
Snow and Avalanches in Utah

Annual Report 2002-2003



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:

Professional photographer, Carl Skoog took this photo after a backcountry skier unintentionally triggered this avalanche as they traveled along the ridge above the crown fracture. One of the skiers is visible on the avalanche bed surface. If the skier would have triggered this avalanche while skiing, they would almost certainly have been caught and carried 3000 vertical feet over steep, cliffy terrain, which would be almost impossible to survive. This is typical of the kind of avalanches that plagued us all season—deep, wide and often sensitive enough to be triggered remotely. This season, we had a record number—175—unintentional human triggered avalanches in the backcountry with miraculously only one death.

Copies of this report can be obtained by writing, calling or e-mailing:

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Or view online at:

www.avalanche.org and click on Salt Lake

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 National Geographic and several on the Discovery Channel, PBS and the Weather Channel. The Forest Service Utah Avalanche Center staff is featured in most of these documentaries.

Avalanche education:

We teach about 50 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 hear the information doesn't mean they listen. 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, 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
- Manti Skyline (Fairfield Canyon – Wasatch Plateau)
- La Sal Mountains (near Moab)

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

In Moab, Eric Trenbeath heads the center with Even Stevens as the assistant. The Moab office is located in the Moab Ranger District on the Manti-LaSal National Forest and is supported by both the Moab Ranger district and a grant from the National Recreation Trails Program (to cover forecasts for the Manti Skyline). Eric and Even provide weekend forecasts for the Manti Skyline.

Craig Gordon is the sole forecaster for the western Uinta Mountains. This was our first season that we offered a forecast for the western Uinta Mountains. A generous grant from Utah State Parks funds this position.

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 17th season, is the Director. The rest of the very experienced Salt Lake staff include: Evelyn Lees, Tom Kimbrough and Ethan Greene. Unfortunately, two of the staff will leave for next season. Tom Kimbrough retires after an illustrious 37 years in the avalanche business and Ethan Greene will spend next winter finishing his PhD thesis in Colorado.

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.

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)
Snowmobile hotline (courtesy of Utah State Parks)

(800) 648-7433
(800) 648-7433

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

KRCL 91 FM
KPCW 92 FM
KCPW 105.7 FM

Internet:

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

E-mail:

We offer a 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 often think of ourselves as natural detectives. We gather as much information as possible, and then we communicate our analysis to the public. Each day the forecaster in the office looks at weather and collects information from ski area avalanche control programs, helicopter ski companies, highway control programs, volunteers and automated weather stations. The most important information, however, comes from us, from our own field work—the up-close-and-personal work with snowpack.

We split our time more or less equally between the mountains and the office. A staff of four people rotates through the office in which one person comes in early to issue the forecast while the others either head into the mountains to look at snow, work in the office on various education or computer projects or take their scheduled days off.

Field Day:

A typical "field day" might begin at 6:00 in the morning when we wake up, listen to our trusty NOAA weather radio, get on our home computer and look at the data from all the automated weather stations in the mountain. Like everyone else, we call our own avalanche advisory to get the latest information. Then we jump in the car or on the bus and head for the mountains.

We usually travel 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 we simply go to the area that concerns us the most, or to a place that we know is representative, where we can 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.

And yes, it can certainly be dangerous if you don't know what you're doing. 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, geology or engineering. 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. Finally, we all stay in top physical condition so we can efficiently cover lots of terrain.

Information comes from many different places in many different ways. For instance, we dig snow pits on several different slopes to get a good feel for the distribution pattern of snow stability. A snow pit, like the name implies, is about a 5 foot (1.5 meter) hole in the snow we dig and then we do a variety of stress tests to determine the stability of the snowpack. We also look at the crystallography of the various layers, and measure temperatures and sometimes density. This isn't nearly as complicated or time-consuming as it seems, as we usually spend no more than 15 minutes in a single snow pit. We would rather dig several quick pits in several areas than do one detailed pit in several different areas because we want to know the distribution of the pattern so we can communicate the pattern to the public.

We also test the snow in other ways, such as sawing off cornices, which bounce down the slope, 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 than after it's buried by the next storm. Finally, when we get home, we leave a detailed message on our answer machine in the office, which the forecaster will hear early the next morning. We also either fax or e-mail a written version of our observation, including the snow pit profiles, so that the forecaster has less to write down the next morning. Finally, we often call the person who will forecast the next day and talk to them in more detail, making sure not to call after bedtime, which is 8:00 pm, since they have to be up by 3:00 am the next morning.

Office:

The office days are equally as brutal. The forecaster for the day arrives at our office, co-located with the National Weather Service near the Salt Lake Airport, around 4:00 am—earlier on big storm days. 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 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 our army of volunteer observers, ski areas, helicopter skiing companies and high-way control programs. Then 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 answer machines, 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 twice that number get it over the Internet, and many thousands hear it on the radio. Many of them head into the backcountry to test our theories, sometimes with their lives.

Then it's lunch time, just when most people are eating their breakfast. 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

- The 2002-03 season was unprecedented in the 22 year history of the Forest Service Utah Avalanche Center. Although significantly less snow fell than normal, more people unintentionally triggered avalanches in the backcountry than in any previous year—176 incidents that we know of, which smashed the old record of around 100. Of those who triggered avalanches, 65 were caught, 16 were partially buried, six were totally buried, four were injured, and despite all this, there was only one fatality.
- This was the fifth year of below normal precipitation in northern Utah and this was the lowest snowpack year since the early 90's. The first half of the winter was the driest winter since the record-setting 1976 season. Even though February, March and April ended up near average at upper elevations, just like most of the winter, very little low elevation snow fell. Although high elevation places like Alta ended up at 79 percent of normal, most mountain areas were between 50 and 70 percent, while down in Salt Lake City, ended up with only 36 percent of normal snow for the winter. .
- Thanks to a generous grant from Utah State Parks, for the first time, we offered an avalanche advisory for the western Uinta Mountains. The grant also allowed continued avalanche forecasting for the Logan Area Mountains as well, since the Logan forecast had been supported by Olympic funds for the past couple seasons. It appears that both these areas will continue to receive funding by Utah State Parks.
- For the first time, we published a list of backcountry avalanche activity on the Internet. In this way, the public can easily learn the details and location of backcountry avalanche activity, which is probably the most important piece of information for people heading into the backcountry. The public can also view past avalanche activity without having to read archived advisories.
- Our web site has grown in size and complexity to the point where we will completely redesign it for next season. The web site will have a completely new look and feel and be much easier to navigate.
- The photos of avalanches and avalanche accidents on the web page continues to be very popular with the public. We find that pictures can communicate the danger of avalanche activity much more effectively than words.
- After our Olympic funding has ended, we had to cut back out staff and services offered.
- We will lose two of our best forecasters for next season. Tom Kimbrough will retire after 37 years in the avalanche business and Ethan Greene will spend next winter in Colorado finishing his PhD. Hopefully Ethan will return to the UAC for the 2004-05 season.

New This Season and Plans for the Next

New Avalanche Advisory for the western Uinta Mountains

In the past, we have never offered an advisory for the Uinta Mountains due to lack of funding and lack of reliable observations. We have, however, included information on the Park City line when we receive it and we issued avalanche warnings for the Uinta Mountains during obviously unstable conditions. This season, through a generous grant from Utah State Parks, we started a new avalanche advisory for the western Uinta Mountains. The grant also allowed us to continue forecasting for the Logan Area Mountains and provide avalanche education to snowmobilers. We posted both of these advisories on the internet as well as on the toll-free Utah State Parks snowmobile hotline. Utah State Parks has been a vital partner for the UAC in their ongoing support of avalanche advisory programs and in particular, avalanche education for all user groups. State Parks provided the UAC with a PowerPoint projector which enabled us to produce state-of-the-art avalanche awareness presentations.

Craig Gordon was the obvious choice to head the Uinta forecasting program because he and Eric Trenbeath of the Manti-La Sal National Forest established a similar program on the Wasatch Plateau two years ago. Craig also continued in his role as a snowmobile avalanche educator for northern Utah.

The western Uinta Mountains not only contain the highest peaks in the state, but unlike almost all mountain ranges in the western U.S., they uniquely run east-west. The Uinta Range tends to receive less snow than the Wasatch Range and generally experiences colder and windier conditions. Because of this, the snowpack usually remains shallow and weak, which we would call a “continental” snow climate, similar to conditions on the east slopes of the Rockies, which lead to deeper, longer lasting instabilities within the snowpack and generally much more dangerous conditions.

Although some backcountry skiers frequent these mountains each year, long, arduous approaches tend to keep the numbers to a minimum. Consequently, snowmobilers make up the largest user group, numbering close to 60,000 rider visits annually. While groomed trails pose no avalanche threat, the advent of powerful machines has enabled many riders to easily access the steep, avalanche prone slopes in the off-road areas. In recent years there have been three avalanche fatalities in the Uinta Mountains--two snowmobilers and one skier, and countless close calls.

The new forecast area includes the terrain surrounding Chalk Creek, Smith-Moorehouse, The Mirror Lake Highway, and Woodland. Periphery terrain incorporated the ingresses neighboring the Whitney Basin and the Daniels area.

It's hard enough to establish a new program for a team of people, much less a one-man operation. Fortunately, Tim Garcia, the Kamas Ranger District stepped up to the plate to provide vehicles, personnel, and local knowledge. Other key Kamas District office staff included, Andy Smith, Aaron Peterson, and long-time Alta patrolman/Cottonwood Canyon Snow Ranger Dave Ream, who served as a valued field partners and backcountry observers. In addition, Rick Shuler and the Evanston Ranger District assisted with weekly observations and Ted Scroggin played a vital role in this capacity. The Heber Ranger District also aided in spreading the word of the new advisory to outlying areas. Along with a host of volunteer observers, Ray Santa Maria and the Park City Powdercats called in snowpack and avalanche observations religiously. Finally, the Utah Snowmobile Association as well as Snow West helped to get the word out on the new advisory as they provided a link on their web pages. As with forecasts for any other part of the country, it was a team effort. With several hundred square miles to forecast, it would have been a difficult task without them.

As with any new operation, it takes time for the public to realize that a forecast is available. The forecast only received just under 3,000 hits this season, which actually isn't bad considering that it's a new program and the forecast began mid season. We have no way to sample the number of calls to

the recorded avalanche advisory on the State Parks snowmobile hotline, but we assume the about an equal number of people call the forecast as download off the Internet. We assume it will receive much more use as word spreads and the program becomes more established.

Web Site Changes

As technology changes as well as the makeup of our customers, we have to continually adapt the way we do business. For instance, when we first started offering our products over the Internet, we simply offered posted an electronic version of the advisory and mountain weather forecast on the National Weather Service web page. Through the years, we not only designed our own web page and located it at www.avalanche.org, the national avalanche web site, but to our horror, this season we realized that our web site had grown to 80 different pages and navigation had become very difficult. Although our web site has served us well, we will completely redesign it this summer so that the public can access all our pages and products from the main page via drop-down menus and they can navigate the web site much more easily.

Avalanche List

This season, we also decided to make a list of backcountry avalanches available to the public. For many years, we simply compiled each avalanche and avalanche incident on a clipboard in the office. Then at the end of each season, we hired someone to keypunch all the data into the computer to become part of a multi-year database. This season, we finally decided to join the modern world and made it the duty of each forecaster to enter the avalanche information directly into the computer, which we published each morning on the Internet. This way, the public can quickly scan through all the recent avalanches and see all the details. This also saved time on the avalanche advisory each day because we could refer the public to the avalanche list on the web instead of listing all the details on the advisory each day. We also used our second recording (which we have always used for more detailed information) to offer more details on recent avalanche activity than we can offer on the regular public advisory.

We felt that this new system worked quite well. The public seemed to like it, as it received 11,000 hits this season. It also helps to keep the data cleaner. We originally wanted to design the list as a database and query the database each day to generate a subset of avalanches and fields for public consumption. But as we all too often discover, the project required more time than our limited staff and funding allowed, so as a temporary solution, we simply entered the avalanches into a spreadsheet each day and published the spreadsheet to the web. We hope to have the database project finished by next season.

Avalanche Photos

For the second season, we published photographs of avalanches and avalanche incidents on the web. This has become our second most popular product (33,000 hits) and even ranks ahead of the mountain weather forecast. All of our staff carries digital cameras and we can often publish photos on the web the following day along with detailed captions. It's one thing to read in the advisory about an avalanche 2 feet deep and 200 feet wide, and it's quite another to see the photos of big blocks of avalanche debris piled up against trees and tiny people wandering around on acres of avalanche debris. People quickly get the idea that a 2 foot deep avalanche is a very scary thing. We have even had requests for a CD ROM version of photos for the season.

The staff has struggled to come into the age of digital photography. Gone are the days of film, processing, carousel projectors, light tables and notebooks filled with slides. In its place, we now have become very familiar with the inner workings of Adobe Photoshop, memory cards, white balance, resolutions, file sizes, file formats, html templates and FTP programs. Bob Athey, the observer contracted by the Friends of the Utah Avalanche Center, bought a computer this year and he now stays up late each evening,

swallowed up by the addictive pull of the cyber void. He has taught himself Photoshop along with a host of other programs. He e-mailed photos to the UAC staff nearly every day. Making the big jump into the strange, new world of digital photography has not been an easy transition for our staff, but it offers an extremely powerful way to communicate critical avalanche information to the public. Now that we have started shooting digital, film seem so primitive and limiting.

Staff Changes

We will lose two of our most capable staff for next season, Tom Kimbrough and Ethan Greene. Tom has retired after 37 years in the avalanche business and Ethan will spend a winter doing snow and avalanche studies for his PhD. He hopes to return to the UAC for the 2004-05 season.

Tom Kimbrough Retires after 37 Years in the Avalanche Business

This season marks the last year in Tom Kimbrough's illustrious career, which spans 37 years in the avalanche business and more than 40 years spent as a climber and ranger. As far as we know, Tom is the only professional avalanche forecaster from the state of Tennessee. Born in 1938, there are photos, prophetic of his future climbing career, which show him at the age of four, 15 feet up on a steep cliff face with his mother spotting him from below. After stints as a racecar driver and the Army, Tom started climbing in 1960 in Tennessee, but soon worked his way into the Tetons and Yosemite by the mid 60's. Then a friend mentioned that ski patrolling was the perfect way for a climber to earn money in the off-season and he started his long avalanche career at Badger Pass in Yosemite in 1965. By 1967, he moved into the major leagues at Alpine Meadows, the most active avalanche area in the U.S., and became the Patrol Director in 1972. Discovering that he didn't care for being an administrator, he demoted himself and spent the rest of his career wisely avoiding the entanglements of boss-hood.

He was present at the famous Alpine Meadows avalanche accident in 1982, where a massive avalanche killed seven people in the base area. Tom had to extricate his boss and mentor, Bernie Kingrery, who was one of the victims. He then patrolled at Alta for several years with a two-year sabbatical as an avalanche consultant for the Galena Project, a proposed ski area in California. He began working at the Utah Avalanche Center in 1987, where he has remained ever since.

