Ski Area Operators Attitude Toward Skier Safety Issues

An Interactive Qualifying Project

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Abstract

This study investigates the reasons behind ski resort's refusal to provide skier/snowboarder accident and death information. Working from literature and interviews, we establish ski area operators attitude toward ski trail characteristic studies to further skier/snowboarder safety. We assess if ski area operators place a greater concern on decreasing their liability towards lawsuits or increasing skier/snowboarder safety.

Executive Summary

Currently, it is accepted practice for ski resorts to refuse skier/snowboarder accident information to the public. This poses a problem for investigations to be made to establish characteristics that may attribute to skier injury and death. The following are categories ski accidents may be classified as: a collision with a manmade object, manmade or natural terrain features, collisions between skiers, and lessons conducted by ski instructor employed by the ski are operator (Chalat 1998). Although there are many reasons that may attribute to skier injuries and deaths there has yet to be any studies that investigate the association of trail design.

The original objective of this study was to investigate whether or not a correlation could be made between trail design and skier injury and death. In doing this, the intent was to determine which trail characteristics are more responsible for injuries and deaths. Such evidence would promote the design of safer trails and modifying problem areas on the slopes. However, this proved to be an arduous task. Information regarding skier accidents was unattainable and ski resorts did not want to cooperate in such a study. Data to support the objective could not be obtained and therefore the objective was reformulated.

The focus of the study shifted to the elucidation of why ski resorts are reluctant to provide information regarding skier accidents although it may help improve the safety of skiers. Questionnaires were composed and given to ski resort managers, head ski patrollers, and a lawyer specializing in ski accidents. Furthermore, an in-depth examination of legal and legislative policies associated with the ski industry was carried out.

The results of the study show the attitudes of the ski resorts towards issues regarding liability and skier safety. Most ski areas do not believe trail characteristics are the cause of ski-related injury or death and are not willing to release skier accident information, although it may improve skier safety of the resort. Interestingly, most mountains believe that a study that investigates the correlation between trail characteristics and skier injury would be valuable. This is a paradox because if mountains truly believe trail characteristics have nothing to do with skier injury, a study that investigates this issue should not be of interest for the resorts. Furthermore, the reluctance of ski areas to provide skier accident information for a study may be the result of not only liability issues but public relation issues as well. Finally, the results also showed that increased protection form state statues help ski are operators from having liability claims brought against them.

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Statement of Primary Authorship

Michael Carlin, Robert Goudreau, and Babak Samii equally contributed in the completion of the project.

2. Introduction

2.1 Objective

Initially, the objective of this study was to determine if trail design and trail characteristics are related to skier injuries. However, access to information regarding skier injuries from resorts proved to be unattainable and therefore the objective was reformulated. Thus, the objective of this study was changed to investigate and determine reasons why ski resorts are reluctant to provide information on skier accidents.

2.2 Rationale

Reaching the intended objective of this study would be important because it could lead to determining whether or not certain trail characteristics may be the cause of serious injuries and deaths. If it could be determined that trail design of a ski slope has a direct connection to skier safety, then trails need to be changed appropriately.

2.3 Background

2.3.1 How Skiing Started

The history of skiing goes back several thousand years to post-glacial stone-age people who lived in the northern latitudes of Europe and Russia. Skis made it possible for them to survive the harsh winters because it aided them in hunting game. (Pfeif 2000) Skiing as a means of travel existed from the time of man's earliest migrations. Physical evidence dates back to about 2500 B.C., and includes a pair of preserved skis from Central Sweden, and rock drawings from Northern Norway showing a party of either hunters or warriors wearing skis. (Allen 1993) Literary reference to skiing can also be

found in Europe's far north in Virgil's Aeneid, written almost 2000 years ago. The use of some kind of equipment for travel over snow is ancient. Greek historians mention skins, sliders, or shoes used for this purpose, and similar references occur in Norse myths. (Encarta 1997) The earliest skis of which any record exists were found in bogs in Sweden and Finland. They are thought to be between 4000 and 5000 years old and consist of elongated curved frames covered with leather. (Encarta 1997) The Rodoy rock carvings above the Arctic Circle in Norway are at least 4500 years old and depict a man on long runners with a hunting implement in hand. Ski artifacts of all sizes have been dug out of peat bogs in the Scandinavian countries indicating wide use of the over-snow runners. (Pfeif 2000)

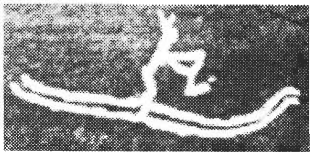


Fig. 1 Rock wall drawing from Rodoy, Norway
Man on skis. 2500 B.C. Skiing

The first written account of skiing appears around 1000 A.D. in the Viking "Sagas" where several kings are described as being superb skiers. In 1206, during the Norwegian civil war, two scouts on skis carried the infant heir to the throne 35 miles to safety in the middle of winter. The "Birchleg Race" celebrates the historic event today over the same route - so called because the scouts wrapped their legs in birch bark to keep them warm and dry. Another traditional ski race takes place every year in Sweden. The Vasaloppet Cross Country race (53 miles) honors Gustav Vasa's ski trip in 1523 when he raised an army and beat the Danes who were then in control of the country. (Pfeif 2000)

In the 18th and 19th centuries the armies of Norway and Sweden used skis for winter warfare. A pair of skis consisted of one long runner and one shorter one called an andor. The long ski was used to glide, the shorter one to brake and climb. Skins could be applied to the latter. By 1840 local cross-country ski races (with skis of equal length) were beginning to be held in Norway among military personnel. Soon, civilians were allowed to enter and the popularity of the ski contests spread rapidly among the peasants in the rural countryside. The races were Nordic in concept - over rolling terrain and down short steeper slopes where jumping was necessary. (Pfeif 2000)

In 1868 Sondre Norheim, a young man from the Telemark region, broke all the jumping and cross-country records at a Nordic tournament in Christiana (Oslo, Norway). Up to that time a single toe strap had been used to hold the ski on the foot. He revolutionized the ski-sport by adding a willow strap around the heel and contouring his skis so that they were slightly waisted in the middle. The new binding and refinement of the ski shape gave greater control and maneuverability, which meant faster running and longer jumps. The words, "Christiana" and "Telemark" were given to the new ski technique he pioneered. He is considered the “Father of Modern Skiing”. (Pfeif 2000)

2.3.2 Europe

Modern sports skiing began in the middle of the 19th century in Norway and soon spread throughout Scandinavia. The Norwegian Ski Association was formed in 1883, and the first international ski tournament was held in 1892 near Christiania. Cross-country and downhill skiing was eventually separated for purposes of competition, although prizes were given for the combined result. In the 1880s and 1890s, skiing began

to gain popularity in other countries of Europe, in large part because of the written account by Norwegian explorer Fridtjof Nansen of his trip across Greenland on skis in 1888. (Encarta 1997)

The first Swiss ski club was formed in 1893, and at the turn of the century the golden period of ski mountaineering began in the Alps. Most of the important ski expeditions were accomplished in these years, with the exploration and demarcation of all the Alpine terrain. The first ski club in Germany was formed in 1890, and ski competitions were held there in 1896. After a slow beginning, skiing became established in Chamonix, France in 1898 and thereafter steadily gained popularity. In central Europe and Russia, where favorable terrain and snow quality exist, skiing also rapidly gained enthusiasts. (Encarta 1997)

World War I (1914-1918) served as a thrust for the development of skiing, because the training and use of special ski troops spread knowledge of techniques. The Federation Internationale de Ski (FIS), with headquarters in Stockholm, Sweden, was formed in 1924, and Nordic skiing became part of the Olympic Games in that year. (The FIS is now located in Oberhofen, Switzerland.) (Encarta 1997)

2.3.3 How Skiing Came to America

Scandinavian immigrants who settled in the upper Midwest introduced skis to the U.S. in the late-1830s. The California Gold Rush of 1849 lured many to the gold camps in the high Sierra where the long runners, called "Norwegian snowshoes," were quickly adopted for over-snow travel. One of the most famous skiers of that era was "Snowshoe Thompson" who carried the mail for 20 years from Placerville to Carson Valley, a distance of 90 miles, with a heavy mail sack on his back. (Allen 1993) Skis were handmade from pine or spruce trees and ranged in length from 8-14 feet in length. They were usually 1/2 inch thick and about 4 inches wide. They weighed about 25 lbs. One long pole, 8-10 feet long was used to steer and to brake (sometimes by straddling it). Turning was practically impossible on the long boards and one usually had to slow down and step around the pole to change direction. Norheim's refinements in ski equipment did not reach the USA until much later. (Pfeif 2000)

It was not long before California miners were challenging each other to spur of the moment downhill races during their off time. Then the rivalry spread to other camps and a racing circuit was established. Each camp had its "aces" who rode the 12-foot boards all out for glory and the honor of the camp they represented. Recipes for "doping" (waxing) were highly guarded secrets and often determined who would win or lose. Prizes of silver belt buckles were most common. Betting was intense; spirits were high; and après ski revelry could last through the night. (Pfeif 2000)

In 1874 at La Porte California, Tommy Todd was clocked at over 85 miles an hour down an icy 1804-foot course with a 1,000-foot vertical. His unofficial speed record stood until the middle of the 20th century. Ten years after the rush to California, gold was

discovered in the mountains west of present-day Denver. Skis would find a welcome new home in the high mountain mining camps of Colorado. (Pfeif 2000)

