

Outdoor Action Guide to Winter Camping

by Rick Curtis

2. Personal Equipment

The essence of staying warm in the winter is having the proper clothing layers and knowing how to use them effectively.

Heat Loss

The body basically acts as a furnace, producing heat through chemical reactions and activity. This heat is lost through conduction, convection, evaporation, radiation, and respiration. As physical activity increases so does heat production and conversely as activity decreases so does heat production. The key to keeping warm is to add insulation to the body.

Insulation

The thermal insulation of clothing is proportional to the thickness of the dead air space enclosed. Dead air is defined as any enclosed unit of air that is small enough that natural convection currents would not arise in it. Such currents have been detected in units as small as 2 millimeters in diameter. The dead air next to the skin is heated up by the body and provides a layer of warmth around the body. The clothing is not what is keeping you warm it is the dead air. This is because the denser a material the faster it can transfer heat through conduction, the density of air is obviously minuscule compared to a piece of a fabric. The "clo" unit was developed to provide a measurement of insulating effectiveness. One clo is roughly equal to the insulating value of an ordinary wool business suit. Each inch of thickness of conventional insulating materials (wool, pile, down) provides a theoretical value of about 4.7 clo or a practical "in use" value of 4.0 clo.

The Layering Principle

The key to providing this dead air space is through having a number of layers of clothing. Each layer provides a certain clo value of dead air space. This allows you to add or shed layers to increase or decrease your accumulated dead air space as the temperature changes and/or as your activity level changes. Remember, your body is the heat source, the clothing layers only serve to trap the heat and slow down your heat loss to the cold environment. If you have too much clothing on, you will overheat and start to sweat. You need to find the proper heat balance between the number and types of layers and your activity level.

Example 1: You are snowshoeing up a steep incline with a 50 lb. pack. The air temperature is 10o Fahrenheit and you are dressed in wool pants and a lightweight polypropylene shirt. As soon as you stop for a rest, your heat production slows. If you stop for more than a couple of minutes, you will begin to chill. So you need to have an outer layer handy to put on.

Example 2: You are skiing along the flat. The air temp is 25o Fahrenheit and you are dressing in light polypropylene tops and bottoms, a down vest, and a windshell. You come to a long steep hill and have to push hard to get up and over. You start to sweat as your heat production increase with the increased muscle activity. To prevent overheating, you pull off the vest and stick it in your pack.

Why not just have lots of layers on and sweat? Heat loss from a wet surface can be up to 25 times greater than a dry surface (due to the higher density of water). If you sweat and get soaked, you will lose heat much more quickly through evaporation of the water. Also you are losing an incredible amount of water through sweating since the air is so dry. Too much water loss leads to dehydration which significantly increases the risk of hypothermia. So you want to control your layers so as to be warm at the activity level you are in but not sweating profusely.

Thus, traveling in the winter is a constant process of adjusting your layers to keep comfortable. This means having a number of layers you can add or subtract and allowing for versatility within layers. Convection may account for the greatest amount of heat loss under most conditions. In order to properly insulate, you need to have an outer layer that is windproof.

Example 3: You are standing on a windblown summit in a wool sweater, the wind will penetrate through the openings in the sweater and quickly carry away the warm layer of air next to the skin.

Another convective factor is the "bellows action" of clothing. As you move a bellows action occurs which tends to pump your accumulated warm air out through openings in your clothing and sucks the cooler air in. In some conditions this action can reduce your body's personal insulation by 50% or more. Thus, it is important that all layers have effective methods of being "sealed" (i.e. buttons, zippers etc.) Openings in layers allow you to ventilate, to open the "chimney damper" if you are beginning to overheat, without having to actually remove a layer. So opening and closing zippers on a jacket, or armpit zips will allow you to either ventilate if you are getting too hot or seal up if you are getting chilly, all without having to add or take off a layer. With clothes that are too loose, the bellows action pumps warm air out through the openings. You need to have clothes that fit properly but not tightly. Too tight, and the clothes compress and actually reduce dead air space in layers below as well as restricting body movement.

Another general rule is that the efficiency of clothing is proportional to the diameter of the body part it covers. Thus a given thickness of insulation added to your trunk will be more thermally efficient than the same thickness added to your arm or leg. It will also help maintain that body core temperature. This is why vests work well to maintain body heat. There is an optimal thickness of insulation for each body part. Beyond that the added bulk tends to be more of a hindrance in movement than the added insulation is worth.

Have you ever noticed that your hands feel colder after putting on a thin pair of gloves? This is because when insulation is wrapped around a curved surface, the cross-sectional area of the insulation through which the heat may flow is greater as is the surface area from which the heat may be lost. This means that the total insulation efficiency of a given thickness progressively decreases as curvature sharpens over a surface. In addition, small cylinders, such as fingers, show a paradoxical effect. The addition of a thin layer of insulation actually increases heat loss until a thickness of about 1/4 inch is reached. This heat resistance gains as additional thickness is added. However, added thickness beyond 1/4 inch increases warmth very little in proportion to its thickness. This is one reason that thin gloves don't keep your hands particularly warm.

Clothing Materials

Some of the different types of materials for winter clothing and insulation are discussed below.

1. Wool - derives its insulating quality from the elastic, three-dimensional wavy crimp in the fiber that traps air between fibers. Depending on the texture and thickness of the fabric, as much as 60-80% of wool cloth can be air. Wool can absorb a fair amount of moisture without imparting a damp feeling because the water "disappears" into the fiber spaces. Even with water in the fabric wool still retains dead air space and will still insulate you. The disadvantage to wool is that it can absorb so much water (maximum absorption can be as much as 1/3 third the garment weight) making wet wool clothing very heavy. Wool releases moisture slowly, with minimum chilling effect. Wool can be woven in very tight weaves that are quite wind resistant. An advantage to wool is that it is relatively inexpensive (if purchased at surplus stores). However, it can be itchy against the skin and some people are allergic to it.

2. Pile or Fleece fabrics - is a synthetic material often made of a plastic (polyester, polyolefin, polypropylene, etc.). This material has a similar insulative capacity as wool. Its advantages are that it holds less water (than wool) and dries more quickly. Pile is manufactured in a variety of different weights (thicknesses) offering different amounts of loft and insulation. This allows for numerous layering possibilities. The disadvantage of pile is that it has very poor wind resistance and hence a wind shell on top is almost always required. Versions of pile are available that have a middle windproof layer.

