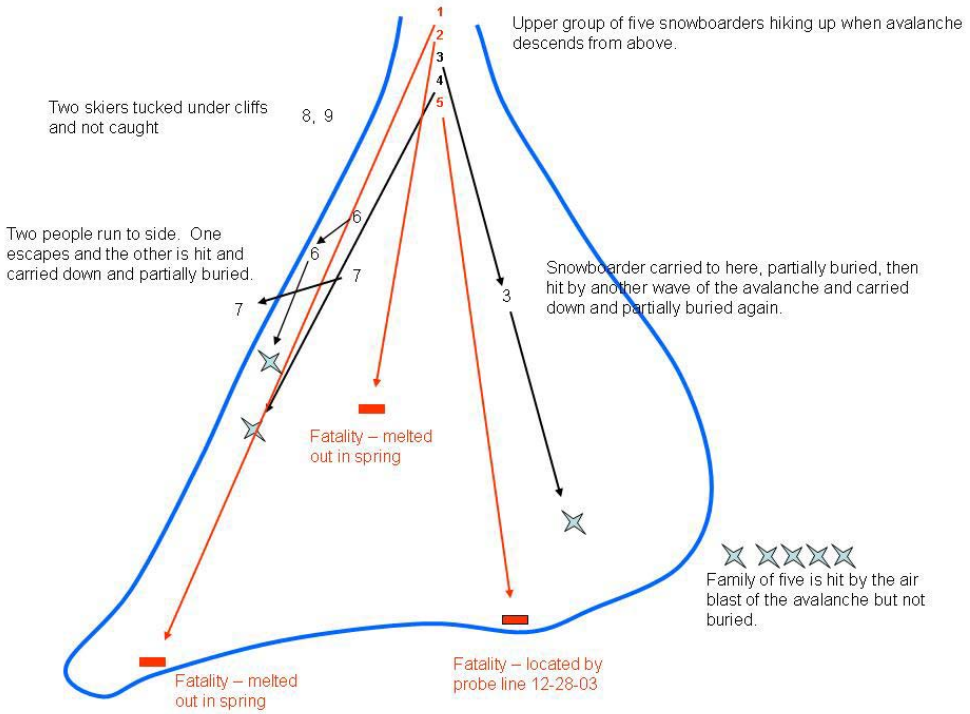
All of the fatalities and nearly all the close calls this season involved people not wearing avalanche rescue gear and most were relatively inexperienced and did not know much about avalanches. All four fatalities occurred during obviously dangerous conditions. As far as we know, none of them had called or read the avalanche bulletin before they went out nor did they hear the avalanche warnings on NOAA weather radio or other media outlets. We continue to struggle with how to reach the public who has no avalanche education or who normally do not consult the avalanche advisory before heading out, but we have come up with no better solutions that would fit within the constraints of our small budget. During the 2002-03 season in Canada, an inexperienced group of young adults walked into an obviously dangerous situation in which caught 17 skiers and killing seven of them. Since then, the Canadians have been spending considerable resources to find better ways of communicating avalanche information to relatively inexperienced users, and perhaps we can benefit from their recommendations and technical solutions.

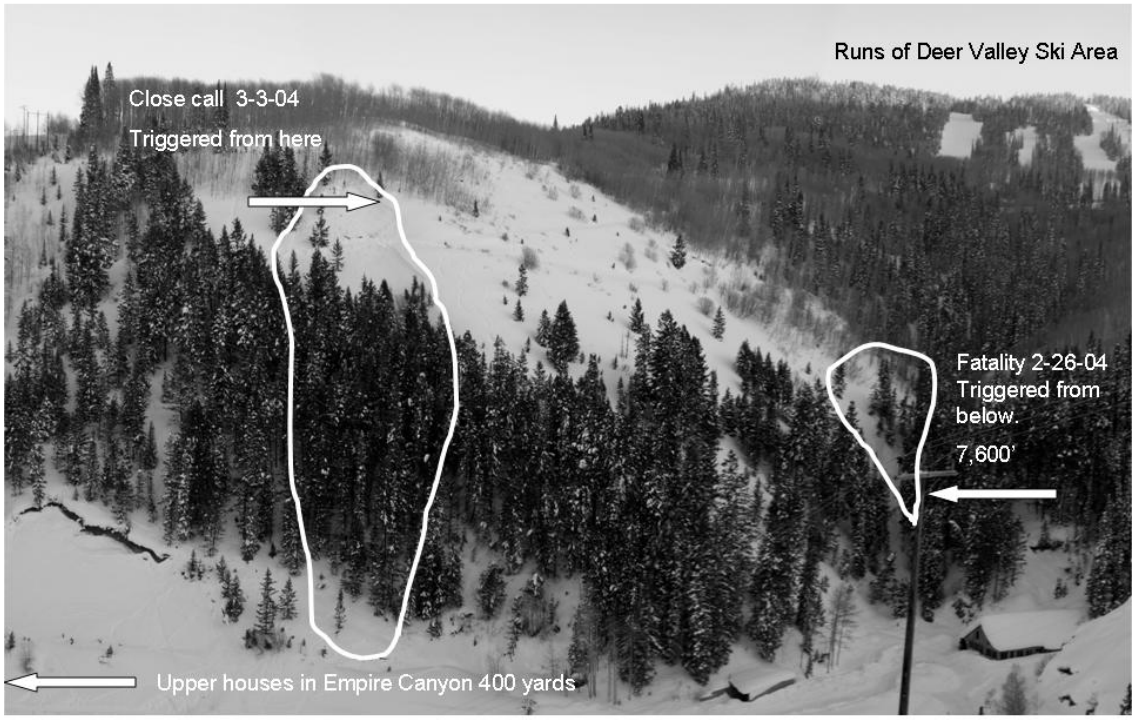
Nationally, it was a less-than-average year as well with only 21 avalanche fatalities, which is below the recent average of 25 and much less than the 2002 season, in which 35 people were killed in the U.S. Looking at world statistics, the United States ranks third, just behind Austria and France.

Rescuers found one victim on the second day and spent a number of days looking for the remaining two bodies in vain. The debris was well over 10 feet deep and covered an area the size of 11 football fields. It was so deep that even the avalanche rescue dogs could not detect a scent.



An overview of the Aspen Grove—Elk Point avalanche fatalities in which three snowboarders were killed on the day after Christmas. There was 14 people playing on the slope at the time. Five snowboarders were up high in the narrow part of the avalanche track, two more skiers were near them but tucked in beneath a cliff, two others were on the viewer's left of the runout who barely escaped and a family of four was at the bottom and was hit by the air blast of the avalanche but not buried. The five snowboarders were scattered all over the apron as the avalanche spread out at the bottom, and three completely buried, which created a huge 11 acre area to probe. You can barely see some of the rescuers in a horizontal line on the apron.





