



Drawing by Joseph Csatari

# COLD WEATHER CAMPING

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- Introduction
- Review Course Expectations
- Overview of Winter Camping
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- Places to Go
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- Personal & Troop Gear
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- Comments & Questions

**Resources:**

Hardcopy

Boy Scout Handbook and BSA Fieldbook

Okpik: Cold Weather Camping, by BSA, ISBN 083954040X

Snow Camping, Designed for Venture Crews & Varsity Teams, by BSA, ISBN 083953440X

Internet

Outdoor Action Guide to Winter Camping, by Rick Curtis of Princeton University,  
*One of the best free Winter Camping Guides I've been able to locate yet.* [www.princeton.edu/~ra/winter/wintcamp.shtml](http://www.princeton.edu/~ra/winter/wintcamp.shtml)

Igloo Building Guide, by Ronny Finnema & Geir Drange. All photos copyrighted by Geir Drange.

Google search under "Winter Camping" "Cold Weather Camping"

# The Inuit

THE PEOPLE WE KNOW AS THE "ESKIMO" LONG AGO DETERMINED HOW TO LIVE AND ENJOY A SUB-ZERO ENVIRONMENT. OUR METHODS ARE PATTERNED AFTER THEIRS, THE ONLY DIFFERENCE BEING IN DETAILS OF MATERIALS, FOOD AND EQUIPMENT.

**GOOD CLOTHING AND EQUIPMENT** - These are essential for your enjoyment of the outdoors in the winter. The base furnishes many pieces of equipment so that a one-time use will not be expensive to you. In this folder, various items of clothing and equipment are described as well as the reasons for their use.



**WINTER** - Short days, deep snow and cold, clear, dry air characterize our winter. The beauty of snow-covered terrain and the hushed silence of frozen lakes provide a unique setting for those who answer the call of winter camping. Learning to live in and enjoy the snow country is a challenge that requires preparation and training. But once you have answered this call and have slept beneath the stars and the northern lights arrayed against a black velvet sky, or listened to the distant howl of a hunting wolf, snow camping will become an unforgettable experience which calls you back again and again.

**TEMPERATURE** - This indicates how much of the system you will need. In warmer situations, only part of the system may be needed. The winter camper adds or takes away individual items to maintain personal comfort. In extreme cold, the entire system may be in use. Clothing items worn inside the sleeping bag including a knit cap also add warmth.

**FIRE** - Nowhere in the winter clothing or sleeping systems will you find any provision for fire to provide body heat. Fire in the winter is a "false god" in regard to warmth. The body itself is like a big furnace. You stoke your furnace with good food; it burns the food and provides the heat which your heart circulates through your body. Layers of insulation determine how much of that heat is retained and how warm you will feel. Fire is useful for turning snow into water, for its cheerful glow, and for heating water in an emergency. Extreme care must be taken around an open fire not to get too close with synthetic fiber garments which can shrivel or melt just from reflected heat.

# Your Clothing Is Your Key To Winter Comfort

**HEADGEAR** - This is personal preference but it is always a good idea to have at least two stocking or knit caps & one for use under a parka hood and one for use in the sleeping bag. Soft, insulated caps with ear flaps are good, but should be loose-fitting.

**EYE PROTECTION** - Goggles are best, but sunglasses and homemade snow shields will reduce glare from sun off the snow, a situation which can cause "snow blindness."

**SCARF** - Wool or synthetic fiber makes an excellent cold weather protector, but make sure it is plenty long.

**PARKA** - The anorak or pullover should be windproof, should reach almost to the knees, and be large enough to fit over all the other garments. It should have a hood.

**HAND COVERING** - This is a personal preference which can be made up of any loose-fitting combination of the following: wool gloves, wristlets, wool mittens, insulated mittens, leather over-mitts or wind and waterproof expedition mitts.

**JACKET** - A lightweight wool or fleece jacket used in combination with other outer garments makes a better "layering" system than one thick, heavy jacket. A hood for extreme cold is a welcome addition.

**VEST** - This insulated garment keeps the vital organs - heart and lungs - warm. Best style has a flap in back to protect the kidneys. Detachable sleeves convert a vest to an insulated jacket.