2.3.4 North America

In the United States, skiing developed first in Minnesota, with its large Scandinavian population, about the middle of the 19th century. As a result of its popularity across the border in Canada, skiing then spread to the Rocky Mountain States. Beginning in the 1920s, skiing began to enjoy continuous popularity, developing in areas of California and the Pacific Northwest, as well as the Northeast. The development of competent ski schools, the accessibility of skiing areas to the automobile, the introduction of the ski lift in the 1930s, and the development of ski resorts (such as Aspen, Colorado; Sun Valley, Idaho; and Lake Placid, New York) made the sport more available. After World War II ended in 1945, the sport expanded enormously, no longer limited to a small, affluent minority. (Encarta 1997)

Over the years, skiing competition has gained an increasing following because of television, which has brought isolated sites with limited spectator facilities to large audiences. Nordic skiing dominated international competition until 1936, when alpine skiing was introduced at the Winter Olympics in Garmisch-Partenkirchen, Germany. In 1967 the World Cup for Alpine competition was introduced. In the 1970s and 1980s World Cup circuits were developed in freestyle, cross-country, ski jumping, and Nordic combined. The alpine events in the Winter Olympics are the downhill, slalom, giant slalom, super giant slalom, and combined races; aerial and mogul competitions; ski jumping (for men only); and the Nordic combined. The cross-country events include individual and team races for both men and women. (Encarta 1997)

2.3.5 Skiing In New England

Skiing is a popular sport in New England. Resorts and skiing sites are popping up in many places and even more people are starting to take interest in the sport. But skiing was not always as popular as it is now. In fact, it was not long ago that skiers had to go many miles to find a ski resort and some had to use their own back yard if they wanted to ski. (Borysenko-Anderson, May 2001)

Once skiing was introduced in New Sweden, a place in northern Maine, its popularity spread rapidly throughout New England. People used skiing as a way of getting around in the deep snow of the Northeast. Alden Anderson, who was born in New Sweden said that "If you wanted to go anywhere in the winter you just jumped on your skis and went." Children would use skiing to get to schools. With so many people using skis as a way of transportation, new companies sprang up to meet the rising demand for ski equipment. (Borysenko-Anderson, May 2001)

Around the turn of the twentieth century people started using "dope" or ski wax on their skis to help them ride smoother and quicker across the snow. Frank Stewart was one man who made and used wax for his skis. Using the wax he won many races. When Stewart retired in 1911, he told people how he made the Old Black Dope, his most popular skiing wax. Waxing skis nowadays is a science. (Borysenko-Anderson, May 2001)

Before 1905 little had been published in the United States about skiing and its official rules. Theodore A. Johnsen, an English immigrant, changed that though. When he was 48 years old he wrote the first American Skiing Book, *The Winter Sport of Skiing*.

It was 54 pages long and included a manual for skiing technique and use of skiing equipment. (Borysenko-Anderson, May 2001)

Before 1916, skiing in Maine was still confined to certain Scandinavian communities. But in 1916, a summer resort located at Poland Springs started to stay open in winter. It offered all different kinds of ski lessons, from cross-country to ski jumping. Before long these events were being called winter carnivals and because of their elaborate offerings, thousands of people were drawn to them each year. Portland and Augusta started to vie for the best show, so each year both towns would do something special to attract more people. (Borysenko-Anderson, May 2001)

2.3.6 Cutting Trails in The Northeast

In Europe and the western United States skiing was easily possible above the tree line, but in New England there was hardly a mountain without a forest. After the first snow train season it became obvious there was an acute shortage of terrain for Alpine skiing. Sometime in early 1932 informal discussions among leading skiers took place before John Carleton called on James E. Scott, the supervisor of the White Mountain National Forest. As a result, the New Hampshire Development Commission, which already promoted skiing in the state through the *Troubadour*, a fifteen-page booklet extolling the joys of country living. The Commission called a meeting of recognized ski club leaders and interested hotel owners. (Allen 1993)

A committee was formed to supervise the building of trails specifically for skiing. The Marquis d'Albizzi and Duke Dimitri of Leuchtenberg were engaged to lay out trails in the Franconia area. Charley Proctor laid trails in Pinkham and Crawford notches. As

with earlier innovations, it was a small elite group that was responsible for initiating trail development. Carleton and Proctor were both Dartmouth Olympians with European experience and connections to the Boston and New York clubs, and the status of a skiing marquis and a duke seemed obvious. (Allen 1993)

Survey work began in June 1932. Trails were marked and when Carleton received the funds, the Civilian Conservation Corps (CCC) was put to work on fifteen trails that made for a total of forty miles of skiing. Although they were specifically announced as not the usual narrow slits, Carleton and Proctor's trails were criticized for their toughness. The Appalachian Mountain Club (AMC) from Boston called for more suitable paths for the non-competitive skier. There was also an effort to make them more accessible from highways. Some hotels and clubs built their own trails. In 1932 Peckett's started the construction of the Richard Taft Racing Trail, and the Newport Ski Club built its own trail on Mt. Sunapee. The CCC completed both these trails the next year. (Allen 1993)

There was continued discussion of what constituted a good trail. The ideal minimum width was twenty feet for any gradient more than 5 degrees, but many were not that wide. One of the astounding facts about the Taft trail was its width – all of sixty feet. When local regions began to advertise their delights, they frequently featured the width of trails. From the start, New Hampshire planned a substantial booklet with maps and details of the trails. First published for the 1934 season and issued free, the statistics for the ski trails were impressive. The New Hampshire maps of 1935 marked 50 ski trails (total miles, 115) and of 1936 marked 90 ski trails (total miles, 200). In 1939 there were too many to mark (total miles, 1000). (Allen 1993)

Since New Hampshire was the first state to capitalize on the labor of the CCC for trail construction, that was the place to ski in 1934. Vermont lagged behind principally because there was a lack of general winter sports enthusiasm. Trail design and cut in Vermont was based upon Proctor's work in the White Mountains. When the CCC did construct trails in the Green Mountains it did so in areas where skiing had some foundation: Stowe and Brattleboro. Whereas New Hampshire could boast fifty trails in 1935, Vermont listed fifteen. In spite of the increasing localized interest in winter sporting, there was still a question of whether it would take hold in the Green Mountain state. (Allen 1993)

Vermont lacked trail mileage, but various communities in the state saw themselves as ski centers. Brattleboro, with its jumping heritage, made ongoing efforts to keep that ideal foremost. Although the town's outing club had CCC help with trails, patrician Woodstock and New York favored Stowe became more popular in the 1930s. Woodstock, which acted as if it had invented winter sports, owed its skiing popularity to the Woodstock Ski Runners Club, founded and promoted by J. Dwight Francis in 1932. Promising open field running near an established inn with good rail and road connections, and close to Dartmouth College, this club guaranteed lively activity. Francis imported Fritz Steuri, a well-known Swiss racer/instructor, and invited the wealthy to make Woodstock and Alpine success. Two poor snow seasons damned his hopes; so he took to promoting the first ski cruise to the Alps in 1935 – a forerunner of the ski vacation package. Woodstock owed its survival as a ski center to the various rope tows dotted around the neighborhood. The future belonged to the areas where trails, tows, lifts, and

villages all came together – however inharmoniously – and one of those areas was Stowe. (Allen 1993)

The Amateur Ski Club of New York "discovered" Stowe. One of the club's objectives was to pool information of newly explored skiing opportunities. President of the club, Roland Palmedo, took a spring trip in 1932 and reported not only to his club but also to the wider skiing fraternity served by *The Ski Bulletin* that the Stowe area offered various possibilities for a week or ten days. The toll road from the top of Mt. Mansfield, he judged, was probably not exciting enough for the experts. In 1935, as a challenge to such experts, the CCC cut the 1 ¾ - mile, 14-degree Nose Dive, the slightly shorter and steeper Barnes Run, and five other trails on the mountain. (Allen 1993)

Besides the actual ski slopes, a ski center needed communication links, inns and restaurants, parking lots and on-site instruction. Two hostels remained open in Stowe for the 1934 winter: the Green Mountain Inn in the village and The Lodge at the bottom of the mountain. Buses met trains arriving at Waterbury, and up at the mountain a large sign announced a ski school with "Herr Sepp Ruschp – In Charge" for the 1937 season. The Stowe – Mansfield Association maintained an office with a phone so that late arrivals could find room and board at one of the lodges or farms listed with the association. This service was paid for by a five cent per person tax. Palmedo began interesting investors in a six thousand foot chairlift up Mt. Mansfield in Stowe and as this single chairlift was being readied for the 1940 season, the ski area already had a following that appreciated both the variety of down mountain thrills and the amenities provided. In 1939 Stowe played host to the United States National Alpine Ski

Championships, competitions that confirmed Stowe as one of the most important areas for testing the downhill and slalom sporting fraternity. (Allen 1993)

2.4 State of the Art

2.4.1 Literature Review

At this point in time there have been no formal studies to investigate and determine the existence of ski trail characteristics that may be the cause of skier/snowboarder injuries or deaths. However, there have been numerous studies that investigate skier injury trends as well as preventative measures for mitigating common hazards at ski areas.

In a study done by Johnson, Ettlinger, and Shealy (1994), the trends of skier injuries at a Vermont ski area were documented from 1972-1994. They have documented that overall injury rate decreased 44% over the twenty-two years. However, that decrease in the overall trend occurred in the first ten years of the study. They determined that lower leg injuries had the greatest decrease while severe sprains to the knee had a dramatic increase. Also, the incidence of upper body injuries has remained constant over the years. The overall injury rate in alpine skiing has decreased to approximately 2.5 injuries per thousand skier visits. This rate is relevant to trail characteristics and design because there were 52.5 million skier visits last year, according to the NSAA, that would mean there would be approximately 21,000 injuries per year. Granted that not all those injuries would be related to trail characteristics or design, a portion of them would be. It is a portion of accidents that could be decreased or prevented.