3. Polypropylene and other Hydrophobic fabrics - polypropylene is a synthetic, plastic fiber which offers dead air space and a fiber which cannot absorb water. The fiber is hydrophobic so it moves the water vapor away from the source (the body). Polypropylene layers are extremely effective worn directly against the skin as a way of keeping the skin from being wet and reducing evaporative heat loss. As the water moves away from the body it will evaporate, but each additional millimeter of distance between your skin and the point of evaporation decreases the amount of body heat lost in the evaporative process. Some fabrics rely on the chemical nature of the fiber to be hydrophobic. Others fabrics use a molecular coating to achieve the same end.

4. Vapor Barrier Systems - another way to stay warm in the winter is through vapor barriers. The body is always losing water through the skin even when we are not active. This loss is known as insensible

perspiration and occurs unless the air humidity is 70%. This insensible perspiration goes on at the rate of nearly half a quart every 24 hours. Since it takes 580 calories per gram to turn liquid water into water vapor, heat is continually lost through insensible perspiration as well as through sweat from any activity. A vapor barrier is a clothing item which is impervious to water thereby serving as a barrier to the transportation of water vapor. When worn near the skin it keeps water vapor near the skin. Eventually the humidity level rises to the point where the body senses a high humidity level and shuts off insensible perspiration. This prevents evaporative heat loss and slows dehydration.

Vapor barriers should not be used directly against the skin because any evaporation of moisture directly at the skin surface leads to heat loss. Wearing polypropylene or some other hydrophobic layer between the skin and the vapor barrier allows the moisture to be transported away from direct skin contact. There is no doubt that vapor barrier systems are effective for some people in some conditions. The issues you must consider before using a vapor barrier are activity level, amount you naturally sweat, and "moisture comfort." If you are not active, such as when using a vapor barrier liner at night in a sleeping bag, the system will work well. A vapor barrier sleeping bag liner will typically permit you to sleep comfortably in temperatures 10 - 15 degrees colder than in the bag alone. However, some people find that they are not comfortable with the level of moisture in the bag and feel clammy. If this interferes with sleeping it may be a problem, better to have a better insulated sleeping bag. Vapor barrier liners for sleeping bags also help in another way. In cold conditions, the moisture from your body escapes upward through the bag, when reaching the cold outside of the bag it condenses into liquid or even frost. Over a number of days this moisture level in your bag increases. If you can't dry out the bag it will slowly get heavier and heavier as it holds more water. With a down bag, this moisture can actually soak the feathers and cause the bag to lose significant amounts of loft (dead air space), thereby reducing its effectiveness.

When you are active, like snowshoeing, and you are wearing a vapor barrier such as a vapor barrier sock, you must carefully monitor how you sweat. If you are someone who sweats a lot with activity, your foot and polypropylene liner sock may be totally soaked before the body shuts down sweating. Having this liquid water next to the skin is going to lead to increased heat loss. If you don't sweat much, your body may shut down perspiration at the foot before it gets actually wet. This is when the vapor barrier system is working. The important point is that heat loss comes from water changing state from a liquid to a gas. Liquid water next to the skin leads to significant heat loss. Water vapor next to the skin does not. You must experiment to determine if vapor barrier systems will work for you.

5. Polarguard, Hollofil, Quallofil and others - these are synthetic fibers which are primarily used in sleeping bags and heavy outer garments like parkas. The fibers are fairly efficient at providing dead air space (though not nearly as efficient as down). Their advantages are that they do not absorb water and dry fairly quickly. Polarguard is made in large sheets. Hollofil is a fiber similar to Polarguard but hollow. This increases the dead air space and makes the fiber more thermally efficient. Quallofil took Hollofil one step further by creating four "holes" running through the fiber.

6. "Superthin" fibers - Primaloft, Microloft, Thinsulate and others - the principal behind these synthetic fibers is that by making the fiber thinner you can increase the amount of dead air space. For example, take an enclosed space 5 inches wide and place 2 dividers into that space, each 1 inch thick. You have an effective air layer of 3 inches. If you take the same 5 inch space and divide it with 4 dividers, each 1/4 inch thick you now have an effective air layer of 4 inches. You have gained one inch. Under laboratory conditions a given thickness of Thinsulate is almost twice as warm as the same thickness of down, however, the Thinsulate is 40% heavier. Thinsulate is made in sheets and therefore tends to be used primarily for outer layers, parkas and pants. New materials such as Primaloft and Microloft are superthin fibers that are close to the weight of down for an equivalent fiber volume. They are now being used in parkas and sleeping bags as an alternative to down. They stuff down to a small size and have similar warmth to weight ratios as down without the worries about getting wet.

7. Down - feathers are a very efficient insulator. They provide excellent dead air space for very little weight. The major problem with down (and it can be a major problem) in the winter is that down absorbs water. Once the feathers get wet they tend to clump, and lose dead air space. Using down items in the winter takes special care to prevent them from getting wet. For example, a vapor barrier sleeping bag liner in a down bag will help the bag stay dry. Down is useful in sleeping bags since it tends to conform to the shape of the occupant and prevents convection areas. Down is very compressible, which is an

advantage when putting it into your pack but also realize that your body weight compresses the feathers beneath you and you need good insulation (foam pad, etc.) underneath you, more so than with a synthetic bag. Some people are allergic to down. The effectiveness of a down bag is directly related to the quality of the feathers used. Since down is made of individual feathers, sleeping bags are garments must have baffles sewn in to prevent the down from shifting in the bag which would create cold spots.

8. Radiant Barriers - some portion of body heat is lost through radiation. One method of retaining this heat is through use of a reflective barrier such as aluminum. This is the principal used in "Space Blankets" and is also used in some bivy sacks and sleeping bags.

Note: Cotton is basically useless in winter time. It wicks water, but unlike polypropylene, cotton absorbs this moisture and the water occupies the space previously occupied by dead air. This means a loss in dead air space, high evaporative cooling, and a garment that is almost impossible to dry out.

The Body and Clothing

1. Head - because the head has a very high surface to volume ratio and the head is heavily vascularized, you can lose a great deal of heat (up to 70%) from the head. Therefore, hats are essential in winter camping. The adage - if your toes are cold, put on a hat - is true. A balaclava is particularly effective and versatile. A facemask may be required if there are high wind conditions due to the susceptibility of the face to frostbite.

2. Hands - mittens are warmer than gloves because you don't contend with the curvature problem described above. Also the fingers tend to keep each other warm, rather than being isolated as in gloves. It is useful to have an inner mitten with an outer shell to give you layering capabilities. Also "idiot strings" are important to keep you from losing mittens in the snow. However, gloves are always essential as well in winter because of the need for dexterity in various operations.

