



## ANNUAL REPORT 2005-2006

Greetings!

The Eastern Sierra Avalanche Center issued its first advisory on November 9, 2005. Three advisories a week were issued beginning at the end of November and continued until May 15, 2006 with several advisories posted from the middle to end of May.

We had a year of deep snow, great powder and the best spring skiing in years. The season was also marked by a tragic avalanche fatality and the loss of our friend, mentor and well respected snow scientist, Walter Rosenthal. Walter was the President of ESAC and responsible for the high standards of advisory information and operations that we continue to follow.

We are proud of our accomplishments in our first season of operation. Here is a brief list of the Center's achievements.

- ESAC issued 70 advisories and special avalanche statements from November 9 to May 26, 2006. Even with limited funding and a part time avalanche forecaster, three advisories were posted each week from the end of November 2005 to May 15 2006.
- ESAC raised more than \$40,000 from sponsors, memberships, slide shows and private donors.
- The website advisory page was accessed 33,000 times during the season.
- Several basic avalanche awareness classes were taught to the public and local schools.

**Avalanche advisories**

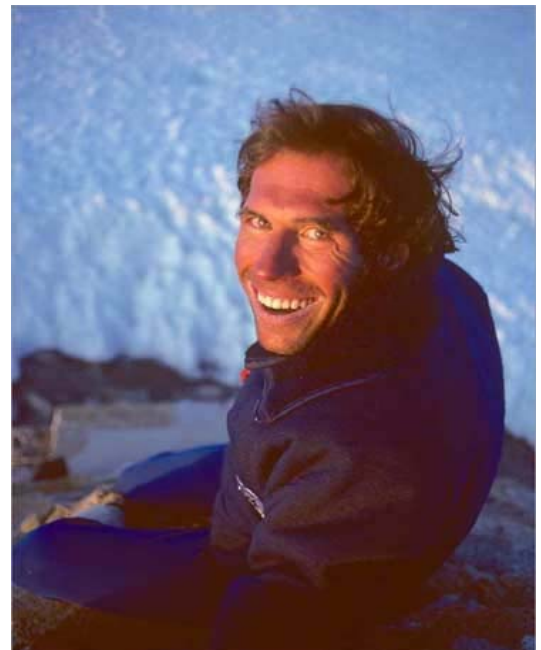
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**Volume 1, Spring 2006**

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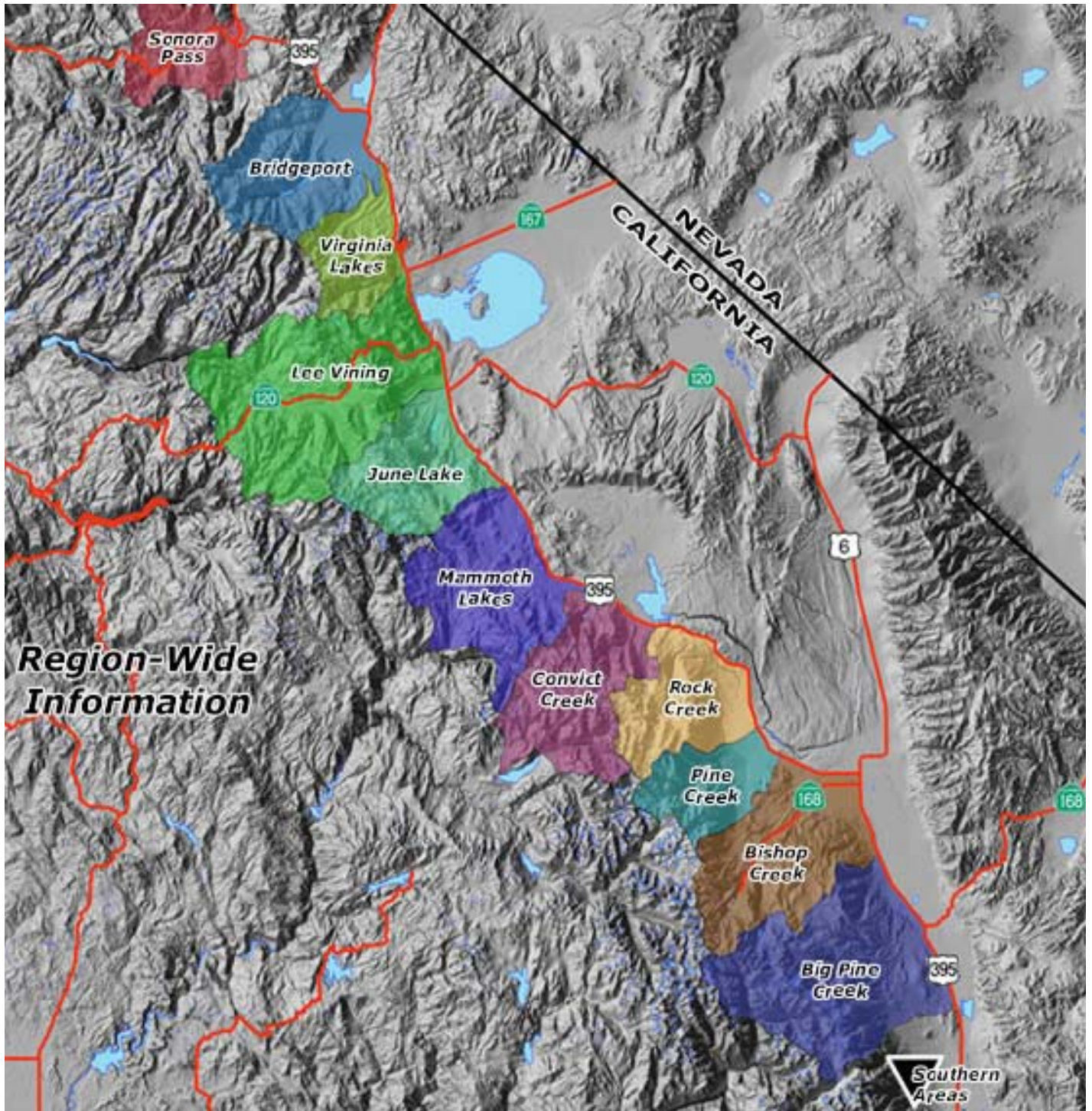


Walter Rosenthal, 1948-2006

Honorary President,  
Eastern Sierra Avalanche Center

## Avalanche Advisory Geographic Area

The Eastern Sierra lies between 36° and 38°N and is located within 320 km (200 miles) of the Pacific Ocean. The abrupt eastern escarpment ranges from 5,000 to 9,000 vertical feet of relief. The topography is characterized by elevation and latitudinal precipitation gradients. During our first year of operation, field work and advisories focused on the Mammoth Lakes to Bishop Creek regions. With additional funding and another avalanche specialist, we hope to expand our coverage area north into the June Lake to Bridgeport area and south to Mt. Whitney.