The site of an avalanche fatality on 2-26-04. This area is on the outskirts of Park City in Empire Canyon. The snowshoers triggered a very small avalanche on the right as they descended a small gully near the end of the day. Another close call came just six days later as some snowboarders triggered another avalanche just 50 yards from

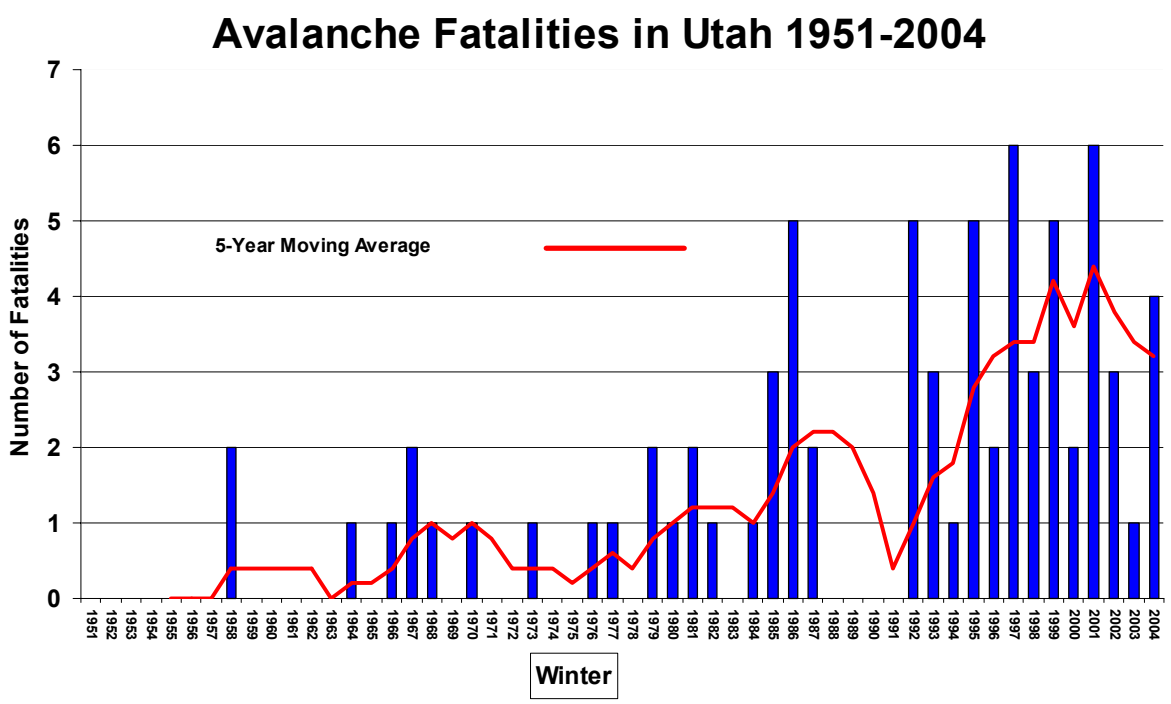
The site of a skier triggered avalanche near Desolation Lake. The skier was partially buried but otherwise OK.

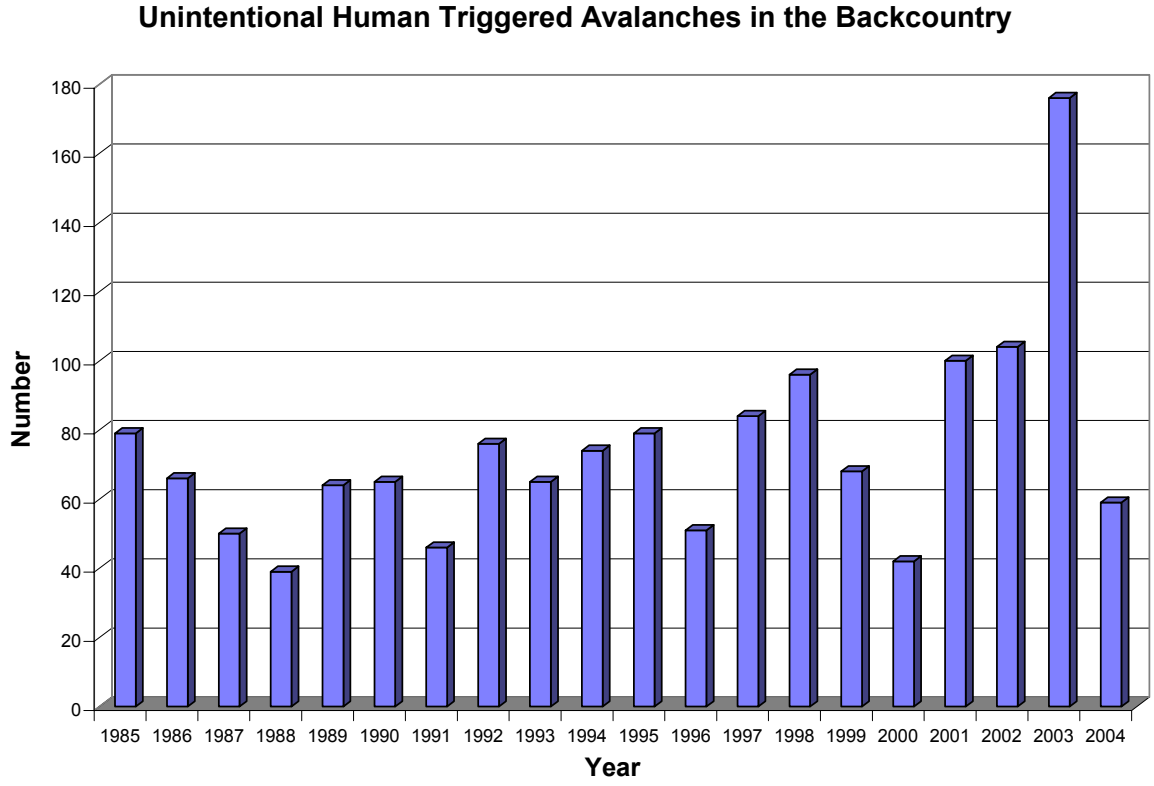
Incidents and Accidents 2003-04

This list includes only unintentional human triggered avalanches in the backcountry.