**SWEATER** - Wool or fleece synthetic.

**SHIRTS** - Wear full-cut, loose wool or synthetic fiber.

**LONG UNDERWEAR** - May be wool, wool-and-synthetic fiber, and/or synthetic fiber. Keep a spare set for emergencies and to sleep in.

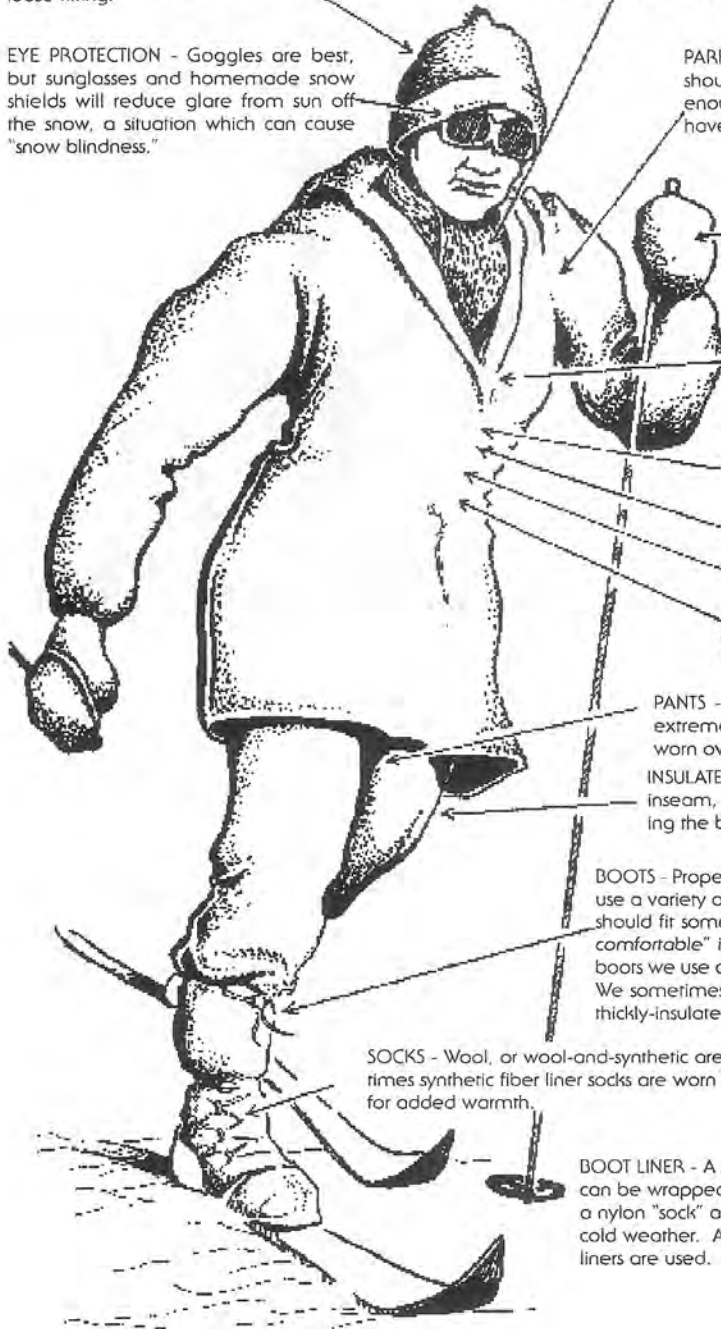
**PANTS** - Wear full-cut, preferably with suspenders. In extreme cold, lightweight, windproof pants may be worn over everything.

**INSULATED SNOWPANTS** - Equipped with snaps down the inseam, they may be put on or taken off without removing the boots.

**BOOTS** - Proper footgear is essential. In the Okpik program we use a variety of footgear, designed for different needs. A boot should fit somewhat loose for warmth, but the adage "cool is comfortable" is true; the feet should not sweat profusely. The boots we use are rubber bottom pacs and mukluks (high tops). We sometimes use a combination of a light boot for travel, a thickly-insulated boot for camp.

**SOCKS** - Wool, or wool-and-synthetic are good. Sometimes synthetic fiber liner socks are worn next to the skin for added warmth.

