

# 50 YEARS OF AVALANCHE DEATHS IN THE UNITED STATES

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**ABSTRACT:** Since 1950 593 people have died in avalanches. This poster summarizes trends in fatal avalanche accidents in the United States from 1950/1951 to 1999/2000. During the past 50 years the number of avalanche fatalities have increased significantly. The poster presents the distribution of avalanche fatalities by month, state, activity group and the shifting profile of the typical avalanche victim. The relevant information for this study came from accident reports, media reports, and interviews collected and compiled by the Colorado Avalanche Information Center.

**KEYWORDS:** Avalanche accidents, avalanche fatalities, avalanche victims, states, months, ages.

## 1. INTRODUCTION

Snow avalanche fatalities in the United States have increased steadily for the last 50 years. In this poster and paper we will look at avalanche fatalities from 1950-1951 through 1999-2000. The year 1950 was chosen as a convenient starting point as it marks the beginning of the tourist to the winter backcountry and also because reasonably accurate records exist for this period. The presented statistics were compiled using avalanche accident reports from the old files of the United States Forest Service Westwide Data Network, and the new Westwide Avalanche Network. This avalanche accident data is collected by the Colorado Avalanche Information Center. At this point, a word of caution about these data is necessary. During the last 20 years the data set has become increasingly biased towards avalanche fatalities. This trend has worsened in recent years as most of the reported accidents involve avalanche fatalities with fewer detailed nonfatal accidents being reported. While we are confident that nearly all of the U.S. fatalities are reported to the Westwide Network, fewer and fewer nonfatal accidents are being reported.

## 2. DISCUSSION

### 2.1. *An Upward Trend*

In the last 50 years avalanches killed 593 people in the United States—an average of 11.9 deaths per year. (We have defined an avalanche

year from September 1 through August 31.) Most dramatic has been the increase in fatalities during the last 25 years—an average of 17.5 deaths or almost triple the average number for the previous 25 years. (Williams, 1975). In the United States avalanche now kill about 26 people each year (figure 1). Avalanches claimed lives in each year, although only one death was recorded in the winters of 1954-55 and 1960-61. The most deadly decade has been the 1990s with 39 percent of the fatalities (table 1).

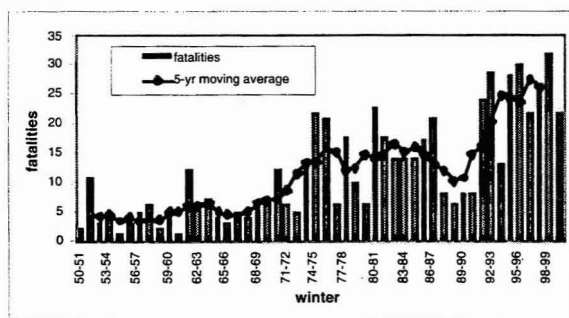


Figure 1. Avalanche fatalities in the United States by avalanche year and the 5-year moving average.

decade	avalanche fatalities
1990s	234
1980s	143
1970s	119
1960s	55
1950s	42
50-year total	593

Table 1. Avalanche fatalities in the United States by decade.

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The 64% increase in deaths from the 1980s to the 1990s is likely the result of more people recreating in the backcountry. While no accurate figures or even reasonable estimates are available regarding winter backcountry use, casual conversations with manufacturers and retailers of outdoor recreation equipment and with many USFS recreation officials infer that backcountry winter use has doubled in many areas of the United States. A solid example can be found in Colorado where snowmobile registrations increased 98% from 15,149 in 1989 to 29,989 in 1999 (personal communication, Colorado Division of Parks and Outdoor Recreation, 2000).

### 2.2 Distribution by Month

Figure 2a shows the monthly distribution of avalanche fatalities during the 50-year period. Historically January and February have been the most deadly months. It is also important to note that avalanche deaths have occurred in each month. Figure 2b shows the distribution of fatalities by three-month periods or "season".

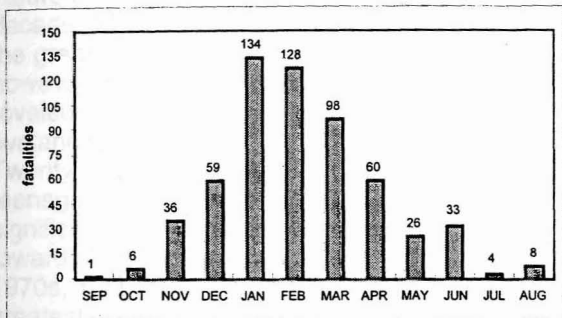


Figure 2a. Avalanche fatalities by month (1950-51 to 1999-00).

