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Emergency Winter Shelter

February 14, 2001

by John Fey, M.D.

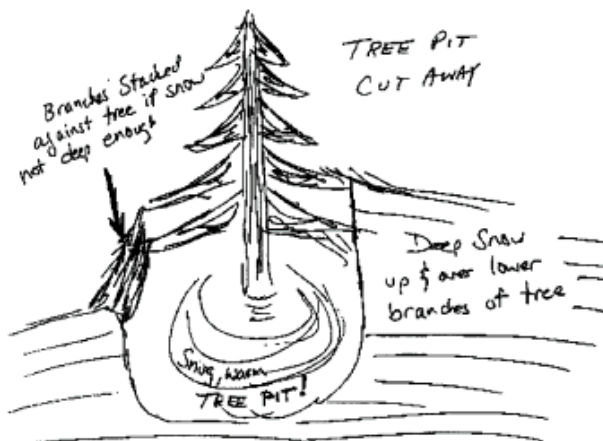
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It is important to consider what a shelter provides: it protects us from the wind, the cold, and the wet. It does not necessarily provide comfort, convenience, aesthetics, or enjoyment. In its most basic form, it offers pure survival. Emergency conditions dictate a reasoned compromise between that survival and the extra time and energy consumed trying to make something spacious and comfortable.

Wind is one of the biggest factors in heat loss. A barrier to the wind is an important function of any emergency shelter. If you have ample snow, wind walls or even more elaborate shelters can be made to deflect the chilling gale. Always consider the wind's direction when choosing a location and orientation of your shelter; you want to be on the leeward side of any barrier you choose or make. Don't overlook simple natural protection like boulders, upturned trees, or any other natural barrier to the wind. Orient the entrance of a freestanding snow structure downwind.

Protection from moisture should be your next consideration. This may simply require a roof over your head but may also require a floor and walls that separate you from melting snow. Remember, you don't necessarily have to be comfortable to be safe. Even a couple of large garbage or lawn and leaf bags could be enough to get you through a long and otherwise wet night. A small tarp or a bivy sac would be better; both together would be luxury indeed. Again, don't overlook overhanging rock ledges, boulders, etc. Lacking everything else, I suspect most of us would forgive you for cutting enough boughs and branches to fashion some sort of primitive lean-to. This possible need is one reason that I try to always take some type of knife with me. A skeleton of branches covered with an opened lawn and leaf bag might make a very serviceable roof. The next consideration is insulation. In low-snow situations, consider grasses, evergreen boughs, leaves, moss, etc. as possible insulators. Snow when available is a wonderful material. It is the paradox of snow that this water crystal, a product of the cold, can effectively insulate us from the cold. I don't know its R-value, but I do know that a well-constructed snow cave or igloo can offer an environment above freezing when it is profoundly cold outside. In general you should have 12 or more inches of snow to have a reasonable amount of insulation. More is better since it will melt, compact, and lose what R-value it has. Deep snow pack makes life pretty easy; shallower snow means you have to work a little harder.

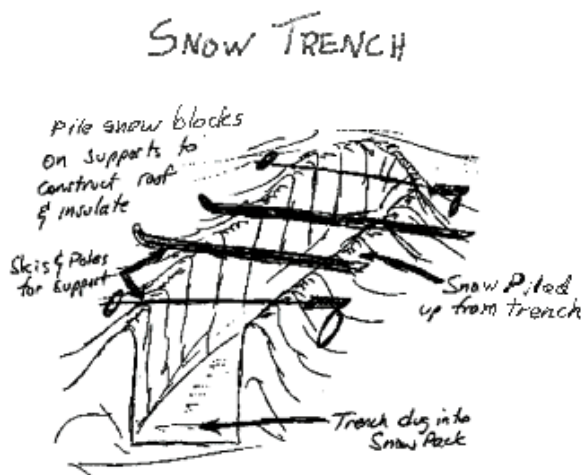
Snow Tree Pit



Snow shelters do not have to be elaborate to be effective. Often you can

combine a natural feature with snow to help build your structure. A prime example of this is an evergreen tree. In deep snow conditions, skiers and snowshoers are well aware of being cautious of falling into a snow pit around a tree. Well, what a great natural snow shelter- one person's trap can be another's salvation. Living trees give off heat; the melted-out space around a tree trunk can be significantly warmer than the surrounding environment. The boughs overhead provide a natural roof. If you are lucky and have deep snow, you need to do nothing more than to tunnel down at the base of a big full spruce or fir tree and find yourself in a warm, dry, protected lodge for the night. If the snow is not deep enough to reach the bottom of the lower branches, you can either build a snow wall around the perimeter or cut some branches from other trees and stack them up around the pit leaning them in against your main tree. For insulation pile the snow against the matrix you have constructed.