**BOOT LINER** - A specially-cut piece of polar fleece can be wrapped around the foot, held in place with a nylon "sock" and used with the mukluk in very cold weather. Also, quilted, synthetic liners or felt liners are used.



# LOSS OF BODY HEAT

## Homeostasis

The body's process for maintaining an even temperature. The arms and legs are used as a radiator to remove excess heat from the body. This process dilates the blood vessels, allowing more blood to flow to the skin surfaces. When the body temperature drops, these blood vessels constrict, decreasing blood flow, and thereby, heat loss. This is why hands and feet get numb when cold, and why they're particularly vulnerable to frostbite. Since your brain needs oxygen to function, your body can't cut off the flow of blood to your head in order to conserve heat. Consequently, much of your body heat can be lost through an uncovered head and neck

**Radiation.** (55%) A major source of heat loss. Heat is lost directly from exposed skin and the head. The head may lose up to one-half of the body's total heat production at 40° F, and up to three-quarters at 5° F.

**Conduction.** (15% w/convection) Heat is lost through skin contact with cold objects, primarily the hands, and wet or tight clothing. Handling gasoline, and other super-cooled liquids, at low temperatures is especially dangerous.

**Convection.** Heat is lost from the wind carrying away heat from the surface of the skin. This includes wind-chill effects.

**Evaporation.** (21%) Loss from evaporation of sweat, moisture from the skin and lungs produces substantial heat loss. This is little that can be done about this. We need to allow for this by using breathable fabrics to allow this moisture to pass out freely.

**Respiration.** (2-9%) Heat lost from inhaling cold air and exhaling warm air.

*We plan for  
the first snow in  
Cooking shop to  
go to the hills  
for the day drive  
(Short Drive)*

Camp Name	City	State	Phone	Cabins(s) Shelter	Tenting	Sledding	XC Skiing	Downhill Skiing	Tobogganing	Skating
Sullivan - Cook County FPD	Tinley Park	IL	708.366.9420	X	X		X			
Falcon - Cook County FPD	Tinley Park	IL	708.366.9420	X	X		X			
Sol R. Crown - NE BSA	Wilmet	WI	847.433.1813	X	X	X	X	X1		X
Starved Rock State Park	Utica	IL	815.667.4726	X	X	X	X		X	
Somnak Forest Preserve - Dekalb	Sandwich	IL	815.498.3086	X	X	X	X			
Potato Creek State Park	North Liberty	IN	574.656.8186	X*	X		X			
Reinberg - Cook County FPD	Palatine	IL	708.366.9420	X	X		X		X	
Chain O Lakes State Park	Spring Grove	IL	847.587.5512	X2	X	X	X	X1		X
Big Timber - BSA 3 Fires	Elgin	IL	630.584.9280	X	X	X	X	X1		
Oh-Da-Ko-Ta - BSA SE Wisc	Burlington	WI	414.532.1655	X	X		X	X1		
Eden Valley Refuge	Clinton County	IA	563.847.7202	X	X					
Camp Lowden (Blackhawk Council)	Oregon	IL	815.397.0210 x100	X	X		X			
Russell Woods - Dekalb Cty FPD	Genoa	IL	815.895.5556	X	X	X				
MacQueen Preserve	Kirkland	IL	815.522.6254	X	X		X			
Eagle Cave	Blue River	WI	608.537.2988	cave		X				
Goodenow Grove	Crete	IL	708.946.2216		X	X	X			
* <i>Tippewaukee River St. Park</i>										
IN. (vertical exchange per vehicle)										
Additional										
% closed until 2012										
Key										
x = yes										
1 = nearby										
2 = small - for contingency or eating only?										
* - cabins closed during 2011 - call										
CCFPD for info - 708-771-1052										

## 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. Over-boots 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.

*wool + poly blend = good choice*

*no poly propylene  
No natural fibers.*

**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.

*layers - socks - poly socks first*

*Smart wool socks - great - expensive - 15<sup>00</sup>/pair*

*Read labels for breathable clothing - special washing instructions*

*Have a safety net*

*- cabin to warm up in*

*- fire place*

*- boiling water on hand*

*dining fly w/ sides + one burner + pot of water - steam + heat always ready  
when hot water is needed.*

# Igloo Builders Guide

Building an igloo is easy and fun. And the igloo is a great place to spend the night on a small 'expedition' in the mountains. Much warmer than a tent, and can be built just about anywhere. Building an igloo will take somewhere between 3 and 6 hours, depending on your previous experience and level of ambition...