3. Feet - finding the right footgear depends a great deal on the activity you are involved in as well as temperature and environment. The two general modes of travel are skiing or snowshoeing (in areas with only a few inches of snow you can hike in just boots).

1. Cross-country skiing - you need a boot that has some ankle support due to the extra weight of a backpack. Also you may need a ski overboot to give you additional insulation over the ski boots.

2. Snowshoeing/Hiking - regular backpacking boots are not sufficient. They simply do not provide the necessary dead air space. The options for boots include:

- Insulated Boots - such as Sorels or "Mickey Mouse" boots. These are rubber or leather and rubber boots that use a layer of wool felt to provide dead air space. The Mouse boots can be Army surplus or modern copies (avoid the copies since they are often poorly made). With the true Army boots, the black boots are rated to -20 degrees and the white ones to -40 degrees. The one drawback with Sorels is that the wool felt liner is exposed. Breaking through a frozen stream may soak the liner which will be difficult to dry. They can be used with snowshoes, crampons and skis (with special bindings).

- Plastic Mountaineering Boots - plastic shell mountaineering boots use inner boots made with wool felt or a closed cell foam insulation. These can be very warm and easily used with ski bindings, crampons, and snowshoes. Depending on the inner boot, you may need insulated overboots to add enough insulation to keep your feet warm.

- Mukluks - one piece moccasins which reach to the knee. They are used with felt liners and wool socks. The Mukluk itself serves as a high gaiter. They are flexible and breathable. They work with snowshoe bindings and can be used on cross-country skis with special bindings (Berwin Bindings) and with hinged crampons (not for technical ice). They are extremely comfortable, but since they are not waterproof they are best used in dry cold winter settings where water and rain are not a problem (e.g. stream crossings, possibility of rain, etc.)

- Heavy leather mountaineering boots with an insulated overboot - this can be effective but the system still is not very thermally efficient and may lead to frostbite of the feet (not recommended).

1. Socks - one of the best systems for keeping feet warm is using multiple layers. Start with a thin polypropylene liner sock next to the skin to wick moisture away followed by 1 - 2 pairs of wool or

wool/nylon blend socks. Make sure the outer socks are big enough that they can fit comfortably over the inner layers. If they are too tight, they will constrict circulation and increase the chances of frostbite. Keeping your feet dry is essential to keeping your feet warm you may need to change your socks during the day. Foot powder with aluminum hydroxide can help. High altitude mountaineers will put antiperspirant on their feet for a week before the trip. The active ingredient, aluminum hydroxide will keep your feet from sweating for up to a month. (Some medical research has suggested a link between aluminum and Alzheimer's Disease but small exposure [as of the original writing of this article] does not appear to be a problem).

2. High Gaiters - are essential for winter activity. They keep snow from getting into your boots and keep your socks and pants legs free from snow.
3. Insulated Booties - these are booties insulated with a synthetic fill that typically have a foam sole to insulate you from the ground. They are very nice to have to wear in your sleeping bag at night.
4. Camp Overboots - are shells with an insulated bottom. These can be worn over insulated booties for traipsing around in camp. Also for those middle of the night visits to the woods.
4. Outer Layer - it is essential to have an outer layer that is windproof and at least water resistant. In some cases it may be best to have the garment waterproof. It also needs to be able to be ventilated. There is a big trade off between waterproofness and ability to ventilate. A completely waterproof item will keep the water that is moving through your other layers trapped, adding to weight and causing some heat loss. However, in wet snow conditions, if the garment is not waterproof it can get wet and freeze. Gore-tex and other similar fabrics provide one solution. These fabrics have a thin polymer coating which has pores that are large enough to allow water vapor to pass through but too small to allow water droplets through. Nothing is perfect, however, and although Gore-tex does breathe, it doesn't breathe as well as straight cotton/nylon blends. If you opt for a straight wind garment, 65/35 blends of cotton and nylon work well. The other approach is to have a waterproof garment with sufficient ventilation openings to allow water vapor to escape. This provides the ability to work in wet snow without worrying about getting the garment soaked. Part of the basis for making the decision is the area and you are traveling in. If you are in the dry snow of the Rockies you needn't worry so much about waterproofness. If you are in the northeastern mountains where freezing rain is a possibility or very wet snow, you need to be prepared to be wet.
5. Zippers - are wonderful accessories for winter clothing. Having underarm zippers on jackets can greatly increase your ability to ventilate. Having side zippers on pants can allow you to ventilate and to add or subtract a layer without taking off skis or snowshoes.
6. Miscellaneous - knickers with knicker socks can make a good combination. You have the option of ventilating by opening up the bottom of the knickers and/or rolling down your socks. Also bibs are helpful (both pile and outer waterproof layer) because they prevent cold spots at the junction between tops and bottoms. Underwear is also available in the traditional union suit design which accomplishes the same thing. Snaps on jackets etc. can be a problem because they fill with snow and ice and fail to work. Velcro works much better as a closure.

Clothing Techniques

1. When you first get up in the morning (and at the end of the day in camp), your activity level will be low as will be the temperature. You will need to have many, if not all, of your layers on at this point until breakfast is over and you have started to become active.
2. When you get ready to be active, you will need to take off layers since you will begin generating heat. A good rule of thumb is to strip down until you feel just cool, not chilled just before activity. Failure to do this will mean overheating, sweating, losing heat and you will have to stop in 10 minutes down the trail anyway to take layers off. Open or closing zippers, rolling sleeves up or down, taking a hat off or putting one on will all help with temperature regulation.
3. If you stop for more than a few minutes, you will need to put on another layer to keep from getting chilled. Keep a layer close at hand.

4. Whenever you get covered with snow, either from a fall or from dislodged snow from a tree, it is essential to brush yourself off to keep your clothing free of snow. Failure to do this often results in the snow melting into your clothing and refreezing as ice.

5. At the end of the day, as activity decreases and temperature drops, you will need to add layers. Once you start to cool down it takes a lot of the body's resources (calories) to heat up again so layer up ASAP before you get chilled. It may be good to put on more than you think you need; it will only get colder. If you are too warm, you can open up layers and ventilate to reach the proper temperature.