Snow Trench

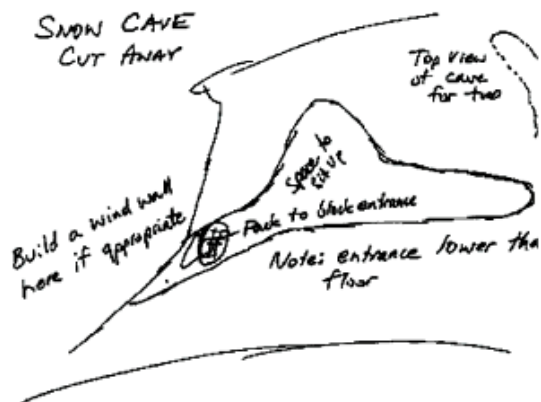


The next simplest shelter is a trench. You can dig a trench in the snow a little wider than your shoulders and a little longer than your height. Keep in mind that the smaller the space, the less body heat you will lose warming that space. Dig the trench deep enough so that when the sides compact, there will be enough height for you to crawl in and out. The snow you remove from the trench can be piled on the sides to build them up and compact them as well. Over the top of the trench you can place some supports to pile snow on top. These supports can be skis, snowshoes, boughs, or branches. If the snow is either wind packed (Styrofoam snow) or sticky enough, you can make blocks or snowballs to carefully place over the trench for a roof. A small tarp over the supports makes this a much easier project. One end of the trench will be left open for the entrance that can be closed with a snowball, snow block, or your pack. A single person can easily make this type of trench or pit shelter in a short period of time. It can be made in conditions of less snow cover by first piling the snow up from the surrounding area. One side of the trench can be the trunk of a downed tree or other natural wall. With this and any other shelter, seal it tightly to protect from drafts and to insulate, but then provide some sort of vent holes for oxygen. If you use a stove or candles, provide enough ventilation to prevent carbon monoxide poisoning! If you think a rescue party may be looking for you, make sure you somehow mark your well-camouflaged shelter with some type of flag. A red or orange bandana on your ski pole would be excellent.

Snow Cave

Next up the line from these simplest of snow shelters would be a snow cave or quinzhee shelter. If the snow cover is adequate, snow caves are wonderful and can be built in a reasonably short period of time. The ideal situation is a large drift on the leeward side of a bank or ridge where snow from the upwind territory has been dropped in the relative quiet of the downwind side of a ridge. Be very careful in big-mountain areas that you are not building your cave in the leading edge or run-out area of a would-be avalanche! (I don't believe we have to worry about that along the Finger Lakes Trail.) If you have something to probe with, you may want to investigate your prospective drift to make sure that it isn't covering a big tree stump, boulder, or clump of brush. You must plan your cave so that there will be at least one foot of snow overhead. "This provides enough structural strength and insulation. If you have the option, keep the entrance downwind and sheltered. Also, if the drift is big enough, start the entranceway below where you anticipate the floor of the

cave to be. Warm air rises. Therefore, if the door is below you, the air heated with your body will be less likely to escape.



Dig into the cave and push the snow out behind you. A partner, if available, can help dispose of the removed snow. If possible, remove the snow in blocks or chunks and use them to build a snow wall around your entranceway. This will be very helpful if you have a small emergency cave with little room. The wind protected "porch" can be used to change clothing or for those more involved nature calls. Try to keep the ceiling of the cave dome-shaped and as smooth as possible. Any projections will form a point from which water drips as the snow melts. Remember, a good snow cave will get pretty warm. Try not to make the cave any larger than necessary; heal as little extra space as possible. If you have the snow, the time, and the energy, try to construct a shelf for sleeping so the colder air sinks below you. (I think this is more a consideration for fancy, planned caves than for emergency survival shelters.) One consideration we learned in our White Mountains experience: if you have the vertical space, carve out a little taller area where you can sit up or kneel. When you are digging your cave, you will work hard and sweat like a pig. Before beginning your dig, it is probably wise to remove as many of your insulating layers as possible and wear just your water-resistant shell top and pants. When you finally get in the cave, you will want to put your other layers back on. This is impossible if you do not have room to sit up or kneel. My son and I learned this in our two-person cave; we were warm enough but had to go into the very inhospitable outside elements to change our clothing and to pack for departure. We were fortunate that the wind died down overnight so that in the morning we could dress and pack outside the cave with only -30°F cold to worry about. I should mention that if you have two or more people, your snow cave should be constructed such that if it collapses, one or more of you can get out and dig the other out. A Y-shaped cave is one design for this purpose. You can construct your cave with a single entranceway leading to a central foyer that then branches like a "Y" with each inhabitant keeping his or her head in the central location. This way the dome over each person can be narrower and therefore stronger. The central shared space can be relatively small and sturdy as well. Again, the entranceway can be plugged with blocks or snowballs or your packs. Don't forget to provide a small vent hole out the top. It is recommended that you keep your shovel inside with you in case of disaster! In areas where there is less snow cover and/or no drifts or snow banks available, you can build a quinzhee shelter. This is basically a snow cave dug into a heap of snow that you pile up. You should start with a ski pole or branch stuck in the center of your planned structure. Pile snow at least 6 feet in diameter around the center pole. Pile it up 4 or more feet deep, tamp it down, and then let it settle an hour or more. As time goes on, depending on the conditions, snow crystals actually adhere to one another and become much more cohesive and strong. It might be good to pile snow eccentrically in one direction where you plan to make your entranceway. This will provide more opportunity to protect the opening from wind and snow. Now you can begin digging much as described for a snow cave. Plan your dig aiming for the center pole and fashion the main cavity centered on the pole. Again I remind you that in an emergency, survival is the goal, not comfort. You don't need a spacious room; you only need enough space to get in and curl up. Remember, if the space is small and you curl up, you will conserve heat and energy. If time, energy, and conditions allow, you can elaborate on these minimal survival requirements. Once the main chamber is complete, the pole can be lifted out of the roof of your new shelter to make a vent hole. If it is snowing hard, you may need to leave the pole poking through the roof of the shelter so that you can periodically wiggle it to keep the hole open and venting. For maximum efficiency, tie your bandana to the pole for visibility. There are other shelters you can build but these are the simplest and most expedient I know of. Igloos and more elaborate structures are great but too time and