## Equipment

The only tool needed in addition to a snow spade is a saw. A special snow saw is recommended, but a carpenter's saw will do (as seen in the pictures). A machete or small axe is handy for molding the snow blocks, but not necessary (use your ski instead - less to carry).

## Step 1: Find a suitable spot

A hard field of snow is required to build an igloo - hard enough to make solid snow blocks. Even if the top layer of snow is soft, hard snow can usually be found underneath. Use your sticks to make a circle, marking the base of the dome. The snow depth should be at least 1m (3 - 3 1/2 feet) where the igloo is placed. Don't make it too big, or you're into trouble later. This igloo is for 2-3 persons.

## Step 2: Prepare the snow blocks

The snow blocks are prepared with the saw. They should be solid enough to be carried horizontal without breaking by their own weight. Large blocks are used at the base of the dome, smaller ones at the top. A thickness of 15-30cm (6 to 12 inches) is good. The blocks can be made extra strong by setting them up to harden in the wind.

## Step 3: The building starts



The edges of each snow block should be smoothed and angled correctly to make a strong bond to the adjacent blocks. A ski with its tip placed in the centre of the igloo is a perfect tool for this. There will always be some (or maybe a lot of) cracks between blocks, but that is fixed later. It is very important that the bottom rows of snow blocks are placed aslant, (on an angle) otherwise you are building a tower...

A full circle of snow blocks has been built. Ideally, the blocks should be placed in a spiral. This will make the dome is starting to form. Keep removing the snow that is piling up inside. It is a lot easier to throw it out of an open dome than to shovel it out the entrance afterwards.





If everything is done right, the dome will not collapse because the blocks are supporting each other. But in some critical situations, you might want to use a stick inside to support the topmost blocks until the dome is closed. The last few blocks are moved into the igloo through the entrance and lifted up. There might be need of two persons inside at this stage.

## Step 4: Finishing the igloo

The igloo is closed! Not a perfect dome, but good enough. Now it is time to fill all those cracks with snow. (The really big cracks are filled with small blocks of snow.) Then the inside of the igloo must be smoothed. This is done by hand (your gloves get very wet, bring extra pair!).-If the inside of the dome is one, smooth surface, there will be no dripping of water at all. When the smoothing of the inside is done and all the snow has been shoveled out, it is time to finish the entrance. An L-shaped entrance is a good solution, and will prevent any snow from blowing in. First dig an L with an depth of 1m (or more), then cover it with a square 'roof' made of snow blocks. Or you can just keep the entrance simple, as shown in the image.

It's finished! This is the inside. Note how the entrance is dug deep enough to allow almost standing height (Ronny with the spade). The cold air will flow into this hollow, which function as a cold sink. *NOTE!* *When using a stove in the igloo, make sure the ventilation is adequate!* During cooking small holes will melt in the roof, letting fresh air in. A small ventilation hole in the roof is recommended. Always keep the entrance open. The floor should be covered with some kind of camping mattresses, Therm-a-Rest or similar is a good choice. Candles can be used as light source, cut a small niche for the candle, with sufficient space above it to avoid snow melting.

Well it's time to say goodnight, (Geir in the sleeping bag). Note how the ceiling is smoothed. Even after an hours worth of cooking, there is no dripping. Actually, during the night the water that has melted will freeze again between the blocks, making the igloo stronger than ever. Next morning you might be able to stand on top of the igloo!

Well, this is it. Please excuse my spelling. If you have any comments or suggestions, mail to [gedra@hate.spam.start.no](mailto:gedra@hate.spam.start.no) Note! Remove "hate. spam." from mail address before sending.

Participants of the igloo building project:

- Ronny Finnema (master constructor)
- Geir Drange (photography, digging...) All photos are copyright Geir Drange.
- Anonymous (digging, carrying...)

Actually, we spent two nights in this igloo.

# COLD WEATHER TIPS

## WINTER CAMPING

### CLOTHING FOR WINTER CAMPING

IN COLD WEATHER, WEAR LOOSE FITTING CLOTHES IN LAYERS OR "SHELLS" KEEP IT DRY!