Sleeping Bags

Sleeping bags for winter camping should be rated to temperatures below what you will likely experience if you want to be comfortable. If the nighttime temperature can drop to -15o Fahrenheit, then your bag should be rated to -30o Fahrenheit. There are a variety of different fills for sleeping bags: down, Primaloft, Microloft, Qualofill, Polarguard, etc. The bag itself should be a mummy style bag with a hood. It should also have a draft tube along the zipper and a draft collar at the neck. In sleeping bags, you want the bag to snugly conform to your body. If the bag is too big, you will have large spaces for convection currents and you will be cold. In a bag that has too much space, you may need to wear clothing layers to help fill up the space. You can opt for the expedition bag which is rated to -30o Fahrenheit or you can use a three season bag rated to 0o Fahrenheit and augment it with a vapor barrier liner (adds 5-10 degrees), a bivy sack (adds 5-10 degrees), and/or an overbag (a summer weight bag that fits over your mummy bag - adds 15 - 20 degrees make sure it is big enough to fit over the mummy without compressing it). Keep in mind that each of these options has advantages and disadvantages in terms of price, weight, and volume taken up in your pack.

Foam Pads

You also need to insulate yourself from the underlying snow. Foam pads (Ensolite) or inflatables (Thermarest) work well. Your insulation should be at least 1/2 " thick (two 3/8 " summer pads work well, or use a Thermarest on top of a 3/8 " foam pad). It is best to use full length pads so that all of your body is insulated.

4. Winter Water

1) Do not eat snow! It takes an incredible amount of energy to transfer water from one state to another (solid to liquid). You are burning up too many calories to do this which can quickly lead to hypothermia.

2) Water may be obtained by digging a hole in frozen lakes or streams where there is running water beneath the ice. Be careful about falling in. Remember, in most cases water will need to be purified from giardia and other bacteriological contaminants (see below).

3) Snow can be melted on a fire or stove to make water. It should be clean snow, no yellow (urine) or pink (bacterial growth). Because it takes so much energy to convert from one state to another you should have some water in the bottom of your container. Heat this water up and add snow to it slowly so it turns to slush and then water. This is much more efficient. If you dump in straight snow, you will only burn the bottom of your container and not make any water. By volume it takes about 10 quarts of snow to make 1 quart of water. Snow does not need purification.

5) Water in a pot can be stored overnight by placing the pot lid on and burying the pot under a foot of snow. Snow is such a good insulator that it will keep the water from completely freezing even in sub-zero temperatures.

6) Personal Water - You should have a water bottle with a wide mouth, otherwise the opening will easily freeze up. During the day you should carry at least one bottle next to your body (usually with a shoulder strap arrangement). Your body heat will keep it from freezing and the bottle is handy to rehydrate yourself throughout the day. Insulated water bottle holders are available for this. Other bottles can be kept upside down in an insulated container (sock etc.) preferably in an outside pocket on your pack. Being upside down will keep the mouth of the bottle from freezing. Keep in mind that the lid must be on tightly or water will leak all over the place. A cold water bottle may have ice crystals in the threads. As the bottle heats up from body temperature the ice may melt causing the cap to loosen also the lid may expand with heat causing leakage. At night keep your water bottles in your sleeping bag to prevent them from freezing.

7) Getting Water - sometimes filling pots and water bottles from a stream or lake is a major expedition in itself. Make sure that the area you plan to get water from is secure. Avoid steep banks that might lead to a plunge and make sure any ice is sufficiently stable to hold your weight. Also make sure you don't get your mittens soaked with icy water. A loop of string tied tightly around the water bottle neck will allow you to lower a bottle in by hand or with a ski pole or ice axe. Don't trust pot grips on a large pot, with mittens you can lose your grip and your pot. Fill the pot up part way and then use a water bottle to top it off. Mark the area so you can find it next time.

5. Winter Shelters

Tents

In many cases you will be traveling to areas without shelters, so you need to bring your own. There are a range of tents available. The key factors are:

- **Strength** - to withstand both wind and snow. In general it is recommended that you use a tent specifically rated to be a 4-season tent. Four season tents typically have stronger poles (to hold snow loads).
- **Ability to shed snow** - the tent must have a roof line that allows snow to fall off. Otherwise the tent will load up and the weight will cause it to collapse. (Four season tents are designed this way).
- **Room** - you need lots of internal space on a winter trip for all the bulky gear you are carrying. Also you may get snowed in and need to stay in the tent for an extended period of time. Being snowbound in a cramped tent with several other people can be unpleasant.
- **Rainfly** - the tent must have a rainfly. Having a breathable inner tent wall with a waterproof fly outside helps reduce condensation in the tent (see below). It also helps provide better insulation by increasing (relatively) unmoving air space layers. Typically a tent will be 10-20 degrees warmer than the outside air (once your body is inside heating it up).
- **Free standing tents** (dome type) are recommended because they shed snow fairly well and they provide efficient interior space. Make sure that the manufacturer recommends the tent for winter use. Many dome tents are designed for three season use only and the stitching and the poles are not designed to take the weight of snow.
- **Other shelter options** include the Black Diamond Megamid. This a single, center pole, pyramid tent with no floor. They require some staking but are quit roomy. By adding a space blanket as a floor, and covering the edges with snow, you can seal off the tent quite well.
- **Another issue with tents** is condensation. During the night your breathing pumps a great deal of humid air into the tent. This air rises and hits the inner tent wall where the moisture condenses into ice. These fine particles can get all over you and your gear. It is best to brush the ice particles off the tent in the morning and sweep them outside. A frost liner, hung inside the tent, allows the moisture to pass through and provides a layer between you and the ice.

Tips for Tents

- **Make sure you bring extra poles** with you and pole splints in case a pole breaks.
- **A ground sheet** (like a space blanket or tarp) can help protect your tent floor (the ground underneath usually turns to ice from your weight and body heat. Sharp ice can tear the floor)
- **Always stake you tent down** if you are going to be in windy areas or leaving your tents during day excursions. Bring stakes or know how to stake using "dead men."
- **Wisk Broom** - is an important addition to every tent. You should brush all the snow off your clothes and boots before getting into the tent at night. This helps reduce condensation and water buildup in the tent keeping you and your belongings dryer. Also when snow gets into the tent at night it often melts from your body temperature, then freezes during the day when you are not in the tent.
- **Cooking** - Do not cook in a tent. It is possible to asphyxiate yourself from accumulated carbon monoxide and the water vapor leads to extensive condensation.

Winter Campsite

Keep the following factors in mind when choosing a winter camp.

