NSAA Avalanche Safety Fact Sheet

- The majority of avalanche accidents and near-misses occur in the backcountry.
- In-bounds avalanches are rare.
- Recent court rulings have held that avalanches and/or changing snow conditions are an inherent risk of skiing.
- There have been eight deaths resulting from in-bounds avalanches in the last 10 years, the most recent being in the 2016/17 season.

Overview

While they are rare, avalanches can occur within the boundaries of ski areas, despite the best efforts of highly trained snow safety professionals. The safety of guests and employees remains the highest value held within the ski industry. Ski area snow safety professionals employ avalanche mitigation, snow safety practices and public education measures to reduce the risk of avalanches and being caught in a slide. There were no fatalities from in-bounds avalanches in the 2017/18 season.

Methodology & Terms

In-bounds avalanches are often reported by ski areas and compiled by local avalanche centers. NSAA references data from the Colorado Avalanche Information Center (CAIC), the national clearinghouse for both backcountry and in-bounds avalanches. When speaking about the past 10 seasons of data, we mean data spanning the 2008/09 and 2017/18 winter seasons.

Backcountry: The terrain outside of a ski area’s operating boundary. This terrain is not patrolled or mitigated for avalanches by ski patrol. Skiers/snowboarders venturing into this terrain should be equipped with some degree of snow safety education and standard avalanche rescue gear (beacon, shovel, probe). Backcountry travelers should always ski/ride with a partner, and should ask ski patrol or the local avalanche center about current snow conditions.

Sidecountry: This term was once used to refer to backcountry terrain that was accessible by a ski area’s lifts. However, this term is no longer used in ski industry parlance as it creates a false sense of safety. “Sidecountry” is analogous to “backcountry” in that it refers to terrain that is neither patrolled nor mitigated for avalanches.

1 This statistic includes all in-bounds avalanche deaths occurring in both closed terrain and terrain that was open to the public at the time of the incident. Deaths of patrollers performing avalanche mitigation are not included here as those situations are not ones that would be faced by general members of the skiing public.
Open terrain: Terrain within a ski area’s boundary that is marked as open to the public by the ski area.

Closed terrain: Terrain within a ski area’s boundary that is marked as closed to the public. This terrain may or may not have been mitigated for avalanches.

Avalanche terrain: Terrain that is prone to avalanches, with a pitch generally greater than 30 degrees. However, snow slides and/or sluffs can happen on almost any terrain. This terrain may also be identified by rock outcappings, a defined lack of trees (indicating years of avalanche activity) or be exacerbated by a “terrain trap” such as a gully or concave topography.

In context

There have been 258 avalanche fatalities in the U.S. in the last 10 ski seasons (since 2008/09), with the vast majority occurring in the backcountry. There have been an average of 26 avalanche fatalities per season over the past 10 seasons. Only 12 of those reported avalanche deaths occurred within a ski area’s boundary, less than 5 percent of the total avalanche fatalities. In those same 10 years, there were approximately 556 million skier visits across the U.S.; the odds over the past 10 years of this happening would have been 1 in 46 million. The most recent in-bounds avalanche occurred in the 2016/17 season; however, the avalanche occurred in terrain that was closed to the public. There have been in-bounds avalanches at ski areas in the past several seasons that have not resulted in fatalities. Those avalanches are not included in this report. To view CAIC’s U.S. fatality statistics by year and location, visit http://avalanche.state.co.us/accidents/us/.

While guest fatalities from in-bounds avalanches are rare at U.S. ski areas, ski patrollers doing snow safety mitigation at ski areas have been caught in avalanches. A total of 12 avalanche workers (including ski patrollers, snow scientists, and highway workers) have been killed in avalanches from 2009 to 2015. NSAA does not include avalanche workers in the count of in-bounds avalanche fatalities as they do not accurately represent the risk to members of the general skiing public.  

Avalanche fatality data from CAIC is not limited to skiers/snowboarders; snowmobilers, climbers, and hikers are also included in the total avalanche fatality number. According to this data, more avalanches deaths occur to individuals who are snowmobiling, climbing, hiking, or showshoeing than to those who are skiing or snowboarding. In the last 10 seasons, there have been 146 avalanche-related fatalities involving snowmobilers, hikers, climbers, snowshoers, and other non-skiers – over 56 percent of the total number of avalanche fatalities in the U.S..

NSAA and snow safety professionals on in-bounds avalanches

“Avalanches and snow slides remain an inherent and recurrent risk of skiing and snowboarding,” stressed Kelly Pawlak, president of the National Ski Areas Association (NSAA) and the former general manager at Mount Snow Resort in Vermont. “Skiers and snowboarders should educate themselves about the risks involved in recreating in avalanche terrain, and take precautions whenever they’re in avalanche-prone areas.”

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2 In the 2013/14 season, CAIC lists one fatality as an in-bounds avalanche fatality. However, that fatality did not occur within the boundary of a ski area; it references the death of a ski patroller performing exploratory research 16 miles beyond the ski area boundary. Due to the constraints of the CAIC database, this information was listed as an “in-bounds fatality.” You can review the incident here.
“Resorts do a phenomenal job with avalanche mitigation given how few fatalities there have been,” noted Dale Atkins, an avalanche specialist in Avon, Colo., and vice president of the Avalanche Rescue Commission for the International Commission on Alpine Rescue.

“The ability to manage Mother Nature can be limited, particularly in alpine environments where local weather and snow conditions can change dramatically in minutes,” emphasized Kelly Pawlak, NSAA’s president.

“Ski patrols can minimize the danger to an extremely low level, but they can’t completely eliminate it,” noted Karl Birkeland, PhD., the director of the United States Forest Service Avalanche Center, which monitors avalanche activity in national forests.

Ski areas have utilized continuous and aggressive training and education efforts to help minimize the number of in-bounds avalanche fatalities, including frequent use of explosives to intentionally release unstable snow. Despite the diligent work conducted by snow safety professionals on-site at ski areas, avalanche mitigation remains an imperfect science. Ethan Greene, PhD., the director of the Colorado Avalanche Information Center and a former ski patroller, emphasizes that avalanche fatalities can and do occur at ski areas, despite the fact that areas have impressive safety records spanning several decades.

**Safety tips for travelling in avalanche terrain**

Ski areas take proactive steps to provide avalanche safety education to guests and employees, including mountain signage and closures, trail map language, informational videos (such as the Utah Avalanche Center’s [Know Before You Go](#)), and hands-on training in the use of avalanche transceivers. Individual, personal responsibility remains a hallmark of avalanche precaution and preparedness. NSAA emphasizes that skiers and snowboarders should always ski with at least one partner, and keep those partners within sight. Strict adherence to trail and terrain closures reduces the risk of avalanches. Those who choose to ski extreme terrain should carry avalanche equipment, including transceivers (beacons), probes and shovels, as well as cell or satellite phones. Skiers and snowboarders accessing extreme terrain, as well as backcountry terrain, should ski the slope one at a time, rather than in a group; this is especially good practice when the terrain is first opened for the season or after a large storm. When headed to avalanche-prone terrain or into the backcountry, skiers and snowboarders should let a trusted individual know where they are going and when they expect to return. Always check ski patrol to learn what terrain is open or closed and get the local avalanche forecast.

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3 To see a team of ski patrol avalanche professionals at work, [watch this 2013 video](#) from Canyons Ski Resort (now part of Park City Mountain Resort).
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