Accident prevention for skiers can be broken down into several categories. Penniman (1993) displays this in a hierarchy from which he bases his discussion. Potential solutions are given in five priority levels, with the "First Priority" level containing the most preferable of methods. The successive levels are each resorted to if

the previous levels do not adequately alleviate the danger. The priorities are as follows, First Priority: Eliminate the hazard and/or risk, Second Priority: Apply safeguarding technology, Third Priority: Use warning signs, Fourth Priority: Train and instruct, and the Fifth Priority: Prescribe personal protection (helmets, wrist braces, etc.). There is no exact science to preventing accidents but only guidelines to follow which will help reduce accidents. An example prevention method is to reduce the angle at which trails merge, in order to reduce merger collisions (Penniman 1993).

In a few studies that analyzed skier injury trends, the authors noted that further studies need to be done to find preventative measures to help decrease injuries. In their study at a Swedish ski area, Curt Made and Lars-Gunnar Elmqvist, noted that their "findings have prompted the need for further study to find preventive measures for, and also to evaluate the consequences of, downhill skiing injuries" (Made & Elmqvist 1993). Martin Burtscher and Michael Philadephy determined that almost 1000 skiers are involved in a serious skiing accident yearly. They determined that "this strongly increasing frequency necessitates equally effective preventative measures" (Burtscher 1993).

There have been no types of trail characteristic or design studies close to the study that has been proposed or at least none were found. Penniman's studies have come fairly close, but deal with hazard mitigation and not the possible relation between trial characteristics or design and injuries.

2.4.2 Legal and Legislative Overview of Skiing

2.4.2.1 Purpose of This Section

The purpose of this section is to provide a brief background and overview of legal cases and legislative laws that help support the new objective.

2.4.2.2 Overview

According to Jim Chalat, in 1951 the first ski accident lawsuit was reported. The case was Wright vs. Mt. Mansfield. The case involved a skier who was skiing down a trial, on a Vermont mountain, and collided with a snow-covered stump. The skier took the area operator to court and tried to make a claim against them for damages. When the trial ended, the court stated that the skier assumes the risk of the sport and that no duty could be imposed on the owner or operator of the ski area to keep the trials level and free of fluctuations in the terrain. And since no duty was imposed to maintain the slopes in any conditions there is no duty for the area to warn the public of such hazards. The court held that skiers assume the risk and that skiers have to use their own judgment of their ability and assessment of the slopes (McCaffrey 1991).

This case was widely cited by many other court cases following this one. The courts held that skiers accept the risks of the sport and must use their own abilities and judgments so as not be injured while participating in the sport. The inherent danger rule started to take form. Roughly stated, that in the sport of skiing there are inherent dangers that are integral to skiing and claims cannot be made against an area operator or owner if the danger is inherent to the sport. If skiers were injured, it was most likely because they

were skiing beyond their ability or failed to assess the danger properly. It became extremely difficult to prove that a skier was not liable for an accident.

The ski industry was prospering quite well and experiencing a nice growth rate among new participants. The ski area operators, however, were dealt a blow that sent a shudder through the industry. In 1978, a court found for a defendant in a ski accident case and awarded 1.5 million dollars to the plaintiff (McCaffrey 1991). James Sunday, a novice skier, was skiing down a beginner's trail and fell when his ski caught some underbrush hidden beneath the snow surface. He became a quadriplegic because of the fall. The court ruled that not every fall is inherent in the sport and "if the fall is due to no breach of duty on the part of the defendant, its risk is assumed in the primary sense and there can be no recovery. But where the evidence indicates existence or assumption of duty and its breach, that risk is not on 'assumed by the plaintiff. What he then 'assumes' is no the risk of injury, but the use of reasonable care on the part of the defendant" (Sunday vs. Stratton Corp. 1978).

With this finding, the ski industry called upon its lobbyists to push for legislation that would prevent this case from causing possible redress from past cases (Chalat 1998). What was in effect lobbied for was a rough model of the "Ski Area Safety and Liability Act" which would define the inherent risks of the sport and prevent large claims, like the Sunday case, from happening again.

The states with large ski industries operating within them realized the large economic benefit from the operations and did not want to jeopardize the state's economy by having the ski areas go out of business due to large-scale claims. The ski areas

lobbied fairly hard to push skier liability acts through the houses and senates in many states. The ski safety acts puts duty on both ski area operators and skiers (Chalat 1998).

Although ski safety acts differ from state to state, they all roughly cover the same ideas. Skiers have to remain in control and use their own judgment in assessing their ability and should not ski in places above that ability. They also cannot not make a claim against an area operator or owner for dangers that are inherent in the sport, such as changing weather conditions, natural objects or man-made objects that are integral to the sport (i.e. lift towers, buildings, snow making equipment, trees, rocks or surface conditions), as well as collisions with other skiers. Ski area operators or owners have a duty to remove dangers that are not integral to the sport, mark trail conditions that could pose a hazard as well as mark trails with the appropriate signage (Chalat 1998).

2.4.2.3 Current Legislative Trends

There have been some recent new trends in ski legislation. More and more ski areas are lobbying and pushing for more defined inherent risk and the liabilities that skiers take when they go skiing. An example of this is the bill that is coming up before the Vermont House of Representatives. This new bill, H.282 - Ski Area Liability, greatly limits the ability of a skier to make a claim against an area operator or owner if they are injured while skiing (Times Argus 2001).

The representatives supporting this bill claim that it is needed to clarify the laws in order to take some of the guesswork out of the liability issue for skiers and ski area operators (Vt. Newspaper 2001). Also, they claim that skiers may face higher ticket prices if this act is not passed. How justifiable that is, is not entirely clear.

2.5 Approach

Initially, the approach of this study was aimed towards the primary objective of trying to obtain information regarding skier injuries and accidents. Ski resorts were contacted and visited with the intent of obtaining information on skier injuries. However, since most ski resorts were hesitant to supply this type of information, other ski industry organizations were contacted including the National Ski Patrol, National Ski Area Association, the Consumer Product Safety Commission as well as lawyers specializing in ski-related cases. Moreover, published literature was reviewed to determine if there has been any prior research on legal issues dealing with ski resorts providing information on accidents.

Contacting ski resorts was the primary root in trying to acquire information relating to skier injuries on the mountains. This was done through numerous emails, phone calls, and personal interviews. However, this approach proved to be inadequate in obtaining solid, consistent data and therefore questionnaires were given out. The use of questionnaires provided a means of asking questions that would provide direct responses.

3. Methods

3.1 Interviewing of Ski Industry Professionals

3.1.1 Method Overview

Attempting to prove the original objective, it was recognized that skier/snowboarder accident and death data had to be obtained. Starting with the ski area operators first, contacts were established and they were either personally visited, sent an e-mail, given a phone call, or a combination of the three. Recognizing that more information was needed, ski industry organizations were sought out for help in providing information. The National Ski Patrollers, the Professional Ski Patroller Association, and the National Ski Areas Association were a few of the organizations contacted. Also information from professional people who are involved with the ski industry such as lawyers, state medical examiners and the National Injury Information Clearinghouse, which is a part of the Consumer Product Safety Commission, were contacted for help. (see Appendix A)

3.1.2 Who Was Contacted and Type of Contact

Appendix B lists who was contacted (organizational names and names of people); the type of contact and the date the contact took place.

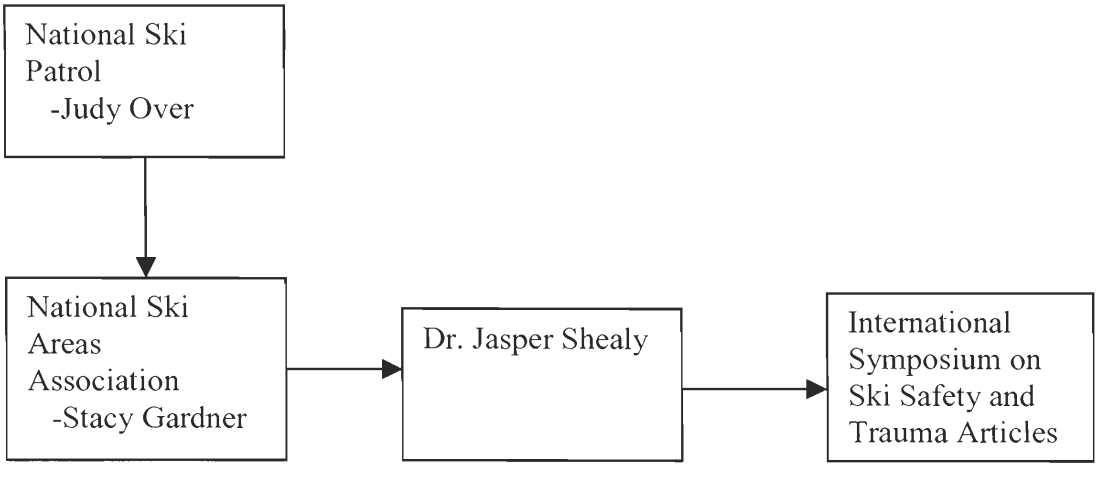
3.1.3 Process of Contacting, Flow Charts of Referrals and Reasoning

The skier area operators appeared to be the best place to start. Personnel at many different resorts were contacted. The ski area's ski patrol, risk managers, and general managers were contacted first with the justification that they would be the people who would have the information as well as first hand accounts of accidents and deaths.

The different organizations were contacted on the basis of either a referral from another organization, the ski area operators, or it was inferred that they might have information that would be helpful. In contacting the organizations, some of them were not able to provide any information. Instead, they made referrals to other organizations or people that they thought would be more able to help obtain the information needed.

