

# TREE WELL & DEEP SNOW SAFETY INFO



[www.treewelldeepsnowsafety.com](http://www.treewelldeepsnowsafety.com)

## TREE WELL & DEEP SNOW IMMERSION SAFETY

Skiing and snowboarding off of the groomed runs and in deep powder snow is one of the most exciting and appealing parts of our sport.

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, however, **fortunately these types of accidents are very preventable.**

Each skier or snowboarder controls his or her own level of risk and are the only ones who can prevent this type of accident from happening. To minimize your risk, you must know how to travel safely with your partners in these ungroomed deep snow areas.

This personal safety information is intended to assist all skiers and riders in learning about the risks and prevention of tree well and deep snow immersion accidents. If you still have questions please contact your ski patrol.

## WHAT IS A TREE WELL OR DEEP SNOW IMMERSION ACCIDENT?

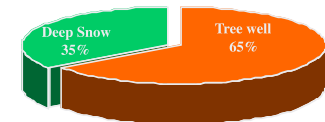
A deep snow or tree well accident occurs when a rider or skier falls into an area of deep unconsolidated snow and becomes immobilized. The more the person struggles the more entrapped in the snow they become.

If a partner is not there for immediate rescue, the skier or rider may die very quickly from suffocation - in many cases, they can die as quickly as someone can drown in water.

Deaths resulting from these kinds of accidents are referred to as a NARSID or Non-Avalanche Related Snow Immersion Death.

The odds of surviving a deep snow immersion/NARSID accident are low; especially if you are not with a partner. In two experiments conducted in the U.S. and Canada in which volunteers were temporarily placed in a tree well, **90% COULD NOT rescue themselves.**

% of Tree Wells & Deep Snow involved in NARSID cases

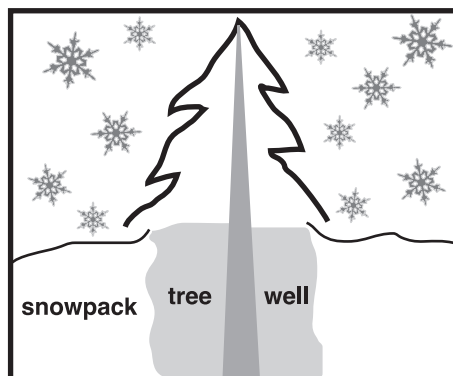


These photographs were taken of volunteers during an on-mountain educational demonstration organized and monitored by the expert supervision of ski patrol.

# WHAT EXACTLY IS A TREE WELL?

Trees are an important and integral part of the natural mountain environment. Thick stands of evergreen trees are common at ski resorts in the western U.S. and Canada, predominantly in the ungroomed areas.

Most of the documented cases of deep snow suffocation at ski areas involve people falling headfirst into a tree well.



A tree well is the hole or depression that forms around the base of a tree. Evergreen trees (fir, hemlock, etc) can have large, deep tree wells that form when low hanging branches prohibit snow from filling in and consolidating around the base of the tree. These holes are hidden from view by the tree's low hanging branches.

Tree bows buried by snow created a tree well in which a 6 foot person's head is just above the surface of the snow while standing in the tree well.



Walking into ungroomed area to a tree.



One step into the tree well, and the person here is 6 feet tall.



An actual location of a tree well fatality.

## IMPORTANT TREE WELL FACTS

- **Hazardous tree wells are generally found in ungroomed areas.** You must also be careful next to trees on the edges of groomed trails.
- **Particularly hazardous trees are fir trees that have their lower branches touching the snow surface.** The branches help form a canopy over the tree well and can support a lot of snow on top of them. This snow is often knocked off if a person falls through the branches into the tree well and results in a deeper burial in the tree well.
- **There is no easy way to identify if a particular tree has a dangerous tree well by sight.** The branches often block visibility of the hole that may exist. Even very small trees can have deep tree wells and have resulted in burials. Many of the NARSID accidents have occurred around small or medium size trees.
- **Prevention of falling into a tree well is all-important because the odds of surviving deep snow immersion are low.** Remember, in two experiments conducted in the U.S. and Canada in which volunteers were temporarily placed in a tree well, 90% COULD NOT rescue themselves.