Date	Region	Location	Details	Triggered	Caught	Partially Buried	Totally Buried	Injured	Killed
				1					
11/11/2003	Ogden	Snowbasin	Triggered a small slide on surface hoar						
11/12/2003	Logan	Logan Peak	Snowmobiler completely buried 2-3 feet deep, no beacon but found by partners, OK. Very close call.	1	1		1		
11/12/2003	SLC	Caribou Basin BCC	Skier Triggered	1					
11/13/2003	PV	Robert's Horn	Triggered as skiers ascended this gentle slope, one caught	1	1				
11/13/2003	SLC	E. Bowl of Silver Fk.	Skier caught and carried on very gentle slope - ended up mostly on surface. Lost pole.	1	1				
11/13/2003	SLC	E. Bowl of Silver Fk.	Skier triggered and caught on a very gentle slope	1	1				
11/14/2003	PC	McKonkies Bowl	1	1	1				
11/14/2003	PC	Sunrise Bowl	Triggered by backcountry skiers. Skied off of slab.	1	1				
11/14/2003	PC	East McKonkies Bowl	Triggered by backcountry skiers. Skied off of slab.	1	1				
11/14/2003	SLC	Alta	Triggered by backcountry skier - Alta not open for season and not doing avalanche control	1					
11/15/2003	SLC	Hidden Canyon	Triggered by backcountry skiers.	1					
11/15/2003	SLC	Sunset Pk	Triggered by a backcountry skier.	1					
11/18/203	Uintas	Hoyt's Peak	Wind slab triggered by snowmobiler who was able to ride out of the slide	1	1				
12/16/2003	SLC	Toledo Chute	Skier triggered avalanche, not caught - presumed unintentional.	1					
12/24/2003	SLC	Day's Fork	Skier triggered but skied out of it. Not caught. Recent wind slab sliding on old snow	1					
12/26/2003	**Provo**	**Aspen Grove area - Elk Point**	**6 caught, 3 snowboarders without becons were killed by natural avalanche during a large snow storm while playing in the outrun of a very large avalanche path.**		**6**	**3**	**3**		**3**
12/27/2003	Uintas	Ray's Area	Possible remote trigger by skier.	1					
12/31/2003	SLC	Figure 8 Hill, upper BCC	New wind slab. Caught, but got out to side.	1					
1/1/2004	Ogden	Foothills	Snowboarder triggered avalanche in the foothills above North Ogden. They rode the blocks for a short distance and were able to stop on bed surface. Recent wind slab	1	1				
1/3/2004	Uintas	1000 peaks	Cutting roads with a snow cat got three remote triggers breaking to ground with big dust cloud.	1					
1/7/2004	Provo	Primrose Cirque	Skier jumped on test slope that was too large, was caught and buried to waist.	1	1	1			
1/7/2004	SLC	Flagstaff Pk	Skier triggerd, caught, carried 100' and buried to knees. Parter waited to side		1	1			
1/8/2004	SLC	Mary Ellen Gulch		1					
1/9/2004	SLC	Patsy Marley		1					
1/12/2004	Logan	Double Top	Small snowmobiler triggered avalanche.	1					
2/5/2004	SLC	Desolation Lake area	Skier caught, carried, partially buried.	1	1	1			

2/6/2004	SLC	Cardiff	Skier kicked out very soft slab in lower breakover	1					
2/6/2004	SLC	Cardiff	Skier kicked out very soft slab in upper chutes	1					
2/10/2004	SLC	Gobblers Knob SE Ridge into Bulter	Caught and carried person - no injury	1	1				
2/13/2004	Park City	No-no name bowl		1					
2/14/2004	Provo	Mill Canyon Peak	triggered by ski cut	1					
2/14/2004	Provo	UFO Bowl	remotely triggered from above	1					
2/14/2004	Park City	No-no name bowl	remotely triggered from side	1					
2/22/2004	SLC	Broads Fork	Triggered remotely on an uptrack, a few steps after getting a collapse	1					
2/26/2004	Uintas	1000 Peaks area	Skier caught, lost ski.	1	1				
2/26/2004	**Park City**	**Empire Canyon (Daily Canyon)**	**Snowshoer fatality, 4 foot burial without beacon in low elevation gully near town.**	**1**	**1**		**1**		**1**
2/27/2004	Ogden	Snowbasin backcountry - Coldwater Canyon	Triggered by backcountry skier	1					
2/27/2004	Logan		UAC observer remotely triggered slide - not caught.	1					
2/27/2004	SLC	Brighton backcountry	Anonymous caller triggered and was buried to his shoulders in a slide in the "Brighton backcountry". Call came in 24 hours after incident.	1					
2/28/2004	SLC	USA Bowl - Scotts Peak area	Skier caught and carried.	1	1				
2/29/2004	Park City	Top of Summit Park		1					
2/29/2004	SLC	Renolds Peak	Skier triggered	1					
2/29/2004	SLC	Lamb's Canyon	Remotely triggered	1					
3/2/2004	Uintas	Smith/Morehouse	Skier triggered, got out to side	1	1				
3/2/2004	SLC	Birthday Chutes - White Pine	Skier triggered, caught but skied out.	1	1				
3/2/2004	SLC	Argenta - Kessler Pk	Skier triggered, caught, but arrested on bed	1	1				
3/3/2004	Park City	Daly Canyon	Human triggered slide 100 yards away from the fatality on 2-26-04. Very close call.	1					
3/5/2004	SLC	Above LCC road	Skiers remotely triggered from 50 feet away when looking at a controlled slide in same area.	1					
3/5/2004	SLC	Little Superior Buttress	Skier triggered but not caught.	1					
3/5/2004	SLC	Little Superior Buttress	Skier triggered, caught, carried, lost some gear but OK.	1	1				
3/6/2004	SLC	Big Water	Skier triggered	1					
3/6/2004	SLC	Tom's Hill	Skier caught and carried.	1	1				
3/6/2004	Ogden	Farmington canyon	Falling skier triggered it from lower angled	1					
3/7/2004	SLC	Toledo Chute		1					
3/7/2004	SLC	No Name Bowl		1					
3/8/2004	SLC	PC Ridgeline - 9990	Released on ski cut. Caught and carried skier. No injury.	1	1				
3/13/2004	SLC	Near Desolation Lake	Skier caught and carried	1	1				
3/28/2004	SLC	Toledo Chute		1					
4/21/2004	SLC	High Rusler (Alta closed for season)	Skier triggered, 4 feet of debris on corkscrew road, skier OK.	1	1				
4/21/2004	SLC	Figure 8 Hill, near Brighton	Broke above skier on 4th turn. Got out to side and OK	1	1				
4/20/2004	SLC	Baldy Chute	Triggered sympathetically from side, skier OK	1					
			Total	**59**	**31**	**6**	**5**		**4**





Utah had a very stable season with only 59 unintentional human triggered avalanches in the backcountry. Despite this, we had four avalanche fatalities, which occurred during times of unusually high avalanche danger during storms.