When the National Ski Patrol Association was contacted and requests were made for information, they stated that they did not track the information regarding skier accidents and deaths. They then made a referral to the National Ski Areas Association. Stacy Gardner, the director of public relations for the NSAA, was the representative of the NSAA that was contacted. Gardner then recommended talking to Dr. Jasper Shealy. Shealy, an expert on skier injury trends suggested reading his articles and others that are published in the International Symposium on Ski Safety and Trauma. (see Fig. 3.1.A)

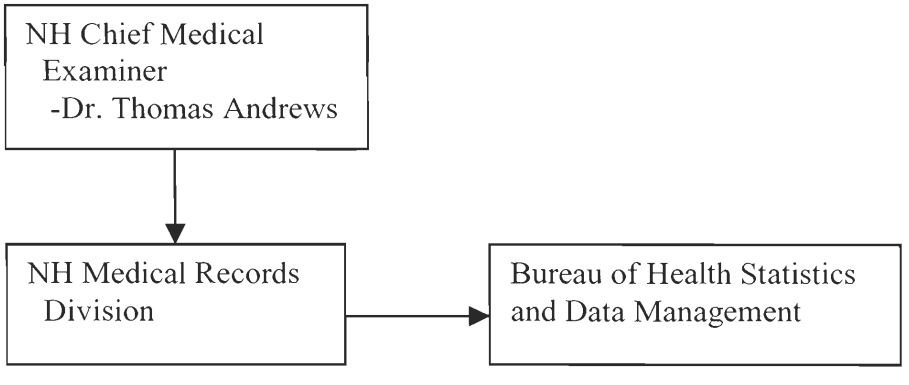
Figure 3.1.A Referral Flow Chart



State medical examiners were contacted and questioned if they could help provide the information needed. It was determined that since they are the ones who deal with death sites, they may have valuable information to provide. They were also questioned if they knew of other means of obtaining the specific information. Medical Examiners were contacted in three different states: New Hampshire, Maine and Vermont.

Dr. Thomas Andrews is the current New Hampshire Chief Medical Examiner. His office was contacted and said that they could not provide us with the information needed. They did, however, recommend contacting the New Hampshire Medical Records Division. After a phone call to the Medical Records Division, they referred the Bureau of Health Statistics and Data Management, a part of the New Hampshire Department of Health and Human Services, as a possible source for the specific information. The Bureau provided information about how all injuries and deaths that are reported by medical providers are coded. They are coded by "E-codes." Every type of injury or death is given a different code depending on the situation of the injury or death. The Maine and Vermont Chief Medical Examiners were contacted but they made no referrals. The medical examiners in these three states were contacted because they are located in states where skiing is a large industry.

Figure 3.1.B Referral Flow Chart



3.1.4 Types of Questions Asked

When the ski area operators were first contacted, with regards to the original objective, they were first asked if the information on skier/snowboarder accidents could be attained. The information needed is documented in the accident report filled out by the attending ski patroller. They were then asked if they felt that there was a relationship between accidents and trial characteristics or designs. Also, they were asked if they had ever performed a study or investigated the possibility of the relationship existing.

The organizations that were contacted were asked if they had kept any of the information needed to support the objective, such as the location of the accident, type of accident, the cause of the accident and other related factors needed to support the objective. When referrals were made to contact other organizations, the same questions were asked.

The medical examiners from the three states were contacted and asked if they would be willing to help provide information. They were asked if they had the specific information and if they were able to provide it.

3.1.5 Types of Questions Asked – Changed Objective

When the objective was changed, new questions had to be asked to the ski area personnel. Phone interviews and personal interviews we conducted. They were asked for reasons why they could not provide the information needed to support the original objective. They were also questioned if they felt that they had liability pressures to not provide the information to support the objective.

The organizations were not contacted after the change of the objective. They were unable to provide information then and they were not helpful for the new objective. However, lawyers were contacted in order to determine the liability issues that mountains would face and also if they knew of a way to get the ski area operators to provide the information necessary for the original objective.

The press was also contacted and asked if they could provide help to support the new objective. However, they were not helpful at all.

3.2 Ski Resort Questionnaire

In order to acquire straightforward answers from ski resorts, a short questionnaire was created. This would allow questions to be asked that would provide explicit answers, leaving little room for dubious responses. The questionnaire consisted of four questions that were given to and asked from general managers, risk managers, head ski patrollers, and presidents of ski resorts. Personnel of ski resorts were contacted rather than other industry professionals in order to gather a collection of responses that would be exclusively representative of ski areas. Furthermore, the questionnaire, as well as the group members asking the questions, made it clear that responses would remain completely anonymous and would be used for research purposes only. For this reason, titles of people questioned were asked for instead of names.

Table 3.2.1 Ski Resorts that Participated in Questionnaire

Mountains Contacted	People Spoken To
Waterville Valley, NH*	Director of Ski Safety
Gunstock, NH*	Head Ski Patroller
Wildcat, NH*	General Manager
Sugarloaf, ME	General Manager
Jay Peak, VT	President
Mt. Snow, VT	Head Ski Patroller
Squaw Valley, CA	General Manager
Sugar Bowl, CA	Head Ski Patroller
Kirkwood, CA	Risk Manager
Boreal Ski Resort, CA	Director of Safety
Heavenly, CA	Director of Risk Management
Jackson Hole, WY	General Manager

* Indicates visited mountains that received questionnaires personally

The above table is a list of mountains and titles of people that were either visited or contacted and provided responses to the questionnaire. The mountains contacted were chosen non-specifically. The people spoken to were chosen based on their presence the day of contact as well as their affiliation with skier safety issues of the mountain they worked for. The questionnaires were given via phone calls or by personally handing them to the appropriate people at the resorts.

The questionnaire was devised to ask questions that are concise and to the point with the intent of supporting the objective. The following table displays the questions that were asked on the questionnaire along with reasons why they were asked.

Table 3.2.2 Questions and Rationale of Ski Resort Questionnaire

Questions asked from Questionnaire	Rationale
1.) Do you feel that trail characteristics may be the cause of ski-related injuries or deaths? (Yes or No)	To determine if there may be a correlation between trail characteristics and skier injury and death.
a) If yes, what measures have been implemented to change trails?	To find out what types measures have been carried out on problem trails
b) If no, why not?	To find out what the ski resort believes to be the major culprit of ski injuries and deaths and why trail characteristics do not play a significant role
2.) Would you be willing to release accidents and death statistics in order to help the completion of a study to increase skier safety? (Yes or No)	To determine whether or not the ski resort are reluctant to provide accident and death information.
a) If no, is it because of legal liability concerns?	To find out if liability issues are the focus of concern for providing information
3.) Do you feel ski mountains generally have more of a concern with minimizing liability exposure or increasing skier safety?	To determine if the priority of the ski resort is on minimizing liability exposure or increasing skier safety, though both go hand-in-hand.
4.) Would you find a study investigating the correlation of trail characteristics and design to skier safety valuable?	To support or refute the possible correlations of trail characteristics with skier injury and death.

3.3 Lawyer Questionnaire

In addition to questioning people working for ski resorts, a questionnaire was devised for lawyers that specialize in ski related cases. The purpose of this questionnaire was to gain a legal perspective on the issues at hand. The questionnaire consisted of seven questions that were given via email to two lawyers that have had substantial experience with skier and ski resort lawsuits. The following table displays the questions that were asked and reasons for asking each question.

Table 3.2.3 Questions and Rationale of Lawyer Questionnaire

Questions asked from Questionnaire	Rationale
1. What are the most common law suits brought against ski area operators?	To gain an understanding of what typical law suits resort have to deal with.
2. What are, as defined by the courts, the inherent risks of skiing?	To establish if there may be trail characteristics that could be classified as inherent risks.
3. What factors are looked at to determine who is liable?	To determine if trail characteristics may be one of these factors.
4. Do you believe that trail characteristics (i.e. slope, fall lines) and trail design play a role in skier injuries?	To support or refute the first objective.
5. Do you feel ski area operators should investigate trail characteristics and designs to determine if there is a link with skier injuries?	To determine, from a legal perspective, if this type of investigation would be valuable.
6. What kind of reasons do your feel ski area operators may not want to investigate a correlation between trail design and skier injuries and deaths?	To establish the cause of ski area's reluctance to provide information for this type of study.
7. If a correlation were found between a specific trail characteristic or design, what kind of legal and financial situation would the ski area operators be in?	To find out what the implications of this type of study may be for ski resorts.

4 Results

4.1 Analysis of Responses by Ski Industry Professionals

4.1.1 Positive Responses

Positive responses are defined as responses by people who were willing to provide information to help support the objective or made a referral that led to useful information.

Judy Over at the National Ski Patrol was unable to provide the specific information needed, but she made a recommendation to talk to Stacy Gardner, the Public Relations Director for the National Ski Areas Association. Stacy Gardner was also unable to provide information, stating that it is up to the individual ski area operators to release the information. However, she recommended talking to Dr. Jasper Shealy. Dr. Shealy was contacted and he recommended reading articles in the International Symposium on Ski Safety and Trauma. He was unable to provide the specific information because he deals with skier injury trends rather than the specifics of the accidents. (See Fig. 3.1.A)

The Consumer Product Safety Commission proved to be helpful. They forwarded the requests for ski accident information to the National Injury Information Clearinghouse. The NIIC sent a large packet full of skier injury data. (Appendix B) This information was useful, but was not as specific as needed. The information they sent was a detailed list of every accident that was reported from 1985 to 1995. It also had statistical analysis of the type of injuries people sustained. However, in all the information it provided, including injuries sustained, how they were sustained, and how

people died, it did not include the specific location which is needed in determining a relationship between accidents and trail characteristics or design.