- Camping regulations
- Other campers
- Wind - avoid ridge tops and open areas where wind can blow down tents or create drifts.
- Be aware of "widow makers", dead branches hanging in trees.
- Avoid low lying areas where the coldest air will settle.
- Avalanche danger - select sites that do not pose any risk from avalanches.
- Exposure - south facing areas will give longer days and more direct sunlight.
- Water availability from lakes or streams will prevent you having to melt snow for all your water.
- Level ground

Setting up Camp

When you first get into camp, leave your snowshoes or skis on and begin to tramp down areas for tents and your kitchen. If possible, let the snow set up for 30 minutes or so, this will minimize postholing once you take snowshoes or skis off. Set up your tents with the doors at 90 degrees to the prevailing winds. Stake the tents out. On a cold night you can build snow walls on the windward side of the tent. Mound the sides of the tent with snow (have someone inside pushing out on the tent to keep it from collapsing. When the snow sets up you will have a hybrid tent-snow shelter which will have better insulation than the tent alone. Dig out a pit in front of your tent for a porch. This makes taking your boots off much easier. Put your foam pads in the tent and unstuff your sleeping bag and place it in the tent so it can "expand" from it's stuffed size.

If the snow is deep, you may want to dig out a pit for your kitchen. Dig a pit at least 6 feet in diameter (for 4-6 people). You can mark out the circle using a ski or a rope. Dig down about 2-3 feet and pile the excavated snow around the perimeter. Pack the snow at the perimeter of the hole with your shovel. This will give you a 4-5 foot deep area, protected from the wind. You can carve out seats and benches, put your skis or snow shoes behind the pile as backrests, carve places for stoves, etc.

General night sequence - after dinner, getting warm water for water bottles, and putting gear away, it's time for bed. This is a general sequence:

1. Get warm before you get into your bag. Do some jumping jacks, etc. so your heat is built up for when you get in your bag.
2. Get any clothing/gear you will need out of your pack as well as full water bottles and tomorrow's lunch.
3. At the tent door, brush off any snow with the wisk broom. Sit down inside the tent entrance and, keeping your boots outside, either have a friend brush them off, or remove them and brush them yourself.
4. Climb into the tent and close the door.
5. Strip off your layers of clothing to what will be appropriate in your sleeping bag. The more layers you wear the better insulated and the warmer you will be (contrary to the myth that says sleep in your underwear). However, too much clothing can compress dead air space in the bag and reduce its effectiveness.
6. Remove any wet/damp layers and replace them with dry ones, particularly socks.
7. Pre-warm your bag with your body (get it nice and toasty).
8. Place damp items in the sleeping bag with you near your trunk. This will help dry them overnight.
9. Place your boots in your sleeping bag stuff sack (turned inside out) and place the stuff sack between your legs. This will keep them from freezing during the night and the stuff sack keeps your legs from getting wet.
10. Put water bottles and food with you in the bag.
11. A hat and polarguard booties are recommended to help keep you warm.

12. Try to sleep with your face out of the bag. This reduces moisture build-up inside the bag (which could be catastrophic for a down bag). A scarf on your neck may be better than using the sleeping bag neck drawcord (which makes some people feel a little claustrophobic and creates a difficult nights sleep).

13. You will probably wake up a number of times during the night. This is normal in cold weather. Your body needs to change position to allow for circulation to compressed tissues and to move around a bit so that muscle movement generates more heat. If you are still cold, eat some protein to "stoke up your furnace" If that doesn't work, wake a tent-mate for some extra warmth.

14. With 10 or more hours in the tent, you are likely to need to urinate in the middle of the night. Go for it! Otherwise you won't get back to sleep, and your body is wasting energy keep all that extra fluid warm. You will be surprised how quickly you can get out and back in and your body really won't chill that much.

15. It is useful to have a thermos of hot drink in each tent.

Winter Hazards

Climactic Conditions

- Temperature
- Wetness
- Cold Metal
- Supercooled liquids - fuel

All of the above can lead to Hypothermia, Frostnip, Windchill, Frostbite, Frozen Eyelashes/cornea

Terrain

- Steep Terrain
- Avalanche - rare except for steep gullies (for east coast trips)
- Gully Garbage - falling objects with sun, heat
- Breaking Through Ice - watch undercutting, watch margins of ice to shore
- Moats - at objects, may be covered, watch margins of object to snow Cornices

Campsite Problems

- Tent Collapse - from snow loading
- "Widow makers"
- Stove Explosion
- Carbon Monoxide Poisoning - from stove use in tent
- Stove Burns - remember you are well insulated

Other Hazards

- Dehydration - increases risk of hypothermia, frostbite
- Ice Axe/Crampon Injuries - "stabbing"
- Watermelon Snow - diarrhea
- Yellow Snow
- Poor Handwashing - food poisoning

Winter Camping Personal Equipment List

* Available from Outdoor Action

Head:

- _____ * Wool/Pile Balaclava
- _____ Silk Balaclava (optional - for sleeping)
- _____ * Leather Face Mask
- _____ * Ski Goggles or Glacier Goggles with side screens

Upper Body:

- _____ 2 Long Undershirts - polypropylene
- _____ Vapor Barrier Shirt (optional)
- _____ * Wool/Polypropylene/Pile Shirt - medium weight
- _____ * Wool/Pile Sweater or Jacket - heavy
- _____ Wind Jacket with Hood - 60/40, nylon, Goretex-will double as rain jacket
- _____ *Winter Parka with Hood - synthetic fill, nylon or Gore-tex outer

Hands:

- _____ Glove Liners - synthetic, polypropylene

- Wool Gloves
- * Wool/Synthetic/Pile Mittens
- * Mitten Shells (not needed if above mittens are shelled)

Lower Body:

- Underwear
- Long Underwear - polypropylene - light to medium
- Vapor Barrier Pants (optional)
- * Wool/Pile Pants/bibs or Knickers - heavy
- * Wind Pants - nylon (Goretex-doubles as rain pants)
- Overpants - insulated, synthetic fill ski pants (optional)

Feet:

- Liner Socks (thin) - polypropylene - 2+ pairs
- * Vapor Barrier Socks
- Wool/Pile Socks (heavy) - 4+ pairs (knicker socks if knickers)
- * Mickey Mouse Boots or Mountaineering double boots + overboot
- * Gaiters - coated nylon, large to fit over Mouse boots
- * Polarguard/Down Booties
- * Camp Overboots
- * Cross-Country Ski Boots (if skiing)
- * Ski Overboots (if skiing)

Raingear:

- Rain Jacket - nylon, Goretex - must fit over stacked layers
- Rain Pants - nylon, Goretex - must fit over stacked layers

Pack & Packing:

- * Large External Frame Pack - with frame extension or Large Internal Frame Pack (4500+ cubic inches)
- * Stuff Sacks of all sizes - all equipment in stuff sacks
- Pack Raincover

Sleeping Gear:

- * Synthetic/Down Sleeping Bag - rated to -15 or to 0 with overbag and/or vapor barrier liner, if down should have Gore-tex shell,
- * Ensolite Foam Pad - 1/2" or Thermarest Pad

