



avalanche safety

I wanted to help him get his sled unstuck. When I rode above him & turned, **the snow gave way** beneath me and the last time I saw him, **he was tumbling.**

They weren't even riding. They were sitting on the flats, talking, **while we made a few runs up the hill.**

I wish I'd taken my helmet off and just **looked around.** Then I might have seen that the slope we were on had much **steeper slopes** above it.

These quotes should give you an idea of what your friends and relatives will say if you die in an avalanche.

Snowmachiners now lead the list of those getting caught and killed in avalanches in North America.

The good news is that these "accidents" are completely preventable.

**STOPPING the TREND
BEGINS with YOU!**



HIGHMARK'n safety

One rider's last highmark

Anything steeper than 25° can avalanche, but prime time slopes are 30° – 45°, the same slopes most of us like to play on. You don't have to be on a steep slope to make it avalanche, you just have to be connected to it.

HIGHMARKING accounts for more than 60% of the avalanche deaths involving snowmachiners in North America. It is **not unusual** for snowmachiners to hill climb for more than an hour before the slope avalanches. Tracks **do not** mean that a slope is safe. **TIMING IS EVERYTHING!** You can play safely on steep slopes **ONLY** when the snowpack is stable.



If you like to highmark, adopting the following habits will help keep you and the members of your group alive:

- Stay alert for clues to instability, even while driving to the trailhead. Ride your sled onto small cutbanks to test snow stability. Periodically STOP your machine, remove your helmet, walk around to get a feel for the snow, and scan the area. If the snow is unstable, you should notice one or more of the following clues:
 - ◆ Recent avalanches (don't play on similar, unreleased slopes)
 - ◆ New snow or wind-loading (may be your only clue)
 - ◆ Rain (weakens snow quickly, will stabilize when refrozen)
 - ◆ Whumphing noises (indicate the collapse of a buried weak layer)
 - ◆ Shooting cracks (indicate snow is ripe for fracturing)
 - ◆ Hollow-sounding snow (indicates a buried weak layer)
 - ◆ Signs of rapid or intense warming (snow will weaken quickly)
- Choose slopes that have been stripped by the wind (windward) over slopes that have been loaded (leeward). Snow that is rock hard can still avalanche if it is poorly bonded to the layers below. **Beware of steep, smooth, leeward slopes.**

If you learn nothing else, remember that if you like to ride onto steep slopes **do so ONE AT A TIME**, with the rest of your group watching from a safe spot. **DO NOT PARK AT THE BOTTOM** of a steep slope and **DO NOT GO HELP SOMEONE WHO HAS THEIR SLED STUCK.** These travel procedures alone would cut the number of fatalities in half.



No one above.
No one below.
My turn.



- Start out on the less steep slope angles and on the side of a slope instead of center-punching it. Do your first runs low and fast rather than maximizing your commitment and exposure by climbing as high as possible right away. If possible, do your first runs from the top down to get a feel for the snow and improve your chances of escape.
- Always turn toward the edge of a slope rather than turning toward the middle.
 - If unsure of the snow stability, favor slopes that have recently avalanched over those that have not yet slid. You can still ride on unstable days—just choose slopes less than 25° that are not connected to anything steeper.
 - Do not approach steep convex rollovers or aim right for a large rock or tree isolated in the middle of a steep slope unless you know the snow is stable. These are places where the snowpack is under greater stress, and thus where you are more likely to trigger a slide. Also be suspicious of steep areas where the snow is shallow and weaker.
 - Avoid deadly terrain traps such as gullies, steep-sided creek bottoms, or slopes that end in depressions because of the high probability of a deep burial. Do not ride on slopes with cliffs below. Favor slopes that are fan-shaped at the bottom and do not have obstacles like rocks or trees to crash into. Concave bowls are nasty traps because the fracture propagates around the slope and all the debris collects at the bottom. This is why it is not uncommon for snowmachiners to be buried under 10-30 feet of debris.
 - **ALLOW ONLY ONE RIDER AT A TIME ON THE SLOPE. IF A PERSON GETS STUCK, DO NOT SEND A SECOND SLEDDER TO HELP!!!** Facts: Roughly 33% of snowmachiner fatalities occur when a sled is stuck. About 34% involve more than one machine on the slope at the time of the avalanche. It is common for a second rider to turn above the stuck person and trigger an avalanche onto the sitting duck below.
 - **EVERYONE SHOULD BE WATCHING THE CLIMBER FROM A SAFE SPOT.**
 - **ALWAYS PARK WELL AWAY FROM THE BOTTOM OF STEEP SLOPES.** Do not count on being able to outrun a slide. Get in the habit of parking parallel rather than one behind the other, have your machine pointing away from the avalanche path, and always have the kill switch up.