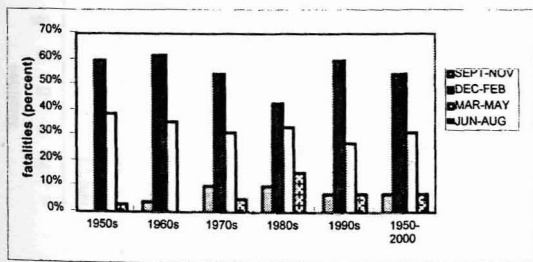


Figure 2b. Avalanche fatalities by 3-month "season" (1950-51 to 1999-00).

### 2.3 Distribution by State

Figure 3 shows fatal avalanches during the past 50 years have occurred in 15 different states. Colorado has the dubious distinction of having

had one-third of all deaths. Table 2 shows the distribution by decade and month. As a percentage of total United States avalanche fatalities Alaska, Idaho, Montana, New Hampshire, Utah, and Wyoming have had deaths increase significantly since the 1980s. Conversely deaths as a percentage of the total in California, Colorado, Nevada, and Washington have decreased since the 1980s.

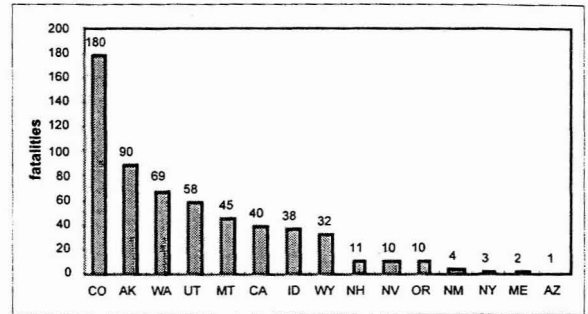


Figure 3. Avalanche fatalities by state, 1950-51 to 1999-00.

### 2.4 Distribution by Activity

Figure 4 shows avalanche fatalities by activity group. Since 1950 nearly four-in-five fatalities (83%) were pursuing some form of recreation at the time of the accident. This trend is the result of a huge increase in winter recreation beginning in the 1970s. Since 1970 nearly nine-in-ten (88%) of the fatalities were pursuing some form of recreation at the time of the accident. The categories of *climbers*, *backcountry skiers*, and *snowmobilers* head the list. Since the first snowboarder avalanche fatality in 1986 (Utah) 24 snowboarders have been killed, however, 23 of those deaths occurred in the 1990s. The category *miscellaneous recreation* includes campers, and a very unlucky sea-kayaker.

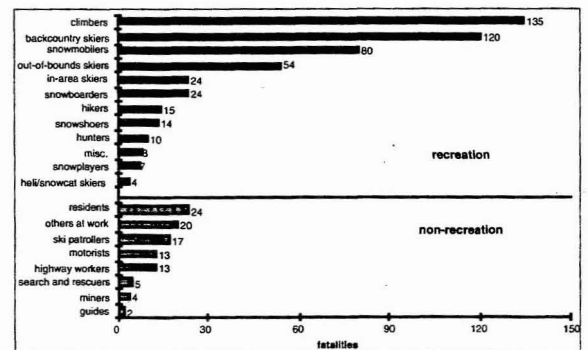


Figure 4. Avalanche fatalities in the United States by activity, 1950-51 to 1999-00.

Among the non-recreation groups, the *others-at-work* category includes such occupations as construction and power company workers, wildlife researchers, a snow ranger and a photographer.

Table 3 shows the distribution of fatalities by activity by decade. Avalanche deaths involving non-recreational activities have decreased

significantly from 54.8 percent to 7.3 percent since the 1950s. The categories with the most deaths have changed each decade. During the 1950s most avalanche victims were *highway workers/motorists* or *in-areas-skiers*. During the 1960s and 1970s *climbers* topped the list; during the 1980s, *backcountry skiers* lead, and during the 1990s a new category *snowmobilers* moved to the top.