START WITH "LONG JOHNS" NOT TOO TIGHT.

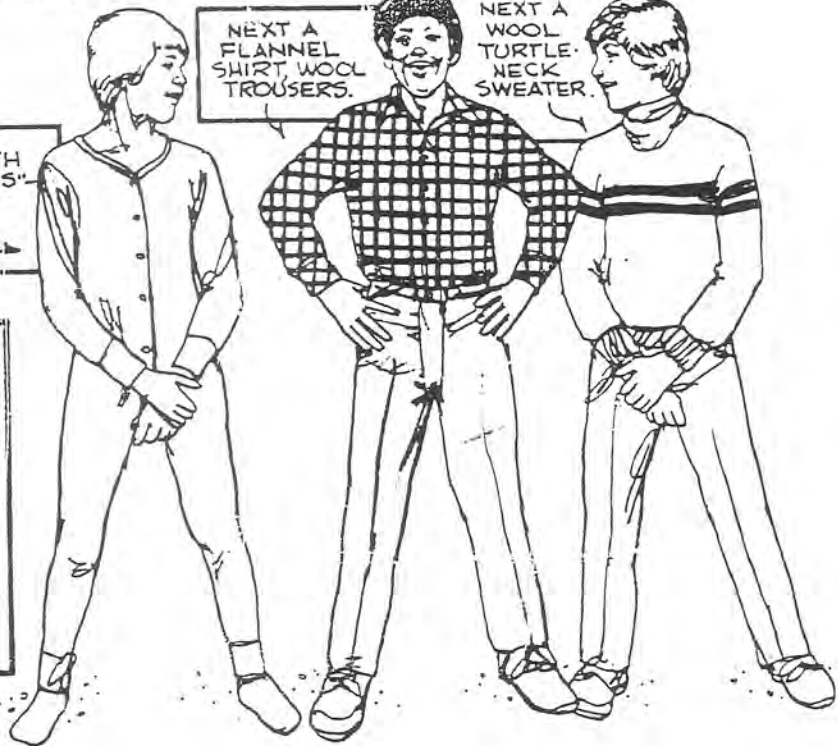
WEAR WOOLEN GLOVES WITH WATER-REPELLENT SHELLS OVER THEM IN WET WEATHER.

KEEP YOUR FEET DRY!

WEAR HEAVY BOOTS—OR GALOSHES OVER LOW SHOES.

NEXT A FLANNEL SHIRT, WOOL TROUSERS.

NEXT A WOOL TURTLE-NECK SWEATER.



ADD A LIGHT JACKET, WOOL CAP, HEAVY BOOTS.

FOR VERY SEVERE COLD WEATHER, OR WET, COLD RAIN WEAR WATER-REPELLENT JACKET OR COAT OVER ALL YOUR OTHER CLOTHES; WEAR WATER-PROOF SHELLS OVER GLOVES AND GALOSHES.



### BEDDIN' DOWN



A SWEATSHIRT WITH A BUILT-IN HOOD AND A PAIR OF TRACK PANTS MAKE A FINE SLEEPING OUTFIT. UNDRESS IN YOUR SLEEPING BAG—FIRST FLUFF IT UP WELL—IT'S THE AIR, NOT THE STUFFING, THAT KEEPS YOU WARM.

HAVE MORE UNDERNEATH THAN ABOVE: MORE LAYERS OF BLANKETS, OR SLEEPING BAG, ~~OR~~ BROWSE-FILLED TICK ON TOP OF GROUND CLOTH.

## COLD WEATHER CAMPING CLOTHING & NECESSITIES TIPS

### CLOTHES

long underwear	1-2 pairs	heavy pants (not blue jeans)	1-2 pairs
wool/flannel shirt	1-2	turtleneck/sweater	1-2
warm heavy coat	1	hooded sweatshirt	1
knit/wool cap	2 or more	gloves, mittens, scarfs	2 or more
rainsuit/snow pants	1	glove liners	2 or more

### FOOTWEAR

wool socks	2-3 pairs	cotton socks	2-3 pairs
boots	1-2 pairs	"Poly" socks (thin - 1st pair on)	2-3 pairs

**!!!!!! REMEMBER TENNIS TYPE SHOES ARE NOT ENOUGH !!!!!!!**

You're not going to a fashion show! Rubber insulated boots especially with liners are great and inexpensive!! Treated leather is also good. Be sure your boots fit a little loose - one: to accommodate extra socks - two: tight boots will not keep your feet warm!! Dry spare boot liners make good feet warmers while sleeping!