Avalanche Fatalities in Utah 1958-2004 - 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	Out of bounds Skiers	2						
14-Dec-01	1	Male	Willard Basin	Snowmobiler				1			
27-Feb-01	1	Female	Near Canyons Resort	Out of bounds Skier	1						
10-Mar-01	2	Males	Uinta Mtns near Oakly	Snowmobiler				2			
28-Apr-01	2	Males	Stairs Gulch, BCC	Climbers		2					
31-Jan-02	1	Male	Windy Ridge, Uinta Mtns.	Backcountry Skier	1						
16-Mar-02	2	Males	Pioneer Ridge near Brighton	Out of bounds Snowboarders			2				
15-Feb-03	1	Male	Gobbler's Knob, B.C.C.	Skier	1						
26-Dec-04	3	Males	Aspen Grove, Timpanogos	Snowboarders			3				
26-Feb-04	1	Male	Empire Canyon - Park City	Snowshoer					1		

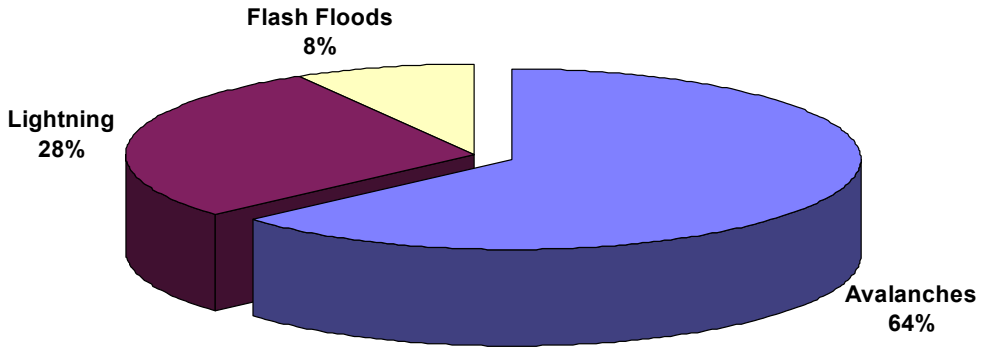
Total **74**

66 Males (94%), 4 Females (6%)

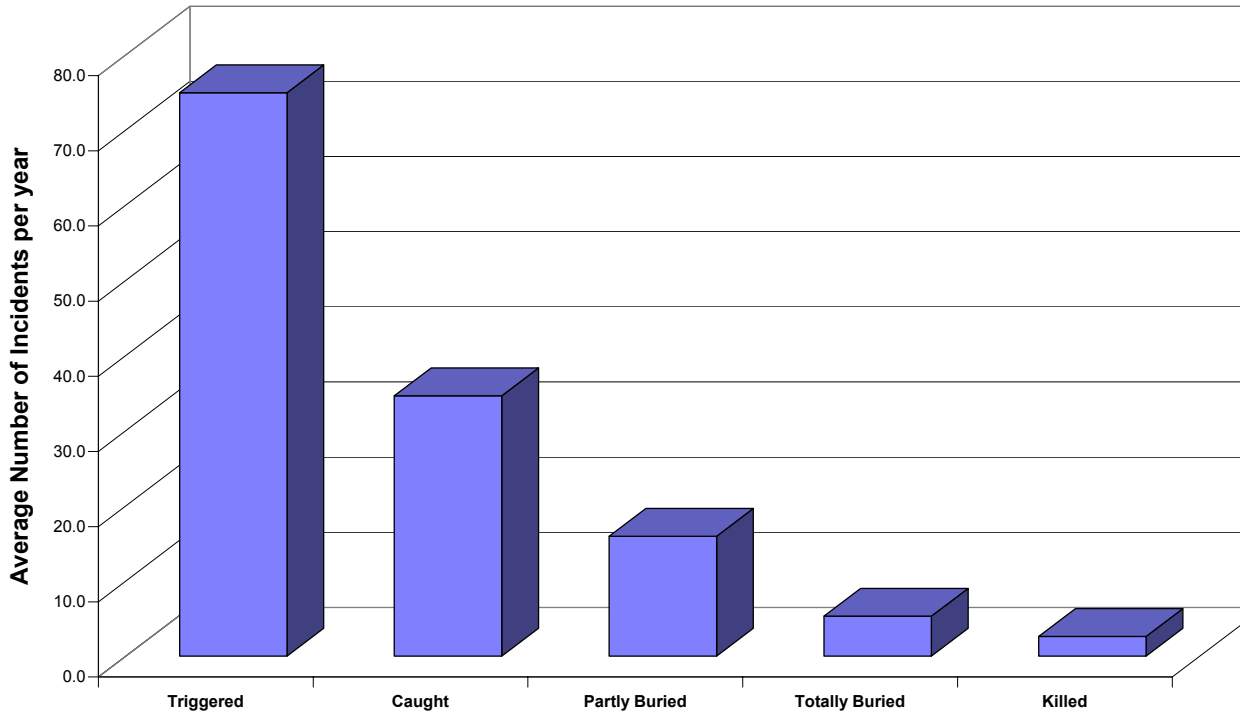
Shaded areas indicate greatest concentration of fatalities.