energy consuming for emergency use. Whatever your choice of structure is, try to insulate your body from the cold ground or snow it will be contacting. In FLT territory you should have plenty of options with both evergreen and deciduous trees, brush, leaves, etc. Above tree line you'll be out of luck unless you brought insulation with you. This brings me to my last section on emergency shelter.

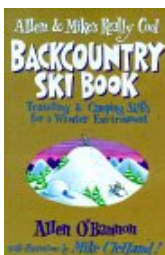
Shelters are great and necessary but in deep winter conditions may not be possible to build or even enough to keep you alive if you are not personally prepared with necessary clothing and equipment. I suppose you can dig a snow cave without a shovel, but I wouldn't be eager to try. Any serious winter mountain travel really should mandate at least one or more shovels per group. In the tamer environs of the FLT, even a short afternoon's ski workout offers the possibility of injury and an unexpected night out. I'd be willing to bet your likelihood of being spotted by passersby on the FLT is significantly less than it is in the Adirondacks or Whites. For this reason I strongly advocate taking survival necessities with you. I rarely go out even for a short walk without the following extra gear:

- One layer (top and bottom) of warm insulation. This may either be down or fleece. This layer may be replaced by or augmented by a warmer but less versatile sleeping bag.
- Outer waterproof layer (parka and pants or bibs). Gore-Tex is great but not necessary. Cheap waterproof nylon may be adequate and is often lighter if you plan to carry it just for emergencies.
- A Mylar or similar space blanket or bag (4 oz.). One of each is even better. The bag can serve as a bivy sac and the blanket as a small tarp. If you don't have or want these, consider taking two or three large garbage bags. Lawn and leaf bags are the biggest and usually the toughest. They can be used as ponchos, tarps, bivy sacs, etc. They weigh nearly nothing. If weight is no object (or in fact desirable; see my last paragraphs) I take a bivy sac and/or a small tarp.
- A decent multi-tool. I favor my Leatherman PST II. It has pliers, file, scissors, and knife and it weighs only five ounces.
- A loud whistle.
- A small flashlight or headlamp.
- Fire starter and matches.
- Two or three extra nutrition bars, fig newtons, etc.
- Extra water or means to melt snow if water is not available. I always carry a bottle of iodine tabs with me, but I would not worry about a little Giardia as opposed to hypothermia. Remember, dehydration makes hypothermia much more likely and severe.
- Nylon cord. You can use it to lash, drag, or suspend anything you want when creating your shelter.
- Duct tape. It goes without saying!

I sometimes (when the risk is a little higher) carry a three-quarter-length Therm-a-Rest UltraLite mattress or cut down closed-cell foam pad. These can provide much needed insulation from the ground beneath you and can double as a splint if you need to hike out with an injured limb. A bigger pad is better if you don't mind carrying it.

Oh yeah, don't forget your pack to put all this stuff in! It can serve as a partial bivy sac, sleeping pad, door, roof, distress marker, or any other imaginative use. The pack frame can be used for splints too!

My buddies accuse me of being paranoid and ridicule me for taking all this stuff. For serious winter travel I think most would consider this equipment essential. For "little" day trips I like to carry it for two reasons: First, I don't want to be that person we occasionally read about who needs to be evacuated from a simple afternoon's walk in the woods. Second, I consider that any casual day trip is basically a training run and that the little weight involved with the above items just adds to the quality of my workout. I enjoy toting my pack knowing that I can master almost any adversity that I might encounter and that I'm getting stronger carrying it.



A great reference for fun and survival in the snow: *Allen & Mike's Really Cool Backcountry Ski Book, Traveling & Camping Skills for a Winter Environment* by Allen O'Bannon, illustrated by Mike Clelland, (c)1996 by Falcon Publishing, Inc. Pray for snow!

For more information:

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