## Advisories

Avalanche advisories fulfill our mission of providing avalanche information to the general public and skiing and snowboarding communities. We hope people use the advisory to make informed decisions in the backcountry. Advisories were sent via email to members, and the general public accessed advisories on the ESAC website. One local radio station broadcasted avalanche advisories when the danger rating was high or extreme. The Inyo National Forest provided a dedicated phone line and the advisory hotline received approximately 550 calls from January to the end of April. Advisory pages were accessed over 33,000 times from November 2005 to the end of May.

The ESAC website was the single best source of avalanche information for the public. The Discussion section provided readers the opportunity to post snowpack observations and general information about trip location and avalanche occurrences. The interactive nature of the Discussion Board promoted thoughtful discussion and a forum for posting of details of the Blacksmith avalanche incident.

### Example of an ESAC Avalanche Advisory

Good morning, this is Sue Burak of the Eastern Sierra Avalanche Center with an avalanche advisory issued Monday, February 27, 2006.

#### **BOTTOM LINE**

Snow is falling this morning above 9,000 ft. With strong south winds and heavy snowfall and precipitation rates, the snowpack will not be able to adjust fast enough to accommodate the new load. Avalanche danger is **HIGH** today and may become **EXTREME** later in the day or tonight. Natural and human triggered avalanches are likely. Travel in avalanche terrain is not recommended. Select routes on windward ridges of lower angle slopes that do not have steeper terrain above.

#### **MOUNTAIN WEATHER**

This morning, snow levels are holding steady at the 9000 ft elevation. It is raining in Aspendell, elevation 8600 ft. Main Lodge has received 9 inches of snow with a density of 18%. Snow is accumulating at Tioga Pass which has received over 8 inches of new snow. Snow levels are forecasted to lower later today. Forecasted QPF (quantitative precipitation forecast) still calls for 3.5 to 5 inches of water to accumulate over 8500 ft in Mono and Inyo Counties. This means about 20 inches of new snow above 8500 ft. At Mammoth Mountain and Lee Vining Hill, wind gusts are exceeding 80 mph. Strong to extreme winds are expected to continue for at least another 24 hours.

#### **OUTLOOK**

Snowfall is expected to end Tuesday. The storm for Thursday and Friday is on track to produce another foot or more of lighter and colder snow.

#### **SNOW AND AVALANCHE DISCUSSION**

The main avalanche concern today is the rapid loading of the snowpack. This is due to the combined effects of high winds and heavy snowfall rates. As water is added to the snowpack in the form of heavy dense snow or rain, the added weight can be the trigger for an avalanche.

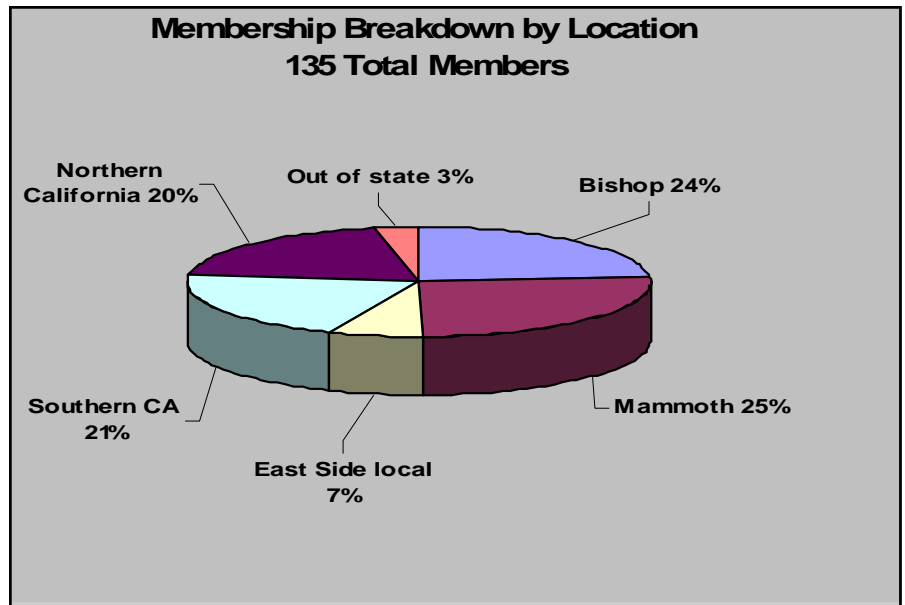
High winds from the south and southwest are creating additional loading on northern slopes above 9,000 ft. This loading of the snowpack is happening over a 24 hour period. On steep wind loaded slopes, the snowpack may not will not be able to adjust to the rapid new load.

Today, the avalanche danger is **HIGH** on all wind loaded slopes above 9,000 ft. Human and skier triggered slab avalanches are likely if you venture out in this unpleasant weather. Ski the trees today.

I will be posting another advisory tomorrow morning. Thank you for your interest and support of ESAC.

## Membership

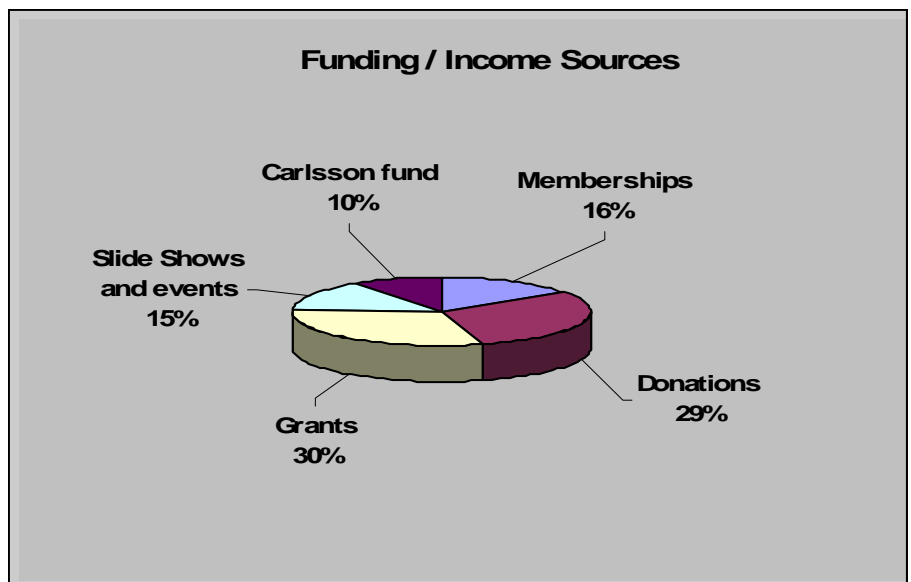
We are honored and proud of the support from our local and state wide backcountry members. Almost one half of our members live in northern or southern California. Local east side residents comprised 56% of total membership.