**For your safety, you should assume all trees have a hazardous tree well. Fortunately, the risk of falling into a tree well is completely avoidable.**

Tree wells exist in deep snow areas and only around trees – in simple terms, a tree well is a hole in the deep snow, which is clearly marked by a tree. You can easily identify and avoid these areas.



## WHO DO THESE ACCIDENTS HAPPEN TO?

Both skiers and snowboarders account for cases of NARSID. It is important to know that **deaths have occurred with people using both releasable ski bindings as well as non-releasable snowboarding bindings.**

Most of these people have been found buried in an inverted body position with their head under the snow. This position makes it very difficult to breathe or escape.

It is very important to note that many of the **people who died as a result of a NARSID**

**accident were with partners at the time of the accident but, unfortunately, the partners did not witness the fall.**

In the years between 1990-2000 skier deaths due to NARSID accidents out numbered snowboarders by 2:1.

However, from 2000-2006, **that trend completely reversed** and snowboarders are now twice as likely to be involved in a NARSID accident than a skier.

## WHEN & WHERE DO ACCIDENTS HAPPEN?

Most of these accidents happen **during, or just after, big snowfalls.** This is also the time when skiers and snowboarders venture off of the groomed trails in search of powder snow.

December and January have more of the documented cases due to the loose and unconsolidated snowpack conditions generally associated with early season.

The amount of newly deposited snow is much more important than the total depth of the snowpack.

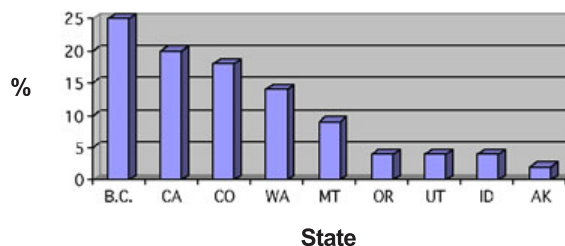
Deep snow and tree well suffocation accidents have been documented at many western ski areas that have heavy snowfalls, thick western forests, and lots of skiers and riders who regularly leave the designated trails. The number of actual cases that occur is greater than what is documented, but due to a lack of awareness many of these deaths are attributed to other causes.

These accidents are most likely to occur in areas of loose unconsolidated snow on ungroomed runs. You must understand the difference between **groomed** and **ungroomed** areas within the ski area and know what a **tree well** is.



A cat, or grooming machine, smooths a groomed trail. To the right of the cat is considered ungroomed.

% of NARSID Accidents by State



## UNGROOMED AREAS

Ungroomed areas are those areas in the ski area where unconsolidated natural snow is found and they are immediately next to and in between the groomed trails.

Ungroomed areas include areas bordering the groomed beginner and intermediate trails, tree areas, steeps and rugged terrain, and **ANY AREA** that has not been driven on and compacted by a snow grooming machine (snow cat).

**UNGROOMED AREAS** are where there is the **GREATEST RISK OF A TREE WELL OR DEEP SNOW ACCIDENT.**

If you choose to go into an ungroomed area, it is important that you use heightened awareness and take necessary precautionary steps associated with tree well and deep snow accident prevention.

**You and your partner have additional responsibilities for your safety when skiing or riding in any ungroomed area.**

## GROOMED AREAS

Groomed trails within the ski area have substantially compacted snow surfaces where large snow grooming machines weighing thousands of pounds have driven over them.

Groomed trails have a more solid and consistent snow surface as grooming helps fill in holes, compress the snow and refine the surface.

The tree wells of trees that may exist in or on the edge of groomed trails may be partially filled in by the grooming process but still need to be given a wide berth.

Some tree well accidents have occurred in areas very close or next to the edge of a groomed trails.

# WHAT CAN I DO TO PREVENT TREE WELL & DEEP SNOW ACCIDENTS?

## 1. AVOID DEEP SNOW & TREE AREAS

**Skiing or riding in treed areas and deep snow is a choice.**

The easiest and most important prevention step is to remain on groomed trails (see Groomed and Ungroomed Trails section). Be aware of the deep ungroomed powder at the very edges of the groomed runs.



ungroomed area

groomed area

Remember, most of these accidents happen in treed areas during or right after deep snowfalls. Resisting the urge to ski or snowboard through the trees during deep powder conditions, no matter how inviting the untracked powder looks, is the easiest deep snow accident prevention.