Kimbrough clearly found his niche at the Utah Avalanche Center. He put his writing skills to good use each morning with carefully constructed, informative and humorous avalanche advisories, read in his deep, clear voice. He was often called the "Walter Cronkite of the avalanche world." On many Christmas mornings, Tom would deliver the advisory in verse.

For the past 30 summers, Tom has worked as a climbing ranger in Grand Teton National Park and he is now the head seasonal climbing ranger. He became famous for reading poetry to the climbers standing in line for a permit each morning before he allowed them into the ranger station. He also developed a keen ability to size up a climber and line them up with routes they could handle, yet still offered them a learning experience, and he would coach them on how long it would take and the exact route to get there and back safely.

Kimbrough was also a spiritual mentor as he has maintained a daily Zen practice for the past dozen years and leads a Sunday night "sanga" for other students. Combining his Zen practice with a lifetime of giving advice on backcountry activities, Tom developed an uncanny ability to tell people exactly what they

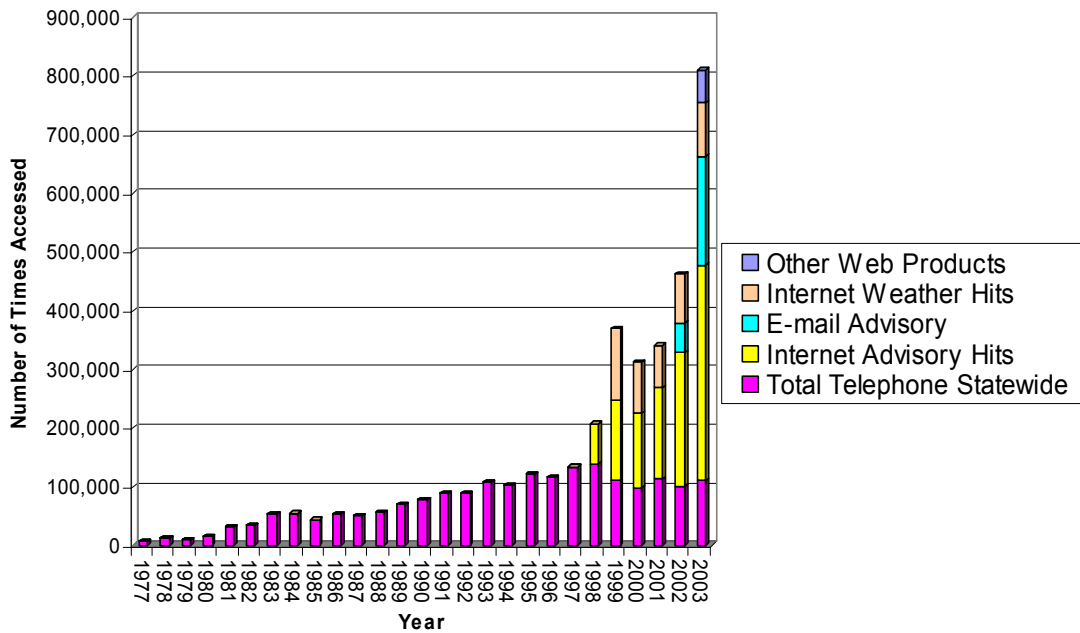
need to hear, not only about the mountains but what they needed to learn in their particular stage of life. I have heard many people use the word “Yoda” to describe him, not for his short stature, but his patient, wise, intuitive council.

At the age of 65, when most people buy a mobile home and head for Arizona, Tom will begin his retirement by spending a month trekking to various Buddhist temples in Tibet, and also a visit to Everest base camp. Then he will return to the Tetons as his last season as a climbing ranger, where he will continue to do climbing patrols in the high mountains and give advice to young climbers. He still lives his life like the bumper sticker on his car, which reads, “my best vacation is your worst nightmare.”

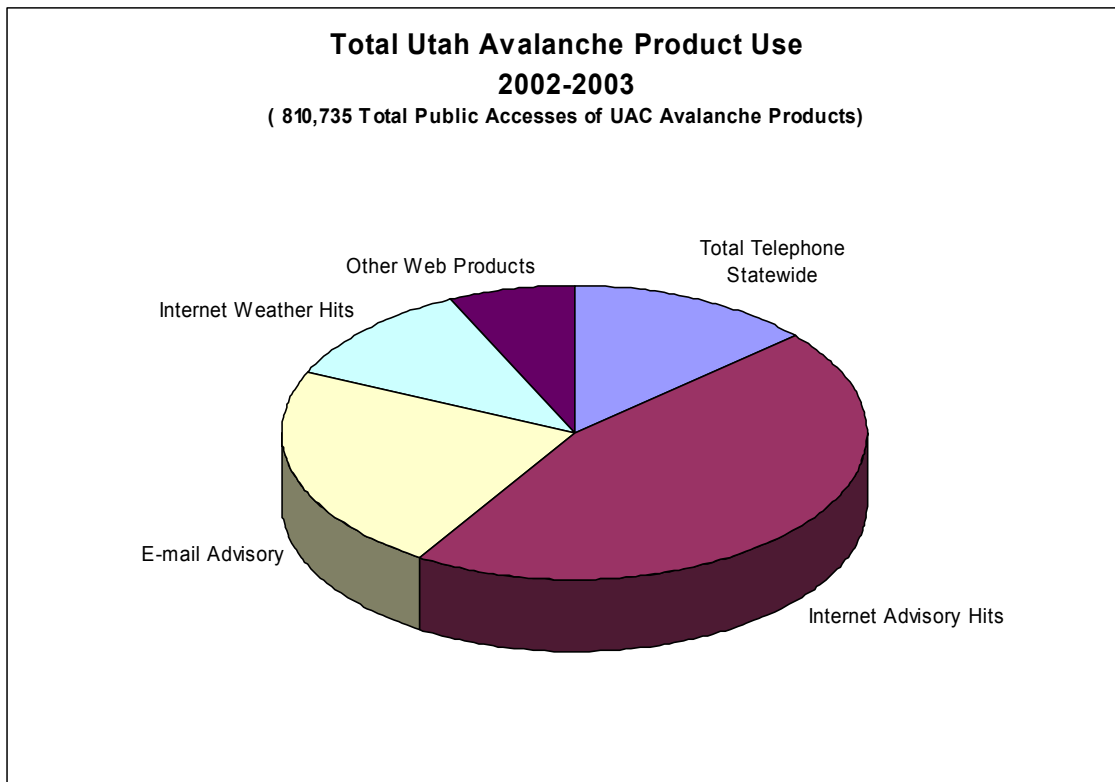


Tom Kimbrough remembers the past sitting in front of his cabin at the foot of the Tetons in Grand Teton National Park where he has been a climbing ranger for the past 30 years. Bruce Tremper photo

Total Avalanche Product Access Statewide



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. 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.



Distribution of UAC Products

Each year, we continue to see the demand for UAC products increase exponentially. These products include the avalanche advisory, the mountain weather forecast, photos of avalanches and avalanche accidents, a list of backcountry avalanche activity, products for the media, avalanche education information, maps, and a number of other products. The Internet has been an invaluable tool for avalanche forecasting, as it allows the public to quickly and efficiently gather critical information. Nearly every day, we talk to people who say that they don't call the advisory anymore, they just look at it on the Internet or have it automatically e-mailed to them each day. This season, we sent out an incredible 185,000 e-mails, averaging 1300 per day. In addition, around 800 people per day listen the advisory via the telephone recording and several thousand hear it each day during our three live radio broadcasts.

this season, for the first time, we posted a list of backcountry avalanches on the web. This list includes natural avalanches, intentionally triggered avalanches and unintentionally triggered avalanches. We could not include all the natural avalanche activity after a storm, as the list would be far too long, but we included only the significant events that we felt people needed to know about. Even so, the list included well over 300 avalanches, each listed by location, elevation, aspect, steepness, depth, width, vertical fall, weak layer involved and a short discussion about the avalanche. For anyone heading into the backcountry, recent avalanche activity is the most important piece of information and we felt strongly that we should make it available on the web. It also saved time in listing all the details on our regular avalanche advisory and allowed the public to look at the past week or two of avalanche activity to look for patterns. It was a popular product with over 11,000 web hits for the season.

Our second most popular product besides the avalanche advisory, is the photos of avalanches and avalanche accidents. People tell us that they spend far too many of their lunch hours at work browsing through all the photos and reading the stories about avalanches and avalanche accidents. The photos provide an extremely valuable learning experience—so see how large and deadly avalanches actually are, and exactly how, why and where they occur.

As the Internet continues to evolve as a medium, we will continually change our ways of doing business. In the future, we will likely carry video cameras and post video clips. We will likely continue to develop more graphical-based avalanche advisories and continue to provide more and more detailed information.

Season Summary

This was the fifth year of below normal precipitation in northern Utah and this was the lowest snowpack year since the early 90's. The first half of the winter was the driest winter since the record-setting 1976 season. Even though February, March and April ended up near average at upper elevations, just like most of the winter, very little low elevation snow fell. Throughout the winter the Wasatch Range looked like what Evelyn Lees said in one of her advisories, "A cake decorated by a child, where they put frosting on top but they forgot the sides." Although high elevation places like Alta ended up at 79 percent of normal, most mountain areas were between 50 and 70 percent, while down in Salt Lake City, ended up with only 36 percent of normal snow for the winter. Maybe next year...

Early Season

A series of storms in early October blanketed the mid and upper elevations with snow, but warm weather towards the end of the month caused most of it to melt, with the exception of the upper elevation northerly facing slopes—the same slopes which produced large and scary avalanches for most of the season. The snow in these shady areas sat undisturbed for about two weeks. Cold snow surface temperatures combined with a shallow snowpack formed a steep temperature gradient, which rotted the snow into very weak, large-grained, depth hoar, which not only has the mechanical properties of a pile of champagne glasses, but it is notoriously persistent.

November

A series of snow storms in early November produced the first avalanche cycle of the year. The storms created several new snow and wind layers above the weak October snow. This stratigraphy created some unusual avalanche conditions in upper elevation areas. Several people triggered avalanches on the bed surface of avalanches which had just run, which is extremely unusual. Near the end of November it stopped snowing and the beginning of our second period of depth hoar formation. November only totaled 57 percent of average at Alta.

December

During the dry spell of late November and early December the entire snowpack turned into some of the weakest snow ever observed by our staff. On December 12th an ice crust formed on the surface of the snowpack, which was kind of like putting a thin pane of glass on top of a pile of potato chips. A large storm around the middle of the month dropped over two inches of water in the upper mountains and a series of storms for the next couple weeks continued to incrementally add weight on top of the fragile snowpack. Not surprisingly, many people got a good education in depth hoar avalanches by unintentionally triggering many avalanches, some "remotely"—when people trigger avalanches some distance away. Although more snow fell in December than November, it still was only 86 percent of average for December at Alta.

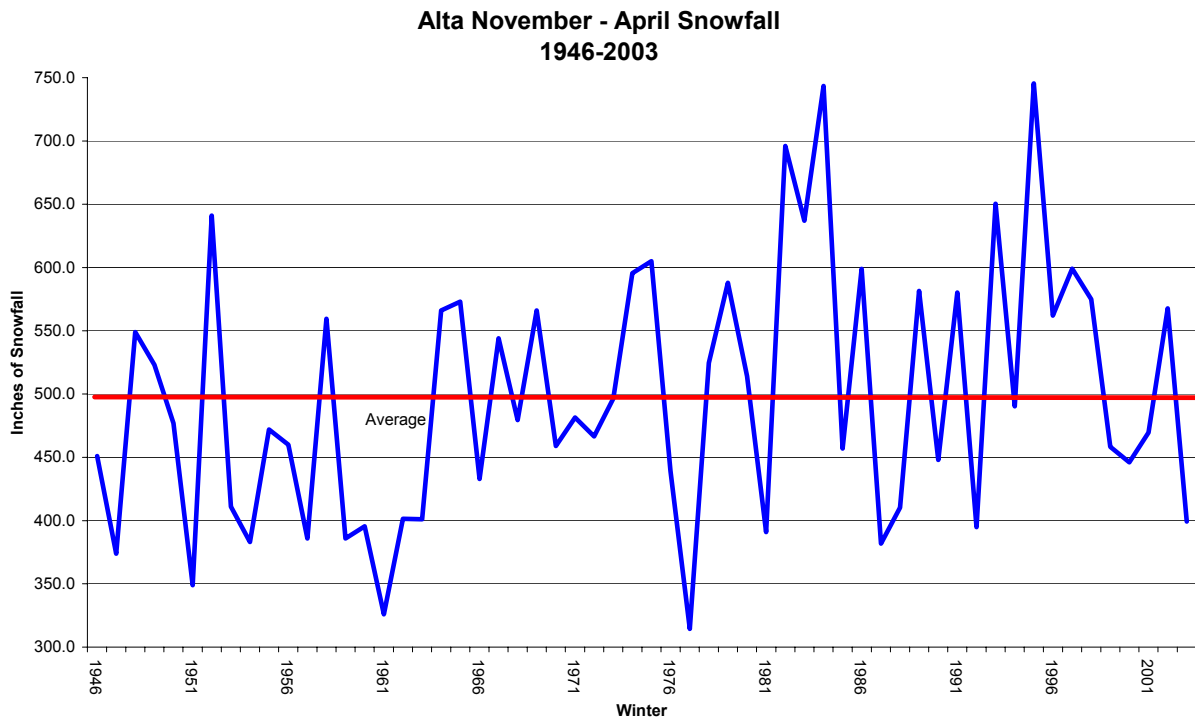
January

Unfortunately, the drought intensified and our usual January thaw was more intense than most years.

Snowfall at Alta 1945 - Present

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

1989-90	76.0	49.0	107.5	100.5	84.0	31.0	448.0
1990-91	109.5	91.0	82.8	49.7	110.9	136.3	580.2
1991-92	133.4	57.2	41.8	85	50.1	27.5	395.0
1992-93	118.8	119.2	165.3	102.9	63.0	81.2	650.4
1993-94	40.7	64.85	122.7	134.05	47.2	80.8	490.3
1994-95	205.9	73.8	199.7	56.3	128.9	80.7	745.4
1995-96	57	53	187	104	82	79	562
1996-97	78.3	164.8	141.5	91	53.8	69.7	599.1
1997-98	46.3	81.8	128.9	156.6	92.3	69	574.9
1998-99	76.5	43.1	105.3	98	46.5	89	458.4
1999-00	30.0	97.0	100.0	119.5	84.0	15.5	446.0
2000-01	88.0	71.0	66.2	79.5	53.0	112.0	469.7
2001-02	137	86.1	100.9	53.4	142.2	48.1	567.7
2002-03	42	78.7	26	84.1	93.8	74.8	399.4
Average	72.4	91.1	94.4	83.0	90.1	66.3	497.9
Maximum	205.9	244.5	199.7	156.6	183	136.3	745.4
Year of Max	94	83	95	97	64	91	95



The town of Alta only received 27 percent of its average for the month, and the Salt Lake International Airport was only 0.8° F away from the warmest January on record. Although not much snow fell in January, there were numerous human triggered avalanches through the first week of the month.