Daniel Coakly, a Waterville Valley ski patroller, provided some useful information. He described an incident that occurred at Loon Mt. Where 2 people were killed on one run at the same time. The incident occurred when 3 three skiers, a father, daughter, and the daughter's fiancée, were skiing by a closed run. The father fell and slid down the closed run. The run was closed because of a bad fall line and icy conditions. The father then proceeded to slide down the trail where the fall line went right into the trees. He went sliding right into the trees and died. The fiancée of the daughter attempted to get down to the father to help and in doing so slipped on the icy slope and slid into the trees as well. The daughter, also, then made the same attempt to help and slid down into the trees. The father and fiancée died due to severe trauma caused by the impact with the trees and the daughter sustained injuries. Coakley stated that he believes that trees are the major culprit to sever injuries and deaths.

Another ski patroller also provided some useful information. Mike Pelchat, the head ski patroller at Cannon Mt. stated that icy conditions and bad fall lines are a bad combination that leads to many injuries and deaths. A fall line is defined as the line of steepest decent. A bad fall line is where that line of steepest decent heads toward trees, rocks or other obstacles where an injury could happen. This is not Pelchat's definition of a bad fall line, he did not provide one so it was speculated that this is what he meant. He also stated that there were 360 accidents in the 99-00 season and 24 were serious. He believes that the majority of accidents are skier error but has no solid proof to state other wise.

The Chalat Law Offices helped provide some useful information that helped refocus the objective. Jim Chalat stated "liability issues are always raised as a bugaboo by the ski areas so they can consistently lobby for more immunity statutes." He also recommended investigating the possibility of using the Freedom of Information Act as a possible way of obtaining the specific information. Citing the Freedom of Information Act to the ski area operators did not work. They stated that this information was private and not subject to the Act.

4.1.2 Neutral/No Response

Neutral/No Responses are defined as those responses that either provided no useful information, stated help would be given and nothing came of it, or contact was made and no response was given back.

All three of the medical examiners fall into this category. The Vermont Chief Medical Examiner, Dr. Paul Morrow, stated he would love to help out and also said the same the previous year as well. A phone call was made to his office and his secretary stated an email would be the best way to get in touch with him. An email was sent explaining the objective of the project and a reply email was given. He stated that he was interested in the objective and would like to help but was extremely busy. He asked for the time frame of the project and also stated that he was not sure if he ethically could provide the information. A more specific objective was also requested. Another email was sent to give the time frame and a more specific objective and no email was returned from him. A final email was sent a few weeks after asking if he was willing to still provide some help and no reply was given.

The New Hampshire Chief Medical Examiner was contacted. Dr. Thomas Andrew was not available and his secretary recommended talking to the New Hampshire Medical Records Division. A follow up call was given but Dr. Andrew was, again, unavailable. The Medical Records Division was then contacted and the request for information was forwarded to the Bureau of Health Statistics and Data Management, a department of the New Hampshire Department of Health and Human Services. The objective and information needs were given to the Bureau and stated that all injuries and deaths are coded together by the type of accident that occurred. These are called "E-codes." They were not entirely sure if skiing accidents had their own "E-code" but said they would find out. Follow-up calls were made to find out if they had found the "E-code" and it was determined that since skiing injuries and deaths were not as common as other accidents they are placed in a general "E-code" category. They said that it would take too much effort and time to scan through every "E-code" to find the reports of skiing accidents. No further information was provided from the Bureau and it was determined that they would no longer be helpful.

The Maine medical examiner, Dr. Greenwald, was reached and James Ferland, an assistant to Dr. Greenwald was sent some information. He was not able to provide the specific information needed. He did send information of at 4 deaths that occurred in the past 6 years. He was unable to provide further information regarding those deaths. He mentioned that they do not record the exact location of deaths/serious injuries.

The National Ski Patrol was contacted. Four different people in that organization were contacted. Jerry Sherman, the director of the East Division, stated that the NSP does not track that sort of information and recommended contacting the National Ski

Areas Association. William Sachs, the National Chairperson for the NSP, stated that the "objective out reaches the NSP's mission." Daryl Whitcher, the director of the Far West division, and Kim Mills, director of the Intermountain division, provided no useful information.

4.1.3 Negative Responses

Negative responses are defined by an unwillingness to provide information when it is possible.

All the negative responses came from the ski area personnel. They are the ones that have the specific information needed to prove the original objective. When the mountains were contacted, they were asked if they have the information. They all said yes. When requests were made if that information could be given they all said no. When questioned why they would not provide the information many said that it is private information held by the ski area and they felt no reason to release it. Also, some mountain personnel felt that ski trail characteristics or design have no relation to skier accidents. George Lamerise, the Attitash/Bear Peak Head Ski Patroller and Tom Day, the General Manager of Waterville Valley are two who feel this way.

The overwhelming response is that the ski area operators will not release the specific information. It also appears that they are the only ones who have this information.

4.2 Ski Resort Questionnaire

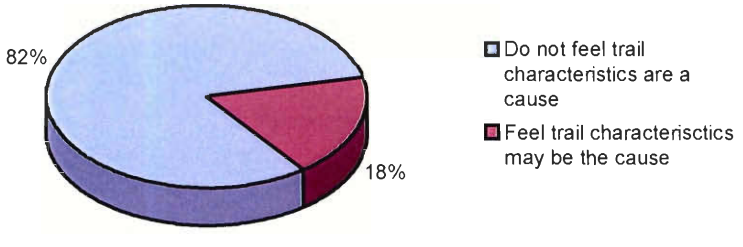
The questionnaires were given out, personally and by phone, to a total of 12 ski resorts. Out of these 12, all provided responses except for one, Boreal Ski Resort. Boreal Ski Resort was unwilling to participate in the questionnaire unless a condition was met first. This condition was to send a letter from Worcester Polytechnic Institute with an official letterhead to the general manager of the mountain giving proof that college students were conducting the study.

4.2.1 Question 1

Do you feel that trail characteristics may be the cause of ski-related injuries or deaths? (Yes or No)
If yes, what measures have been implemented to change trails?
If no, why not?

Out of the 11 ski resorts that responded, only two of them feel that trail characteristics may be the cause of ski related injuries or deaths the other nine do not. Figure 4.2.A. provides the distribution of the responses to question one.

Fig. 4.2.A Responses to Question 1



Both responses involve measures that have been implemented or can be implemented on ski trails. Fall lines, grade, and mergers are common elements of both responses. Appendix A provides the nine 'no' responses to the follow up question for question one.

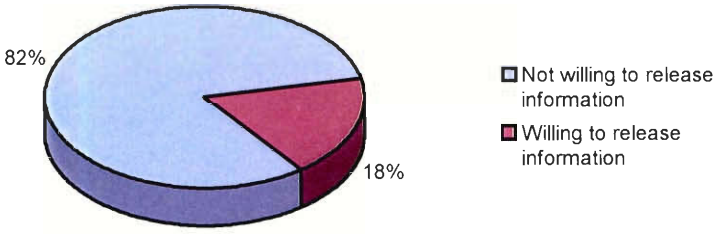
On the other hand, all nine resorts that did not feel trail characteristics may be the cause of ski related injuries and deaths generally felt it was the fault of the skier. Only one response does not involve the responsibility or ability of the skier.

4.2.2 Question 2

Would you be willing to release accidents and death statistics in order to help the completion of a study to increase skier safety? (Yes or No)
If no, is it because of legal liability concerns?

When asked if the ski resort would be willing to release accident and death statistics in order to help the completion of a study to increase skier safety, all but two of the 11 ski resorts responded 'yes'. The other nine were not willing to release accident and death statistics to help the completion of a study to increase skier safety.

Fig. 4.2.B Responses to Question 2



The follow up question for the 'no' response was to determine if liability issues were the roots of concern for releasing information. All nine mountains that responded 'no,' answered 'yes' that it is because of legal liability concerns. Some mountains also added some other reasons, given below.

- Public Relations concerns
- Litigation concerns
- 'Privileged information,' up to insurance company
- Only for internal use and investigation
- Question for insurance company

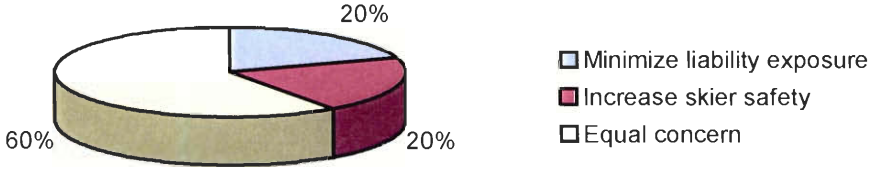
Of the two 'yes' responses, one of them claimed that this type of information would only be released through the United States Forest Service and recommended to check the National Ski Area Association.

4.2.3 Question 3

Do you feel ski mountains generally have more of a concern with minimizing liability exposure or increasing skier safety?

The question of mountains having a concern with minimizing liability exposure or increasing skier safety provided the most contrasting results. Two responded 'increasing skier safety', three responded 'minimizing liability exposure', and six responded either 'both', 'no difference', 'hand-in-hand', or a variation of the three. The following breaks down the given responses. Evidently, increasing skier safety and minimizing liability exposure were of equal concern for the majority of the resorts.

Fig 4.2.C Responses to Question 3

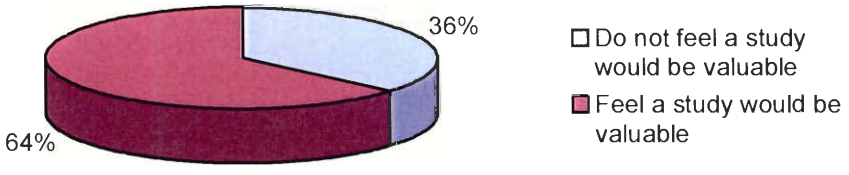


4.2.4 Question 4

Would you find a study investigating the correlation of trail characteristics and design to skier safety valuable?