Eating Utensils:

- Plastic Cup - double walled recommended
- Plastic Spoon - should be tied to cup
- * 2 1 Quart Water Bottles - plastic, wide mouth, cap retainer should be outfitted in small stuff sack with webbing loops

Miscellaneous:

- Day Pack - for carrying extra clothing, water, lunch, camera, doubles as stuff sack
- * Flashlight - headlamp best, with lithium (best) alkaline (ok) batteries (workbetter in cold)
- Knife
- Whistle
- Belt or suspenders
- Bandanas - the ultimate useful item
- Extra Glasses, Sunglasses, Glasses Strap, Antifog
- Sunscreen
- Chapstick
- Toilet Articles
- Any Medications needed during trip
- Camera, film, books, games, paper & pen, etc. (optional)
- Cough drops or sour balls

Notes: Contact lenses can be a problem! Zipper pulls on all clothing and pack zippers. All clothing must be clean. Idiot strings on all mitts/shells. Nonfreezing laces on all boots. Defog all glasses and goggles. Develop method for hanging water bottles on body. Adjust and mark boots, snowshoes and skis before

leaving. Figure out how you carry snowshoes or skis on your pack if the need arises. Figure out clothing arrangements: How will you organize glasses & face mask & balaclava ?

- Will your shell go over pile, over polypro, over water bottles, over body?
- Can you get wind/rainpants on with boots on, snowshoes?
- Can you get gaiters on with boots on?
- Plan your pack beautifully, so that it takes as little time as possible to get anything out.
- All extra clothing should be quickly accessible.

Rules and Instructions for Keeping Warm in the Sack

By Chris Haggerty

1. **REMEMBER:** The sleeping bag doesn't heat you, you heat it. So use this rule, "Thickness is warmth", to keep this heat. If you're cold, add some more insulations (blankets, clothes, more newspaper).
2. **DO NOT SLEEP IN BOTTOM OF BAG:** Your breath contains water. If you close your bag with your head inside, then this water sticks to the bag. Wear a hat to keep your head warm.
3. **CHANGE CLOTHES:** NEVER sleep in wet clothes. Even perspiration will chill you at night.
4. **EAT A CANDY BAR:** This increases your metabolism (moves your blood faster) and it helps keep you warm.
5. **GO TO THE BATHROOM BEFORE BED:** This saves you a middle of the night trip in the cold.
6. **DO NOT DRY "WET" CLOTHES IN BAG:** Moisture will travel from wet clothes to sleeping bag.
7. **PUT TOMORROW'S CLOTHES UNDER BAG:** This heats up clothes for tomorrow's cold morning and also provides more insulation.
8. **FLUFF UP YOUR BAG:** Always fluff up bag before using to create the thickness important in keeping warm.
9. **MOST IMPORTANT, KEEP IT DRY:** Keep all your sleeping gear dry and follow these rules, and winter camp should prove to be a rewarding experience.

IMPORTANT STUFF TO KEEP IN MIND

1. Clothing does not make you warm; it is your body processes that keep you warm. Clothing merely provides the insulation to preserve your warmth.
2. Layered thickness is warmth.
3. Keep your torso warm so that it can send heat to the extremities.
4. Avoid sweating by ventilation.
5. Keep rain and wind out of your insulation.
6. Use your head. Keep it covered when you're cold; remove cap as you warm up to avoid sweating.

7. Strain one muscle against another to maintain metabolism.

8. Wool clothing is best but needs wind protection, synthetics are next best. Down is OK as long as it stays dry, cotton is a poor choice.

9. If your feet are cold, put a hat on.

10. Remember the word "COLD" -

Keep your clothing - Clean.

Avoid ----- Overheating

Wear clothing ----- Loose

Keep it ----- Dry

RECOMMENDED CLOTHING FOR TWO DAY WINTER CAMP

in addition or in substitution to what you would normally bring to camp, bring:

- 2 shirts (wool,best, or flannel)
- 2 pairs wool or synthetic pants (Strongly recommend against cotton pants like jeans. They absorb moisture like a sponge).
- Fishnet, thermal or polypropaline underwear
- Boots (WATERPROOFED)
- 2 pairs of heavy socks (wool recommended)
- 2 pairs lighter socks (polypropaline is best)
- Windbreaker (as is or part of heavier jacket)
- Balaclavia or stocking cap (wool is best)
- Parka or heavy jacket
- Mittens, (WOOL, gloves not recommended except as extra pair)
- Extra shoes

It is always best to stay dry when camping in the snow, but you can expect to get wet and should be prepared. Boots or other shoes which are not waterproof will normally start getting the feet wet and cold after less than 15 minutes in the snow (depending on temperature, the colder it is, the longer the feet stay dry). Low top shoes will not keep the snow out of the shoes. Gaiters can be made from plastic bags and a strong tape like duck tape. Do not cover the bottom of you shoes with plastic, doing so will cause you to lose almost all of your traction (and you will fall down!).

Unless your parents are planning to buy some of the items on this list anyway, do not run out and start spending lots of money on cloths and equipment. If all your pants are jeans, for example, bring three or four pairs and change frequently. If you are in doubt or have questions, call one of the troop leaders for advice.

I edited some of the last comments, we do not have much need for wool pants here in Southern Arizona (unless we go up in the mountains, which is not that often, unless you are skier, in which case you already have what you need).

When taking my hot weather troops up into the snow I used the above and I made sure to plan the activities which makes snow camping fun. I am refering to sledding (in one form or another), games like capture the flag (try in a foot or more of snow in a hilly area-use a wash for no-man's land-its great fun). Snow ball fights, etc. These activities lead to one of my favorite quotes about Winter Camping (I am of course refering to the messy Winter Weather I grew up with in Detroit) is: If you are NOT WET, you are not having FUN. So be sure everyone has plenty of extra dry clothing and go have fun in the snow!

Chris Haggerty, Sierra Vista, Arizona

Some Snow Camping Rules

SHIRTS

The outer shirt of jacket should be of a material that will stop wind and shed snow. Some slick synthetics work well.

PANTS

As with shirts, the outer pair of pants should shed snow and block wind. Some types of ski-pants do both well.