TRAVEL smart

TRAVEL SMART:

- **For mountain riding, limit your groups to three or four people.** There is decreased safety in numbers. In big groups it is difficult to communicate, make good decisions, and follow safe travel procedures. Do not split your group!
- **Stop periodically to look for clues to instability and discuss the avalanche hazard.** Microphones in helmets can help communication within your group.
- **NEVER travel above your partner. Remember, one at a time on steep slopes and park in safe spots while watching the person exposed to avalanche hazard.**
- **Each rider should wear a transmitting avalanche beacon and carry a probe and shovel in a small pack.** If the tools you need to save your friend are on your buried sled, your friend may die. Before you drive to the trailhead, confirm that every group member has this rescue gear and knows how to use it. Check to make sure all the beacons work in both transmit and receive mode.
- **Ride with your helmet securely strapped.** Full face helmets have saved a few buried avalanche victims by providing some built-in air space (though you cannot count on this).
- **Assumptions can kill you. Avalanches don't care what you want to do or how skilled a rider you are.** Don't be reassured just because you've ridden in the area many times before. It doesn't matter that it is a nice day (most accidents happen on blue sky days after storms), there are tracks on the slope, or you're wearing a beacon.
- **Remember that you can have fun even on unstable days by staying away from steep slopes.**



The rider who parked here died under four feet of avalanche debris.



AVALANCHE RESCUE: The best defense is not to get caught. You don't have time to go for help. **YOU ARE THE HELP!**



TOOLS FOR AVALANCHE RESCUE:

Brain, beacon, probe, and shovel.

IF CAUGHT IN AN AVALANCHE:

- **Try to ride to the side and stay on your machine.**
- If knocked off your sled, push away from it to reduce your chances of being injured and **FIGHT HARD** to stay on top of the moving snow by "swimming."
- Attempt to **roll onto your back**; you have a better chance of survival if buried face up.
- As the avalanche slows, **thrust some part of your body above the surface.** Expand your chest and use your arm to create an airspace.
- **Try not to panic** so that you will use oxygen at a slower rate.

Be prepared—have the **tools, know how to use them, and have a plan.**



CORNICE safety

CORNICE BREAKS AND CATCHING BIG AIR:

Cornices are overhanging deposits of wind-drifted snow that form along the leeward side of ridgecrests and gullies. Cornice breaks are caused by additional new snow or wind-loading, warming, or the weight of a person or sled. If you like to jump cornices, know that even if you don't break the cornice, your landing shock-loads the slope (like a detonating bomb) and can trigger an avalanche.

BOTTOMLINE:

- Do not approach cornices from the bottom or ride on slopes that are overhung by cornices.
- When approaching any ridge, slow down, think cornice, and make sure you are riding, parking, or standing on snow that has solid ground beneath it. Many riders have been fooled by bushes because these sometimes extend through the cornice from the slope below.
- If you are determined to jump cornices or ride along their edges, make sure that the slope below is not steep enough to slide (no terrain steeper than 25°) and that it has a gentle runout (no cliffs, ravines, deep pits, big rocks, or trees below).
- If you like to ride on ridges, be aware of cornice crevasses. These are cracks can be quite large and not readily visible if covered by new or wind-drifted snow. Falls into these crevasses have caused injuries, damaged machines, and triggered avalanches on the slope below.