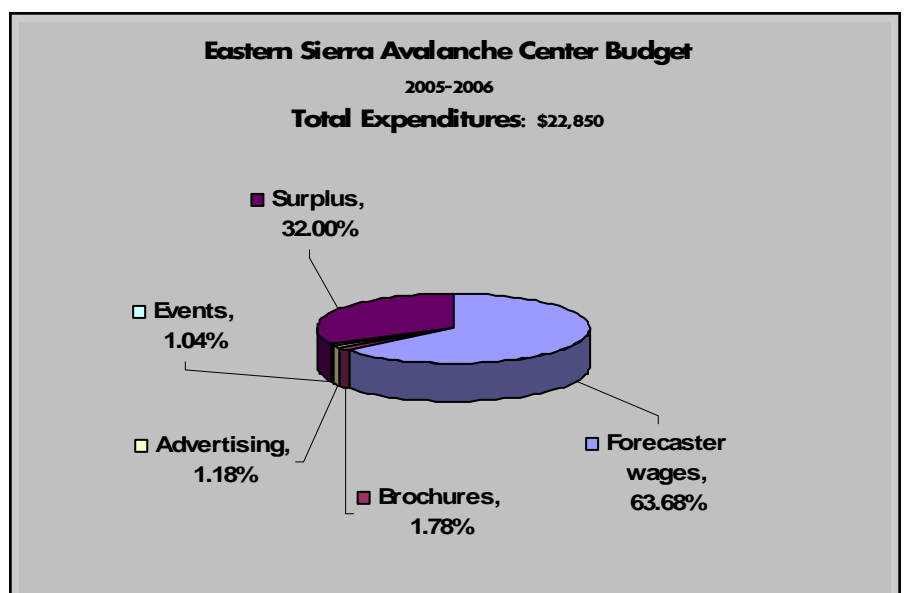
## Eastern Sierra Avalanche Center Funding Sources, and Expenditures

The Eastern Sierra Avalanche Center is a 501 c(3) non profit organization. For the 2005-2006 season, we were funded by our membership base, generous donations from individuals and local businesses, fundraising events and Inyo and Mono Counties. Many businesses contributed time and personnel and facilities for special events.

The Inyo National Forest provided of- fice space for the forecaster including a dedicated phone line for advisories and a computer with high speed internet access.



ESAC raised over \$40,000 from October 2005 to May 2006. Since the forecaster was a contractor, budget expenditures common to most avalanche centers such as vehicle costs, equipment purchases, film processing and internet expenses, were borne by the contractor. At the end of the season, ESAC had a surplus of \$10,000 which will be used as seed money for the 2006/2007 season.



## Eastern Sierra Avalanche Center Personnel

### Sue Burak, Forecaster



Sue Burak has worked in the Eastern Sierra snowpack since 1983. After attending the National Avalanche School in 1982, she went to work as an avalanche forecaster for a small ski touring operation. A few months later, she was hired as a California State Snow Surveyor and began measuring snow on multi-day ski tours in the High Sierra. During her first few seasons working as an avalanche forecaster, Sue was fortunate to be mentored by an experienced USFS forecaster who kept her from making some big mistakes. In 2002, Walter Rosenthal answered some snow physics questions and thus began friend/mentor relationship that lasted until Walter's death in April. In addition to completing the AAA Level 1-3 courses, Sue brings an academic

background in hydrology and snow hydrology with the energy balance approach to her avalanche work. As a private consultant, Sue provides avalanche hazard assessments for residential communities in Inyo County and is working on a research project that uses naturally occurring isotopes as tracers for sources of groundwater.

## ESAC Board of Directors

### Walter Rosenthal, Honorary President

Walter Rosenthal was the Snow and Avalanche Analyst for Mammoth Mountain, a remote sensing expert for the U.S. Army Cold Regions Research and Engineering Laboratory and a researcher at the Institute of Computational Earth System Science, University of California, Santa Barbara. He specialized in remote sensing of snow and snowpack processes related to sintering and avalanches. As a private consultant he provided operational subresolution snow mapping algorithms and programs to the U.S. Army Cold Regions Research and Engineering Laboratory from 1995 through 2002. Both the Army and the National Weather Service's National Operational Hydrologic Remote Sensing Center employ his algorithms and are expanding their use to daily operational snow cover maps over North America. Walter tragically lost his life while trying to save fellow patrollers on the job at Mammoth Mountain Ski Area in April, 2006. He will be forever remembered as a loving husband, father, mentor, scientist, friend, and a founding member of ESAC.

### Nate Greenberg, Vice President

Nate has been an eastside resident for over five years, during which he has spent considerable time exploring the vast winter terrain. He has completed AAA Level III avalanche training and has been involved in winter backcountry travel for nearly 10 years. He is a competitive telemark skier and often works with film crews and other professional athletes on backcountry tours. He worked with NOLS as an instructor and guide for climbing and mountaineering. His interest in disseminating quality information to the general public helps motivate ESAC. Nate spends a great deal of time on the Center's website, and coordinate the overall operations of the Center.

### SP Parker, Treasurer

Although originally from New Zealand, SP Parker has been a resident of the Eastern Sierra since 1980. He is a full time professional guide leading trips from Alaska to Patagonia but always returns to the Sierra Nevada. He is an internationally certified IFMGA guide. As part of his guiding work he teaches avalanche courses as an AIARE instructor in the Sierra Nevada. Avalanche assessment is a daily part of SP's winter guiding job. SP can be found digging snow pits and evaluating stability during the snowy months.

### **Howie Schwartz, Secretary**

Howie Schwartz is an AMGA/IFMGA certified ski and mountain guide based in Big Pine, California. Howie guides skiing and mountain climbing trips year round in the Sierra Nevada, the Alps, Alaska and other destinations. He is an instructor/examiner for the American Mountain Guides Association and is on the AMGA Technical Committee. He was a founding member of the American Institute for Avalanche Research and Education and leads AIARE level 1-3 avalanche courses. Howie also trains AIARE instructors. Howie's skiing relationship with the Sierra started in the spring of 1996 on a basecamp ski trip near Virginia Lakes. Since that time, this love affair has all but ruined his otherwise productive professional life. Howie has still not figured out what "Sierra Cement" is, but he has heard some can be found up near Lake Tahoe.

### **Allan Pietrasanta, Director**

It was almost 25 years ago that Allan realized the need for an easier to use, more protective case for his Pieps avalanche beacon. The standard yellow thin cloth bag and shoestring necklace just wasn't cutting it, so he created high-tech padded pouches that he was able to use in trade for payment to complete one the first avalanche courses taught in Mammoth. While the beacon case project helped increase his avalanche awareness, it was also the roots of a sewing manufacturing company, ABCOM/Buttermilk Mountain Works, that Allan owned and operated for over two decades in Bishop. Allan has left ski tracks in the High Sierra and other mountain ranges of the world, and continues to celebrate the joys of backcountry skiing and its contributions to world piste. He combines his interest in business, his past experience as a mountain guide and early Board member of the American Mountain Guides Association to help ensure a bright future for ESAC.

