

Winter Time Camping OCF Winter Time Camping

Exploring the wilderness in winter is a wonderful experience. You are far from the crowds, in a hushed tranquil world of white. Whether gliding through a glade of maple trees on cross-country skis, hiking up a ridge on snowshoes, or ice climbing, winter can be a spectacular time of year.

At the same time you must realize that this environment can be extremely dangerous. It takes proper trip planning, experience, and the right equipment to travel safely in the winter environment. If you aren't aware of the hazards you can be at great risk. This article will help you understand how to travel in the winter wilderness. The greatest dangers in the winter environment are hypothermia and frostbite.

The Following Topic's will give you a little insite on what is needed and required for Your Winter Time Adventures

- Trip Planning
- Personal Equipment
- Food
- Winter Water
- Winter Shelters
- Leave No Trace Camping in Winter
- Winter Travel

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### Trip Planning

Planning a trip in the winter means spending a good deal of time researching areas and conditions to determine where, when, and how the trip will work. All of these factors will interact to determine what your daily pace and mileage can be.

Goals for the trip

Route - will you be on a trail or off trail, or a mix

Snow level - shallow or deep

Snow quality - powder, packed, breakable crust, or variable

Trail - breaking trail or on a broken trail

Mode of travel - will you be hiking, snowshoeing, or skiing

Elevation changes - going up may be very slow while coming down may be very fast

Strength and experience of group

Group size

Keeping all these factors in mind, set up a Time Control Plan for your trip.

Keep in mind that everything takes "twice" as long in the winter (setting up camp, breaking camp, cooking, going to the bathroom, etc.). Look at your proposed route for potential campsites for each day. Also look to see where you could camp before your planned site if you can't make it. Know what your emergency and bail out options are if conditions deteriorate or you have problems. Talk to area rangers about permits and camping restrictions. Find out about snow levels, avalanche danger, safety of ice crossings, etc.

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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.

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.

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.

Example=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.

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.

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.

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.

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.

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.

"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.

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.

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.

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

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.

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.

Feet - finding the right footwear depends a great deal on the activity you are involved in as well as temperature and environment.

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).

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 does not appear to be a problem).

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. 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.

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.

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.

Zipppers - are wonderful accessories for winter clothing. Having underarm zipppers on jackets can greatly increase your ability to ventilate. Having side zipppers on pants can allow you to ventilate and to add or subtract a layer without taking off skis or snowshoes.

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

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.

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 zipppers, rolling sleeves up or down, taking a hat off or putting one on will all help with temperature regulation.

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.

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.

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.

Packs

Internal versus External Frame

Internal frames tend to be better for winter use. They have a lower center of gravity and hug your body better. When skiing or snowshoeing, the weight moves more with your body allowing for greater freedom of movement.

External frame packs have a higher center of gravity and tend to swing a lot, sometimes throwing you off balance.

In order to carry all the winter gear for a multi-day trip (large sleeping bag, lots of clothing layers, tents, lots of food and fuel, etc.) you need a pack with a capacity of 5,000 cubic inches or greater.

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 a least 1/2 " thick (two 3/8 " summer pads work well, or use a Thermarest on top of a 3/8 " foam pad). It best to use full length pads so that all of your body is insulated.

Stoves versus Fires

In most cases you will be taking stoves and fuel for cooking. Fires are possible in some locations, but in high use areas, it is best to rely on a stove as firewood can be difficult to find in the winter. Your stove should have good heat output. In order to insulate the stove from the snow (so it doesn't melt

itself into a hole) place something underneath it like a pot lid, or a piece of fiberboard. Since the burner is usually significantly smaller than the pot bottom, placing a metal pot lid on top of the burner can also help spread the heat more efficiently to the pot. Wind shields are also helpful in the winter to concentrate the heat. Priming stoves in the winter can be difficult. It is best to use alcohol or lighter fluid rather than trying to prime the stove with white gas.

Fuel - plan on 1/4 quart per person per day if you need to melt snow for water. Plan on 1/8 quart per person per day if water will be available. Make sure you have at least a day's surplus of fuel in case of bad weather, water being unavailable, etc.