The final question regarding whether ski resorts would find a study investigating the correlation of trail characteristics and design to skier safety valuable was almost split even in both directions. Four ski areas claimed that they would not find a study valuable while the other seven claimed a study would be valuable.

Fig 4.2.D Responses to Question 4



A couple people who responded 'yes' had some further responses to the question. One person revealed interest in an investigation between groomed trails versus not groomed trails. Another person followed up the answer 'yes' by stating it may be different at each mountain. Furthermore, one person who responded 'no' to the question felt that trails are designed with skier's ability in mind and therefore there would be no reason for such a study. Consequently, it is unclear why this would avert a study to be carried out.

4.3 Lawyer Questionnaire

The following questionnaire was sent to James H. Chalat, attorney and counselor at law from Chalat Law Offices, Denver, CO. The first three questions of the questionnaire were not answered directly but relevant articles were sent by the lawyer to help answer the questions. For questions 4, 5, 6 and 7 direct responses were provided for the given questions. The following table provides the responses given to the questions.

Table 4.3 Lawyer Questionnaire Questions and Responses

Questions of the Questionnaire	Responses Given
1. What are the most common law suits brought against ski area operators?	"Please send me your fedex account # and I will send you a copy of relevant articles"
2. What are, as defined by the courts, the inherent risks of skiing?	"Ditto"
3. What factors are looked at to determine who is liable?	"Ditto"
4. Do you believe that trail characteristics (i.e. slope, fall lines) and trail design play a role in skier injuries?	"Rarely, so rarely as to not make a statistical difference; its more a function of maintenance, marking, grooming and whether a trail is open under poor conditions."
5. Do you feel ski area operators should investigate trail characteristics and designs to determine if there is a link with skier injuries?	"Not a bad idea if one has the time and money and ready access to the information."
6. What kind of reasons do your feel ski area operators may not want to investigate a correlation between trail design and skier injuries and deaths?	"Because then they would need to publish the data which would allow the public to compare injury rates as between areas, e.g., area #1 has an overall injury rate of ~3x/1000SV while area #2 has an injury rate of x/1000sv; or particular areas of the mountain are "more dangerous" etc. I think the refusal to release the data is ill considered, especially as many

	western areas are operated under permit on USFS land.
7. If a correlation were found between a specific trail characteristic or design, what kind of legal and financial situation would the ski area operators be in?	"I doubt it would make much of a difference. Ski areas are locked in a titanic struggle for skier days now in a market either static or diminishing in size. The ski safety picture is only one element, probably a small one, compared to capitalization, location, real estate, the discount rate, monetary policy and other much larger factors."

5 Discussion

5.1 Ski Resort Questionnaire

The questionnaire proved to be an effective way to obtain responses from ski resorts and helps support the objective of the study.

The first question was asked to support the initial objective of the study. From the results of the first question, it is clear that most mountains feel trail characteristics may not be the cause of ski-related injuries or deaths. Nine of the eleven responses felt this way. When asked why, the most common responses were directed at skier ability. Almost everyone that responded 'no' to question one felt that skiing out of control is the primary culprit of injury and death. Consequently, the previous IQP also received similar responses. Students of that IQP conducted a ski patrol questionnaire and found that it was not the trail features that were most responsible for accidents, but more of a skier believing that he/she is better than they are and skiing above their ability (Dufour *et al* 2000). However, though this may be true, the question of this questionnaire asks whether ski trail characteristics may be the cause, not if it is the sole or major cause to injury and

death. This demonstrates that nine of the eleven mountains do not believe there may be a possibility that trails characteristics have a connection with skier injury and death.

On the other hand, the two that responded 'yes' to this question also gave various examples to measures that have been implemented to change trails. Some of these include modification of layout, grade, blind spots, intersections, fencing, trail marking, cross section to fall line, and snowmaking. Obviously, the 'yes' responses believe there are a lot of trail characteristics that can be changed to make the trail safer.

Furthermore, the questionnaire provided a direct approach to determine if mountains would be willing to release information regarding ski-related injuries and death. In addition, it also resolved whether or not the release of this type of information was based on liability concerns. The results indicate that nine of the eleven mountains would not be willing to release information regarding skier accidents and deaths to help the completion of a study to increase skier safety. Consequently, all nine of these mountains revealed that liability issues were the primary concern. Moreover, one mountain stated that this type of information was only released to their insurance companies and that it was 'privileged' information. Another mountain stated public relations concerns are an issue while another claimed that this type of information is for internal use only.

These results prove that most ski area resorts are reluctant to provide information regarding skier accidents and deaths even though they may ultimately result in an increase in skier safety. In addition, it is clear that the root of this reluctance is based on

liability concerns. Hence, legal liability concerns of ski areas inhibit the release of information even though it could increase skier safety.

The question regarding the concern of ski areas minimizing liability exposure or increasing skier safety yielded contrasting results. Two mountains claim that increasing skier safety is more of a concern, three stated liability exposure, and six claimed both are important. Increasing skier safety and minimizing liability exposure are two issues that go hand in hand. By trying to minimize liability exposure, the result should be an increase in skier safety. Six of the mountains felt that this was the case.

The final question of the questionnaire questions was if the resort would find a study investigating the correlation of trail characteristics and design to skier safety valuable. Four mountains responded 'no' however the other seven believed this type of study would be valuable. This creates a discrepancy with the responses from question one. Five of the mountains that responded 'yes' to this question answered 'no' to question one. In other words, these mountains do not feel that trail characteristics may be the cause of ski related injuries or deaths but they would find a study investigating the correlation of the two valuable. Consequently, it would be interesting to find out if these resorts would fund such a study. This would show the level of importance of such a study and whether monetary reasons are inhibiting a study to take place.

5.2 Lawyer Questionnaire

Although, questions one, two, and three were not responded directly, Chalat provided two series of the American Jurisprudence Proof of Facts including "Liability of Ski Area Operator for Skiing Accident" and "Liability of Skier for Collision with

Another Skier" both written by Chalat. These publications help answer the first three questions. Chalat explains that there is a common theme associated with decisions made by courts of appeal. This is to establish to what extent a jury or judge gives consideration to the specific facts of the case as falling within or without an inherent danger statue. Furthermore, he goes to explain that determining if a risk is inherent must be evaluated in a two-step process. The first step involves the court evaluating whether the risk was truly inherent, followed by determining whether the conduct of a defendant increased the risks beyond those inherent in the sport (Chalat 1998). These two elements are the primary factors in determining who is liable in a case.

Furthermore, based on the questionnaire, Chalat explains the connection between trail characteristics and skier injury is very rare and not substantial enough to make a statistical difference. He claims that cases that involve skiers who have had an accident while on the mountain involve several factors other than trail characteristics. The basis of the fault of the injury lies on improperly maintained, marked, or groomed trails and poor conditions. Although these are not trail characteristics per se, maintenance, grooming, and conditions are all trail-related attributes that have been recognized to be one of the reasons for skier injury and death.

Furthermore, when asked if ski area operators should investigate trail characteristics and design to determine if there may be a connection with injury, Chalat responded "Not a bad idea." Along with the seven mountains that also agreed, this further supports the idea that a study regarding trails and skier injuries needs to be carried out. Seven mountains and a lawyer specialized in the field believe this may be a good idea although there has yet to be any investigations in the matter. However, Chalat

further states that "if one has the time and money and ready access to the information" then this type of investigation may be carried out. "Ready access to the information" has proved to play the inhibitor of a study regarding this issue. Although there is potential to increase skier safety, information regarding skier injuries is unattainable from ski resorts.

This proposes the question of why mountains are reluctant to provide information although it ultimately may save lives and reduce injuries on the slopes. Chalat provides a response to this question. The concept is that if mountains were to follow through with such a study, they would have to publish the data making it readily available for the public. This would result in public speculation and comparison between mountains. The example provided considers the fact that if one mountain had a higher injury to skier rate than another mountain. If this were to happen, the public could compare the two and claim one more "dangerous" than the other. Furthermore, this could also result in particular areas of the mountain to be found more "dangerous" than other areas.

Finally, the last question was asked to determine what kind of legal and financial implications would result for the mountains if a trail characteristic or design was established as being the cause of injury. Chalat's response clearly shows that it would not make much of a difference at all. He explains that ski areas have other problems they are more focused on that would overshadow this type of issue. Chalat claims that ski safety is "only one element, probably a small one" in comparison to "other much larger factors" such as capitalization, location, real estate, the discount rate, and monetary policy. Evidently, the effects of a result from a ski safety investigation would prove to have a minimal affect, legally and financially, according to Chalat. If this is the case, public relation issues seem to be the primary concern for mountains. Therefore, aside

liability issues, the reluctance of mountains to provide information can also be rooted to this reason.

5.3 Liability

In the past years, ski area operators and owners have been lobbying state legislation to decrease their liability for accidents that occur on their mountains. The Sunday vs. Stratton Corp. ignited the lobbyist fuse to increase skier liability and decrease operator liability. Since 1978 all but three states, with significant ski industry within their borders, have adopted a form of ski safety legislation (Chalat 1998). There is no universal statute regarding skier and ski area liability. The exact same accident would be treated differently from state to state.

Some believe that these statues cross constitutional lines. They believe that these statues fail equal protection tests under the constitution because similar activities and industries to do not have these statutes that protects them from liability claims. However, these challenges still seem to hold up in state courts because the courts use the rational basis test to decide the case (McCaffrey 1991). The rational basis test follows the logic that the ski industries support the economic well being of the state and thus the court finds that in finding for a defendant the economic well being of the state could be compromised. So even if there is the possibility that the ski areas should be held liable they are granted further protection by use of the rational basis test.