Although there was much below normal precipitation in January, most people walked around on pins and needles and people continued to trigger large and scary avalanches. Our avalanche advisories began to sound like a broken record, which sounded something like: "The snow continues to become weaker and weaker and if we ever do get snow, it's really going to rock and roll."

February

Time to rock and roll. We had a Colorado snowpack and we began to slam it with Oregon weather. Warm, albeit regular, snowstorms rolled into Utah for the rest of the winter with February, March and April finishing slightly above average for precipitation. February 1st started with a huge dust storm, which created a distinctive chocolate brown layer on the surface of the snow and then promptly buried it with 2-3 feet of new snow. Each day, we waited for the news of a fatality to arrive but miraculously, everyone dodged the bullet until finally, when the avalanche danger had substantially subsided, one backcountry skier happened to find one of the lingering booby traps and triggered a large avalanche on Gobbler's Knob (see Incidents and Accidents). During the last week of February, The Uinta Mountain finally had enough snow to begin an avalanche cycle with many avalanches breaking 4 feet deep and hundreds of feet wide. However, it was nothing compared to what was to come.

March

The snowpack in the highest parts of the Salt Lake Area Mountains finally became deep enough to decrease the temperature gradient across the deeply buried layers of faceted snow and they quickly gained strength. The overlying snow had also become thick and stiff enough that it was difficult for people to trigger deeper avalanches. It was a different story, however, for all the other mountains of northern Utah, most of which have chronically less snow than the Salt Lake Area Mountains. Most of the winter up to this point, almost all the avalanches had been triggered in the mountains near Salt Lake and almost all were skiers. In almost all the areas outside of the Salt Lake Area Mountains, snowmobiling is the primary form of recreation, and finally the snow was deep enough to cover the popular trailheads and allow access into the upper elevation avalanche areas.

In the Uinta Mountains became especially active with numerous, large, climax avalanches. This widespread cycle occurred at mid elevations too. Several days later, when we finally got some visibility, we could see that a very widespread natural avalanche cycle occurred. Nearly every slope above 9,000' in elevation had at least some natural avalanche activity, almost all of which ran on weak, faceted snow near the ground, making for very large avalanches. Many were 4-7 feet deep and hundreds of feet wide. Despite several close calls, everyone came home alive. March ended up with slightly above normal snowfall at Alta.

April

Normally, most of us look forward to the sunny skies, warm temperatures and corn snow of April, but this April it remained cold and snowy for most of the month. Regular snow storms laid down a foot or two of nice powder followed by warm sun, which would make widespread areas of wet sluffs on sun exposed slopes. In the shallower snowpack areas such as the Uinta Mountains and the Timpanogos area, some of these wet sluffs which stepped down into deeper weak layers, making much larger avalanches. The best powder snow conditions

of the season occurred in April in at least three different, memorable storms. Die hard recreationists were well rewarded. Despite starting out with so much promise, April ended the winter with a whimper. Although spring storms buffeted Utah through the entire month, the storms during the last half of the month seemed to lose their resolve at the last minute and leave us with mostly wind and clouds. The snowpack was deep and mostly stable and very few avalanche incidents occurred in April. We issued our end of season message on April 28th glad to put this season out of its misery.

May

Although we were no longer forecasting, the winter suddenly decided to make up for lost time. For the first 9 days of May, more snow fell in the upper elevations of the Salt Lake Area Mountains than in the entire month of January. A continuous series of cold, wet storms laid down several feet of fresh snow in the upper elevations and people enjoyed great powder skiing once again. Finally, when temperatures warmed up on the 10th and there was the predictable widespread wet sluffs and wet slabs on most all slopes, and several more unintentional human triggered avalanches in the backcountry.



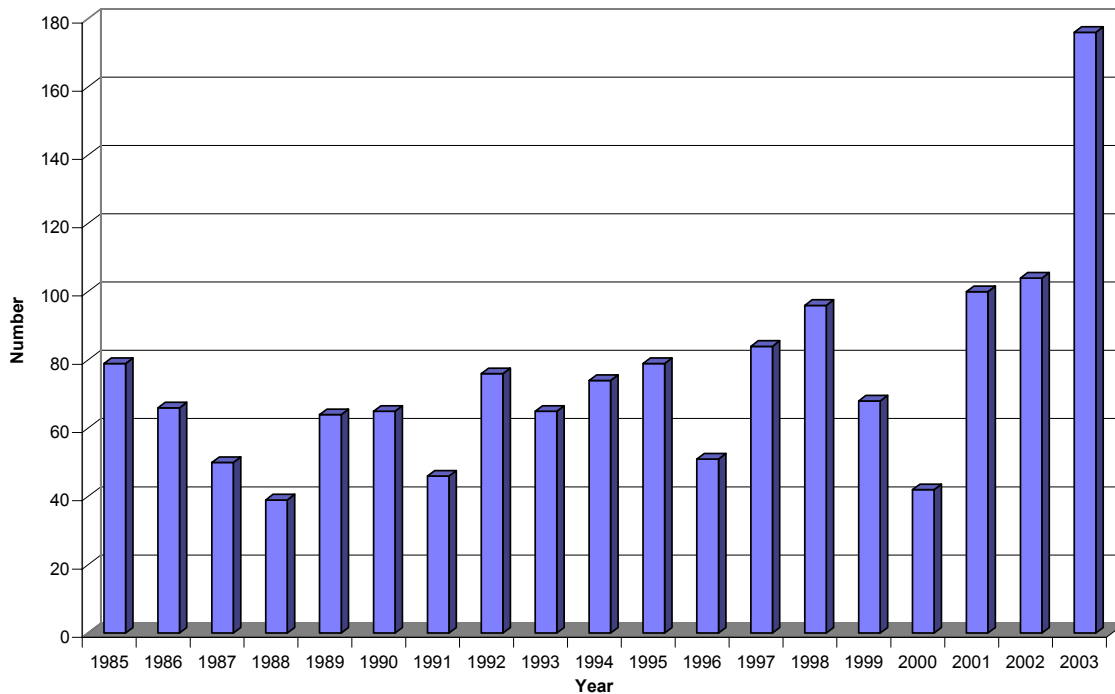
Forest Service Utah Avalanche Center Director, Bruce Tremper, measures the slope steepness of a recent human triggered avalanche in Cardiff Fork. Slope steepness is an extremely critical parameter as just a couple degrees can be the difference between triggering an avalanche and not triggering one. This was a typical avalanche for the season, deep, wide and easily-triggered.

Avalanche Incidents and Accidents

The 2002-03 season was unprecedented in the 22 year history of the Forest Service Utah Avalanche Center. Although significantly less snow fell than normal, more people unintentionally triggered avalanches in the backcountry than in any previous year—176 incidents that we know of, which smashed the old record of around 100. Of those who triggered avalanches, 65 were caught, 16 were partially buried, six were totally buried, four were injured, and despite all this, there was only one fatality. These numbers include only the incidents we heard about and we estimate that perhaps an equal number of people triggered avalanches that we did not hear about, especially among snowmobilers in rural areas outside of our forecast area. This list does not include explosive-triggered avalanches at ski resorts or on highways, nor does it include intentionally-triggered avalanches in the backcountry, such as from ski cuts, kicking cornices or explosive stability testing by the helicopter or cat skiing companies.

Contrary lay wisdom, actually the most dangerous avalanche conditions tend to occur during low snowpack years, because most avalanches in Utah occur on layers of weak, “faceted” snow, which form from large temperature gradients within the snowpack, which occurs with a vengeance in a thin snowpack. The foundations of the fragile snowpack formed in the early season and plagued us until well into March. As we look through the very long list of avalanche accidents this season, we are struck not only by the overwhelming number of incidents, but by how many remotely triggered avalanches occurred, that is, when people trigger avalanches some distance away from them. The person’s weight collapses the snowpack onto the buried weak layer and the fracture propagates outward and when it reaches a slope steep enough to slide, it does

Unintentional Human Triggered Avalanches in the Backcountry



so—sometimes 10, 50 or 100 feet away. Undoubtedly, the sensitivity of the snow saved many lives as people tended to trigger avalanches before they could even get onto the slope. The photo on the cover of this report is a good example.

Why did so few people die when we had so many incidents? We suspect that climate combined with geography and demographics to produce a disproportionate number of skier and boarder triggered avalanches compared to ones triggered by snowmobilers. Snowmobilers have historically produced higher fatality rates per number of triggered avalanches. This season, avalanche incidents included 108 skiers, 11 snowboarders and only 8 snowmobilers. In other words, skiers and snowboarders made up 94 percent of the avalanche incidents. People triggered very few avalanches below an elevation of 9,000', largely because with such a dry, warm winter, almost no snow accumulated at lower elevations. During the months of January and February, when most of the incidents occurred, the only roads that access higher elevation terrain exist in the Salt Lake Area Mountains, which are used almost exclusively by skiers and snowboarders. Terrain used primarily by snowmobilers, (nearly all areas outside the mountains near Salt Lake City) tend to have lower elevation trailheads, which remained nearly devoid of snow until later in the winter. Even for the hard-core riders who could get into the high country, the snow was so thin and rocky it kept most of the riders away from avalanche terrain when it was most hazardous. When low elevation trailheads finally accumulated enough snow later in February and March, the avalanche danger had abated enough to keep snowmobiler avalanche incidents to a minimum, with the exception of the March 8th cycle.

Also, skiers and snowboarders tend to be a very avalanche-educated group compared to snowmobilers. We estimate that close to 100 percent of backcountry skiers carry rescue gear, have taken an avalanche class and consult the avalanche report before heading out, compared to perhaps 80 percent of backcountry boarders, and, depending on location, perhaps only 30-70 percent of snowmobilers, depending on location. Therefore, in recent years, total burials among snowmobilers tend to have a much higher fatality rate than among skiers and boarders. Also, with better avalanche education and more experience, skiers and boarders tend to know how to handle unstable conditions by using safe travel protocol.



The beast. A close look at the very fragile and weak faceted layer of snow that caused a record number of unintentional human triggered avalanches in the backcountry. The snow is large-grained, poorly bonded, and persistent. This means that it continues to produce avalanches throughout the season each time it is loaded with new or wind-blown snow and thumped by a trigger, such as the weight of a person.

Season History of Avalanche Incidents and Accidents

November

Human triggered avalanches started early when a skier near Tony Grove Lake in the Logan Area Mountains triggered an avalanche, which caught him, on November 19th. In the Salt Lake Area Mountains, two other skiers triggered avalanches in separate incidents in Silver Fork and Days Fork and the avalanches partially buried both of them. In this same avalanche cycle, some very unusual avalanches occurred. Normally, after an avalanche occurs, the bed surface of the avalanche instantly becomes a very safe place for the same reason that a stick of dynamite is safe after it has already gone off. But several people, including some experienced patrollers, triggered avalanches on bed surfaces of recent avalanches. Two experienced backcountry skiers had a very close call with one of these on Point Supreme at Alta before Alta was open for the season. As they descended in bad visibility, they found themselves at the top of cliffs. Instead of ascending to skirt around the cliffs, they decided to descend on the bed surface of an avalanche, which had recently run—normally, a very safe practice. The second person down triggered an avalanche, which broke down to the depth hoar near the ground and it not only caught him, but it buried his partner lower on the slope. Despite injuries sustained in the slide, he extricated his completely buried partner. It was the first close call of many more to come. November ended with around 15 unintentional human triggered avalanches in the backcountry.

December

A two-foot storm near mid December again overloaded the buried layers of very fragile depth hoar near the ground. The snowpack became spectacularly unstable as it collapsed nearly everywhere anyone traveled with huge booming whumphs that propagated sometimes a hundred yards outward, which is a classic sign of instability. In a great example of this kind of instability, two of our staff members went to Cardiff Peak because you can get there quite safely and it's also a good vantage point to see avalanche activity in a wide swath of surrounding backcountry. As they broke a trail in safe terrain up the gentle spine of the ridge, they collapsed the snow, which propagated a fracture onto the steeper slopes on the north side of Cardiff Peak, which triggered a 2 foot deep, 300 foot wide avalanche 50 feet away from them. After examining the fracture of that avalanche, they stepped above the fracture line to gain access to the ridge and they heard excited voices coming from the other side of the ridge. When they gained the ridge and looked down the other side, they discovered that a slide had just hit one of two people who happened to be in the bowl below. Although it did not knock him down, it buried one of his skis, which he managed to find. There was no way to know whether they triggered the slide from the opposite side of the ridge or whether the other skiers triggered it from below. Either way it clearly showed the extremely tender nature of the faceted snow when it was freshly overloaded by the weight of new snow.

People were hungry for powder and when it finally came at mid month, everyone had a hard time restraining themselves. **For three weeks from mid December through the first week of January, Utah experienced the most active and longest lasting period of human triggered avalanches in the backcountry in the 22 year history of the Utah Avalanche Center.** An incredible 68 unintentional human triggered avalanches occurred in the backcountry, including 22 people caught. This averages about three and a half per day and it continued nearly unabated for 20 days. Remarkably enough, no one died. A number of other people—primarily skiers in the Salt Lake Area Mountains—got a good education in the persistent instabilities of faceted snow. The December total included, at least 34 people unintentionally triggered avalanches in the backcountry, which caught eight people and partially buried four.



A typical avalanche for the 2002-03 winter. This one on Little Superior Butte in Cardiff Fork broke about four feet deep and about half the size of a foot ball field. They were often triggered in shallow, rocky areas and the fracture then propagated out into more stable snow, making a very large avalanche. Many people got a good education in dealing with what we call "deep slab instability on faceted snow." Often several people could cross the slope without triggering an avalanche and one person happened to hit the trigger point and the avalanche would take out sometimes dozens of other tracks.

January

In the avalanche forecasting business you learn to be very nervous about sunny days following a storm and especially nervous when sunny Saturdays or holidays follow a storm. And so it was that on a sunny New Year's Day following a storm that twelve different people managed to trigger avalanches. Of these, three different people were caught with one buried to his chest and another injured enough to require rescue. The next day, five people triggered avalanches and one lost equipment. In the following few days, 14 more people unintentionally triggered avalanches, catching several of them. An incredible 37 people had close calls with avalanches in six days—capping the aforementioned record-setting 3 week period with a flourish.

Ironically enough, the closest call and the only one that received media attention occurred at the very end of the avalanche cycle, just when conditions had become much more stable. A flock of anglers obviously watched over a lone skier on Cardiac Ridge when he triggered a large avalanche, which swept him 800 vertical feet to the bottom of the bowl and completely buried him at least 4 feet deep. Normally, a person without a partner buried 4

feet deep has close to a zero percent chance of survival. In this case, two other parties happened to be skiing in the area and they quickly converged on the burial site. Two of the rescuers happened to be very experienced backcountry skiers who were very good with their beacons and the other party consisted of an emergency room doctor and a critical care nurse. They extricated him in short order and took good care of him until a medical helicopter arrived. Although there had been a steady sting of close calls with avalanches throughout the season, the arrival of a medical helicopter tends to trigger the media feeding frenzy and this accident became the first one of the season to make it onto the evening news. With two attractive women as the primary rescuers, it was a made-for-media story, which received wide coverage in both television and print media.