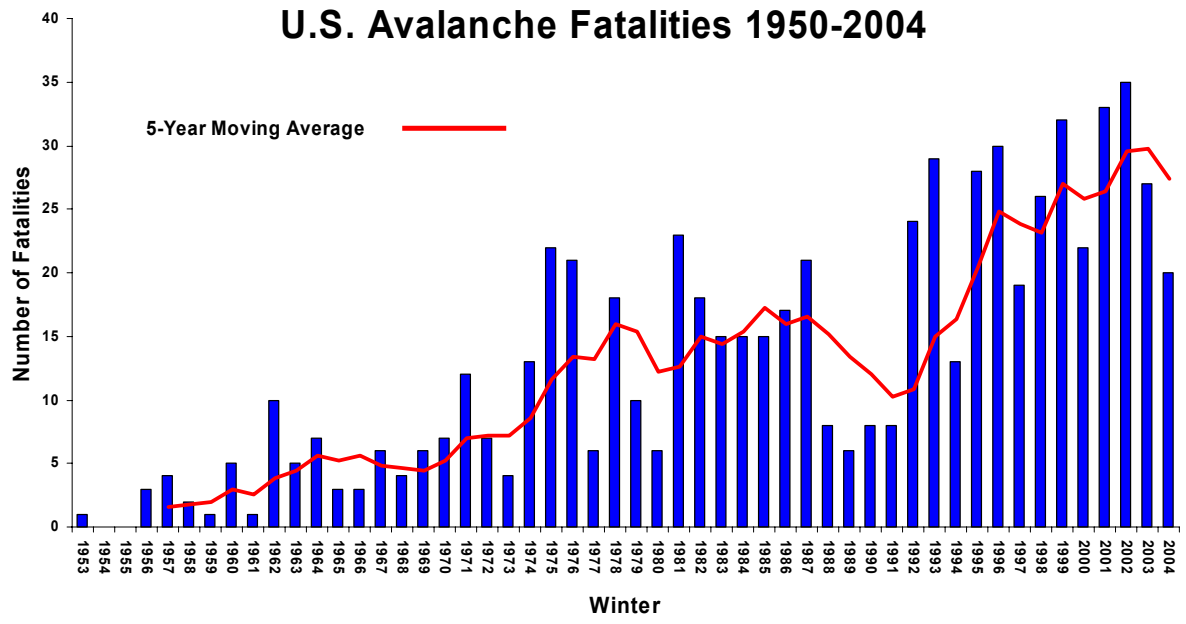
1958 season - Present	**35**	**5**	**10**	**9**	**9**	**5**	**1**
Past 10 seasons	**9**	**3**	**9**	**9**	**6**	**1**	**1**
Past 5 seasons	**5**	**2**	**7**	**4**	**2**	**0**	**0**

Utah Deaths by Natural Hazard
1994 - 2004

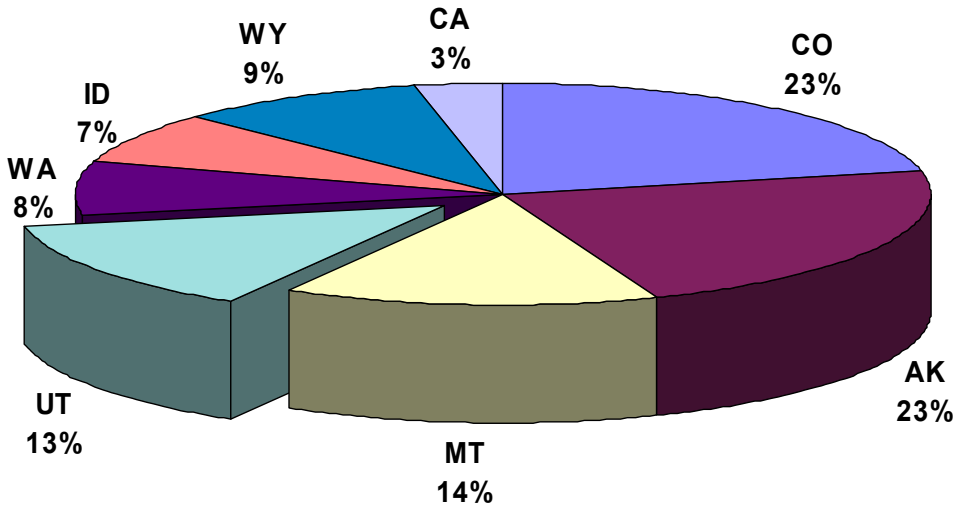


Avalanche Incidents in Utah 1985-2004

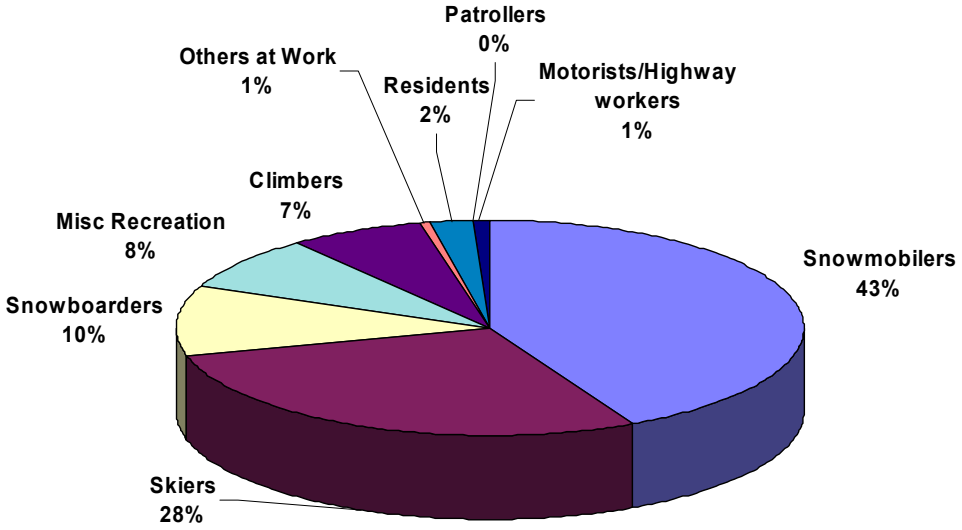




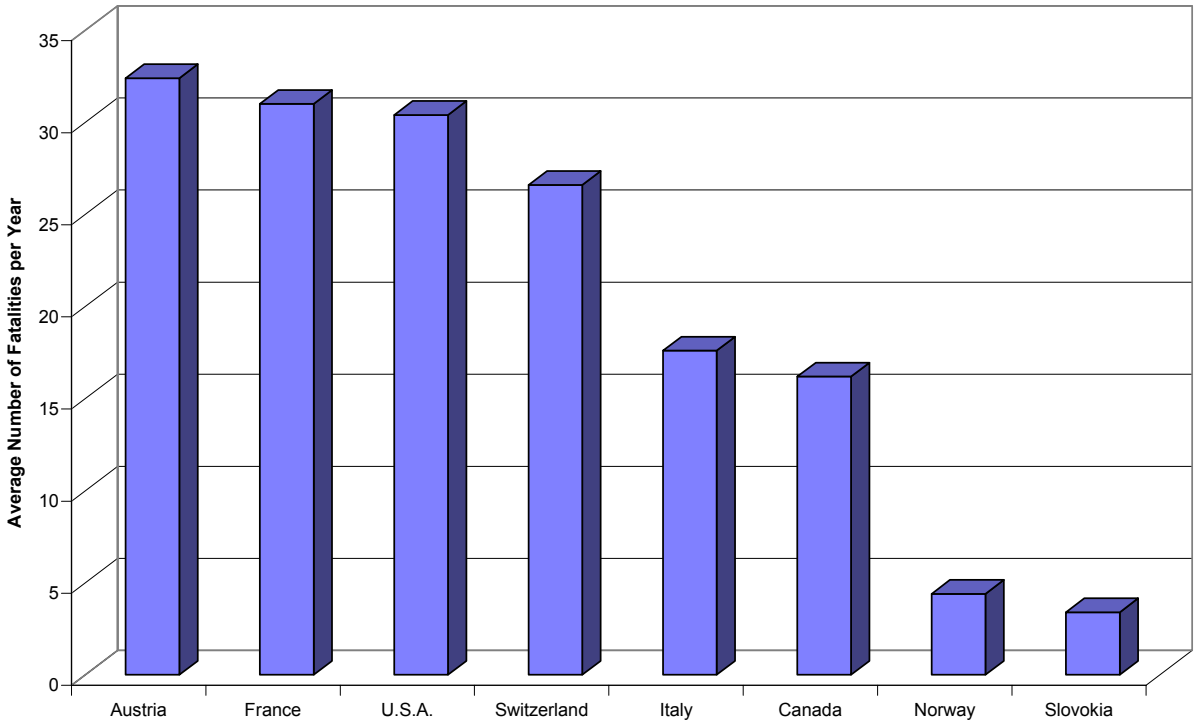
U.S. Avalanche Fatalities by State 1994-2004 (N = 278)