Problem with wind-resistant synthetic outer layers (save the most expensive, such as Gore-Tex) is that if they keep moisture out, then they'll keep it in, too. So perspiration, wicked away from the skin by the polypro/wool inner layers, cannot escape. At the outer layer, where it's coldest, that moisture comes close to freezing (if it doesn't in fact), and (either way) progressively blocks subsequent perspiration from escaping. Result: Damp clear through. If one cannot afford the \$80-400 per garment for Gore-Tex, next best is to go with a blend of synthetics and natural fibers that'll cut the wind and let moisture pass in both directions. I prefer %60-synthetic- to-%40-natural blend, but %65-%35 has proponents. If one is properly layered, it's perfectly feasible to be comfy while the outer surface is at or below freezing. Vapor pressure will force perspiration to the outer surface of the outer garment, where it freezes and can be brushed off. Snow from the outside won't melt, and it too can (and must) be brushed away. When this is so, it doesn't really matter what the material is, so long as snow doesn't adhere when brushed, and moisture passes through. I have been perfectly happy in outer shells of %50-%50.

The problem with ski-pants is that they are cut fashionably tight, whereas baggy is warmer. Again, treated "wetlock" fabrics popular for insulated skiing overpants won't let moisture escape. I go with \$35 army surplus baggy wool pants, and wear home-made %65-%35 overpants (straight cut leg, draw-string waist, ankle ties (usually left untied and just tucked into Sorrels (or gaiters when the snow is deep))).

GROUND CLOTHS AND PADS

Standing all day long is uncomfortable, but sitting on snow just gets your highly vascular (big muscle) bottom wet, making you cold in a hurry. Rock may be dry, but it sucks heat even faster. I paid \$6 for the cheapest closed-cell foam pad that I could find, and cut it into 2 by 2 foot squares. Everybody carries a square on the outside of the pack, so we can flop down anywhere and sit dry and insulated during breaks on the trail. "Don't leave home without it."

Winter Camping

By Brian J. Murrey

This is what I pass out to my Scouts about a month before our winter camporee. That gives us a couple of meetings or more to discuss cold weather survival skills, and a chance to inform parents of the dangers of cold weather camping when one is not fully prepared.

Brian J. Murrey - Assistant Scoutmaster and Outdoors Activities Planner Troop 120 -- brian@iquest.net -- Crossroads of America Council

Computer re-typed and reformatted by Chuck Bramlet, ASM Troop 323, Thunderbird District, Grand Canyon Council, Phoenix, Az.

PLANNING FOR WINTER CAMPING

Most of this information can be found in the Boy Scout Handbook. If you are going to be doing a lot of outdoor activities, this book is an invaluable source of know-how and advice.

"One has to lie deep in the snow to learn how warm and protective it is. A den in the snow confines the body heat like a blanket or overcoat. It is a snug place, no matter how hard the wind may howl. One who holes up in the snow understands better the mysteries of the woods in the winter. He knows why the severe weather grouse squirm their way under soft snow and be quiet. He understands why deer bury themselves in drifts, lying a half day or more with just their heads sticking out. He learns something of the comfort of the bear in hibernation."

William O. Douglas, 1950

MISCONCEPTIONS ABOUT WINTER CAMPING

Myth #1: Leather hiking boots will keep your feet warm. -- FALSE

- The snug fit of most leather hiking boots can limit the circulation of blood in the foot. Especially with thick socks on. Overboots cut generously enough to hold your foot and shoe are much more effective. The cloth stitching in leather boots can also wick moisture into the shoe. Nothing is worse than wet feet in cold winter.

Myth #2: Waterproof clothing is ideal for cold weather camping. -- FALSE

- To keep warm, in the cold, your clothing must allow body moisture to escape. Moisture that is trapped too close to the body can wick heat away through evaporation. It is better to layer your clothing on in cold weather. Wool, Gor Tex, and polypropylene garments work nice in the cold. Always wear insulated underwear.

Myth #3: Winter camping does not require much preparation. -- FALSE

- Arctic conditions exist when the wind is blowing and the temperature drops below 20 degrees F. There are only seven states in the U.S. that do not experience arctic weather. Indiana is not one of them.. It is very important to prepare and even over prepare. I've never heard anyone complain about being too warm or having too many dry clothes on a winter campout.

Myth #4: Mental attitude has little to do with winter camping. -- FALSE

- A positive mental attitude is the most important ingredient in the success of cold weather camping trips. The demands of winter will drain your energy and you'll have to rely on yourself to keep your spirits high.

Myth #5: In cold weather, tasks can be done just as quickly as in warm weather. -- FALSE

- Every effort in cold weather takes longer to complete. Be sure to bring some winter patience with you when you camp in the cold.

CONSERVING BODY HEAT - THE PRIME OBJECTIVE

There are three ways to lose body heat. Keeping them in mind will help you be much more aware of what you are or could be doing to keep your body warm.

RADIATION - The emission of body, especially from the skin areas exposed to the elements. A good set of gloves, hat, and scarf can help best in keeping bare skin to a minimum.

CONDUCTION - The absorption of cold by the body when sitting or laying on cold ground, or handling cold objects such as metal cooking utensils and metal canteens. This is why a decent sleeping pad is required for cold weather camping. The same goes for wearing gloves. A camp stool is a must on a winter camping trip. Try not to sit on the ground.

CONVECTION - The loss of body heat due to wind blowing across unprotected body parts. This situation can also be reduced by keeping bare skin covered with hats, scarves, and gloves. It is important to keep

exposure to a minimum, ESPECIALLY in a windy situation. Convection heat loss can reduce body heat the fastest. Wet clothing will accelerate this process, making staying dry even more important.

OTHER CONCERNS

Tent Placement.

Whenever possible, place your tent in a location that will catch the sunrise in the morning. This will aid in melting off any ice and evaporating any frost or dew that may have formed during the night. This will also warm your tent as you awaken in the morning. Cold air sinks. Try to place your campsite on slightly higher ground than the rest of your surroundings. Try to choose a protected site if it is snowing or the wind is blowing.

Water Consumption In Cold Weather.

Dehydration can seriously impair the body's ability to produce heat. Drink fluids as often as possible during the day and keep a water bottle or canteen with you at night.

Cooking In Cold Weather.

Cooking in cold weather will take about twice as long as normal. Always use a lid on any pots that you are cooking in. This will help to hold in the heat and decrease the overall heating time. Make sure you start hot cleaning water before you start cooking. The pots and utensils must still be cleaned. Try to keep your menu to good one-pot meals. Things like stews, chili, and hot beans stick to your ribs, lessen the cleaning time, and provide good sources of energy and fuel for your internal furnace. A good high-calorie snack before bedtime will also keep you warm all night. Stay away from an overabundance of sugar, cheese is a good high-calorie bedtime snack.

Sleeping Tip #1.

Do not sleep with your mouth and nose in your sleeping bag. The moisture of your breath will condense in the bag, and cause it to become wet and ineffective as an insulator.