January ended with 36 human triggered avalanches, 13 people caught, six partial burials, one total burial and four injuries. Almost all of these occurred within the first week of the month. With almost no snow for the rest of the month, yet another round of very weak faceted snow formed on all the shady aspects, which paved the way for the final round of avalanches in the Wasatch Range.



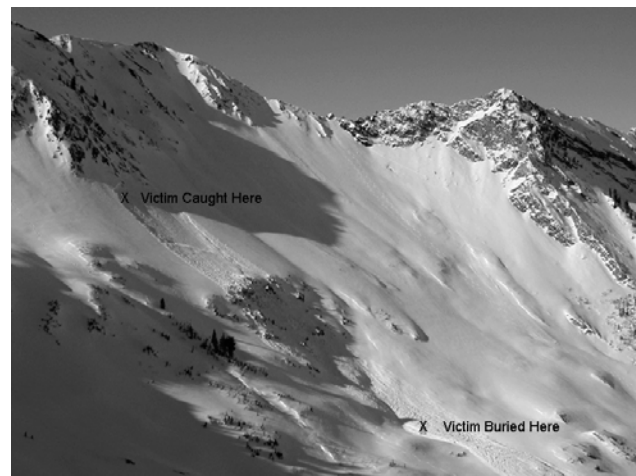
A snowboarder triggered avalanche on Little Water peak. Notice how the fracture pulled up onto the flat part of the ridge, which is occurs only in very unstable conditions.



A skier triggered avalanche low in the foothills of Ben Lomond Peak. The skier was caught but not buried.



A skier-triggered avalanche in west Monitor. They triggered the avalanche from the flat part of the ridge 50 feet away from the fracture.



This photo of Cardiac Ridge, a lone skier triggered an avalanche high on the slope near a shallow, rocky area and was carried over some rocks and completely buried over four feet deep. Two other parties of backcountry skiers happened to be in the area and they located the victim with avalanche rescue beacons and extricated him in time to save his life. He obviously had a flock of angles watching over him.

February

February 1st became an easy day to remember, not only for the change in the calendar, but a huge wind storm filled the air with choking dust blown off the southern deserts creating a distinctive chocolate brown layer in the snowpack. This became a very convenient marker in our snowpits to show when the winter suddenly turned from a drought into more regular and more copious snowstorms.

A big snowstorm in the first few days of February initiated the predictable round of human triggered avalanches. From January 28th through February 9th, 22 unintentional human triggered avalanches occurred in the backcountry, averaging around two per day. Many of these were very sensitive with “remote” triggers common. And the avalanches were all very large, breaking in deep, wide hard slabs 2-4 feet deep and often taking out the entire slope. Often people would trigger them from a shallow area on the slope and it would propagate into deeper, more stable snow. It was the classic setup where many slopes could be negotiated without incident—giving people a false sense of security—and then one person would happen to find the a trigger point and the avalanche would take out dozens of previous tracks. It was a nerve-wracking time and many locals got a valuable education in dealing with hard slabs underlain by weak faceted snow—something that people deal with most every winter on the east slopes of the Rockies.

On the 4th, one person on Twin Lakes Pass triggered an avalanche and was buried with only a hand sticking out and was quickly rescued by their partners. On the same day, two skiers triggered a deep, large avalanche on Cardiff Pass, which pushed one into a tree and partly buried him. As the snowpack became deeper and stronger, the buried layers of faceted snow not only began to gain strength, but the overlying layers of snow became quite thick and stiff, making it more difficult for a person to transmit their energy to deeply buried layers of faceted snow. Avalanches became more difficult to trigger. By mid February, the only places where people could still trigger some of these deep, large, lurking monsters were in steep, shallow, rocky areas. Once again, the most prominent accident in the avalanche cycle—a fatality in this case—occurred near the end of an avalanche cycle. A group of experienced backcountry skiers on Gobbler’s Knob found one of the steep, shallow, rocky slopes we had been warning people about on our forecast.

The group consisted of fairly experienced and avalanche-trained skiers. They had successfully skied several other steep slopes in the area earlier in the day without incident. Near the end of the day, on their last run, they descended the northwest face of Gobbler’s Knob to get to their car in Mill Creek Canyon. Alan Davis descended first while the others waited in the trees at the top. He triggered a one-foot deep, hard slab avalanche on a steep, 40-degree north-facing bowl. The initial avalanche was only about 100 feet wide, but as it descended, it continued to pull out additional slabs on the sides of the bowl, and the avalanche quickly spread out to around 400 feet wide. The resulting large volume of snow funneled into a very narrow, twisting gully, which ran a very long distance. It deposited the victim 4 feet deep and some 1700 vertical feet below where he triggered the avalanche. The rest of the group descend as quickly as they could with their beacons on receive, but the avalanche path snaked around several times and became very narrow and choked with difficult-to-negotiate avalanche debris. Nevertheless, they managed to locate him and dig him out within about 25 minutes, which is a fast time for such a tortuous, long, rough avalanche path and such a deep burial. Unfortunately, he did not respond to CPR.

Alan Davis did volunteer work for the Friends of the Utah Avalanche Center and he was a great guy,



The northwest face of Gobbler's Knob, the site of the season's only avalanche fatality. The first skier in the group descended down this bowl from the trees near the skyline just right of the center of the photo. Although the slab he triggered was only about a foot deep, it continued to propagate and as it descended, it took out the entire bowl, breaking down to the dirt and bushes seen on the bed surface in this photo. The resulting large volume of snow funneled into a narrow gully and descended 1,700 vertical feet, where the victim was buried about four feet deep.

loved by every one who spent time with him. We will miss him.

For the rest of February, several more human triggered slides occurred, but the pace had thankfully diminished from the frantic swarms earlier in the winter. The highest parts of the Wasatch Range began to accumulate enough snow to pass the magic threshold where it becomes much more difficult to trigger the deep, large, scary avalanches so common during most of the winter. For the rest of the season, the avalanches seemed to become shallower and more predictable and most of the activity shifted to thinner snowpack areas at lower elevations and outside of the Salt Lake Area Mountains. During February, 33 people unintentionally triggered avalanches in the backcountry, which caught 12 people, partially buried seven, with one injury and one fatality—thankfully the only one of the season.

March

As the snowpack had finally stabilized in the Salt Lake Area Mountains, it reached critical mass in the thinner snowpack areas, especially in the Uinta Mountains and the Mountains near Ogden and Provo. Of the 48 unintentional human triggered avalanches in March, 80 percent of them were outside of the Salt Lake Mountains. On March 8th, we issued an avalanche warning for the areas outside of the Salt Lake area mountains and



A large snowmobile triggered avalanche on the Manti Skyline during the big avalanche cycle 3-8-2003



A large natural avalanche in the western Uinta Mountains during the big avalanche cycle 3-8-2003



A natural avalanche in Four Eagle Bowl in the Uinta Mountains



A natural avalanche in the 1000 Peaks area in the Uinta Mountains

a group of snowmobilers triggered 14 avalanches in the Bountiful Peak area (between Ogden and Salt Lake) and snowmobilers triggered at least 12 avalanches in the Uinta Mountains. Many of these slides broke up to six feet deep and hundreds of feet wide, breaking down to the weak, layers of depth hoar near the ground. The following weekend, perhaps a dozen human triggered avalanches occurred in the Uinta Mountains, mostly by snowmobilers. Fortunately, everyone escaped uninjured. Another large storm near the end of March came in with hurricane force winds, which initiated another round of natural avalanches.

The Logan and Ogden Area Mountains also produced many large avalanches. One of the closest calls of the winter came on the avalanche warning day—March 8th—in the Logan Area Mountains on Naomi Peak when Jared Stanley, a 22-year old student from Pocatello triggered an avalanche, which buried him under an incredible eight feet of avalanche debris. His quick-acting companions, including his two older brothers, used their beacons to locate him and excreted him quickly. He was not breathing when they dug him out, but they gave him CPR and he came around. Amazingly enough, he received no injuries and after they dug out his sled, he rode out on his own.

Not to be outdone by the rest of the winter, March ended with 48 unintentional human triggered avalanches in the backcountry with 11 people caught, two partial burials and one total burial.

April

After a record-setting and unrelenting winter of human triggered avalanches, we welcomed the arrival of April. Smaller snowstorms, warm weather between storms and a deeper, more stable snowpack combined to keep avalanche activity to a minimum. Only seven people triggered avalanches with four of them caught. We issued our last forecast of the season on April 27th.

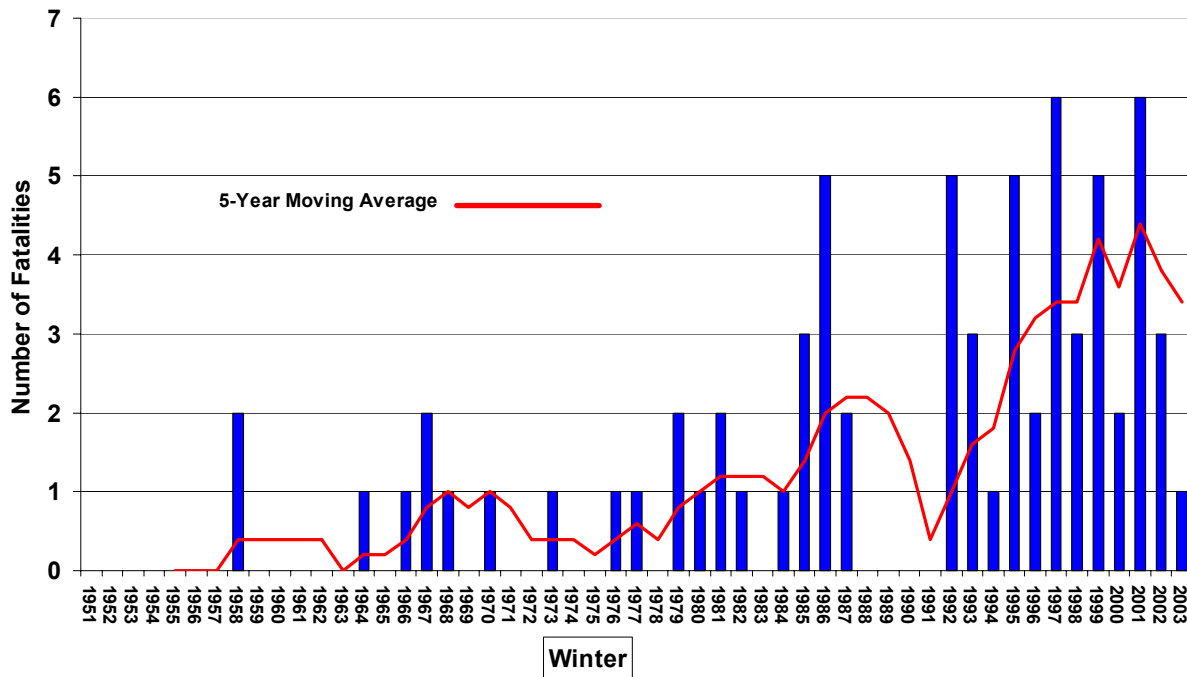
May

Although we had ended our avalanche advisories for the season, the winter suddenly decided to make up for lost time. More snow fell in the first 9 days of May than for the entire month of January. Several more human triggered avalanches occurred in the backcountry including a large slide in Day's Fork and another on Flagstaff Ridge.

On May 10th, Chuck Denwalt, a backcountry skier at Alta (which was closed for the season) got too close to the edge of a knife-edged ridge near the High Notch and it appeared that he either slipped or broke off a small piece of cornice at the top of the cliff, which pitched him over a 50 foot cliff. He landed head first on the rocks at the bottom of the cliff and was killed instantly. Coincidentally enough, on his day off, UAC Director, Bruce Tremper happened to be skiing in the flats below and responded to the accident. He administered CPR but the victim had already died from massive head trauma and blood loss. We did not classify this as an avalanche accident but it deserves mention here since it is possible that a small cornice break at the top of the cliff may have caused his fall. We will never know if he slipped first and broke the cornice as he went over the edge or if the cornice break caused the fall. Bruce Tremper noticed only a very small amount of snow falling with the victim.

On May 28th, the Salt Lake Airport broke the all-time record for the month of May for the warmest temperature—99 degrees. Winter was officially over.

Avalanche Fatalities in Utah 1951-2003



Avalanche Incidents and Accidents 2002-03

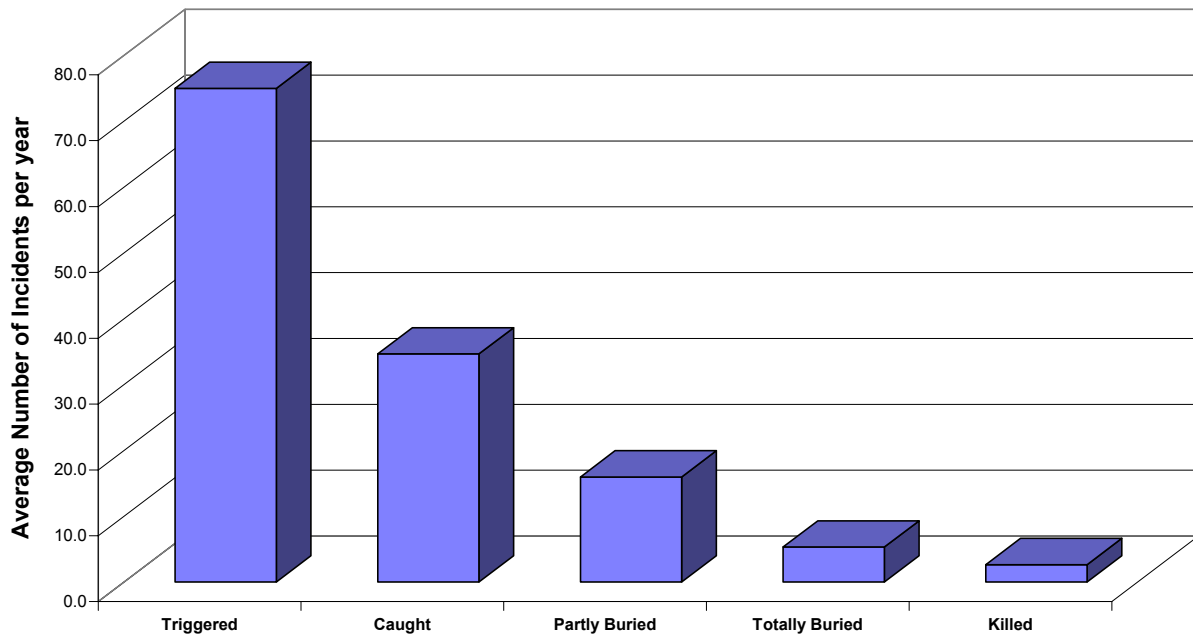
This list includes only unintentional human triggered avalanches in the backcountry