If you choose to ski or snowboard in the ungroomed, deep snow areas with trees, remember:

## 2. KEEP YOUR PARTNER IN SIGHT

**It is critical to ski or ride with a partner who remains in visual contact with you at all times. If you and your partner choose to ski or snowboard in ungroomed areas your partner must:**



- **Always stay in visual contact so that they can see you if you fall.** Visual contact (See photos # 1-3) 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 waiting for you in lift line while you are riding down.

- **Stay close enough to either pull or dig you out.** If you have any question about what “close enough” to assist someone in a tree well is, 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 deep snow or tree well accidents had been skiing or riding with “partners” at the time of their accident. Unfortunately, none of these partners were in visual contact so they were not able to be of help in a timely manner.

**There have also been many cases WHERE PARTNERS HAVE RESCUED SOMEONE in a tree well or deep snow accident and SAVED THEIR LIFE!**



Can you see where the snowboarder went in the picture below?



She's sitting in the snow near the trees.

**DO NOT LEAVE TO GET HELP,** it will not arrive in time. Remember, if your partner is buried under the snow, time is of the essence and **your quick actions to pull or dig them out are your partner's best hope for survival.** In most cases, you are the only hope.

Yell for help, but **stay there until you have recovered your partner.** Make attempts to uncover the head first and help create an airway. When you uncover their head, make sure there is no snow in the mouth and that they can breathe.

### 3. SKI AND RIDE DEFENSIVELY

Besides staying in visual contact with your partner, here are some other steps you can take to improve your chances of avoiding a tree well or deep snow accident:

- **Choose areas of widely spaced trees.** You should be able to ski or ride in between the trees so that if you lose control you do not fall in a tree well (see What is a Tree Well section).
- **If you are a skier, remove your pole straps before heading down an ungroomed powder slope.** Trapped skiers have difficulty removing the pole straps, which can hamper efforts to escape or clear an air space to breathe.
- **As you ski or ride, avoid looking at the trees, rather look at the areas in between them.** Your body usually will go toward where you are looking.
- **If you are sliding toward a tree well or a deep snow bank, do everything you can to avoid going inverted into the snow.** Grab branches, hug the tree, or roll your body to get your feet below you. Do anything you can to keep your head above the surface or at least your feet below you.
- **Carry a transceiver, shovel, probe, and whistle.** This is the same personal rescue gear carried by backcountry skiers or snowboarders.

### Fortunately, these accidents ARE PREVENTABLE

When skiing and snowboarding you get to decide what level of risk you want to accept. If you do choose to accept the risks of skiing and snowboarding in the deep powder snow or in the trees, you can significantly reduce the risk of a tree well or deep snow accident.

**These risks are reduced by awareness and practice of the safe travel techniques outlined in this brochure.**

### 4. FIGHT TO SURVIVE

Have a plan of what you will do if you go down. The following steps may help:

- **Resist the urge to struggle violently.** In tree well experiments people found that the more they struggled, the deeper they sank and the more quickly they became immobilized.
- **Make a breathing space around your face.** Then move your body carefully in a rocking manner. Instead of panicking, try first to hollow out the snow and give you space and air.
- **Stay calm.** Experts advise to stay calm while waiting for assistance as this helps conserve air and extend your time of survival. Hopefully, your partner will have seen you go down and will come to your rescue. If not, your chances of survival are improved if you maintain your air space.

This information was created by a collaboration of the NW Avalanche Institute, Mt. Baker Ski Area, Crystal Mountain and Dr. Robert Cadman. This information was intended for educational purposes only and may not be reproduced for commercial use without the written consent of one of the contacts listed below and any alterations to the photos or content for educational reasons needs to have prior approval. You are welcome to link to this website for educational purposes. Printed brochures containing this information are available through the contacts listed below.

Paul Baugher is continuing his research on NARSID incidents and encourages anyone who has a deep snow or tree well incident story or NARSID case data to contact him so that the most accurate information possible may be presented regarding this issue and every effort can be made to present appropriate safety information. We appreciate your input.

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**Cover Photos**  
Skier courtesy of Mt. Baker Ski Area  
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