### **Forrest Cross, Membership Director**

Forrest Cross has been visiting the Eastern Sierra for almost 10 years and has lived here for the last 5 years. One of the main reasons he lives here is for the endless backcountry skiing opportunities during the winter months. For the last 15 years he has been backcountry skiing in the mountains of Northern California and the Sierra. He has completed a level 2 AIARE course and has taught avalanche awareness to guides for Outdoor Adventures at UC Davis. When not playing in the hills, Forrest works as an engineer for the Mammoth Community Water District and helps monitor all the runoff that the winter snows produce. Forrest enjoys being involved with ESAC and helping to spread the word of avalanche safety in the Eastern Sierra. As Membership Director he keeps tabs on membership numbers and maintains the member email list-serve.

## Eastern Sierra Avalanche Center Season Roundup

The inaugural season of the Eastern Sierra Avalanche Center got off to a slow start in November. An early November storm dropped about 8 to 12 inches of snow which promptly turned into depth hoar. Rain on Thanksgiving Day left a knife hard ice lens that persisted at least into March 2006. The first big holiday of the winter season came and went without the Mammoth area's usual 2 to 3 ft early season snowpack. On November 26 2005, Mammoth Mountain's ski patrol study plot had 5 inches of snow.

### November and December Doldrums

The usual early season November snow storms were rain events below 10,000 ft. Skiers and riders were anxiously watching the long range forecast products, hoping for a change in the dry pattern.

The season's first extreme avalanche warning was issued on December 2 after a Pacific storm dropped 30 to 40 inches of dense (15-19%) snow above 8500 ft. The storm was accompanied by 48 hours of sustained 70 mph + ridgetop winds and resulted in many full depth natural avalanches occurring at the Mammoth Mountain ski area as well the backcountry. Many slopes were bare before the storm and high snowfall and precipitation rates throughout the 36 hour period caused many of the now covered previously bare slopes to avalanche back down to the ground.

Despite the new snowfall, most backcountry slopes did not have skiable snow and advisories warned of shallow snowpack. At this point, the eastern Sierra snowpack was the product of one storm that dumped three inches of water above 9500 ft.

After this storm, the weather pattern along the west coast was dominated by a strong ridge of high pressure and an extended period of dry and unseasonably mild weather. The Pacific-North American Pattern (PNA) index became strongly positive, indicative of strong ridging over the eastern Pacific and west coast.

A small 4 inch storm on Dec. 8 was followed by a week of cold night time temperatures with highs in the low to mid 20's. Vapor diffusion processes dominated the snowpack and the basal depth hoar layer ranged from 10 to 25 cm thick. The snow surface recrystallized to near surface faceted grains. Stability tests showed easy results on either the depth hoar or ice lens at the base of the pack. One skier was caught in two separate slides on the same day. Another week went by with no new snow and facets were gaining size up to 1 mm in the middle of the snowpack.



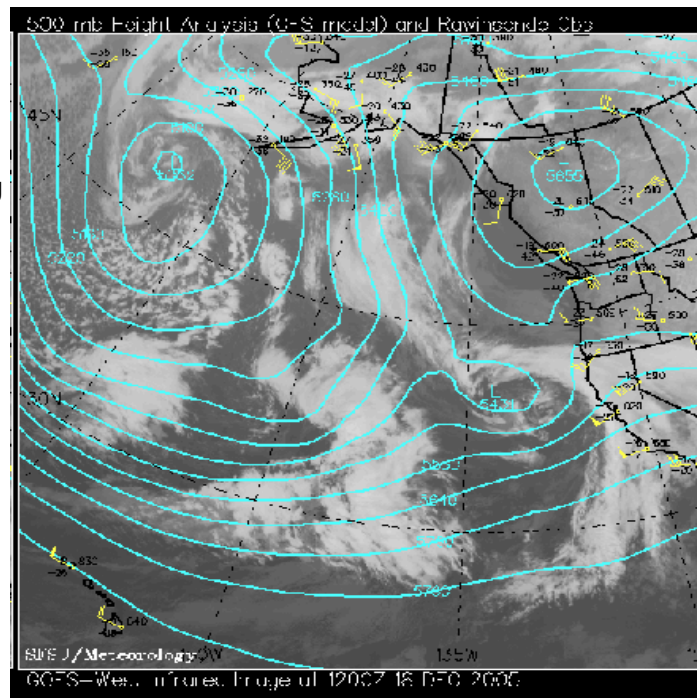
Depth hoar, rain and snow. December 2006. Walter Rosenthal photo.

By Thursday December 15th, the GFS was the first model to signal an impending transition to a wet pattern. Starting on December 17<sup>th</sup>, the ridge gave way to an extended period of wet weather for the eastern Sierra. The breakdown or undercutting process of a west coast upper ridge can lead to extended periods of excessive rainfall in California whenever subtropical moisture becomes entrained in the flow. By December 23, it was clear that the region was on the threshold of a very wet period that would have serious hydrologic implications.

The second extreme rating was issued on December 20<sup>th</sup>, when a cold dry storm dropped two to three feet of snow, followed by warming temperatures and rain. Five inches of water was added to the snowpack in a 24 hour period. Another violent rainstorm occurred on Dec. 22-23 and created another ice lens in the pack. This lens persisted through the winter until early March, when the ice layers were buried under 2.5 over 3 m of snow.

After the series of rain storms, locals were wondering whether the Eastern Sierra was becoming a coastal maritime climate. A few days later, the Reno National Weather Service Office called for an intense mid latitude jet stream to bring very moist subtropical air to the region all week. The storm door was open- whether we would receive rain or snow was the big question.

Three days later on December 29, 18 inches of rain and snow had fallen with 3-4 inches of precipitation. The Tioga Pass Resort at 9,600 ft, reported beachfront property was available. In Tuolumne Meadows, 40 inches of snow fell and 39 inches settled. Wildly fluctuating temperatures during the storm caused snow levels to range from 8,000 to 11,000 ft. Mammoth Mountain ski patrol reported avalanches running on the ice lens of the December 27-28 storm or on a layer 80 cm down that consisted of columns, facets and plates in what was otherwise wind slab.



Rain on snow, December 18, 2006

### Finally, SNOW!

The most potent storm system of the series moved into the region on Dec 30. This system rode in on an impressive zonal Pacific jet stream between 30N and 40N. An enormous amount of subtropical moisture was entrained into this system with a source traced back to the Philippines and Indonesia. Strong mid-level winds provided enhanced orographic precipitation on southwest facing slopes. Wind speeds at 700 mb approached 90 mph, stronger than any storms of the recent past. 150 mph wind gusts were recorded at several ridgetop locations.