Date	Location	Details	Triggered	Caught	Partially Buried	Totally Buried	Injured	Killed
11/8/02	Alexander Basin	Skier triggered, broke 30 feet above him, jumped on rock and escaped	1					
11/8/02	Sugarloaf	Near the top of the lift - ski area closed	1					
11/9/02	Logan - Tony Grove Lake	Two skiers caught, lost gear	1	2				
11/9/02	Catherine's Pass	Skier triggered	1					
11/9/02	Maconkies	Several pockets triggered by skiers	several					
11/9/02	Sunset Peak	Remotely triggered by skiers	2					
11/9/02	Alta Ski Area	Several slides triggered by skiers and boarders. Ski area closed.	several					
11/10/02	Silver Fork	Skier caught, partially buried, lost gear	1	1	1			
11/10/02	Silver Fork	One slide remotely triggered by skiers, which then sympathetically triggered 5 more slides.	1					
11/10/02	Grizzly Gulch	Several human triggered avalanches	several					
11/10/02	Snake Creek	Triggered by the forth skier down	1					
11/10/02	Point Supreme	Two skier's caught with one total burial and one injury. Skiers triggered bed surface of recent avalanche.	2	2	1	1	1	
11/11/02	Main Days	Skier triggered, caught, partly buried, lost gear but no injuries	1	1	1			
11/11/02	Days Fork	Remotely triggered by skiers	1					
12/17/02	Brighton Backcountry	Remotely triggered by skiers	1					
12/18/02	Pioneer Ridge	Snowboarder caught and partly buried	1	1	1			
12/19/02	Cardiff Peak	A group of skiers on a ridge remotely triggered an avalanche that caught another skier below	2	1	1			
12/19/02	Grizzly Gulch	Two slides triggered by skiers	2					
12/20/02	Brighton backcountry - Hidden Canyon	Several slides triggered by OB skiers	4					
12/20/02	Cardiff Fork	Snowmobiler triggered a road cut	1					
12/20/02	Cardiff Pass	Skier triggered on north side of Pole Line Pass	1					
12/20/02	Silver Fork	Skier triggered hard slab	1					
12/21/02	Near Tri Chutes	Remotely triggered by skiers	1					
12/21/02	Little Water Peak	Remotely triggered by skiers	1					
12/22/02	Twin Lakes Pass	Skier triggered	1					
12/22/02	Pink Pine	Skier triggered	1					
12/22/02	Wilson Fork	Three pockets triggered by snowboarders	3					
12/22/02	Lake Lackawaxen	Probably triggered by snowmobiler	1					
12/22/02	Mt. Ogden	Triggered by backcountry boarder, not caught	1					
12/23/02	Cabin Run - Gobblers Knob	Skier triggered	1					
12/23/02	Sunset Peak	Slide broke 20' above skier	1	1				
12/26/02	White Pine Birthday Chutes	Triggered by skiers	3					
12/27/02	Main Days	Human triggered	1					
12/27/02	Ben Lomand	Skier partially buried in two slides	2	2	2			
12/29/02	Willow Heights	Triggered by a skier two turns into the slope	1	1				
12/29/02	Peak 10,420'	Triggered by a skier on their first turn	1	1				
12/30/02	South Monitor	Skier triggered	1					
12/30/02	West Monitor	Skier triggered a cornice that triggered an avalanche	1					
12/30/02	White Pine - Boulder Basin	Snowboarder triggered, caught skier below who grabbed a tree	1	1				
12/30/02	Bunchgrass	Skier triggered	1					
12/31/02	Silver Fork	Human triggered soft slab	1	1				
12/31/02	West Monitor	Ski cut pulled out adjacent 30 degree slope	1	2				
1/1/03	Dutch Draw	One skier caught	1	1				
1/1/03	Limelight Bowl	One skier and dog caught. Required professional rescue	1	1	1		1	
1/1/03	Park City backcountry - Two Goons Bowl	3 OB skiers from Park City triggered large slide - not caught	1					
1/1/03	Dog Lake Chutes	Avalanche broke 40' above skier, strained through trees and rocks, lost equipment	1	1	1			
1/1/03	Ogden - Ben Lomond	Lone skier caught but not injured	1	1				
1/1/03	Ogden - Ben Lomond	Skier remotely triggered slide from a flat slope 50 feet away	1					
1/1/03	Patsy Marley	Remotely triggered slide	1					
1/1/03	West Monitor	Remotely triggered by skiers	1					
1/1/03	Cardiac Ridge	Triggered by skiers - took out their up track	1					

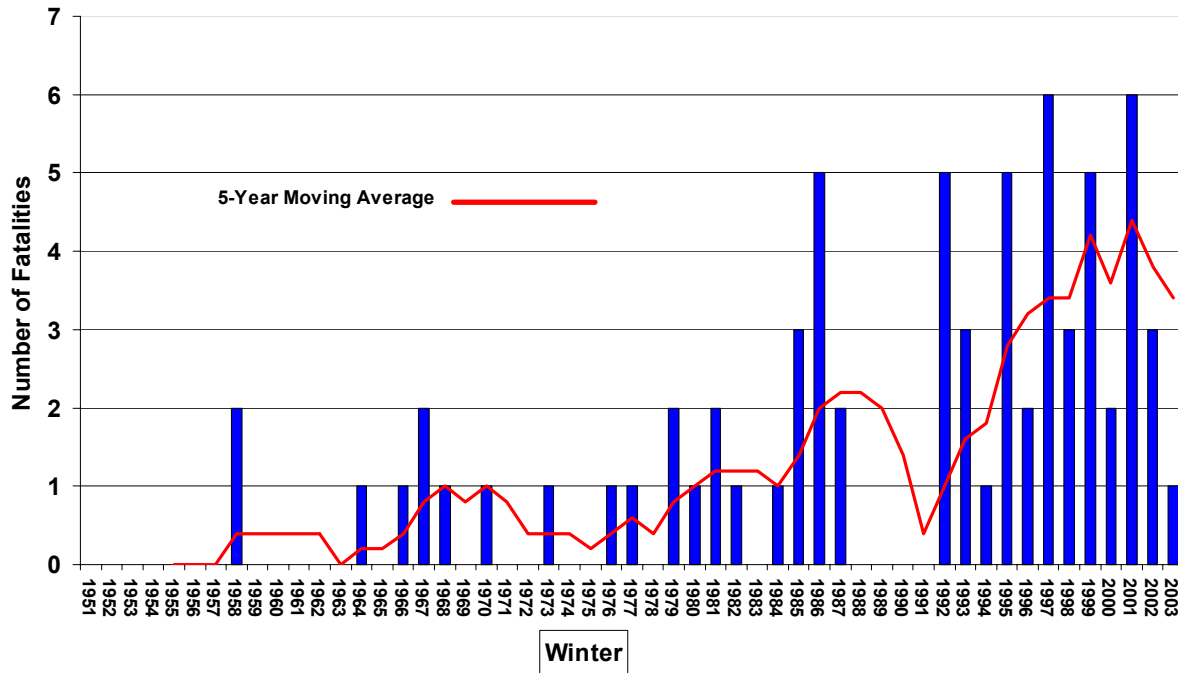
1/1/03	Farmington Peak	Three slides triggered by snowmobilers and one buried a person to his chest	3	1	1			
1/2/03	Peak 10,420'	Skier triggered	1					
1/2/03	Raymond Glades	Skier lost equipment	1	1	1			
1/2/03	Desolation Lake	Remotely triggered by skiers	1					
1/2/03	Cardiff Peak	Remotely triggered by skiers	1					
1/3/03	Snake Creek	Snowmobile triggered, broke to ground. Slope was tracked up	1					
1/4/03	Mt. Raymond	Remotely triggered by skiers	2					
1/4/03	Mary Chutes	Human triggered	1					
1/4/03	Tower Mountain	Snowmobiler buried with one hand out	1	1	1			
1/4/03	Silver Fork - Doug's Drop	Remotely triggered	1					
1/5/03	Reynolds Peak	Remotely triggered from ridgeline 150 feet away	1					
1/5/03	Silver Fork - Flanagan's	Slide broke at their skis but propagated above them	1	1				
1/5/03	Daly Canyon	Remotely triggered by skiers	1					
1/5/03	Little Water Peak	A snowboarder was briefly caught near the flank of a large slide	1	1				
1/6/03	Between Cardiac Bowl and Cardiac Ridge	Lone skier totally buried 4' deep and rescued by two nearby parties	1	1		1		
1/6/03	Days Fork	Skier triggered, went for ride. Injured, lost gear.	1	1				1
1/7/03	Butler Fork	Remotely triggered	1					
1/7/03	Pioneer-Sunset Ridgeline	Skier triggered, skied out	1					
1/20/03	Pioneer Ridge	Skier triggered	1					
1/26/03	South Monitor	Probable skier triggered	1					
1/28/03	Square Top	Remotely triggered by skier	1					
1/29/03	Wolverine Cirque	Triggered by ascending skier, carried 50 feet	1	1				
1/29/03	Dutch Draw	Triggered by OB skier or boarder from Canyons	1	1				
1/31/03	Dutch Draw	Possibly skier triggered	1					
2/2/03	Reynolds Peak	Remotely triggered	1					
2/2/03	George's Bowl	Skier remotely triggered two slides	2					
2/3/03	Silver Fork - Doug's Drop	Skier triggered avalanche on another below who grabbed a tree	1	1				
2/3/03	Clayton Peak	Snowboarder triggered slide but was able to escape	1	1				
2/4/03	Twin Lakes Pass	One skier buried with one hand out. Dug out by partners.	1	1	1			
2/4/03	Cardiff Pass	Skier triggered, one carried, one pinned and partially buried against tree	1	2	1			
2/5/03	Cardiac Bowl	Skier triggered and skied off slab after sliding 100 feet.	1	1				
2/5/03	Toledo Chute	Skier triggered, went for a short ride	1	1				
2/5/03	West Monitor	Skier triggered hard slab	1					
2/6/03	South Monitor	Remotely triggered hard slab	1					
2/7/03	Twin Lakes Pass	Triggered on third turn, buried 4' deep. Dug out by partners in 8 minutes	1	1		1		
2/7/03	Raymond Glade	Skier triggered, grabbed tree and slide washed over him	1	1				
2/7/03	Gobblers Knob	Remotely triggered after several people skied slope	1					
2/7/03	Monte Cristo	Remotely triggered by skiers on the ridge. Slide dusted LCC road 3000 vertical feet below (see cover photo)	1					
2/8/03	Grizzly Gulch	Triggered by backcountry recreationist	1					
2/9/03	Coalville Couloir	Skier triggered five turns into the chute	1	1				
2/15/03	Gobblers Knob	Skier triggered, caught and killed	1	1		1		1
2/17/03	Millicent Peak	Triggered by OB snowboarder who outran slide	1					
2/23/03	George's Bowl	Triggered while ascending. Two skiers partly buried.	1	2	2			
2/23/03	Square Top	One skier caught and carried but skied out to side.	1	1				
2/23/03	Meadow Chutes	Skier triggered	1	1				
2/23/03	Meadow Chutes	One snowboarder caught but rode out to side.	1	1				
2/23/03	Farmington Peak	Snowmobiler triggered as he rode off cornice	1	1				
2/24/03	Mt. Ogden Bowl	OB Skiers and boarders, two carried but not buried	3	2				
2/24/03	Pioneer Peak	Skier triggered, broke at skin track.	1					
2/25/03	Emma Gully	Remotely triggered	1					
2/25/03	Near Snowbasin	OB Skiers and boarders	2					
2/26/03	Millicent Back Bowl	Skier triggered, caught, buried, injured	1	1		1	1	
2/28/03	Wilson Chutes, Gobblers	Skier triggered sluff, hit partner below	1	1				
3/1/03	Logan - Cherry Creek	Skier triggered soft slab	1					
3/1/03	Sugarhouse Park	Sledder triggered small slide	1	1				

3/2/03	Mill Canyon Peak	Skier took short ride, dug into bed surface and stopped	1	1				
3/2/03	Bountiful Peak	Fourth skier triggered a slide	1	1				
3/5/03	Lower Emma Gully	Triggered by recreationists playing in/near gully	1	2				
3/5/03	Logan - Cherry Creek	Skier triggered soft slab	1					
3/5/03	Bountiful Peak	Remotely triggered	1					
3/6/03	Toledo Gully	Skier triggered	1	1				
3/7/03	Logan - Cornice Ridge	Snowmobile triggered soft slab	1					
3/7/03	Logan - Logan Peak	Snowmobile triggered soft slab	1					
3/7/03	Mt. Ogden	Triggered by OB traveler	1					
3/8/03	Logan - Naomi	Snowmobiler totally buried 5' down	1	1		1		
3/8/03	Logan - White Pine	Snowmobiler triggered hard slab	1					
3/8/03	Logan - Tony Grove area	Snowmobiler triggered soft slab	1					
3/8/03	Farmington Peak	Snowmobilers triggered many slides	14	1				
3/8/03	Uinta Mountains	Many snowmobiler triggered slides	12					
3/9/03	Daly Canyon	Remotely triggered by skier	1					
3/16/03	Silver Fork	Skier triggered soft slab	1					
3/17/03	Days Fork	Three skier triggered shallow soft slabs	3					
3/18/03	Grizzly Gulch	Skier triggered	1	1				
3/20/03	Limelight Bowl	Skier triggered, short ride	1	1				
3/26/03	Figure 8 Hill	Skier triggered small slab	1					
4/6/03	Holey Toledo	Skier triggered, carried short distance	1	1				
4/6/03	Near Snowbasin		3	3				
4/7/03	Wolverine Cirque	Triggered by snowboarder	1					
4/7/03	Little Superior	Skier triggered damp sluffs	2					
		Total	175	65	16	6	4	1