### SLEEPING GEAR

Sleeping Bag - winter rated or bring two light-weight bags. If you don't have two bags bring 1 or 2 warm blankets to put inside the bag.

Poly-foam pad - keeps you warmer than a air mattress.

### RULES TO REMEMBER

Wear clothes in **LAYERS**. Take off your heavy coat when you are running around. Put it back on after you stop and cool down. Avoid sweating, it will make you cold. If any clothing gets wet - replace it with dry stuff!! That's why you bringing extras.

Be sure to change clothes (especially socks) every night before going to bed. Though you may not feel it, moisture collects on your clothing during the day and it will cool you off during the night. Don't wear all of your clothing to bed. If you can't go to sleep in just underwear - then long underwear and a wool cap is more than enough! 50% of your body heat will go out of your body through your head - so keep it covered even when you're sleeping!!

Don't put your head inside your sleeping bag. The condensation from your breath will cause the inside of your bag to get wet. **BUT COVER YOUR HEAD!!**

### SCOUT OUTDOOR ESSENTIALS\*

Pocket knife	First Aid Kit	Extra Clothing	Rain Gear
Canteen	Flashlight	Trail Food	Matches/Firestarters
Map & Compass	Sun Protection	Soap	Towel/washcloth
Toothpaste/Brush	Eating Utensils		

### EXTRAS

Watch	Camera	Notebook	Pencil	Binoculars	Sunglasses
Bird/Plant ID Book	Spare Batteries				

#### Resources:

Boy Scout Handbook    Field Book  
Venture Book - Snow Camping    Wilderness Survival Merit Badge Book  
Woods Wisdom

# WINTER CAMPING SAFETY – WEATHER RELATED HEALTH RISKS

## Frostbite

Is tissue injury involving the actual freezing of the skin and underlying tissues. Recovery is slow, severe frostbite can lead to gangrene. Once exposed - the victim will be predisposed toward frostbite in the future.

### **Predisposing Conditions:**

- Prolonged exposure to temperatures 32° F or below.
- Brief exposure at extremely low temperatures, -25° F and below.
- Exposed body parts
- Restriction of circulation.
- Fatigue, poor nutrition, low liquid intake, poor physical condition.
- Previous case of frostbite or other cold injury.

### **Symptoms:**

#### **First Degree** (Frostnip)

- Redness, pain, burning, stinging or prickly sensation.
- Pain disappears and there is a sudden blanching of the skin.
- The skin may look mottled.
- Skin is firm to the touch, but resilient underneath.
- On thawing, there is aching pain or brownness. The skin may peel off, and the part may remain cold for some time.

#### **Second Degree** (Superficial Frostbite, Frostbite)

- No pain, the part may feel dead.
- Numbness, hard to move the part.
- Tissue and layers underneath are hard to the touch.
- After thawing (takes 3 to 20 days) pain, large blisters, sweating.
- Black or discolored skin sloughs off, leaving tender new skin.

#### **Third degree** (Severe Frostbite)

- Full thickness of the skin is involved.
- After thawing, pain continues for 2 to 5 weeks.

#### **Fourth degree** (Severe Frostbite)

- Skin and bone are frozen.
- Swelling and sweating occur.
- Gangrene may develop, amputation may be necessary.

### **Treatment:**

- Do not rub affected area with snow. Hold it over fire, or use cold water to thaw it.
- Exercise the affected area to promote blood circulation.
- Use any warmth available to thaw area.
- Do not attempt to thaw frostbitten limbs in the field. It is less harmful for the victim to walk out on a frostbitten limb than to thaw it in the field. Thawing only risks additional injury and the victim will be in too much pain to walk.
- Check for hypothermia.
- FOR MORE SEVERE CASES REFER TO MORE COMPLETE EMERGENCY CARE INSTRUCTIONS.
- 

### **Prevention:**

- Proper DRY clothing.
- Good nutrition, drink water, maintain core temperature.
- Use buddy system to check face, nose, and ears.
- Immediate treatment of minor symptoms.