Buddy System.

Buddies can help each other pack for a trek, look after one another in the woods, and watch for symptoms of frostbite, hypothermia, and exhaustion.

Checklist.

Make a checklist of everything you need before you start to pack. Then check each item off as you pack it. This way you will not forget anything.

Keeping Warm

Keeping warm is the most important part of cold weather camping. Use the C-O-L-D method to assure staying warm.

- C - Clean

Since insulation is only effective when heat is trapped by dead air spaces, keep your insulating layers clean and fluffy. Dirt, grime, and perspiration can mat down those air spaces and reduce the warmth of a garment.

- O - Overheating

Avoid overheating by adjusting the layers of your clothing to meet the outside temperature and the exertions of your activities. Excessive sweating can dampen your garments and cause chilling later on.

- L - Loose Layers

A steady flow of warm blood is essential to keep all parts of your body heated. Wear several loosely fitting layers of clothing and footwear that will allow maximum insulation without impeding your circulation.

- D - Dry

Damp clothing and skin can cause your body to cool quickly, possibly leading to frostbite and hypothermia. Keep dry by avoiding cotton clothes that absorb moisture. Always brush away snow that is on your clothes before you enter a heated area. Keep the clothing around your neck loosened so that body heat and moisture can escape instead of soaking several layers of clothing.

Clothing.

- Footwear.

As with other clothing, the layer system is also the answer for foot-wear. Start with a pair of silk, nylon, or thin wool socks next to your skin. Then layer on several pairs of heavier wool socks. When and if your feet become damp, change into another pair of dry socks at the first opportunity. Rubber overboots will protect the feet from water and will allow more comfortable shoes to be worn within.

- Mittens and Gloves.

Mittens allow your fingers to be in direct contact with each other. They will keep your hands warmer than regular gloves that cover each finger. Select mittens that are filled with foam insulation, or pull on wool gloves and cover them with a nylon overmitt. Long cuffs will keep wind and snow from getting in.

- Headgear.

The stocking hat is the warmest thing you can cover your head with in cold weather. Get one that is large enough to pull down over your ears. Also ski masks are great in the winter and can help in keeping your neck and face warm as well. Noses and ears can be very easily frostbitten, so a scarf can be an invaluable item to have.

- Parka and/or Overcoat.

Your coat or parka is the most important piece of your winter clothing. It needs to be large enough to fit over extra clothing without cutting off blood flow, and allowing ventilation to keep moisture away from your body. A large permanently attached hood will prevent heat loss around your head and neck.

- Sleepwear.

Never should you sleep in the same clothes that you have worn all day. They are damp and will cause you to chill. This could cause frostbite and hypothermia. It is advised that you bring a thick pair of sweats and thermal underwear to sleep in. Keep the thermals and sweats for sleeping in only. Do not wear them during the day, this will keep them the driest. Also be sure to have a couple of layers of wool or heavy thick cotton socks on as well. Always sleep with a stocking hat on your head. Your sleeping bag needs to be a winter rated bag. Typically rated down to 15 degrees and stuffed with 5 pounds of Holofil, Fiberfil, or other polyester ticking. It is also a very good idea to have some kind of sleeping mat to use in the winter. The mat can be a \$90 Thermal Rest from Galyans (Scouts get a %10 discount by showing Scout ID card) or a piece of high density rubber foam at least one inch thick. In cold weather camping you never want to sleep on an air mattress or off the ground in a cot. The air under you will cool you off in no time and this would create a threatening situation. If you don't have a sleeping mat, bring a spare wool or natural fiber blanket to use as a ground pad under your sleeping bag. The sleeping mat is worth it's weight in gold.

Have fun!

Every year, tens of thousands of boys will go winter camping. Although the threat of danger is always present in a winter camp, planning and knowledge can overcome this. It is very important that the Scouts come prepared. If a Scout feels that at this time winter camping is not for him, then he should not go. There is always next year and the year after and so on. If a Scout comes to camp and I do not feel that he is prepared, I will have to ask him to stay behind. Make sure you are ready, and most of all, SAFE.

OTHER TIPS AND TRICKS

- To keep boots from freezing up overnight, lie them on their sides beneath your sleeping bag under your butt with the soles sticking out. Put one on each side of you and tie the laces together with a simple knot. There should be enough heat escaping there to keep the frost out, plus the placement will help keep you from rolling off your mat.

- Keep gloves, socks, and any of tomorrow's clothes as will comfortably fit inside the sleeping bag. Any other clothes, jacket, sweater, whatever doesn't fit, should be put under the bag. It's much more comfortable to dress in pre-heated clothes and the added insulation doesn't hurt.
- Keep at least one water bottle in the sleeping bag, if it will fit and not leak. If you can't, put it under your bag at the knees. All other water bottles that don't fit under your knees could be put in some of your extra wool socks. Also, heat the water up at night before you go to bed and put the filled bottles in your sleeping bag as you fulfill your nightly duties. Then when you get to bed, your bag will actually be warm.
- Don't forget the nightly duties. A full bladder requires more heat than an empty one, plus getting up at 2:00 AM in sub-zero weather is absolutely no fun.
- Carry and store water bottles upside down. Ice forms on the tops of bodies of water first, so this helps keep ice from forming around the mouth. If you're not carrying a water bottle, stick it in a spare sock or shove it in a snow bank, upside down, of course. Snow will insulate better than nothing.
- If you've got a self-inflating mattress don't roll it up with the valves closed. A frozen mattress valve is real hard to open.
- When standing around eating, cooking, or whatever, stand on your mattress pad. When sitting, sit on your pad.
- Keep active as much as possible. If you feel your feet freezing up, start getting the shakes, or if you see anybody else showing initial signs of hypothermia - go for a long, brisk walk/jog. Take the whole troop with you, because they may be feeling the same way, but are too "cool" (there's that pun again) to show it. Keep going until the signs go away.
- Go for a night hike or play an active game just before you crawl in the bag. After you get in the bag, take a mouthful of water and eat something fatty like cookies. This gets the furnace started and helps keep it going throughout the night.
- The standard 3-tub method of doing the dishes just doesn't work in the extreme cold. Heat up some water and pour this in individual bowls to melt the leftover bits and pieces of food. Soak your utensils in this. Then use a paper towel or even a snowball to scrub. Any cloth dishrag will freeze.
- Bring extra everything. Stoves and lanterns will fail. Water bottles will freeze and crack. Things, like boys, just behave differently in the cold.
- Everyone on the trip should know the signs and treatment of hypothermia!!!