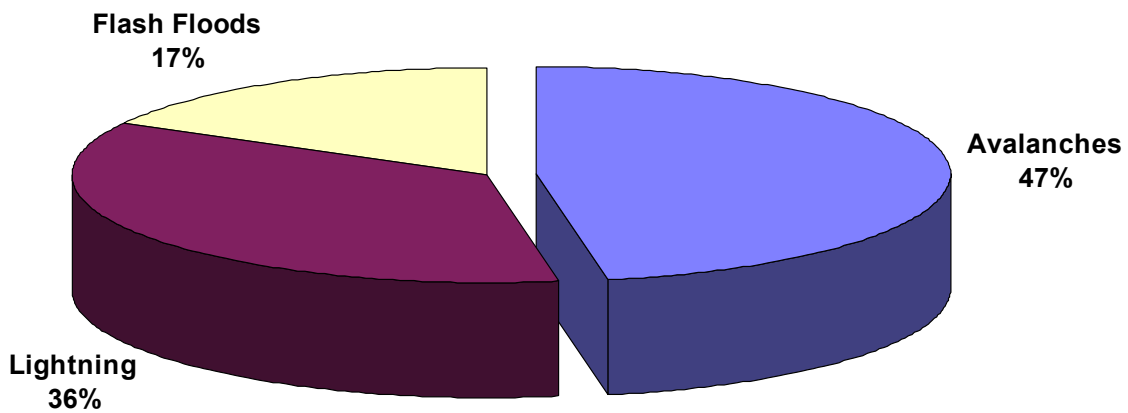
Avalanche Incidents in Utah 1985-2003



Avalanche Fatalities in Utah 1951-2003



Utah Deaths by Natural Hazard 1951 - 2002



Avalanche Fatalities in Utah 1958-2003 - By Activity

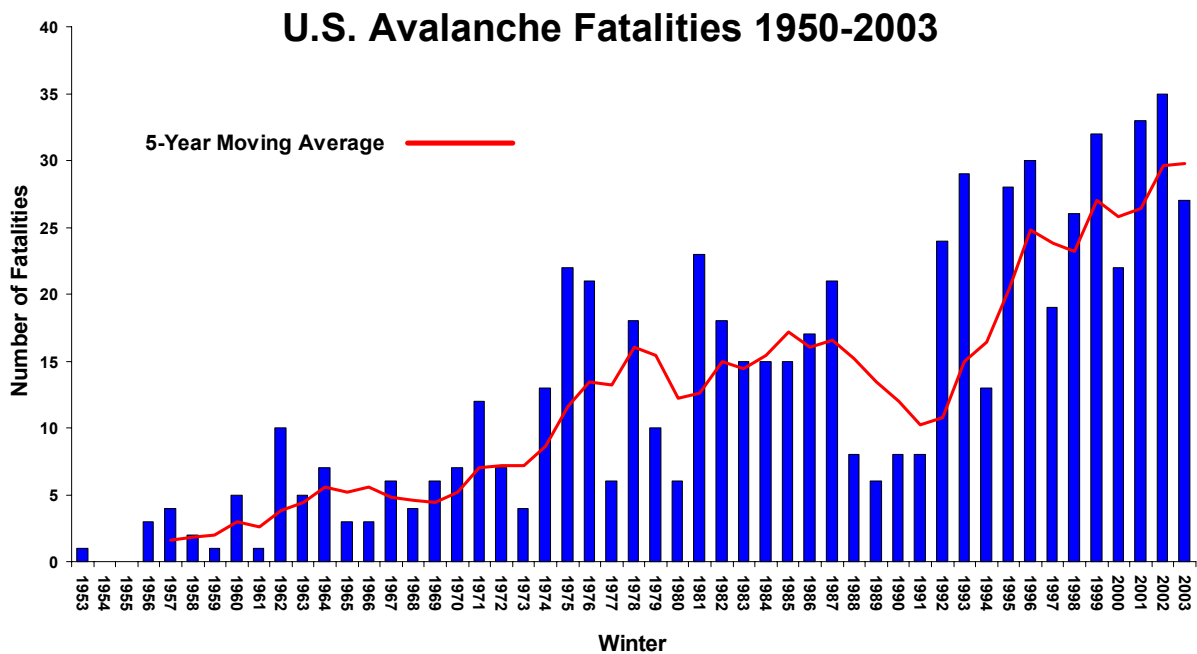
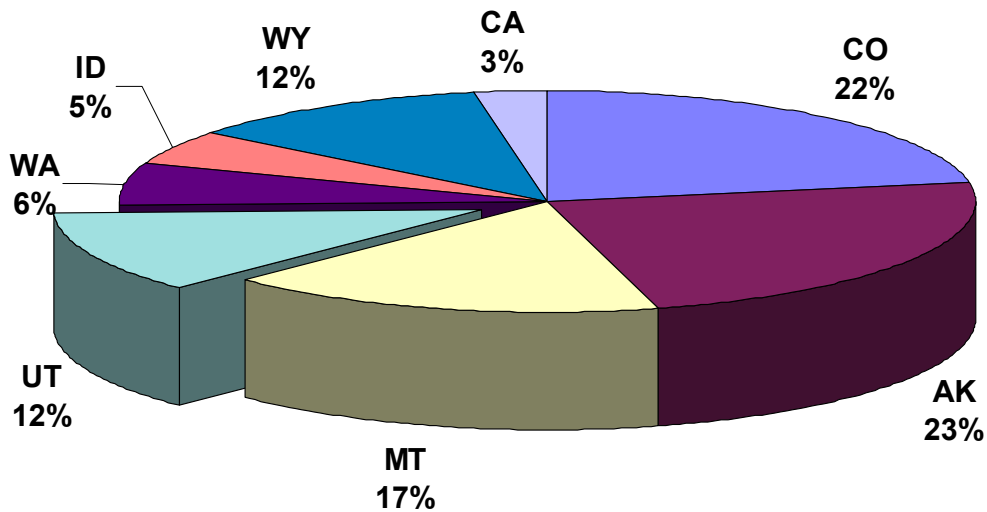
Date	Deaths	Sex	Location	Activity	Skier	Climber	Snow boarder	Snow mobiler	Other Recreation (snowshoe, hiker, hunter)	Worker	Resident
9-Mar-58	2	Males	Snowbasin	Rescuer						2	
29-Mar-64	1	Male	Snowbasin	Worker						1	
31-Dec-65	1	Male	Park City	In-bounds skier	1						
12-Feb-67	2	Males	Pharoah's Glen	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 patroler	Worker						1	
27-Mar-96	1	Male	Maybird Gulch, L.C.C.	Backcountry skier	1						
7-Dec-96	1	Male	Bountiful Peak	Snowmobiler				1			
26-Dec-96	1	Male	Flagstaff Peak	Backcountry snowboarder			1				
11-Jan-97	3	Males	Logan Peak	Three campers					3		
25-Jan-97	1	Male	Provo Canyon	Climber		1					
17-Jan-98	1	Male	Near Coleville	Snowmobiler				1			
18-Jan-98	1	Male	Sanpete County	Snowmobiler				1			
26-Feb-98	1	Male	Near Weber State	hiker (possible suicide)					1		
7-Nov-98	1	Male	Snowbird (pre-season)	Snowboarder			1				
2-Jan-99	2	Males	Wasatch Plateau	Snowboarders			2				
29-Jan-99	1	Male	Mt. Nebo	Snowmobiler				1			
6-Feb-99	1	Male	Little Willow Canyon	Hiker					1		
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						

Total **70**
66 Males (94%), 4 Females (6%)

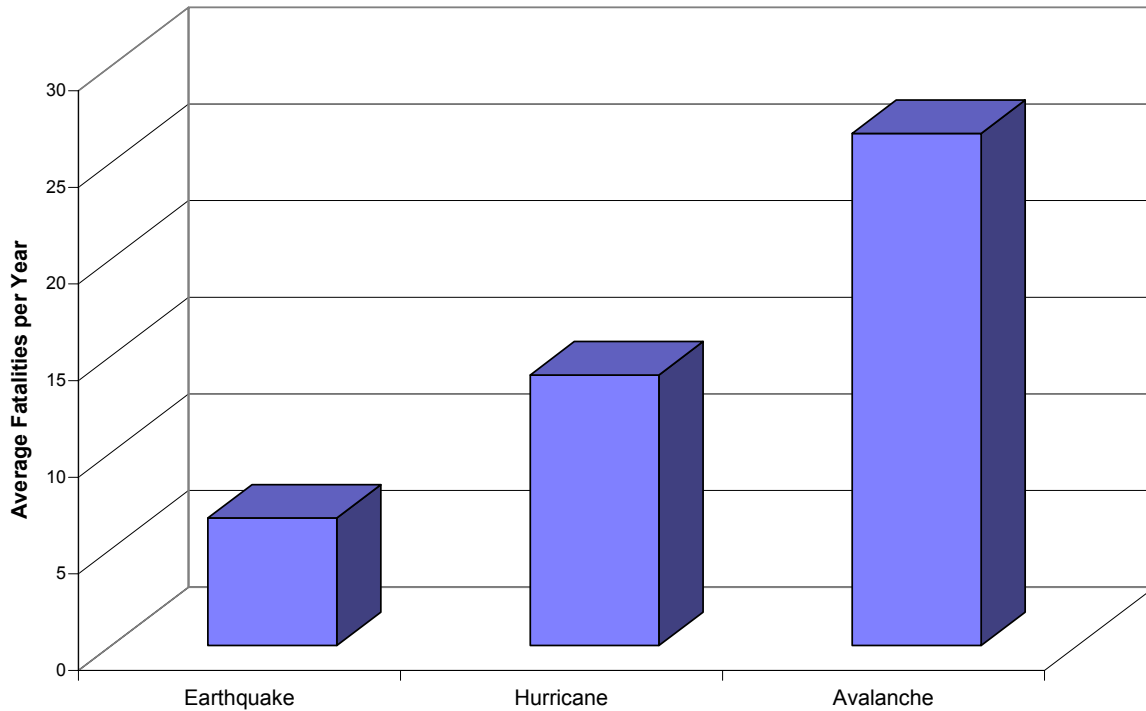
Shaded areas indicate greatest concentration of fatalities.

	1958 season - Present	35	5	7	9	8	5	1
Past 10 seasons	17	3	6	9	5	1	1	
Past 5 seasons	5	3	6	7	5	0	0	

U.S. Avalanche Fatalities by State 1997-2003 (N = 143)

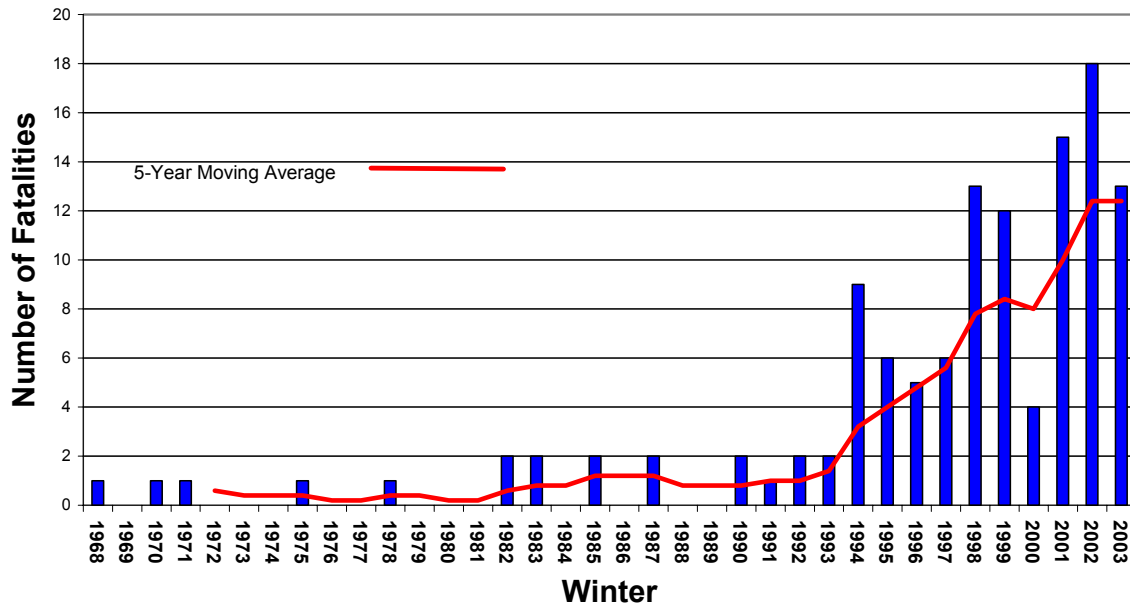


U.S. Deaths per year 1992-2002

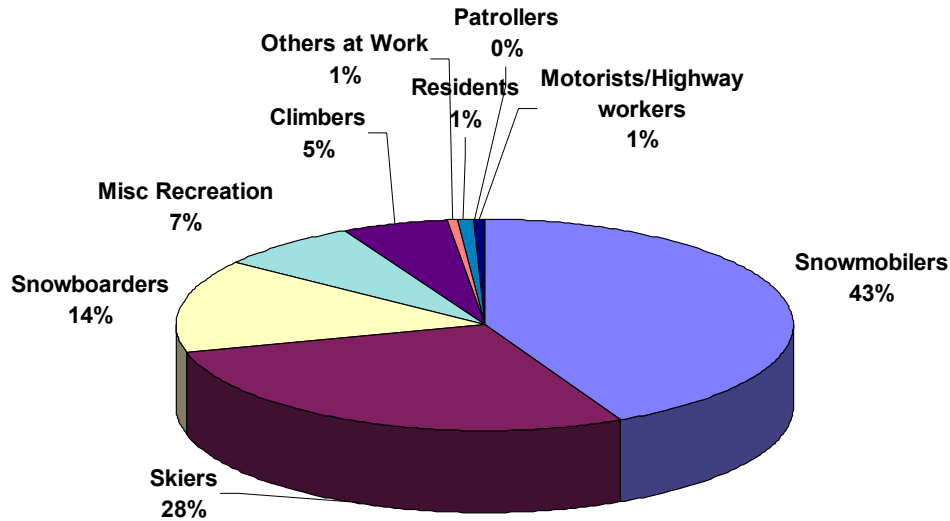


Avalanches kill more people per year in the U.S. than hurricanes and earthquakes combined.