U.S. Avalanche Fatalities by Activity
Past 5 Seasons - Ending 2004
134 Total Fatalities



World Avalanche Fatalities 1999-2003



Avalanche Education

We feel that avalanche education is an essential part of staying alive in avalanche terrain. It not only gives people the basics of avalanche knowledge, but it helps create and maintain an avalanche culture, where people learn from their peers. We teach many free avalanche awareness classes throughout the season, partially to give people the basics of how to stay alive, but also to inspire them to take a more detailed, multi-day avalanche class from the private sector. This season we taught 37 avalanche classes and directly reached over 1,700 people.

In addition, we also had a very successful Avalanche Awareness Week, with a signing ceremony with Olene Walker, Utah's Governor, plus she was the featured speaker for a fundraiser at Snowbird put on by the Friends of the Utah Avalanche Center. Avalanche awareness week consisted of a media blitz and several classes offered both indoor and in the field. Many thanks to Roger Kehr for organizing the event.

We are also working on a traveling avalanche awareness program for young adults that can be taught as a turnkey operation in public schools and youth groups.

Finally, during the summer of 2004, we plan to develop an avalanche education program for young adults that would be taught in Utah schools and youth groups. Funding for this project will be provided primarily by Utah State Parks. Other partners include: The Backcountry Store, Recreation Equipment Inc., and other partners yet to be determined. The project is being contracted through Friends of the Utah Avalanche Center and we will give a more detailed report as the project takes shape.

Utah Governor Olene Walker signs the declaration for Avalanche Awareness Week and hands it to Bruce Tremper, Forest Service Utah Avalanche Center Director. FSUAC forecaster Craig Gordon is on the left. On the right, stands Peter Donner (Friends of the Utah Avalanche Center) and Dave Fields (Snowbird public relations Director).

UAC Avalanche Education 2003-04

Date	Staff	Event	No. people
10/26-31/2003	Lees/Tremper	National Avalanche School, Phase I, Reno	200
11/1/03	Gordon	Avalanche Awareness - Utah Snow Show	40
11/14/03	Gordon	USFS Blasters School	150
11/16/03	Hardesty	Level II, AIARE	5
11/21/03	Gordon	Avalanche Awareness - Butters Tractor	150
11/21/03	Hardesty	Sundance ski patrol - avalanche refresher	20
11/22/03	Weed	Avalanche Awareness - Cache Co Search and Rescue	50
12/1/03	Hardesty	Ski with a Ranger	45
12/2/03	Lees	ACE womens beacon clinic	20
12/2/03	Lees/Tremper	Avalanche Awareness - REI	120
12/2/03	Weed	Avalanche Awareness - Escape Outdoors	10
12/6/03	Tremper	Kirkhams avalanche awareness talk	60
12/6/03	Gordon	Avalanche Awareness - Honda/Suzuki	15
12/9/03	Hardesty/McLean	Avalanche Awareness - Black Diamond	40
12/9/03	Weed	Avalanche Awareness - Escape Outdoors	30
12/10/03	Tremper	Wasatch Mountain Club	80
12/10/03	McLean/Tremper	Avalanche Awareness - REI	80
12/12/03	Lees/Kobernik	Avalanche Awareness - Sandy REI	50
12/12/03	Weed	Avalanche Awareness - Magic Mountain Sports	40
12/16/03	Tremper	Salt Lake District Office	16
1/7/04	Gordon	Avalanche Awareness - Rocky Mountain Sports	30
1/7/04	Weed	Avalanche Awareness - Stokes Nature Center	30
1/15/04	Tremper	Day-long avalanche class, Elko Nevada	60
1/21/04	Tremper	Avalanche History of Alta	30
1/22/04	Hardesty	Avalanche Awareness - SL Rotary Club	20
1/22/04	Weed	2-day intro - Outdoor Recreation Center USU campus	16
1/22/04	Weed	Field day - Outdoor Recreation Center USU campus	15
1/24/04	Gordon/Tremper	Backcountry Awareness, Snowbird	60
2/11/04	McLean	Avalanche Awareness, Park City Newcombers	30
2/19/04	McLean	Avalanche Awareness, Park City Rotary Club	30
2/24/04	Tremper	Science of Avalanches - REI	80
2/25/04	Gordon	Avalanche Awareness - Draper Police Dept.	6
2/25/04	Gordon	Avalanche Awareness, UVSC	10
1/28/04	Grodon	Avalanche Awareness, UVSC	25
1/17/04	Lees/Tremper	Level I Avalanche Class, Brighton	30
2/10-12/04	Gordon/Tremper	National Avalanche School, Phase II, Snowbird	35
2/14-16/04	Hardesty, McLean	Level I Avalanche Class, Brighton	30
2/27-29/04	McLean	Level I Avalanche Class, Alaska	30
38 Talks			**1758**

Media Contacts

Media contacts were a little less than usual because of a fairly stable season and less than average avalanche fatalities nationwide. Nevertheless, our staff was interviewed by three national television programs including an interview by Anderson Coulter on CNN, the NBC Nightly Evening News, A documentary on avalanches filmed last season and it aired this winter on the History Channel and National Geographic re-aired an avalanche documentary filmed several years ago.

In addition, we were interviewed by several national magazines including Outside, National Geographic Adventure and Reader's Digest Magazine. We also were interviewed by three local radio programs and eleven newspaper articles.

Craig Gordon wrote a monthly avalanche article for Snow Scoop Magazine, a snowmobile publication.