Holiday visitors and local officials woke up to a surprise 3 feet of new snow that fell in an 18 hour period. Another 3 feet of snow fell in the next 14-16 hours, and avalanches closed the main highway in the Eastern Sierra. Holiday travel in the eastern Sierra ceased. The eastern Sierra received enough new snow to bring seasonal precipitation values close to April 1 peak accumulation values. From January 1 to January 3, 74 inches of new snow was recorded at the ski patrol study plot. Total snowpack depth at Mammoth Mountain was now 131 inches. Backcountry locations received 48 to 60 inches of new snow and up to 10 inches of water. Many class 4 and 5 avalanches were observed on Mammoth Mountain and in the backcountry. The ski and snowboarding season had begun!

The high paced snowfall action slowed after the first of the year. Temperatures remained cold and skiers and riders were treated to a 6 to 7% density storm that dropped up to two feet of dry light snow on January 17-18. The last week of January was unsettled with scattered snow showers and continual southwest winds creating many 15 to 40 cm wind slabs on north facing slopes below ridgetops. Many

southwest winds creating many 15 to 40 cm wind slabs on north facing slopes below ridgetops. Many small (class 1-2's) slab avalanches ran during the week.

### Tragedy

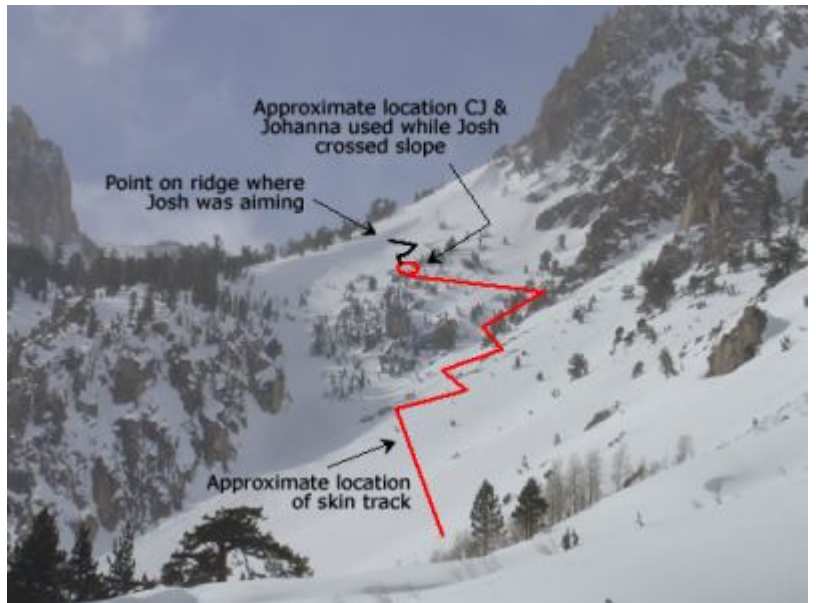
At the end of January, a party of three off duty ski patrollers were skinning up a steep 40 degree, east facing slope. The aspect changed to northeast and a short 150 to 200 ft wind loaded slope had to be traversed. While two skiers waited in a scattered glade of 3 to 10 inches diameter white bark pines, the other skier began to traverse the slope. An 18 inch crown fractured across and above the group, and two were carried and partially buried in a slide.

One patroller managed to hang onto a white bark pine while the avalanche flowed past him. The female skier died as the result of traumatic injuries received when she was taken through the stand of timber. The other skier was partially buried and was not breathing when his rescuer arrived but quickly revived once his airway was cleared. The avalanche danger was rated moderate on wind-loaded slopes on the morning's avalanche advisory.

This was the third avalanche fatality in the Eastern Sierra in eleven months. Ski patrol and many friends in Mammoth mourned the loss of a vibrant, well respected and capable skier and patroller. Many people from many walks of life were saddened by Johanna's passing. Others were beginning to question the so-called "bomber" Sierra snowpack.

### Slow Snow Business in February

February in the Eastern Sierra can be the snowiest month of the season. This season, only 48 inches of snow fell in two storms. The first half of the month was characterized by alternating cold and warm days. The snowpack was a variety pack of sun crusts, hard wind slab, faceting below crusts and slabs and near surface faceting.



Blacksmith avalanche site.

The snow surface above 10,000 ft was mostly hard wind slab and snowpits showed a weak, low density, faceted layer leftover from mid January storms. Two rain layers from the December rain storms were evident in most snowpits and stability tests were consistently failing on facet layers above and below these ice layers at about 50 cm down. Snowpack depths ranged from 90 to 120 inches and I decided digging snowpits to the ground in a search for buried ice lenses is good for snow hydrology but not the best use of an avalanche forecaster's field time.

Unseasonably cold temperatures during the third week of February accompanied an 18-22 inch powder storm and skiers and riders were treated to over a week of Wasatch-like snow conditions. These dreamy conditions were about to change.

### March Madness

By February 24, Weather Service forecasters warned of a large influx of subtropical moisture with 3 to 5 inches of water and high winds developing by February 27 and 28. High precipitation rates and strong (100 mph+) winds resulted in a large destructive avalanche cycle throughout the Sierra. I saw a few backcountry lakes hit with debris fields that pushed huge waves of lake ice and water onto the opposite shore. Ski patrol at June Mountain reported hand charges skittering 1,000 ft down the face of June Mountain on a shiny, hard ice lens. Many class 4 and 5 avalanches were reported due to the lack of bonding taking place between the ice lens and new snow.

After a two day break after the Feb. 27-28 storm, the switch on the snow machine was flipped back on. From the end of February through April 6, a quasi-stationary longwave trough was parked over the west coast and an endless supply of shortwaves kept the snow coming for 22 out of 31 days in March. Mammoth Mountain received 166 inches of snow and 17 inches of water. High elevation snow sensors (10,700 to 11,200 ft) picked up 22 inches of snow water equivalent from Feb. 27 to April 6. The Mammoth Mountain energy balance monitoring site was buried with over 5 meters of snow. The instrument platform in the photograph is 5 meters above the ground.



Mammoth Mountain Energy Balance Monitoring site, April 10 , 2006

March was also the coldest month of the season based on the temperature record at Mammoth Mountain Ski Area and backcountry sensor locations. With snow steadily accumulating on top of the buried ice layers, the potential of deeper instability was a concern. However, the March storms came with extremely high winds and most avalanche activity was limited to 15 to 40 cm wind slabs that failed on thin, low-density layers.

