During the 2016-17 ski season in the U.S., there were six fatalities resulting from snow immersion suffocation (SIS) incidents at ski areas. While such SIS incidents are rare, they are one of the risks inherent to the sport of skiing and snowboarding, and such incidents can be prevented. Accordingly, skiers and snowboarders should become better educated on the various ways to mitigate these risks.

Snow immersion suffocation incidents have also been referred to as tree well immersions, or NARSID incidents, which stands for Non-Avalanche-Related Snow Immersion Deaths. Recently, the broader ski industry and snowsports safety community has adopted the SIS acronym because it is more concise and comprehensible for the public. SIS incidents most often occur with deep snow and tree well immersions, where a skier or boarder falls into an area of deep, unconsolidated snow (especially around the base of a tree) and becomes immobilized. The more the person struggles, the more entrapped in the snow he or she may become, and the risk of suffocation increases.

In the last 10 years, there have been 41 fatalities resulting from SIS incidents occurring at U.S. ski areas (see chart below), according to a study conducted by the National Ski Areas Association (NSAA) and Paul Baugher, a leading snow safety researcher, ski patroller, and director of the Northwest Avalanche Institute. During this 10-year span, there are on average four SIS fatalities at U.S. ski areas per season. The six SIS fatalities last season was an increase from four SIS fatalities during the 2015-16 season. According to Baugher, who is the leading expert on SIS incidents in the United States, a victim can die as quickly as if drowning in water.

Despite the best efforts of highly trained ski area professionals including ski patrollers, SIS incidents can occur at any ski area or in the backcountry beyond ski area boundaries. Notably, for the first time that we are aware of, there was a SIS fatality last season in the Eastern U.S. at a Vermont ski area, following a large storm system that had dropped more than two feet of snow in the region. Still, the overwhelming majority of SIS incidents occur in the West, particularly in the Pacific Northwest, California, and the Rocky Mountains. That said, the likelihood of becoming involved in a fatal SIS incident of any type is below one SIS fatality per one million skier and snowboarder visits (see Facts about Skiing & Snowboarding Safety at www.nsaa.org/press/industry-stats). Safety remains one of the highest priorities in the ski industry, and ski areas focus on in-bounds tree well and deep snow mitigation, safety, and guest education measures.

“Ski areas nationwide take proactive measures to remind their skiing and riding guests that the deep powder they so often seek out can also become hazardous if they decide to go it alone, especially in the trees,” said Kelly Pawlak, president of NSAA, and the former general manager of Mount Snow Resort in Vermont. “Skiers and riders need to take precautions and educate themselves about the risks involved.
when skiing in gladed terrain and especially after big storms or in deep snow conditions,” Pawlak stressed.

The responsibility to understand such risks is on skiers and snowboarders. They should comply with safety recommendations, including avoiding the base of trees, where snow often accumulates and the hazards of confinement are higher. They should always ski or snowboard within direct sight of a partner, especially when they are off of a designated trail, within the trees or gladed terrain, or in the backcountry (which is generally not patrolled or monitored by resort patrollers). When skiing or boarding in such conditions, guests should always follow the ski industry’s long-standing “Your Responsibility Code,” including complying with all signs, warnings, and closures. In addition, guests should wear a helmet, and when venturing into these conditions, carry or wear a whistle in case they become engulfed in deep snow or a tree well. Also, it is wise for all skiers and boarders to enter the ski area’s ski patrol contact phone number into their Smartphones—with the advent of Smartphone technology (and voice command features like Siri on the Apple iPhones), if a person becomes entrapped in deep snow or a tree well, using voice command to call ski patrol can be a critical hands-free tool.

Also, Paul Baugher—in connection with his colleague Gwyn Howat from Washington’s Mt. Baker Ski Area—has developed a SIS safety education website (www.deepsnowsafety.org) as an excellent educational resource for skiers and riders. In addition to this safety website, NSAA has also released brochures and proposed signage for ski areas to use to educate their guests about the hazards associated with deep snow, tree wells, and the dangers of SIS incidents (see Safety Tips below).

“Skiing and snowboarding off of groomed runs and in deep powder snow is one of the most exciting and appealing aspects of our sport,” Baugher said. “However, if you decide to leave the groomed trails, you are voluntarily accepting the specific risks of falling into tree wells or deep snow and suffocating—but remember, these types of incidents are very preventable.”

**Chart 1**

![Snow Immersion Suffocation (SIS) Fatalities at U.S. Ski Areas 2000-2017](www.deepsnowsafety.org)
Key SIS Safety Tips for Skiers and Riders

- Each skier or snowboarder controls his or her own level of risk. Only you can prevent this type of incident from happening. Always ski and ride with a partner, and within close sight. To minimize your risk, you must know how to travel safely with your partners in these ungroomed deep snow areas.

- Always stay in visual contact so that your partner(s) can see you if you fall. Visual contact means stopping and watching your partner descend at all times, then proceeding downhill while he or she watches you at all times. It does no good if your partner is already waiting for you in lift line while you are still descending the slope.

- Stay close enough to either pull or dig out. If you have any question about what is “close enough” to assist someone in a tree well, hold your breath while you are reading this. The amount of time before you need air may be how much time your partner has to pull or dig you out of danger. Other factors such as creating an air pocket or the position you fall in, may affect this critical timeframe.

- Remember, if you lose visual contact with your partner you could lose your friend. It is important to know that most people who have died in a deep snow or tree well accident had been skiing or riding with a partner at the time of their incident. Unfortunately, none of these partners were in visual contact so they were not able to be of help in a timely manner.

- Use appropriate equipment to minimize risks. When skiing or snowboarding in high risk areas for deep snow or tree wells, wear a helmet, enter the ski patrol’s phone number into your Smartphone, and carry a whistle in case you need to get someone’s attention if you become entrapped in deep snow or a tree well.

- If you still have questions, contact your ski patrol. Ask your ski patrol what the current risks and conditions are with deep snow at your local ski area before you explore dangerous terrain such as treed areas, glades, or off-trail terrain where deep snow and tree well risks are higher. Also, if there has been a recent storm or a heavy snowfall, stick to designated trails and avoid gladed areas or trees, which are not groomed and more dangerous after a heavy snowfall.

- Lastly, share this dramatic video with friends and family to reinforce the risks associated with snow immersions and tree wells: http://abcnews.go.com/US/father-posts-video-sons-death-experience-tree/story?id=36995967

For more information on Snow Immersion Suffocation research, contact Paul Baugher, Director of the Northwest Avalanche Institute, at paul@mountainguides.com or by phone at (360) 825-9261 (office) or (206) 310-1494 (mobile).

THE NATIONAL SKI AREAS ASSOCIATION, LOCATED IN LAKEWOOD, COLO., IS A TRADE ASSOCIATION FORMED IN 1962 FOR SKI AREA OWNERS AND OPERATORS NATIONWIDE.