State representatives are also pushing for increased protection for ski area operators and owners. In Vermont, Representative Hube of Londonderry is sponsoring a bill that further defines what the inherent risks of the sport are and what defendants will

be barred against in making claims against operators and owners. The bill, H.282, practically gives immunity to ski area operators and owners. The safety of skiers and snowboarders could be compromised greatly because of this bill.

6 Conclusions

- Most ski areas do not believe trail characteristics are the cause of ski-related injuries and deaths.
- Ski areas are not willing to release information regarding skier accidents and deaths to help the completion of a study to increase skier safety.
- Most mountains believe minimizing liability exposure and increasing skier safety are both important.
- Ski areas believe a study investigating a correlation between trail characteristics and skier injury would be valuable, although a lot of the same areas do no believe trail characteristics and design are related to skier injury.
- Reluctance of ski areas to provide information regarding skier accidents can be rooted to public relations issues as well as liability issues.
- Increased protection from state statutes helps the ski area operators from having liability claims brought against them.

7 Recommendations

- Call newspapers requesting to place an article and question newspapers if they reject the idea.
- Contact insurance companies to try to obtain information.
- Get in touch with the U.S. Forestry Service to see what kind of information and power they have in ski trail design and modification.
- Conduct extensive interviews to get a strong understanding of the topic.
- If an interview or survey of the general public is carried out, ask what the public perceives to be the cause of ski accidents.

Newspapers reach a majority of the population. If an article got into a newspaper then the subject would reach the masses with relative ease. People would easily be able to report a specific site where someone got injured or died. Bringing the topic to the public might get more people asking questions concerning liability of ski resorts.

If the newspapers deny the request to include an article than a few questions need to be addressed – Has the newspaper in question ever written an article that portrayed a ski resort in a negative perspective? If so, did other ski resort pull their advertisements from the newspaper?

Insurance companies have specific enough information to determine whether or not a certain trail characteristics lead to serious injury or even death. Getting the insurance companies to help with providing the specifics on previous injury and death sites would make a meaningful project. They also do not allow their clients, being ski resorts, to give out certain information such as what was requested.

The U.S. Forestry Service has the power to make changes on trails in the National Forests, as they deem necessary. They could hopefully help out and release certain information specific enough that might lead to substantial evidence proving that there is a direct correlation between a specific trail characteristic and serious injury and/or death. If they were convinced that there is a direct correlation they would have to take action to increase the safety for skiers/snowboarders.

More interviews mean more perspectives and information. They can also lead to important contacts.

It would be interesting to compare and contrast the ski industry's perception of causes of skier injury versus the general public.

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Appendices

Appendix A: Contacts

Appendix B: National Electronic Injury Surveillance System Data

Appendix C: Ski Resort Questionnaire Responses

Appendix A: Contacts

Ski Resort Contact Information

Resort Contacted	Person Contacted	Type of Contact
Attitash/Bear Peak, NH	George Lamerise -Head Ski Patroller Janice Sullivan -Risk Manager	Personal Interview Person Interview
Boreal Ski Mt., CA	Director of Ski Safety *	Phone Interview
Bretton Woods, NH	Buddy Cavichi * -Head Ski Patroller	Phone Interview
Cannon Mt., NH	Mike Pelchat * -Head Ski Patroller	Phone Interview Personal Interview
Gunstock, NH	Patrick McGonagle * -Manager Safety Services	Personal Interview
Jackson Hole, WY	General Manager *	Phone Interview
Jay Peak, VT	President *	Phone Interview
Killington, VT	Bill Delmonte -Head Ski Patroller Anne Schneider -Risk Manager	Phone Interview Phone and Personal Interview
Kirkwood, CA	Risk Manager *	Phone Interview
Mt. Snow, VT	Jim Sindt * -Head Ski Patroller	Phone Interview
Squaw Valley, CA	Jim Gravey * -General Manager	Phone Interview
Sugarbowl, CA	Mike Plezzus * -Head Ski Patroller	Phone Interview
Sugarloaf, ME	Rich Wilkinson -General Manager	Email Phone Interview
Sunday River, ME	Skip King -Vice President	Phone and Email Interview
Waterville Valley, NH	Tom Day * -General Manager Daniel Coakley -Ski Patroller Director of Ski Safety*	Personal Interview Personal Interview Phone Interview
Wildcat, NH	General Manager *	Personal Interview

*Answered Survey

Skiing Industry Professionals and Related Organizations

Organization Contacted	Person Contacted -Position Held	Type of Contact
Professional Ski Patrol Association	Jerry Brown -President	E-mail
National Ski Patrol	Jerry Sherman -Director of Eastern Division of NSP	E-mail
National Ski Patrol	William Sachs -National Chairperson of NSP	E-mail
National Ski Patrol	Daryl Whitcher -Director of Western Division of NSP	E-mail
National Ski Patrol	Kim Mills -Director of Intermountain Division	E-mail
National Ski Patrol	Judy Over	E-mail
National Ski Areas Association	Stacy Gardner -Public Relations Director	E-mail
Consumer Product Safety Commission		E-mail
National Injury Information Clearinghouse	Ida Brown	E-mail & Mail
-	Dr. Jasper Shealy	E-mail
NH Medical Examiner	Dr. Thomas Andrews	Phone
NH Medical Records Division		Phone
NH Department of Health and Human Services	Bureau of Health Statistics and Data Management	Phone
VT Chief Medical Examiners Office	Dr. Paul Morrow	Phone & E-mail
ME Medical Examiner Office	Dr. Greenwald -Chief Examiner James Ferland -Secretary	Phone Phone
SE Group	Walter Elander	Phone
Chalat Law Offices	Linda Chalat Jim Chalat	E-mail E-mail
Ryan, Smith & Carbine, Ltd.	Harry Ryan, Esq.	Phone & E-mail
Burlington Free Press	Editorial Department	Phone

Appendix B: National Electronic Injury Surveillance System Data

Skiing Injury Statistics

The following estimates are from injuries treated in hospital emergency departments that take part in the National Electronic Injury Surveillance System (NEISS). Calculating the data was done by taking a sample of hospitals, which are statistically representative of institutions with emergency treatment departments located within the United States and its territories.

NEISS data and estimates are based on injuries treated in hospital emergency rooms that patients say are related to products. Therefore it is incorrect, when using NEISS data, to say the product caused the injuries.

NEISS and the Consumer Product Safety Commission (CPSC) are respected government agencies. However, they are not exact and some variations in estimates are to be expected. The estimated relative sampling error, otherwise known as the coefficient of variation (CV), is a measure of the estimated sampling error of the injury estimate expressed as a proportion of the injury estimate.

It's interesting to see how many injuries occur during one full year. Even more interesting is the amount of injuries that could have been prevented. The original objective could have played a large role in decreasing the number of injuries.

TABLE OF BODY PARTS BY AGE

Body Part	AGE						
Frequency	00-04	05-04	15-24	25-44	45-64	65-UP	Total
SHOULDER	0.00	1222.60	1972.40	3930.40	3638.20	666.90	11430.50
UPPER TRUNK	0.00	253.81	743.11	1815.90	2101.60	933.66	5848.08
ELBOW	0.00	338.12	311.07	86.53	0.00	0.00	735.72
LOWER ARM	0.00	991.43	400.44	462.07	601.63	0.00	2455.57
WRIST	0.00	1020.40	1008.80	424.55	467.78	41.51	2963.04
KNEE	0.00	2169.20	4417.50	8035.70	5868.60	334.87	20825.87
LOWER LEG	77.63	1776.20	662.23	2265.00	1965.70	305.08	7051.84
ANKLE	0.00	529.14	787.38	1036.50	547.99	200.07	3101.08
PUBIC REGION	0.00	0.00	0.00	66.69	105.01	0.00	171.70
HEAD	38.32	2000.80	2510.70	1569.20	1360.30	590.88	8070.20
FACE	0.00	965.06	924.58	1090.70	238.39	133.38	3352.11
EYEBALL	5.47	53.47	17.62	66.69	0.00	0.00	143.25
LOWER TRUNK	0.00	1090.70	1080.80	1815.00	886.82	466.83	5340.15
UPPER ARM	5.47	398.50	414.34	274.23	1039.00	200.07	2331.61
UPPER LEG	0.00	530.92	576.45	495.82	448.77	371.77	2423.73
HAND	0.00	319.69	103.54	466.45	0.00	0.00	889.68
FOOT	0.00	133.38	213.78	200.07	0.00	0.00	547.23
25-50% OF BODY	0.00	0.00	66.69	71.26	68.11	0.00	206.06
ALL PARTS BODY	0.00	216.48	165.28	137.95	218.49	200.07	938.27
NOT STATED/UNK	0.00	72.16	0.00	0.00	0.00	0.00	72.16
MOUTH	0.00	265.67	90.59	18.43	291.86	0.00	666.55
NECK	0.00	333.29	296.55	565.43	533.52	66.69	1795.48
FINGER	5.47	1605.90	1363.70	2322.50	1382.50	151.80	6831.87
TOE	0.00	66.69	23.09	0.00	239.81	0.00	329.59
EAR	0.00	0.00	164.75	68.11	0.00	0.00	232.86
Total	132.36	16353.61	18315.39	27285.18	22004.08	4663.58	88754.20