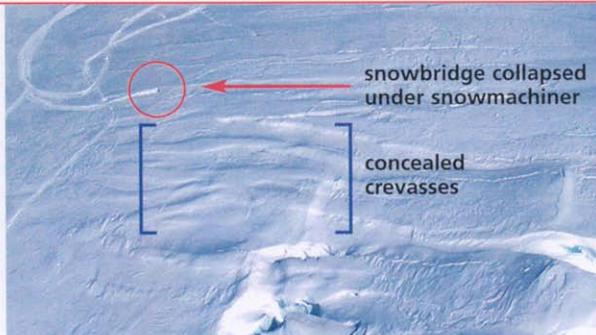


GLIDE CRACKS do not develop every winter or in all mountain ranges, but are most common in areas of deep snowpacks and warm temperatures. When glide failure occurs, the result is an avalanche to the ground.

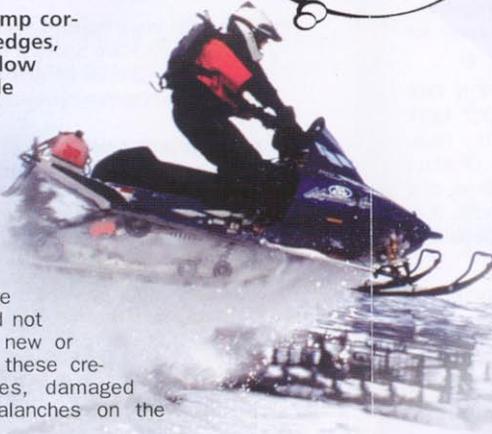
BOTTOMLINE: NEVER ride or park below glide cracks.

GLACIER TRAVEL AND SNOWBRIDGE COLLAPSES:

Snowmachining on glaciers is VERY risky. Crevasses, or cracks in the ice, are most common near the bottom area of a glacier, along the sides, and wherever the glacier bends or steepens. Crevasses are often plugged with seasonal snowcover. Riders have been injured and killed by crevasse falls and snowbridge collapses.