state	1950s	1960s	1970s	1980s	1990s	TOTALS
AK (Alaska)	7.1% (3)	0.0%	19.3% (23)	9.8% (14)	21.4% (50)	90
AZ (Arizona)	0.0%	0.0%	0.0%	0.0%	0.4% (1)	1
CA (California)	7.1% (3)	7.3% (4)	10.9% (13)	9.1% (13)	3.0% (7)	40
CO (Colorado)	35.7% (15)	36.4% (20)	22.7% (27)	37.1% (53)	27.8% (65)	180
ID (Idaho)	23.8% (10)	9.1% (5)	4.2% (5)	3.5% (5)	5.6% (13)	38
ME (Maine)	0.0%	0.0%	0.0%	1.4% (2)	0.0%	2
MT (Montana)	4.8% (2)	10.9% (6)	1.7% (2)	6.3% (9)	11.1% (26)	45
NH (New Hampshire)	7.1% (3)	3.6% (2)	0.0%	0.7% (1)	2.1% (5)	11
NM (New Mexico)	0.0%	0.0%	1.7% (2)	0.7% (1)	0.4% (1)	4
NV (New York)	0.0%	5.5% (3)	2.5% (3)	1.4% (2)	0.9% (2)	10
NY (New York)	0.0%	3.6% (2)	0.0%	0.0%	0.4% (1)	3
OR (Oregon)	2.4% (1)	0.0%	0.8% (1)	2.1% (3)	2.1% (5)	10
UT (Utah)	4.8% (2)	9.1% (5)	5.0% (6)	9.8% (14)	13.2% (31)	58
WA (Washington)	4.8% (2)	10.9% (6)	21.8% (26)	14.7% (21)	6.0% (14)	69
WY (Wyoming)	2.4% (1)	3.6% (2)	9.2% (11)	3.5% (5)	5.6% (13)	32
<b>TOTALS</b>	<b>42</b>	<b>55</b>	<b>119</b>	<b>143</b>	<b>234</b>	<b>593</b>

Table 2. Avalanche fatalities by state and decade, 1950-51 to 1999-00.

activity	1950s	1960s	1970s	1980s	1990s	TOTALS
misc. recreation	0.0%	0.0%	0.0%	0.7% (1)	3.0% (7)	8
hikers	2.4% (1)	1.8% (1)	1.7% (2)	2.8% (4)	3.0% (7)	15
hunters	0.0%	7.3% (4)	1.7% (2)	0.7% (1)	1.3% (3)	10
snowplayers	0.0%	0.0%	1.7% (2)	1.4% (2)	1.3% (3)	7
snowboarders	0.0%	0.0%	0.0%	1.4% (2)	9.4% (22)	24
snowmobilers	0.0%	1.8% (1)	3.4% (4)	7.0% (10)	27.8% (65)	80
snowshoers	0.0%	3.6% (2)	5.9% (7)	0.0%	2.1% (5)	14
climbers	14.3% (6)	25.5% (14)	33.6% (40)	23.8% (34)	17.5% (41)	135
backcountry skiers	11.9% (5)	5.5% (3)	22.7% (27)	30.1% (43)	17.9% (42)	120
heli/snowcat skiers	0.0%	0.0%	0.8% (1)	0.7% (1)	0.9% (2)	4
out-of-bounds skiers	2.4% (1)	3.6% (2)	8.4% (10)	15.4% (22)	8.1% (19)	54
in-area skiers	14.3% (6)	9.1% (5)	7.6% (9)	2.1% (3)	0.4% (1)	24
<i>recreation totals</i>	<i>45.2% (19)</i>	<i>58.2% (32)</i>	<i>87.4% (104)</i>	<i>86.0% (123)</i>	<i>92.7% (217)</i>	<i>495</i>
others at work	4.8% (2)	7.3% (4)	1.7% (2)	4.9% (7)	2.1% (5)	20
residents	9.5% (4)	18.2% (10)	3.4% (4)	1.4% (2)	1.7% (4)	24
miners	4.8% (2)	0.0%	0.8% (1)	0.7% (1)	0.0%	4
search and rescuers	9.5% (4)	0.0%	0.0%	0.7% (1)	0.0%	5
guides	0.0%	0.0%	0.8% (1)	0.0%	0.4% (1)	2
ski patrollers	0.0%	7.3% (4)	0.8% (1)	6.3% (9)	1.3% (3)	17
highway workers	14.3% (6)	1.8% (1)	2.5% (3)	0.0%	1.3% (3)	13
motorists	11.9% (5)	7.3% (4)	2.5% (3)	0.0%	0.4% (1)	13
<i>non-recreation totals</i>	<i>54.8% (23)</i>	<i>41.8% (23)</i>	<i>12.6% (15)</i>	<i>14% (20)</i>	<i>7.3% (17)</i>	<i>98</i>
<b>TOTALS</b>	<b>100% (42)</b>	<b>100% (55)</b>	<b>100% (119)</b>	<b>100% (143)</b>	<b>100% (234)</b>	<b>593</b>

Table 3. Avalanche fatalities in the United States by recreational and non-recreational activities, 1950-51 to 1999-00.