In between storms, the combination of new snow, increasing sun angles and solar radiation resulted in surface wet snow sluffs that entrained massive amounts of snow. Cornices were unusually large and becoming

more unstable with added mass of almost daily new snow. One person learned the cornice lesson the hard way. He broke through an overhanging cornice, landed 20 ft below, triggered a soft slab and slid down face first down one of the steep chutes above Ellery Lake. As the avalanche slowed down, he was taken back to the surface and ended his ride on top of the avalanche debris.

A brief wet slab cycle occurred in the Mammoth Lakes Basin on March 22-23. The starting zone elevations were remarkably uniform at 8700 to 8800 ft. This cycle happened the day after a 13 inch snowfall. Both daytime highs and lows were 11-13 degrees higher on March 22 than the previous day. The slides occurred on east aspects near rocks and small white bark pines. By March 25, high winds and heavy snowfall returned, and advisories warned of wind loading on northern aspects.

#### April Snowfall and Tragedy

By April 1, the generalized March snowpack graphic consisted of 16 layers of alternating hard wind slab layers with low density snow as the sandwich filling. Snowfall totals for March were 164" of snow and 17" of water recorded at the Mammoth study plot. Backcountry locations received 10 to 15 inches of water for the month and seasonal precipitation exceeded 145% of the 50-year average. On April 1, the ski patrol study plot recorded 189 inches of snow depth.

On April 1, another storm had moved out of the area after dropping another 18 inches. Bluebird conditions encouraged a pilgrimage of skiers and riders to easily accessible steep slopes just south of the town of Mammoth. One of a group of three experienced riders triggered a slab avalanche in a steep narrow chute, Rock Chute. His friends watched him disappear, then resurface as he was lifted up on a wave of debris. The rider was deposited on top of a wave of debris that came to a stop within the chute. All three were local riders and none had avalanche beacons or rescue gear.

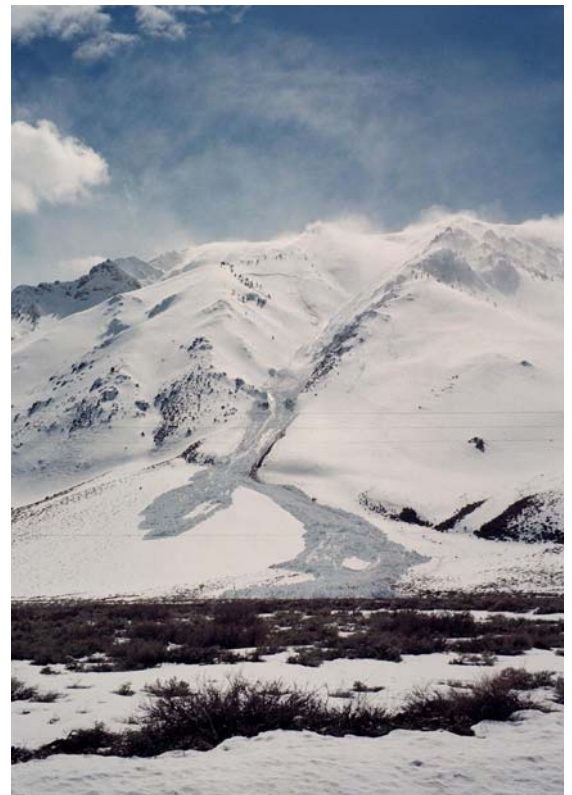
By the end of March and the first week of April, solar radiation and snowmelt processes had changed the sign of the snowpack energy balance equation from negative to positive. Point release wet sluffs and dry powder that turned to mush and avalanched within 12 hrs were commonplace. But the winter was not over yet. With conditions already primed by a wet winter and much above normal March precipitation, a prolonged storm period from Sunday, April 2nd through Thursday, April 06, 2006 brought another 79

inches of snow and 8.9" water to the ski patrol study plot. Backcountry locations received 2 to 3 feet of new snow with up snow water equivalents ranging from 5 to 7 inches.

The source of this system was cold, originating in the Gulf of Alaska. This storm was stronger and moved farther south along the coast as compared to other systems that affected the region in March. The southwest flow that developed in advance of this unseasonably deep upper trough drew warm moist air from the subtropics into central and southern California.



Early in the morning on April 5, a small slab avalanche released from the 10,000 ft elevation on McGee Mountain. At around the same time, a point release wet avalanche started near the summit ridge at 10,500 ft. The resulting wet snow avalanche came to a stop after traveling over 0.3 miles on 10 degree alluvial fan and left walls of debris over 12 feet high.



Upper left. Rock Chute, April 1, 2006

Above. McGee Mountain wet avalanche, April 5, 2006

Left. Debris, McGee Mountain wet avalanche

The storm that produced the McGee wet snow avalanche ended on the morning of April 6, 2006. After a 79 inch dump, the Mammoth Mountain ski patrol was busy opening up the ski area. That morning, two patrollers were resetting a fence that surrounds the opening to a fumarole, a volcanic vent that emits steam and gases of CO<sub>2</sub>, SO<sub>2</sub> and HS<sub>2</sub>. Unaware that heat from the fumarole had created a cavern under the snow, the two fell 20 ft to the hot ground and excessively high concentrations of toxic gases. Two other patrollers went in the hole with oxygen in a vain attempt to rescue their comrades. Both patrollers and one of the rescuers died from suffocation due to the high levels of CO<sub>2</sub> gas trapped by the snowpack. One of the would be rescuers, Walter Rosenthal, will be remembered as a friend, mentor, snow scientist and the driving force behind formation of the Eastern Sierra Avalanche Center.

Spring Arrives With More Snow

After April 6, there were three 9" storms during April. The transition into spring conditions had begun at lower elevations 9500 ft and below. Above 10,000 ft, surface snow conditions ranged from icy sun crusts to hard wind slab. Snow pack temperatures in the upper 3 feet of the snow pack were still in the -6C to -10C range. In Tuolumne Meadows, the NPS rangers reported daily wet slides from point releases to cement pours. Avalanche danger ratings were generally low increasing to moderate on southern and eastern aspects at elevations below 9500 ft. Above 10,000 ft. the danger rating remained in the moderate rating due to non stop ridgetop winds and the weekly 9 inch storm. Snowpack conditions remained a mixed bag of corn snow to breakable and icy crusts to powder stashes. Solar radiation, slope aspect and time of day were the critical forecasting points in late April advisories.

By the end of April, summer-like temperatures paid a week long visit to the eastern Sierra. The last few days of April saw high temperatures in the upper 50's to 60 F and lows in the upper 30's at 10,000 ft. High daytime temperatures, increasing solar radiation inputs and poor refreezing of the snowpack at night resulted in high snowmelt rates along with many skier triggered avalanches and large class 4 naturals in the backcountry. Observations of class 4 and 5 wet slab avalanches on May 2 and 3 revealed entire basins had avalanched to the ground.