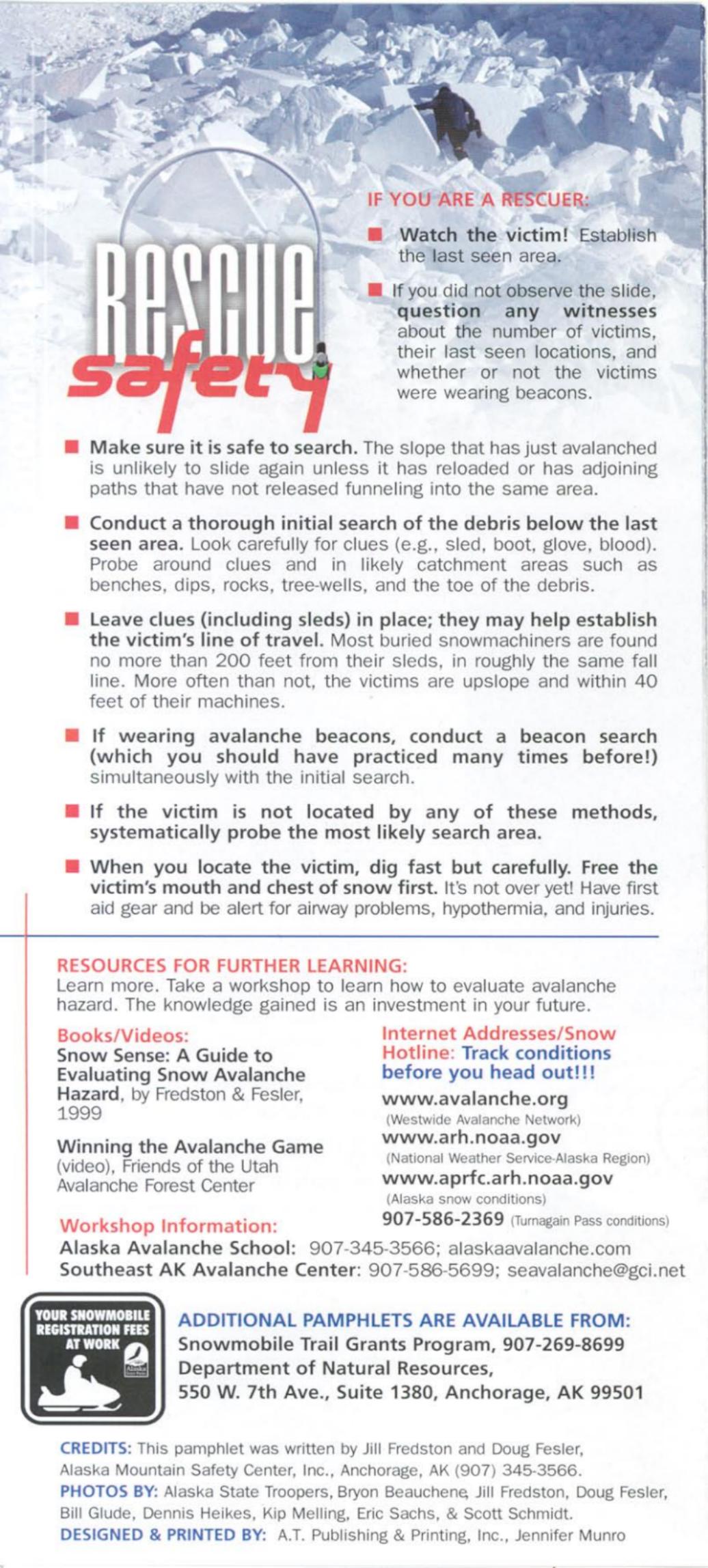


I never even thought about triggering a slide by landing hard.



BOTTOMLINE:

- Avoid travel on glaciers early in the season or in low snow years when snowbridges are likely to be thin.
- Stay alert for dips in the snow surface indicating the possible presence of crevasses.
- Be wary in the spring (especially April and May) as the snowcover weakens due to intense warming.
- Keep wide spacing between riders so that you have time to stop if the rider in front falls into a crevasse. Establish a buddy system and keep your partner in sight. When stopped, don't bunch your group in the same small area.
- Carry ropes and pulleys. Know how to set up rescue hauling systems.



RESCUE safety

IF YOU ARE A RESCUER:

- **Watch the victim!** Establish the last seen area.
- If you did not observe the slide, **question any witnesses** about the number of victims, their last seen locations, and whether or not the victims were wearing beacons.
- **Make sure it is safe to search.** The slope that has just avalanched is unlikely to slide again unless it has reloaded or has adjoining paths that have not released funneling into the same area.
- **Conduct a thorough initial search of the debris below the last seen area.** Look carefully for clues (e.g., sled, boot, glove, blood). Probe around clues and in likely catchment areas such as benches, dips, rocks, tree-wells, and the toe of the debris.
- **Leave clues (including sleds) in place; they may help establish the victim's line of travel.** Most buried snowmachiners are found no more than 200 feet from their sleds, in roughly the same fall line. More often than not, the victims are upslope and within 40 feet of their machines.
- **If wearing avalanche beacons, conduct a beacon search (which you should have practiced many times before!)** simultaneously with the initial search.
- **If the victim is not located by any of these methods, systematically probe the most likely search area.**
- **When you locate the victim, dig fast but carefully. Free the victim's mouth and chest of snow first.** It's not over yet! Have first aid gear and be alert for airway problems, hypothermia, and injuries.

RESOURCES FOR FURTHER LEARNING:

Learn more. Take a workshop to learn how to evaluate avalanche hazard. The knowledge gained is an investment in your future.

Books/Videos:

Snow Sense: A Guide to Evaluating Snow Avalanche Hazard, by Fredston & Fesler, 1999

Winning the Avalanche Game (video), Friends of the Utah Avalanche Forest Center

Workshop Information:

Alaska Avalanche School: 907-345-3566; alaskaavalanche.com

Southeast AK Avalanche Center: 907-586-5699; seavalanche@gci.net

Internet Addresses/Snow Hotline: Track conditions before you head out!!!

www.avalanche.org

(Westwide Avalanche Network)

www.arh.noaa.gov

(National Weather Service-Alaska Region)

www.aprfc.arh.noaa.gov

(Alaska snow conditions)

907-586-2369 (Turnagain Pass conditions)



ADDITIONAL PAMPHLETS ARE AVAILABLE FROM:

Snowmobile Trail Grants Program, 907-269-8699

Department of Natural Resources,

550 W. 7th Ave., Suite 1380, Anchorage, AK 99501

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