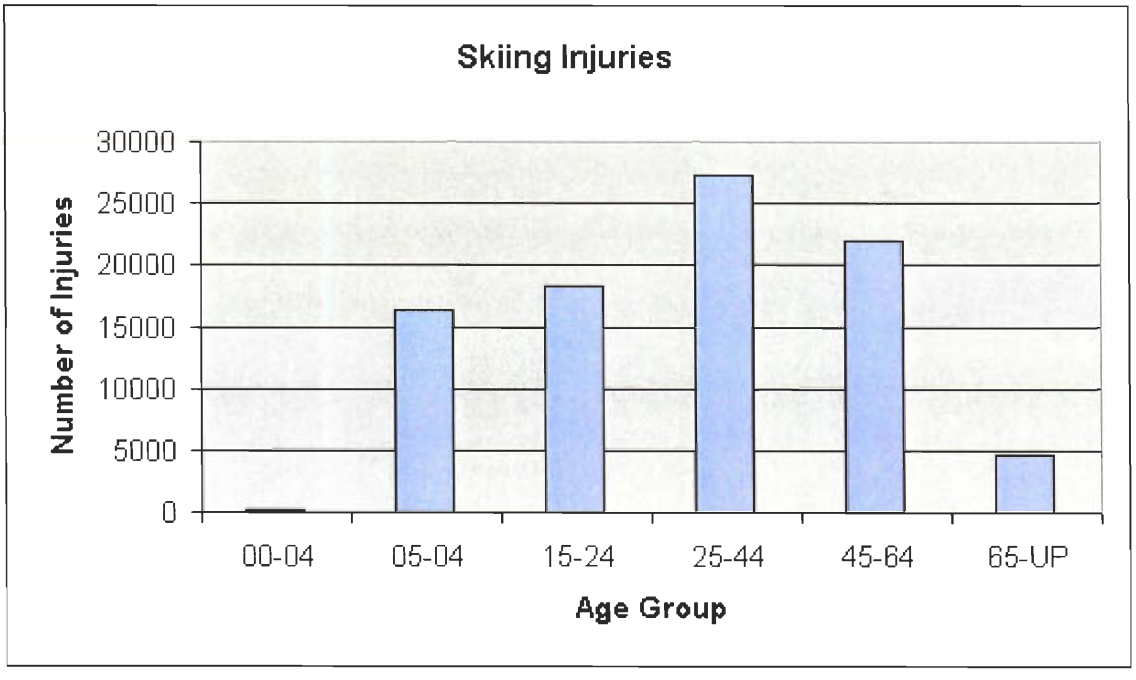


TABLE OF DIAGNOSIS BY DISPOSITION OF CASE

Diagnosis	Disposition					
Frequency	TR/REL	TRANSF	HOSP	DOA	UNK	Total
CONCUSSION	3388.80	38.32	308.28	0.00	0.00	3735.40
CONTUSIONS, ABR.	11587.00	133.38	72.16	0.00	0.00	11792.54
DISLOCATION	3048.10	0.00	66.69	0.00	0.00	3114.79
FOREIGN BODY	133.38	0.00	0.00	0.00	0.00	133.38
FRACTURE	17744.00	710.89	2318.00	0.00	0.00	20772.89
HEMATOMA	614.78	0.00	68.11	0.00	0.00	682.89
LACERATION	5570.90	66.69	144.75	0.00	0.00	5782.34
DENTAL INJURY	136.58	0.00	0.00	0.00	0.00	136.58
INTERNAL INJURY	1843.70	133.38	138.05	0.00	0.00	2115.13
PUNCTURE	133.38	0.00	0.00	0.00	0.00	133.38
STRAIN, SPRAIN	31170.00	0.00	66.69	0.00	0.00	31236.69
HEMORRHAGE	0.00	0.00	66.69	0.00	0.00	66.69
NOT STATED/UNK	0.00	0.00	23.90	0.00	35.84	59.74
OTHER	7819.50	133.38	400.14	80.17	0.00	8433.19
AVULSION	371.77	0.00	0.00	0.00	0.00	371.77
RADIATION	186.85	0.00	0.00	0.00	0.00	186.85
Total	83748.74	1216.04	3673.46	80.17	35.84	88754.25

TABLE OF AGE BY SEX

AGE	SEX		
Frequency			
Row Percent	MALE	FEMALE	Total
00-04	16.41	115.95	132.36
	12.40	87.60	
05-14	9279.00	7074.70	16353.70
	56.74	43.26	
15-24	11409.00	6905.90	18314.90
	62.29	37.71	
25-44	15320.00	11965.00	27285.00
	56.15	43.85	
45-64	10667.00	11338.00	22005.00
	48.48	51.52	
65-UP	2971.80	1691.80	4663.60
	63.72	36.28	
Total	49663.21	39091.35	88754.56

TABLE OF TYPE BY LOCATION

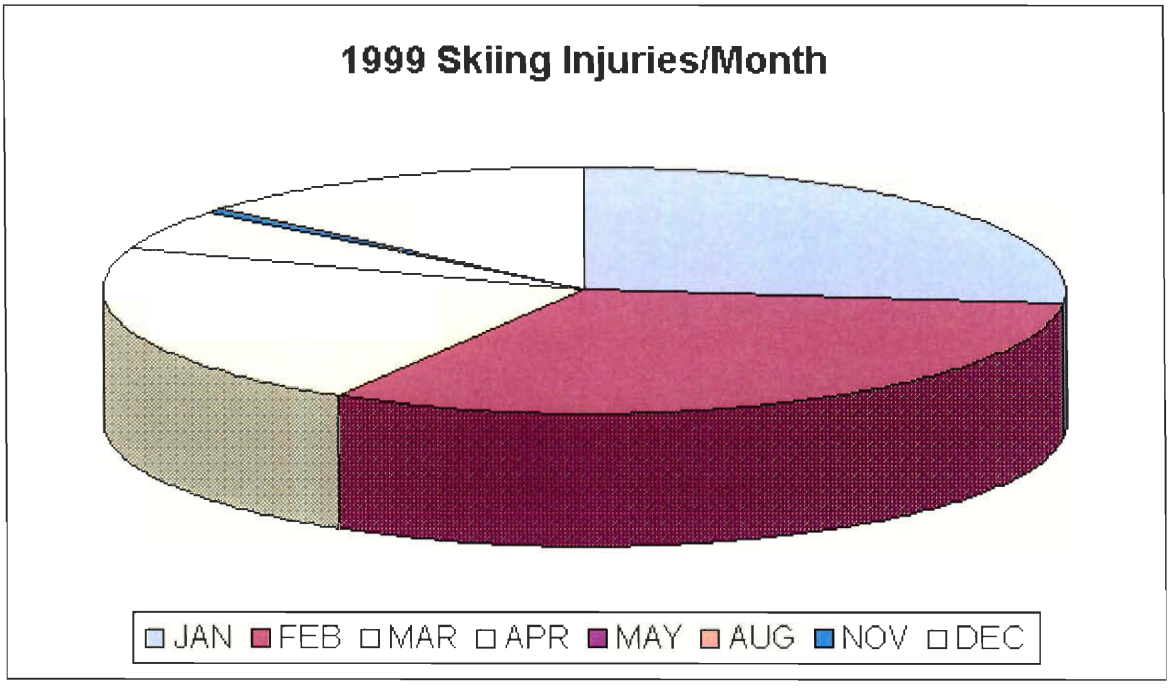
TYPE	LOCATION						
Frequency							
Row Percent	UNK	HOME	STREET	PUBLIC	SCHOOL	SPORTS	Total
UNKNOWN	66.69	0.00	0.00	0.00	0.00	36.85	103.54
	64.41	0.00	0.00	0.00	0.00	35.59	100.00
N*	11511.00	469.58	17.62	1072.40	38.32	75541.00	88649.92
	12.99	0.53	0.02	1.21	0.04	85.21	100.00
Total	11577.69	469.58	17.62	1072.40	38.32	75577.85	88753.46

* injury not occupational or work related

TABLE OF YEAR BY MONTH

YEAR MONTH

Frequency Row Percent	JAN	FEB	MAR	APR	MAY	AUG	NOV	DEC	Total
1999	23584.00	28348.00	19610.00	4569.90	35.25	113.67	381.26	12112.00	88754.08
	26.57	31.94	22.09	5.15	0.04	0.13	0.43	13.65	
Total	23584.00	28348.00	19610.00	4569.90	35.25	113.67	381.26	12112.00	88754.08



Appendix C: Ski Resort Questionnaire Responses

Question 1 'Yes' responses

Do you feel trail characteristics may be the cause ok ski related injuries or deaths?
a.) If yes, what measures have been implemented to change a trail?
"Layout, grade, intersections, fencing, trail-making, cross section to fall line, snow-making."
"If trails are not fall line this may result in injury and should be regraded. Mergers are also an area of main concern. Blind spots such as steep rolls can lead to accidents."

Question 1 'No' responses

Do you feel trail characteristics may be the cause ok ski related injuries or deaths?
b.) If no, why?
"Injuries are caused by skiers skiing beyond their ability"
"People skiing beyond ability, or when drunk or tired"
"Here there aren't many cross trails, skiers are more responsible for their own control"
"Result of skier awareness/responsibility"
"Result of skiers"
"More conduct of skier or rider"
"Skiers skiing out of control"
"Individuals are more responsible"
"As long as trails are rated correctly and ability levels are set, its not the trails"

Question 3 Responses

Do you feel ski mountains generally have more of a concern with minimizing liability exposure or increasing skier safety?
'Increasing skier safety' Responses
'Increasing skier safety' (two responses)
'Minimizing liability exposure' Responses
'Most definitely minimizing liability exposure'
'Minimizing liability exposure'

Other Responses
'Both are important'
'They go hand-in-hand, we focus on both'
'Not different'
'Both, they go hand-in-hand'
'They go hand-in-hand, but probably skier safety'
'No difference, go hand-in-hand'