Come May, the snowpack was melting. However, ESAC rallied to post another six advisories. The final advisory was posted on May 26, with many of us still enjoying fine spring descents on June 12, the date of the final revision of this summary. The month of May was filled with many skier triggered wet avalanches. Fortunately, no one was hurt. It is interesting that despite great concern about deep spring avalanche releases on buried ice layers, there were only a few deep wet slab releases.

A total of 68 advisories were posted for the season, with 6 early season, low snow advisories that did not have danger ratings. One special statement was issued with details of the January 31 fatal accident.

Our first season was marked by the highs of great skiing, mind numbing long periods of heavy snowfall and two heart breaking tragedies. With Forest Service funding, I look forward to another season of operation.

<b>Extreme</b>	<b>High</b>	<b>Considerable</b>	<b>Moderate</b>	<b>Low</b>
4	13	19	34	18

Table 1. Summary of 2005-2006 avalanche danger ratings.

## Contributions of Labor

### Observers

I am indebted to several volunteers who posted snowpack observations on a regular basis. The Tuolumne rangers called or emailed observations at least once a week throughout the winter. The Mammoth Mountain Ski Patrol also contributed information on avalanche occurrences and snowpack conditions as often as they could. Individuals from the National Nordic Ski Patrol were quite helpful with their detailed snowpits profiles and observations. There were also several regular contributors to the Discussion section who provided excellent snowpit and field observations.

### Field Volunteers

A special thanks goes to Zach Schneider and Andy Selters for their countless hours of volunteer time skiing and standing around in cold snowpits.

Julia White provided valuable snowpit data and weather and storm observations from Tioga Pass Resort.

A visit to the area by Karl Birkeland, Doug Abromeit and Doug Chabot for the January Forest Service Winter Sports Specialist gave me the opportunity to travel with Doug Chabot to the Blacksmith avalanche location to conduct an on site investigation. I am grateful to Doug for sharing his expertise and time during this tragic event.



Sue and Zach in the pit. February 2006. Patitucci Photography

## Goals for 2006-2007

1. One fulltime and one part time US Forest Service avalanche specialist
2. Expand advisory area coverage north to Tioga Pass area and south to Big Pine Creek
3. Issue advisories on a more regular basis
4. Establish BCA beacon park
5. Further educational programs in middle and high schools, Bishop and Mammoth
6. Provide avalanche education to the general public in the form of free classes and talks
7. Expand interactive observation functionality on ESAC website
8. Provide more outreach to the local snowmobile community
9. Improve dissemination of advisories via radio stations and local newspapers

## Acknowledgements

The success of the Eastern Sierra Avalanche Center's first season is the result of many hours of volunteer work on the part of two members of the ESAC Board in addition to the efforts and contributions of local businesses. Walter Rosenthal took many hours out of his busy work and family schedule to travel to Board of Supervisor's meetings to request grant money for our operation. He spent many hours in November and December answering my questions and providing guidance for the content of the advisories. He made himself available during the busy mid winter to discuss the finer points of snow physics and especially, the sintering process.

Nate Greenberg donated countless hours of his webmaster expertise in developing and upgrading the ESAC webpage. Nate also volunteered many hours towards scheduling and fundraising events. Dori Leyen and Mono County Search and Rescue were wonderful to work with and helped to spread the Center's name. We also extend our thanks to our many industry supporters who donated prizes for raffles and silent auctions. We especially want to thank anyone who went to the ESAC site for information on conditions. Your support for the site and interest in avalanche awareness are appreciated.

ESAC is indebted to the following individuals and businesses who provided financial support and donations to the Eastern Sierra Avalanche Center, including the regular and student members - who were too many to list.

### Memberships above Standard amount

#### **\$50-\$99 – Sustainers**

Alan DeFever  
Allan Pietrasanta  
Bobbie Morrison  
Darla Heil  
David Erskine  
Douglas Patterson  
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## **Other Non-Financial Support**

**(for slide shows, fund raisers, Walt's memorial, etc.)**

Black Sheep Coffee  
Clevenger Photography  
Great Basin Bakery  
John Dittli  
Kevin Klein  
Mammoth Brewing Co.

Mammoth Ski Museum  
Mountain Light Gallery  
Rock Creek Lodge  
Sherwin's Restaurant  
Skadi  
Tioga Pass Resort

## Appendix

### Media

During the course of the winter, our contacts with the local and national media increased. Media interest follows avalanche accidents and we spoke with reporters from the Reno Gazette, the Los Angeles Times and forecasters from several western avalanche centers. The local country western radio station broadcast our High and Extreme avalanche danger ratings.

**T**oday, we see growing numbers of winter backcountry users with widely ranging levels of wilderness experience seeking increasingly vertical terrain.

Are they any safer, equipped with techno-gizmos they may or may not know how to use in the pinch? Consider the market demand for a simple bladder device fitted with a snorkel mouthpiece that promises potential avalanche victims several more minutes of personal air supply so they might endure their entombment a bit longer.

Burak and her colleagues are concerned. Turning concern into action, they have established the Eastern Sierra Avalanche Center (ESAC), a nonprofit organization with a mission to advise and educate the public on avalanche conditions in the backcountry of the Eastern Sierra and to provide the information winter backcountry users need for sound decision making.

Until last fall, Mammoth was without its own avalanche center, despite the area's dramatic growth as a backcountry ski destination. Forest Service avalanche programs operating in the late '70s and early '80s were eliminated by budgetary constraints. Working in partnership with the ESAC, the Forest Service now provides office space and support for the start-up organization. With the support of the rest of the community, the ESAC hopes to become one of the premier avalanche centers in North America.

In its first year of operation the ESAC has begun to collect, analyze and publish field data from its official avalanche forecaster, from Eastern Sierra mountain guides, from remote instrument sites throughout the range, and from the Mammoth Mountain Ski Patrol, which has information available to the public on the Internet at <http://patrol.mammothmountain.com>.

ESAC's own Web site, [www.esavalanche.org](http://www.esavalanche.org), provides one-click access to weather data, snow pits, remote instrument data, snow conditions and avalanche observations in watersheds from June Lake to Bishop Creek.

As the official ESAC forecaster, Burak collects, organizes and analyzes snowpack and weather information and issues regular, region-specific avalanche advisories. Then, they need to convince backcountry travelers to use them wisely.

"The Eastern Sierra Avalanche Center must meet rigorous scientific standards to be credible in the snow science and avalanche forecasting community," Burak said. "But to be truly foremost in the field of avalanche hazard evaluation, we also have to reduce human involvement—particularly fatal involvement—with actual avalanches.

"For that," she continued, "the ESAC must present scientifically reliable avalanche forecasts that also encourage readers to assess their own abilities, experiences, and attitudes toward route selection and avalanche avoidance.