## 2.5 *Distribution by age and sex*

Historically the greatest number of avalanche deaths have occurred to victims in their 20s with the strongest concentration in the 25 to 29 age group (figure 5a). Ages of victims ranged from 6 to 63.

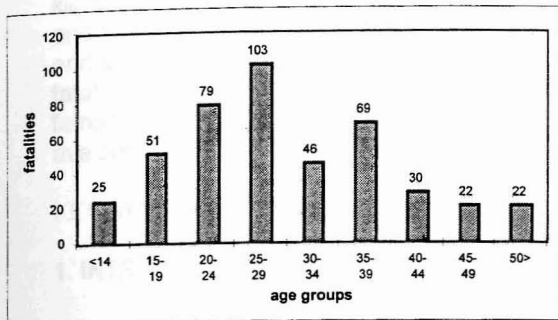


Figure 5a. Avalanche fatalities in the United States by age groups, 1950-51 to 1999-00. (n=447)

Figure 5b presents another view of age data by decade. Again the 25-to-29 age group shows the greatest concentration of reported deaths; however, some other important variances are revealed. During the 1960s a significant portion of avalanche accidents involved young people. Twenty of the victims were children and teenagers. While the 1960s also showed a significant number of young people the trend toward older victims was occurring through the 1970s, 1980s and 1990s. By the 1990s the greatest concentration of avalanche deaths occurred to victims 35 to 39.

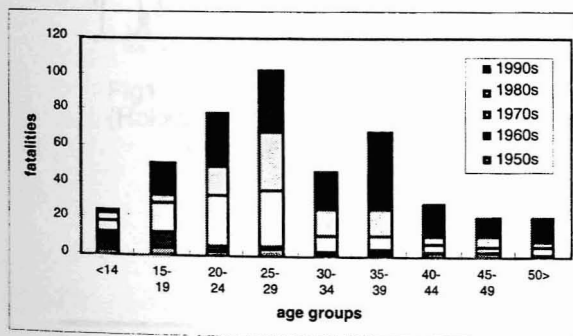


Figure 5b. Avalanche fatalities in the United States by age groups by decade, 1950-51 to 1999-00.

Since the 1970s the average age of avalanche victims has steadily risen from 27 to 32, which likely reflects the increasing average age of the

United States population. During this same period the mean population age in the United States has steadily risen to 36.5 (U.S. Census Bureau, 2000).

The average age of avalanche victims by activity (table 4) shows that snowboarders are the youngest victims and people at work are the oldest victims.

activity	1950s	1960s	1970s	1980s	1990s
climbers	19	20	26	32	32
backcountry skiers	20	31	26	33	33
snowboarders	na	na	na	18	22
snowmobilers	na	34	25	38.5	34
workers	35	37.5	40	33	42

Table 4. Mean age of avalanche fatalities in the United States by activity and decade, 1950-51 to 1999-00.

During the 50-year-period where the sex of the victim was reported, about 9-in-10 victims were male (table 5). This statistic presents an interesting question regarding the role of gender in avalanche accidents: Why are so few women relative to men killed in avalanches? This question deserves future study. Traditionally men have significantly out-numbered women in winter backcountry recreation, but during the 1980s and 1990s the number of women involved in backcountry recreation has grown. Unfortunately no reasonable figures regarding participation by sex are available.

sex	1950s	1960s	1970s	1980s	1990s
male	27	44	100	97	201
female	0	10	19	11	14
unknown	15	1	0	35	19

Table 5. Avalanche fatalities in the United States by sex, 1950-51 to 1999-00.

### 3. CONCLUSION

The profile of the typical avalanche victim has changed over the years as new activities entice more people into avalanche country. In the 1950s and 1960s the victim was typically a young male in his early 20s either at work or at play climbing. Today the typical avalanche victim is more likely to be a snowmobiler in his later 30s.

The jump in avalanche deaths over the past 10 years can be attributed to a huge increase in winter sports. Williams (1975) also observed a similar pattern in the early and mid 1970s when an attitude of "getting away from the crowds" prevailed. While this attitude may still exist a new attitude arose during the 1990s: one of sensation seeking in "extreme" sports. New technology and new equipment designs have greatly improved backcountry-travel equipment so that nearly anyone with a little athleticism and some daring can venture onto steep slopes and deep snow. Today more recreationists are traveling on steeper slopes than ever before. However, a conclusion reached by Williams a quarter century ago still rings true today: "With more people taking risks, the number of avalanche victims can only increase."

#### 4. LITERATURE CITED

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Williams, K. 1975. Avalanche fatalities in the United States, 1950-75. USDA Forest Service Research Note RM-300. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado, 4 pp.