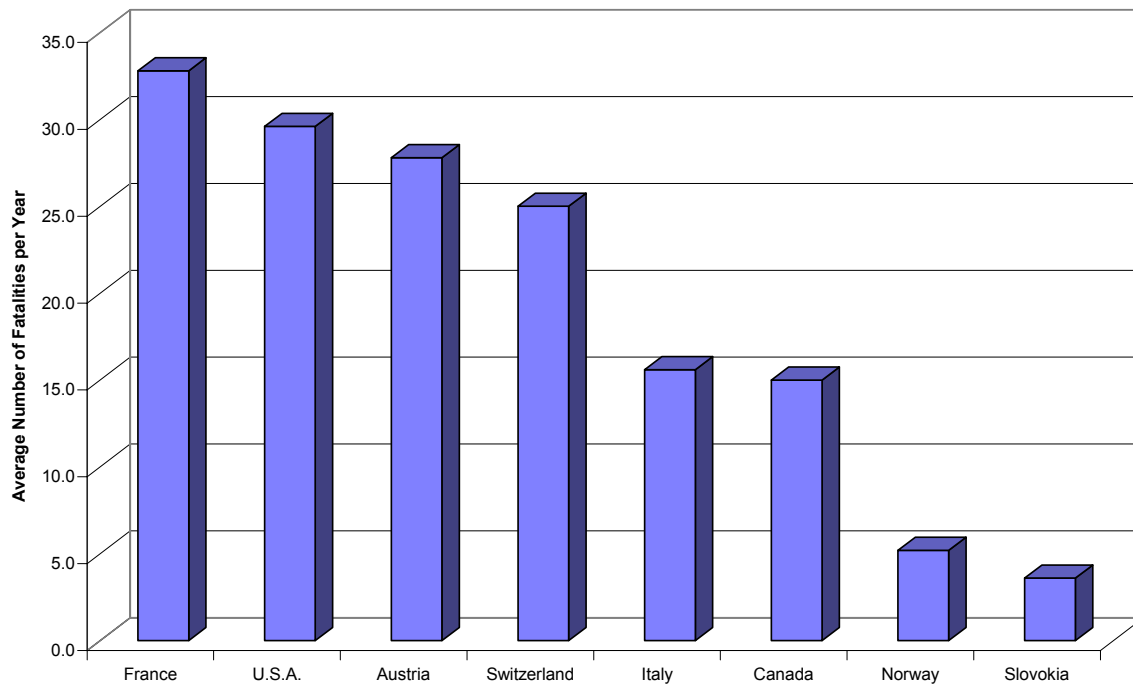
U.S. Snowmobile Avalanche Fatalities by Year 1968-2003



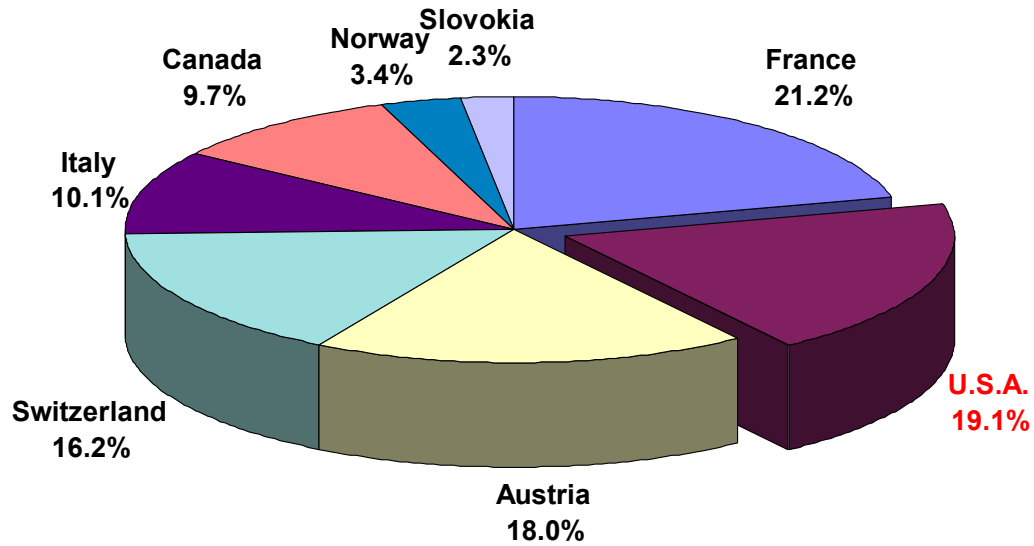
U.S. Avalanche Fatalities by Activity 1997-2003 147 Total Fatalities



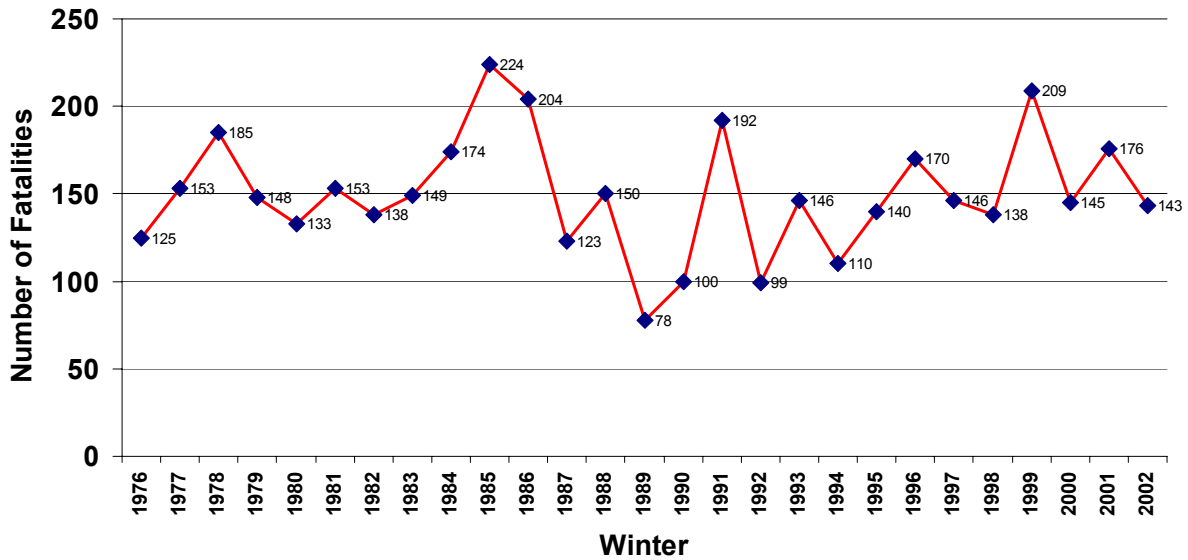
World Avalanche Fatalities 1997-2002



World Avalanche Fatalities by IKAR Country - 1991-2002



World Avalanche Fatalities in IKAR Countries 1976-2002



Avalanche Education

We believe avalanche education is an important component in keeping people alive in avalanche terrain. Ignorance accounts for most avalanche deaths, therefore, often just a little avalanche education can save someone's life. Therefore, we teach a number of free avalanche awareness lectures each season to at least teach people the basics of avalanches. We also hope that these classes encourage people to take a multi-day class from the private sector.

This season, we taught 46 avalanche classes, which personally reached 2,736 people. The indefatigable Craig Gordon taught an incredible 21 of these classes—nearly half—and he taught most of them to snowmobilers, who are the new kids on the block as far as recreation in avalanche terrain and who also account for nearly half of avalanche deaths nationwide.

User Survey

This was our second season to offer free e-mail delivery of our avalanche advisories. When people sign up for the service, we offer them the opportunity to answer a few questions about themselves so that we can know our customers better. Of the over 1,300 people who receive e-mail every day, about 850 of them chose to answer our short survey. I have included the graphs of their response here. Realize that this is certainly not a statistically representative cross section of our users, it's only the ones who choose to receive e-mail advisories. This population probably represents the more hard-core and computer savvy users. Nevertheless, it's interesting to see some of the patterns.

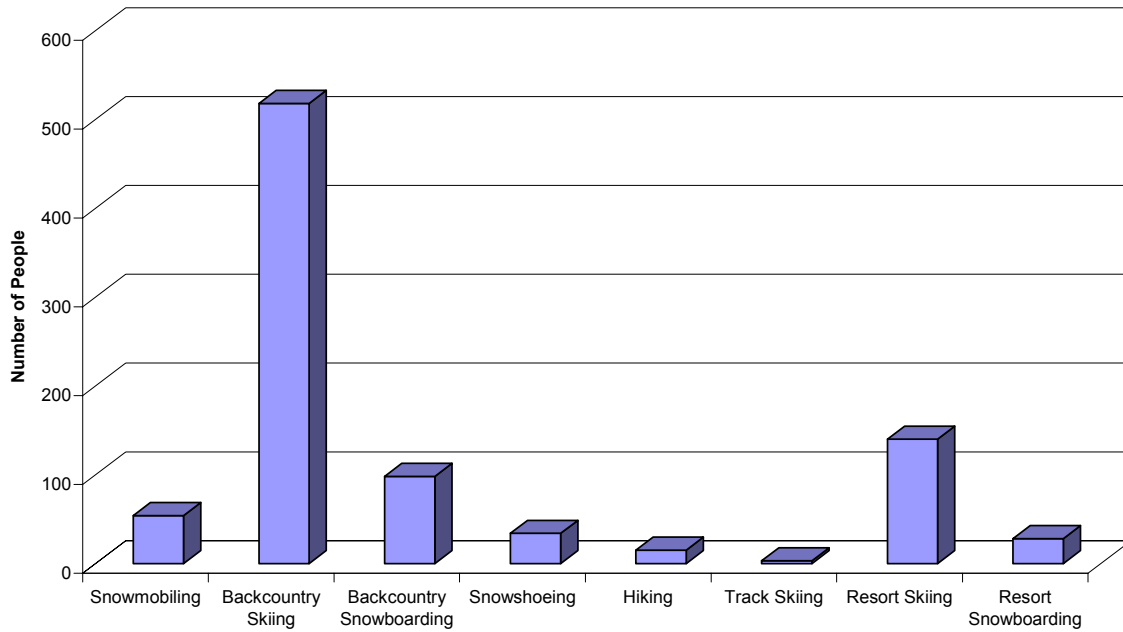
Since the e-mail advisory is only for the Wasatch Range, which includes the cities of Ogden, Salt Lake City, Provo and Park City, it does not represent the people who normally consult the Logan, western Uinta or Manti Skyline advisories. As such it's not surprising to find that most of the users are backcountry skiers, as opposed to snowmobilers, since there are very few places open to snowmobilers in the central Wasatch Range. Next season, we will offer free e-mail service to both the Logan and western Uinta advisories and it will be interesting to see how the populations differ. We suspect that snowmobilers represent the vast majority of the use in the Logan and the Uinta Mountains.

We can also see from the graphs, that most of the population recreating in the central Wasatch Range is quite avalanche educated and it tends to be a population evenly distributed by age.

UAC Avalanche Education 2002-03

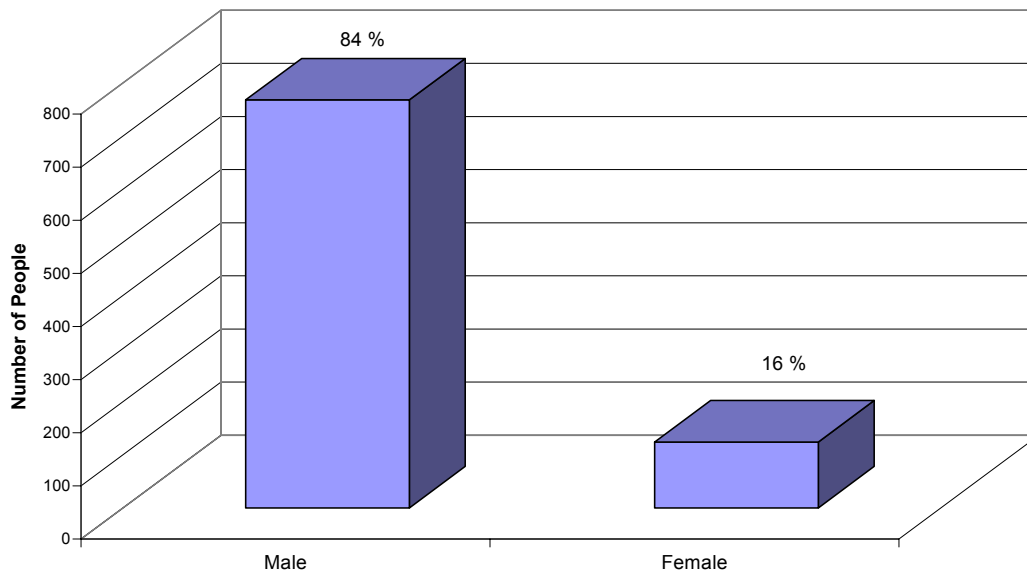
Date	Staff	Event	No. people
10/26/2002	Tremper	Norway Avalanche Conference	200
11/9/2002	Gordon	Utah Snow Show; Sandy	17
11/12/2002	Tremper/Kimbrough	Avalanche Awareness - REI	150
11/14/2002	Tremper	Avalanche Awareness - Black Diamond	150
11/14/2002	Gordon	Butters Tractor; Tremonton	65
11/16/2002	Gordon	Goodwill Riders; Kamas	20
11/19/2002	Gordon	State Parks Groomers; SLC	27
11/20/2002	Gordon	UVSC; Orem	50
11/21/2002	Gordon	Big Boys Toys; Ogden	30
12/3/2002	Greene/Lees	Avalanche Awareness - REI	150
12/4/2002	Tremper	Ski with a Ranger Program	50
12/4/2002	Gordon	Rocky Mtn. Sports; SLC	20
12/5/2002	Tremper	Level II Avalanche Course - Snowbasin Ski Patrol and SAR	25
12/5/2002	Gordon	Point Power Sports; Draper	35
12/7/2002	Gordon	Brighton Ski Team; Brighton	70
12/9/2002	Gordon	Park City Library; Park City	22
12/10/2002	Tremper	REI Science of Avalanches	150
12/11/2002	Greene	Avalanche Awareness - Utah Power and Light	30
12/11/2002	Tremper	Avalanche Awareness - Ogden Forest Service District Office	15
12/12/2002	Tremper	Avalanche Awareness - Wasatch Mountains Club	100
1/3/2003	Greene	Avalanche Awareness - Park City Schools	8
1/6/2003	Gordon	Snow Flakes Club; Ogden	35
1/8/2003	Kimbrough	Avalanches - Lodge at Snowbird	20
1/8/2003	Gordon	Sandy Rotary; Sandy	20
1/9/2003	Gordon	Summit County S&R	27
1/16/2003	Tremper	Snow Survey Avalanche Class	30
1/16/2003	Gordon	Forest Service Staff; Kamas	40
1/18/2003	Gordon	Snow Flakes-Field Day; Uintas	21
1/18-20/2003	Staff	Level I Avalanche Class, Brighton	40
1/20/2003	Gordon	Public Awareness; Mt. View, Wy	110
1/21/2003	Tremper	ARUUP Blood Services avalanche classs	200
1/22/2003	Gordon	Forest Service Staff; Heber	15
1/24/2003	Tremper	7th graders avalanche assembly	400
1/29/2003	Gordon	State Parks Staff; Jordanelle	25
2/4/2003	Gordon	Salt Lake Club; Ogden	40
2/11/2003	Gordon	Golden Spike Club; Ogden	35
2/12/2003	Lees/Kobernik	Avalanche Awareness - Milosport	40
2/12/2003	Gordon	Neilson's Fast Track; Heber	15
2/12/2003	Weed	Stokes Nature Center, Logan	?
2/15/2003	Weed	Tony Grove Trailhead, general safety, Logan	?
2/15-17/2003	Staff	Level I Avalanche Class, Brighton	24
2/19/2003	Gordon	Bear River Guides; Uintas	15
2/22/2003	Weed	Franklin Basin, Beacons	?
3/1/2003	Weed	Tony Grove Trailhead, general safety, Logan	?
3/8/2003	Greene	NSP Level II - Park City Mountain Resort	50
3/15/2003	Weed	Franklin Basin, Beacons	?
3/18/2003	Greene	Science of Avalanches - REI	150
Total		46 Talks	2736

E-mail List Statistics - Recreation Type 2002-03 (n=890)



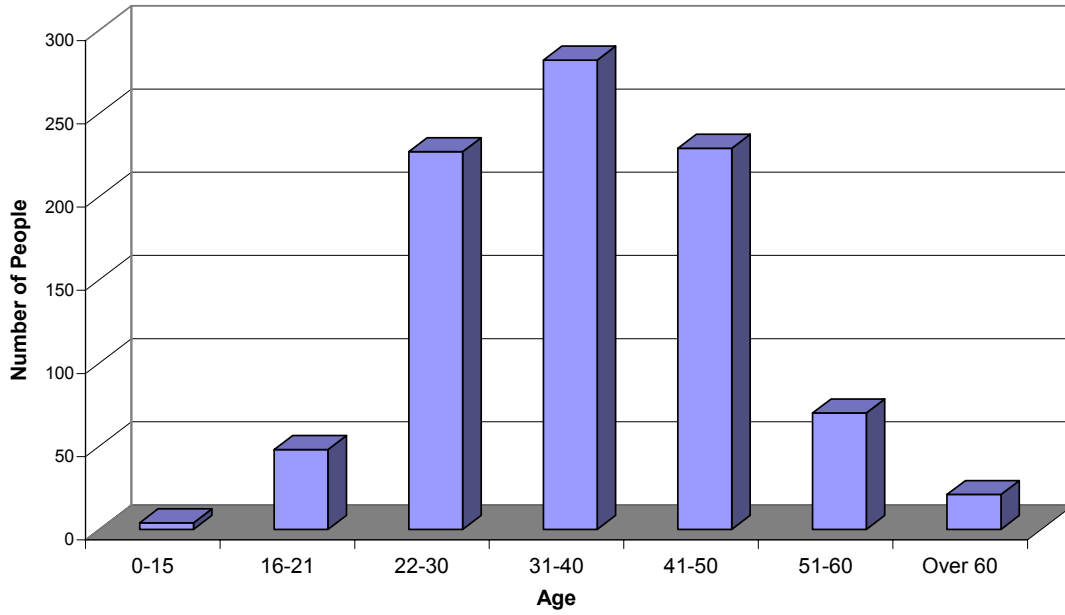
The e-mail list is only for the Wasatch Range advisory from Ogden to Provo, where very few places are open for snowmobiling. Therefore, backcountry skiing represents the largest user group.