"While we gather data and make hypotheses about the weather and snowpacks, we also need to learn how to help winter wilderness users become aware of their own strengths and liabilities when it comes to making appropriate backcountry decisions." ■■■

## Letters and emails of support

Dear ESAC,

We want to thank you for all of your efforts this winter. Having a local avalanche forecasting center has been an invaluable resource for this part of the Sierra. It has been extremely helpful to be able to pass on ESAC's web site address to the many skiers who call us at Tuolumne Meadows for general avalanche information.

We hope that the many people who are accessing ESAC's web site also show their gratitude with some financial support. It's amazing how quickly we have all come to rely on the availability of expert avalanche forecasting for the area.

Sincerely,

Tracey Wiese and Bruce Carter  
Tuolumne Meadows Winter Rangers  
Yosemite, CA

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Dear Sue,

I want to thank you and the Eastern Sierra Avalanche Center for the wonderful work you've been doing all winter long.

I live in San Francisco and I mostly backcountry snowboard in the Lake Tahoe area. However, I do try to head to the Eastern Sierra a few times a year.

I enjoy automatically receiving your updates by email because they provide such a wonderful, detailed description of the Sierra weather and snowpack. I am relatively new to the backcountry, but I am fast becoming a snow science geek and I love the data you provide.

Also, I love the fact that you are so approachable on the ESAC online forum. Being able to directly query an avalanche expert about her field observations is pure gold.

Thanks again,  
Storn

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Just wanted to voice my support for the work you have been doing with ESAC, particularly this season. Especially with the observations forum and your participation, I have learned more about how to conduct and interpret tests (having taken an Avy I class, but having not kept very fresh on the particulars, this has been key), and I feel like I'm better able to make safe decisions, or at least judge objective risks more sensibly, than last season.

Absent a federally funded avalanche center in the region, I would be delighted if some of my tax dollars went to support ESAC's work. I hope that I am not alone in communicating this -- while donations are perfectly justifiable, I pay about a third of my income into taxes, and I'd really like to see projects like yours receive some of those funds. Your reports have been most helpful in making safer decisions in the backcountry, and enjoying the Sierra. I'm not really sure how to go about pushing for federal assistance for projects like ESAC, but if I can help, I'd like to. Thank you!

Sincerely,  
Tim Triche, Jr.  
Altadena, CA

I wanted to express my support for ESAC. In its short time in existence it has dramatically improved the quality of avalanche information available to winter visitors to the Eastern Sierra. I hope that in the future ESAC will have the resources to expand its forecast area further south. The Whitney area, in particular, is heavily used in the winter, and visitors there would benefit from the same high-quality information available for the Bishop Creek-Mammoth Lakes-Tioga Pass area.

All the Best,  
Steve Larson  
Glendale, CA

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I am writing this to thank Sue and the staff at the ESAC for an outstanding job of bringing avalanche awareness and up to date snowpack information. The Eastern Sierra has been in need of these services for some time. As more and more skiers and snowboarders venture out into the backcountry it is extremely important for them to have as much information about the conditions and snowpack as possible. The forums are also a great place for people to write in and let everyone know what's going on out in the backcountry. Thanks again, I am already looking forward to next year.

Sincerely,  
Gabe Taylor

---

Dear Sue,

I am writing to express my support for the Eastern Sierra Avalanche Center and the reports that you issue. This is an invaluable service.

I particularly like the fact that your reports are in depth, technical, and yet also include a "bottom line". Since I live on the "West Side" it is especially valuable to have the detail that you provide since I am not in the Eastern Sierra on a daily basis and thus can not observe weather or snow trends. Thanks and keep up the good work!

Julin Maloof  
Assistant Professor  
Section of Plant Biology  
University of California, Davis  
1 Shields Ave  
Davis, CA, 95616

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Dear Sue,

I live in Huntington Beach, but enjoy ski trips to the Eastern Sierra with my friends. Your advisory reports this winter have been educational and are a great tool for trip planning. The observation postings on the ESAC website by other backcountry travelers are also very valuable, and enable us to get a handle on snow conditions in different areas of the Sierra.

The number of backcountry travelers is increasing, and ESAC is a valuable resource for a safer and enjoyable time in the backcountry.

Thank you to everyone involved with ESAC.

Regards,  
Mark Goebel

I would like to express my support for ESAC. I have found it is an excellent resource for keeping track of what is happening with the snow pack in the Eastern Sierra. It allows us 'weekend warriors' the opportunity to follow the daily events that affect the snowpack. The result is we can base our decision making more on fact and less on guessing. In a case of using the site, on one trip we looked for a layer that was predicted to be there, found it, and deemed it too unstable (for us) to ski. We then changed aspect, found that layer was not present, and safely skied the slope. Would we have skied the suspect slope without knowing what to look for? Probably not, because we would have dug a pit anyway, but knowing there was a wind event re-enforces the need to be extra careful. It's also useful to quote the ESAC advisory when you've got someone who wants to ski something that could be iffy. And on a personal note, I could easily become a snow geek, so I like watching the weather and then trying to predict what the next advisory might be. It's just too bad for me that I live in San Diego. Now I have to put my money where my mouth is and join up!

Jeff

I have been getting these East Side avalanche reports and have found them to be most helpful, educational and informative, please keep it going. I base much of where and when I will ski on these reports.

Thanks,  
David Adler

Hi,

---

I've been receiving your snow & avalanche updates for a few months now and just wanted to drop a quick note saying thanks. It's really great and--for the layperson like me--accessible information.

Keep up the good and valuable work.

Take care,  
Mike

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I just recently joined your organization. Although I live in San Diego, I have a vacation condo in Mammoth, I get up there frequently. Thank you and all of the staff for the great work you do and such professional reports. I would like to attend one of your 3 day clinics at some point to increase my own knowledge of snow safety. I find it fascinating that you put in the time and efforts to help all of us back country lovers and traveler. Thanks for a great job and I will surely renew my membership for next year.

Kevin McCauley

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Hi Sue,

I just wanted to express my gratitude for the services you provide at the ESAC. Although I did not get out much this winter, I was constantly checking your advisories to evaluate current conditions. The information provided is of great value to the backcountry skiers & riders who chose to play on the east-side. Lots of my friends have been using the information also. I really like the idea of the photo gallery and discussion boards as well.

I will be sending another donation later in the season to support your efforts, things are a little tight right now as my summer crew has begun to arrive.

I'm not sure if I will make the Millpond memorial for Walter, I'm going to the one the day before and my folks are visiting from the east coast. If I do go, I'll be sure to introduce myself.

Thanks again,  
Chris Keith

Thanks Sue, for keeping 'em coming all winter. I read and archived all of your reports. And, I really like your Voltaire quote.

Jeff

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