Avalanches don't happen just in the mountains. Appropriately enough, we noticed these "glide cracks" in City Creek near the State Capitol Building after a ceremony with Utah's Governor, Olene Walker in which she signed the declaration for Avalanche Awareness Week. Glide cracks form when the entire snowpack slides slowly on the ground underneath when lubricated with melt water. With the copious low elevation snow this season, low elevation avalanche potential was a concern. Glide cracks like these can release catastrophically, causing an avalanches. This is a good example that avalanches are important to all people in Utah.

UAC Media Contacts 2002-03

Date	Staff	Agency	Subject	National or Inter-national Television Interview	National or Inter-national Television Information	National or Inter-national Print Media	Local Television Interviews	National Radio Interviews	Local Radio Interviews	Local Print Interviews
1-Jul-03	Tremper	Book: In the Path of the Avalanche	Review book for accuracy			1				
10-Sep-03	Tremper	Owl Magazine	Interview and reviewed content			1				
19-Sep-03	Tremper	Park City Record	Interview about fund raising party							1
22-Sep-03	Tremper	National Geographic Adventure Magazine	Interview about avalanche centers			1				
10-Oct-03	Tremper	Reader's Digest	Review story for avalanche accuracy			1				
23-Oct-03	Tremper	Arctic Cat	Interview for article about avalanches			1				
30-Oct-03	Tremper	Outside Magazine	Interview about avalanche information			1				
17-Nov-03	Tremper	Channel 4	Interview about conditions				1			
18-Nov-03	Tremper	National Geographic TV	Re-airing interview of Tremper	1						
18-Dec-03	Gordon	Salt Lake Tribune	Forecasting for Uinta Mountains							1
19-Dec-03	Gordon	Channel 2 News	Forecasting for Uinta Mountains							1
26-Dec-03	Gordon	Park City Record	Avalanche Conditions							1
27-Dec-03	Hardesty	CNN	Avalanche Fatality		1					
29-Dec-03	Tremper	CNN - Anderson Coulter	Live interview about avalanche conditions	1						
29-Dec-03	Tremper	Salt Lake Tribune	Interview about snowboarders							1
29-Dec-03	Lees	KCPW Radio	Interview about avalanches						1	
29-Dec-03	Lees	Colorado newspaper	Interview about avalanches							1
31-Dec-03	Lees	Hearald Journal - Logan	Interview about avalanches							1
3-Jan-04	Gordon	Channel 5 TV	Interveiw on snowmobile avalanche forecasts				1			
4-Jan-04	Gordon	Channel 5 TV	Interview about snowmobile avalanche forecasts				1			
5-Jan-04	Tremper	National Geographic TV	Interview about avalanche information		1					
6-Jan-04	Hardesty	Public Radio International	Interview about avalanches					1		
7-Jan-04	Lees	NBC Nightly News	Interview about avalanches	1						
9-Jan-04	Gordon	Channel 5 TV	Snowmobile avalanche forecasts				1			
12-Jan-04	Tremper	Channel 5 TV	Live interview about avalanches				1			
12-Jan-04	Tremper	Channel 2	Interview about Avalanche Awareness Week				1			
12-Jan-04	Tremper	Channel 4	Interview about Avalanche Awareness Week				1			
12-Jan-04	Tremper	Channel 5	Interview about Avalanche Awareness Week				1			
12-Jan-04	Hardesty	Daily Universe - BYU	Interview about avalanches							1
13-Jan-04	Tremper	Central Washington newspaper	Avalanche information							1
14-Jan-04	Tremper	Ski Magazine	Interview about avalanches			1				
15-Jan-04	Tremper	Pitsburg Post Gazette	Interview about avalanches			1				
15-Jan-04	Tremper	Freelance writer	Interview about avalanches			1				
29-Jan-04	Gordon	Channel 5	Interview about snowmobile avalanche safety				1			
19-Feb-04	Tremper	Provo Daily Universe	Interview about avalanches							1
26-Feb-04	Tremper	Deseret News	Interview about fatality							1
27-Feb-04	Tremper	Channel 13 News	Interview about fatality				1			
27-Feb-04	Tremper	KSL Radio	Interview about fatality						1	
6-Mar-04	Gordon	Channel 5	Interview about snowmobile avalanche safety				1			
12-Mar-04	Tremper	KPCW Radio	30 minute interview about avalanches						1	
20-Mar-04	Lees	Channel 13 TV	Interview about avalanches				1			
Totals				**3**	**2**	**9**	**12**	**1**	**3**	**11**

Total Contacts **41**

Budget

The Forest Service Utah Avalanche Center is the epitome of a strong partnership organization. Funding comes from a diverse source. In addition to the base funding from the Wasatch-Cache National Forest, Utah State Parks actually contributes more funds than any other partner. For the past several years, all the funding from Utah State Parks came through grants, either a National Recreation Trails Program or a State motorized grant. Funds were used primarily to forecast for areas used primarily by snowmobilers and for snowmobile avalanche education. This season, the grant funds were skimpy, so Utah State Parks generously made up the difference out of their own budget to the tune of $85,000. $15,000 of that money goes to the Manti- La Sal National Forest for forecasting in Moab and the Manti-Skyline area. Many thanks to Fred Hayes and our other supporters at Utah State Parks and the Utah Snowmobile Association.

In addition, the State of Utah Division of Comprehensive Emergency Management contributes $25,000 per year, Salt Lake County contributes $20,000 and last but not least, the Friends of the Utah Avalanche Center is a private, non-profit fundraising organization which supports avalanche forecasting and avalanche education in Utah. Each season, they raise around $40,000. Part of that money is donated to the Forest Service Utah Avalanche Center for salaries, but most of the funds are spent outside the Forest Service for contract observers, education and equipment.