E-mail list Statistics - Gender 2002-03 (n=892)

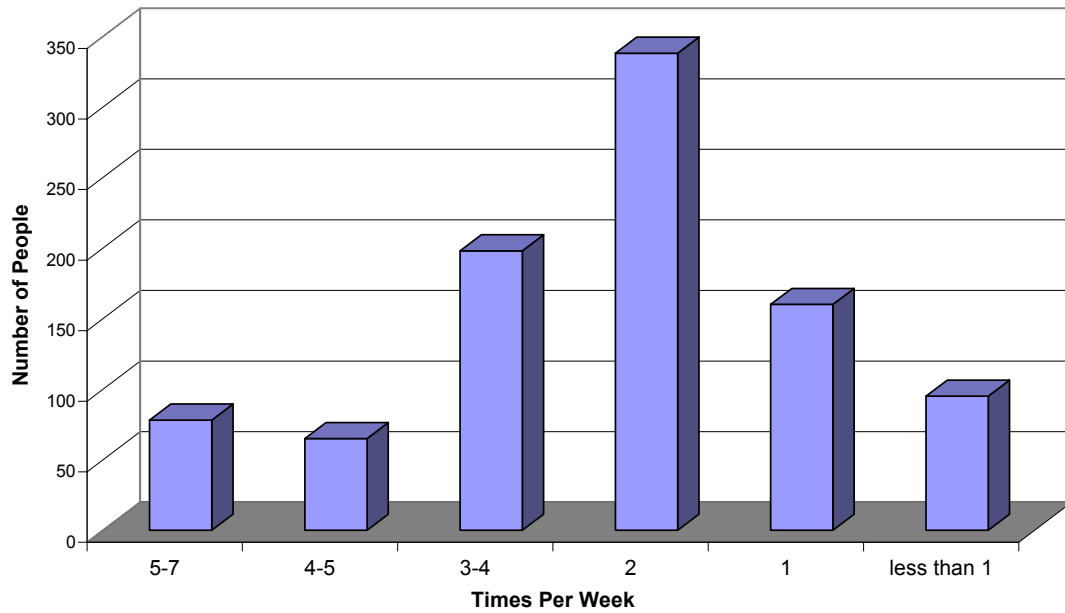


Men take note: Although females make up 16 percent of the e-mail list, they account for only 6 percent of the fatalities.

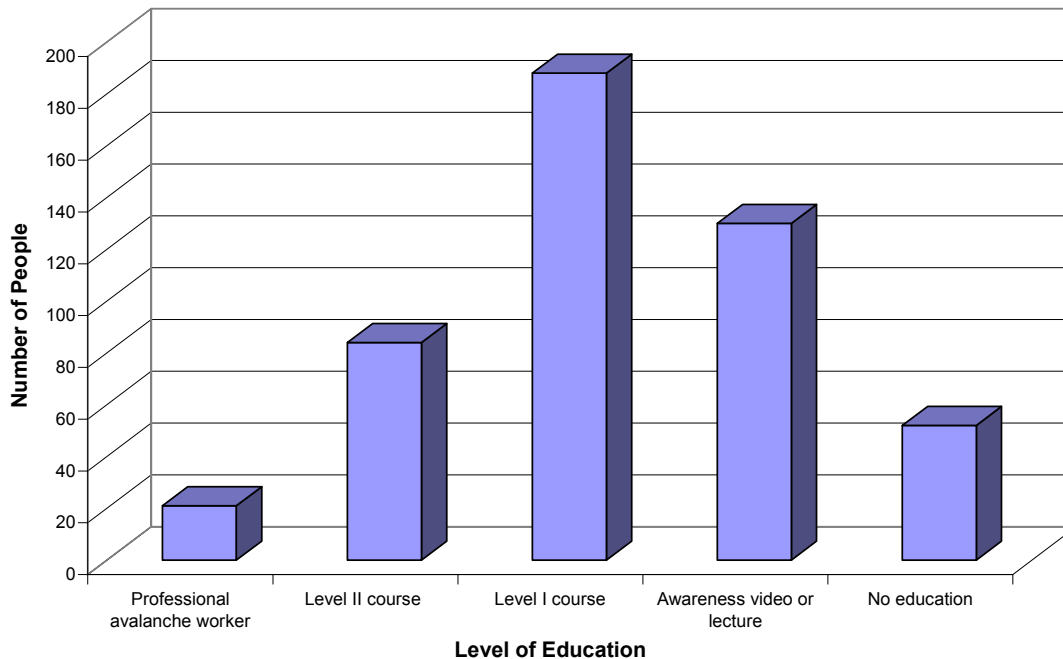
E-mail List Statistics - Age (n=881)



E-mail Statistics - How Many Times Per Week Do You Get Out? (n=934)



E-mail Statistics - Level of Avalanche Education (n=882)



Media Contacts

As usual, we logged a lot of media time this season. We had 55 media contacts with included 3 national television interviews including Bruce Tremper's live interview with Connie Chung on CNN, his interview for a documentary on the History Channel and a national documentary on global warming. In addition, we provided avalanche information to five national television programs, were interviewed by 13 national print media including a front page story on the New York Times, National Geographic Adventure, the Associated Press and several other prominent magazines. We also were interviewed around 20 times for local newspaper articles and appeared on local radio shows four times.

Since we have logged so much media attention through the years, Director of the Forest Service Utah Avalanche Center, Bruce Tremper, wrote an article titled "Winning the Media Game" for The Avalanche Review, which was also used by the Canadian Avalanche Association's Avalanche Notes. This article was a compilation of sage advice and detailed instructions on how avalanche professionals can effectively deal with media.

UAC Media Contacts 2002-03

Date	Staff	Agency	Subject	National or International Television Interview	National or International Television Information	National or International Print Media	Local Television Interviews	National Radio Interviews	Local Radio Interviews	Local Print Interviews
9/3/2002	Tremper	National Geographic Adventure	Interview			1				
9/9/2002	Tremper	Couloir	Profile			1				
9/13/2002	Tremper	Couloir	Backcountry Trends			1				
9/17/2002	Tremper	Skiing Magazine	Avalanche Safety			1				
11/4/2002	Tremper	Sports Guide	Avalanche Safety							1
11/5/2002	Tremper	Discovery Channel	Rescue Technology		1					
11/12/2002	Tremper	Wired Magazine	Photos of avalanches			1				
11/12/2002	Tremper	KSL Radio	Avalanche Conditions						1	
11/20/2002	Tremper	Now See This	Footage of Rescues		1					
11/27/2002	Tremper	SIA Press	Equipment Trends							
11/28/2002	Tremper	Salt Lake Tribune	Article about avalanches							1
12/2/2002	Tremper	Channel 4	Interview about inversions				1			
12/3/2002	Tremper	Channel 13	Interview about lack of snow				1			
12/17/2002	Tremper	Deseret News	Interview about avalanche conditions							1
12/18/2002	Tremper	Channel 2	Interview about avalanche conditions				1			
12/19/2002	Gordon	KSL TV	Uinta Advisory				1			
12/22/2002	Greene	Strange but True	Avalanches			1				
12/22/2002	Greene	A freelance reporter	Avalanche Research			1				
12/31/2002	Lees									
1/2/2003	Tremper	Associated Press	Interview about avalanche conditions			1				
1/3/2003	Kimbrough	KCPW - Science Friday	Avalanche						1	
1/6/2003	Greene	SLC - Channel 13	Avalanche Accident				1			
1/6/2003	Greene	Salt Lake Tribune	Avalanche Accident				1			
1/8/2003	Tremper	Associated Press	Interview about avalanche conditions			1				
1/14/2003	Gordon	KSL Radio	Avalanche Awareness						1	
1/14/2003	Gordon	Outdoors with Doug and Milled	Avalanche Awareness				1			
1/14/2003	Gordon	Uinta Herald	Uinta Advisory							1
1/14/2003	Tremper	NBC Today Show	Information about Cardiff accident		1					
1/16/2003	Gordon	Park Record	Information about Canadian accident							1
1/21/2003	Tremper	ABC News (national)	Information about Canadian accident		1					
1/21/2003	Tremper	CNN with Connie Chung	Live interview with Connie Chung	1						
1/28/2003	Tremper	Channel 5	Interview about avalanche conditions				1			
1/28/2003	Tremper	National Geographic Adventure	Interview about corn snow			1				
1/29/2003	Tremper	Toxic Comedy Pictures	Interview about avalanches - national documentary	1						
2/4/2003	Tremper	Seattle Post Intelligencer	Interview about rising avalanche deaths			1				
2/7/2003	Weed	Logan Herald Journal	Press release of new forecaster							1
2/10/2003	Tremper	Deseret News	Interview about recent avalanches							1
2/16/2003	Tremper	Channel 5	Interview about fatality				1			
2/16/2003	Tremper	Channel 4	Interview about fatality				1			
2/16/2003	Tremper	Salt Lake Tribune	Interview about fatality							1
2/16/2003	Tremper	Press Release	About fatality							1
2/18/2003	Gordon	Park Record	Avalanche Conditions							1
2/21/2003	Tremper	Outdoor Life Network	Avalanche information		1					
2/28/2003	Weed	Logan Herald Journal	Avalanches/Utah Snowmobile Club							1
3/8/2003	Tremper	Channel 4	Avalanche warning				1			
3/10/2003	Weed	Logan Herald Journal	Avalanche burial							1
3/10/2003	Weed	USU Public Radio	Avalanche burial						1	
3/12/2003	Tremper	Christian Science Monitor	Article about avalanches			1				
3/20/2003	Tremper	New York Times	Interview with photos about avalanches			1				
3/24/2003	Greene	Deseret News	Season Snow Totals							1
3/28/2003	Tremper	Salt Lake Tribune	Interview about avalanches							1
4/13/2003	Tremper	History Channel	Interview about avalanches	1						
4/30/2003	Kimbrough	Salt Lake Tribune	Kimbrough's retirement							1
5/11/2003	Tremper	Deseret News	Interview about death at Alta							1
5/11/2003	Tremper	Salt Lake Tribune	Interview about death at Alta							1
Totals				3	5	13	11		4	17

Budget

After having our budget doubled during last season's Olympic winter, it was both a shock and a relief to return to our usual impoverished existence with a simpler operation. The Salt Lake office shrunk from a staff of eight down to three and a half. We had to drop many of the services that people came to expect during the Olympic years, like having two people in the office at a time, graphical-based avalanche advisories, running a Swiss Nearest Neighbors computer model and more thorough coverage in the field. In some ways, it was difficult, but in others, it made the operation simpler, staff meetings shorter and evening telephone conversations with the staff much easier. Has our service to the public suffered? Certainly, but since we retained all our most experienced staff, we suspect the public did not notice much of a drop in the quality of the forecasts.

The big news, this season, is that Utah State Parks awarded us with a grant from the Off-Highway Vehicle program to the tune of \$50,000 per season. This allowed us to continue forecasting in Logan and also add a long-needed weekend and holiday forecast for the western Uinta Mountains. Through the years, Utah State Parks has become a strong supporter of the Forest Service Utah Avalanche Center, both with the Off-Highway Vehicle grant, but also the National Recreation Trails Program grant, which add up to around \$82,000 per year that goes directly towards providing critical avalanche information to the public. Craig Gordon has done a superb job of making contacts in the snowmobiling community, teaching snowmobile classes and court-ing contacts at Utah State Parks. He has put together a new avalanche forecasting program not only for the Manti Skyline, but also this season for the western Uinta Mountains and has garnered high praise from everyone who works with him. Most of the expansion of forecasting areas as well as new money from grants has come about because of the efforts of Craig Gordon.

Although we are a Forest Service program, the lion's share of the funding comes from other sources including the State of Utah, Salt Lake County, private funds raised by the Friends of the Utah Avalanche Center and, of course, from grants through Utah State Parks. The Forest Service Utah Avalanche Center is the epitome of a successful funding partnership with a variety of interested parties.

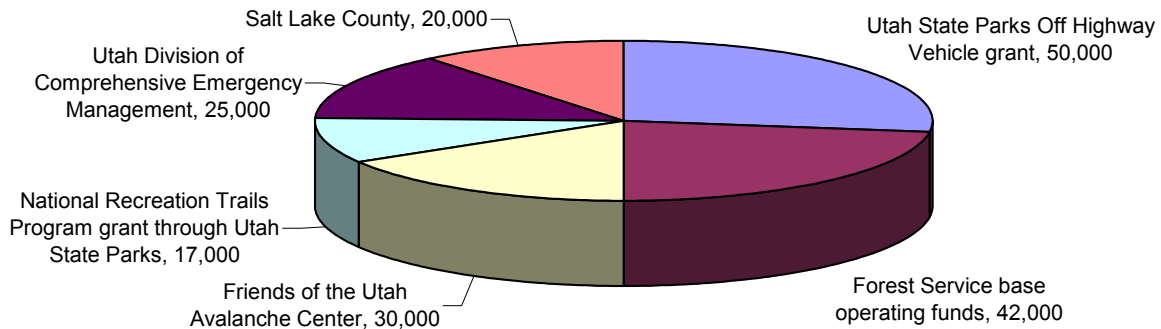
Where the money comes from

Utah State Parks Off Highway Vehicle grant	50,000
Forest Service base operating funds	42,000
Friends of the Utah Avalanche Center	30,000
National Recreation Trails Program grant through Utah State Parks	17,000
Utah Division of Comprehensive Emergency Management	25,000
Salt Lake County	20,000
Total	184,000

Where the money goes

Salaries	170,000
Travel	4,000
Equipment and Supplies	2,000
Telephones	2,000
Computers and Safety Equipment	5,000
Total	183,000

Where the money comes from



Where the Money Goes