Expenditures

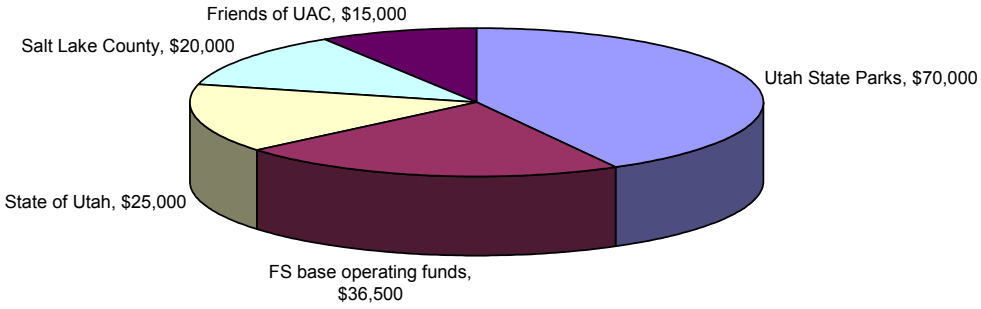
Staff Salary and Benefits	$158,654
Telephones	$2,000
Equipment and Supplies	$2,000
Travel	$3,000
Training	$2,000
Printing	$1,000
Total	**$168,654**

Revenues

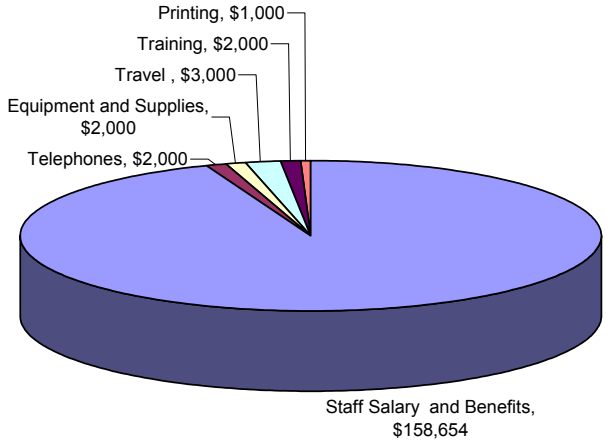
Utah State Parks	$70,000
FS base operating funds	$36,500
State of Utah	$25,000
Salt Lake County	$20,000
Friends of UAC	$15,000
Total	**$166,500**

Note: Staff salary and benefits is spread between six people, most of which work six months per year and the Director works eight months per year. Utah State Parks contributes a total of $85,000 but $15,000 of that money goes to the Manti-La Sal National Forest for avalanche forecasting and education in the La Sal Mountains and for the Manti-Skyline area.. Finally, as noted above, the Friends of the Utah Avalanche Center donate $15,000 to the Forest Service for salaries, but they spend an additional $35,000 per year on their own to hire contract observers, avalanche education projects and for equipment. These expenses are not itemized here.

Utah Avalanche Center Revenues - Wasatch-Cache and Uinta National Forests



Utah Avalanche Center Expenditures - Wasatch-Cache and Uinta National Forests



Example of an Avalanche Advisory

Wasatch Cache National Forest

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

: *http://www.avalanche.org/~uac/*

To have this advisory automatically e-mailed to you each day free of charge, click HERE.

AVALANCHE ADVISORY

FRIDAY, DECEMBER 26, 2003 7:30 AM

Good morning, this is Andrew McLean with the Forest Service Utah Avalanche Center with your backcountry avalanche and mountain weather advisory. Today 1s Friday, December 26th, 2003, and it's 7:30 a.m.

Current Conditions:

We had a slight lull in our storm system yesterday, and then it returned with a vengeance to deliver current storm totals of 28" in Little Cottonwood, 29" in Big Cottonwood, 24" in the Ogden area mountains and 22" in the Provo area mountains. And it's far from over – another 10-14" are expected by the end of today. So far, this has been a fairly warm storm system, with temperatures in the mid to high 20's, which has produced moderate density snow in the 8-11% range, that makes for slow trail breaking, plush turning and riding conditions and a deep base. With all of this new snow, the trick for today will be finding slopes that are steep enough to move on, yet not so steep they will avalanche.

Avalanche Conditions:

Although we might be in the Christmas season, the snowpack is pure Halloween. There is wide spread natural avalanche activity being reported from the resorts, with large sluffs and soft slabs running full track and ending in deep debris piles. With 2.5" of water weight being deposited in the last 48 hours we have added a huge new load to the snowpack. Underneath all of this, there are a series of slabs and potential weak layers stacked up, and with this sudden increase in loading, there is a good chance that shallower avalanches in the new snow could step down into deeper layers and trigger large avalanches. With the ridgetop winds yesterday, sensitive cornices are forming with wind loaded pillows beneath them. These recent deposits of wind drifted snow will be very sensitive to a person's weight.

Today, expect to easily trigger avalanches anywhere from small powder sluffs to deep soft slab avalanches especially in wind affected areas. Until the storm abates, it will be a good idea to stick to sheltered, mid elevation areas with slope angles of less than 35 degrees and avoid avalanche run-out zones.

Bottom Line (Salt Lake and Park City, Provo, and Ogden mountains):

With natural and human triggered avalanches already occurring, there is a **HIGH** danger today on any slope steeper than 35 degrees. In wind sheltered areas with slopes less steep than 35 degrees, there is a **CONSIDERABLE** danger, with human trigger avalanches probable. People without good avalanche skills should avoid the backcountry today.

Uinta Mountains: A specific advisory for the Uinta mountains is being issued today. Click on western Uintas on the advisory page or phone 1-800-648-7433.

Mountain Weather:

Today the storm will intensify as a cold trough moves over the area and brings a heavy snow warning with another 10-14" of new snow expected at 8,000'. As of 6:00am, the 8,000' temperature is 18 degrees with a 10mph wind coming out of the SW. The moderate winds will shift from the SW to the NW with occasional strong gusts and a chance of lightning. We can expect a slight reprieve in the snowfall inten-

sity at sunrise, only to have it kick back in as the storm shifts to a NW flow and temperatures drop into the lower teens by mid morning. 24 hour storm totals for today are expected to be in the 16-23" range, with heavy snowfall throughout the day and into this evening. The storm will most likely shift to the east on Saturday, with the next one following it in from the Pacific on Monday.

For specific digital forecasts for selected mountain areas from the National Weather Service, click the links below or choose your own specific location at the National Weather Service Digital Forecast Page.

3-Day Table	3-Day Graph	7-Day Table
Ogden Mountains	Ogden Mountains	Ogden Mountains
SLC Mountains	SLC Mountains	SLC Mountains
Provo Mountains	Provo Mountains	Provo Mountains

General Information:

The Wasatch Powderbird Guides will not fly today because of weather.

If you are getting into the backcountry, please give us a call and let us know what you're seeing, especially if you trigger an avalanche. You can leave a message at 524-5304 or 1-800-662-4140. Or you can e-mail an observation to uac@avalanche .org, or you can fax an observation to 801-524-6301.

The Friends of the Utah Avalanche Center is offering two 3-day avalanche workshops which are being held January 17-19 and February 14-16. Information and sign-up sheets are available at the Black Diamond store (2092 E. 3900 S.; 278-0233).

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

Drew Hardesty will update this advisory on Saturday morning.

Thanks for calling.

For more detailed weather information go to our Mountain Weather Advisory

National Weather Service - Salt Lake City - Snow.

For an explanation of avalanche danger ratings:

http://www.avalanche.org/usdanger.htm