## Hypothermia

Is the lowering of the body inner core temperature – caused by overexposure to cool or cold water, air and or wind. Can and usually does happen above freezing. The victim may not recognize the symptoms and may not be able to think clearly enough to react. Injury or death may result.

### Predisposing Conditions:

- Poor physical condition.
- Inadequate nutrition and water intake.
- Thin build.
- Nonprotective clothing.
- Getting wet.
- Inadequate protection from wind, rain and snow.
- Exhaustion.

*Talking nonsense / in circles*



### Symptoms:

- Loss of ability to reason.
- Shivering.
- Slowing, drowsiness, fatigue.
- Stumbling.
- Thickness of speech.
- Amnesia.
- Irrationality, poor judgment.
- Hallucinations.
- Cyanosis (blueness of skin).
- Dilation of pupils of eyes.
- Decreased heart and respiration rate.
- Stupor.

### Treatment:

- Shelter the victim from wind and weather.
- Insulate the victim from the ground.
- Change wet clothing.
- Put on windproof, waterproof gear.
- Increase exercise, if possible.
- Put in a pre-warmed sleeping bag.
- Give hot drinks, followed by candy or other high-sugar foods.
- Apply external heat; hot stones, hot canteens.
- Huddle for body heat from others.
- Place victim in a tub of 105° F water. Never above 110° F.

### Prevention:

- Keep rested, maintain good nutrition.
- Consume plenty of high-energy food.
- Use proper clothing.
- Make camp early if tired, injured or lost.
- Get plenty of exercise. Don't sit around much.
- Appoint an experienced person to watch the group for signs.
- Take immediate corrective action for any signs.

## Dehydration

Is the excessive loss of body water. Dehydration impairs the ability to reason, so the victim may not react properly.

### **Prevention:**

- Drink at least 2 quarts of water a day.
- Avoid dehydrating foods (high protein) and fluids (coffee, caffeine).
- Increase fluid intake at first signs of darker yellow urine.

### **Symptoms:**

- 1 to 5 % deficiency
- Increased pulse rate
- Nausea and loss of appetite
- Dark urine or constipation
- Irritability, fatigue
- Thirst
- 6 to 10 % deficiency
- Headache, dizziness
- Labored breathing
- Tingling
- Absence of salivation
- Inability to walk
- Cyanosis (bluish or grayish skin color)
- 11 to 20 % deficiency
- Swollen tongue, inability to swallow
- Dim vision, deafness
- Shriveled, numb skin
- Painful urination
- Delirium, unconsciousness and death

### **Treatment:**

- Mild cases - drink liquids, keep warm.
- More severe cases require professional medical treatment.

## Carbon Monoxide

Poisoning from inhalation of carbon monoxide, constant threat during winter camping.

It is created by incomplete combustion of fuel due to insufficient air supply

### **Symptoms**

Tightness across the forehead. Followed by headache and pounding of the heart . Weakness and unconsciousness follows.

### **Prevention**

Make sure that heated vehicle is ventilated regardless of outdoor temperature

Make sure that heated shelter is ventilated regardless of outdoor temperature

Never burn charcoal indoors, Use caution with propane heaters indoors (*Always ventilate*)

Never use flames in tents

Never use flame in air tight enclosure

### **First Aid Care**

Get the victim out into fresh air and oxygen immediately

Artificial respiration may be lifesaver

Keep victim warm and rested

Seek professional medical assistance as soon as possible.

## **Chilblains**

Chilblains are caused by the skin's abnormal reaction to cold, damp or draughty conditions  
If the skin is chilled, and then followed by too fast warming with direct heat, chilblains may result

### **Symptoms**

Include burning and itching on hands and feet · the itching and burning intensifies in warm environment  
May be swelling or redness · Extreme cases, the skin may break, and sores (*ulcers*) may develop

### **Prevention**

Keep your body, feet and legs dry and warm (*waterproof footwear*)  
Dry wet feet as soon as possible, warm with hands, apply foot powder, put on dry socks  
The whole body, not just the feet, needs to be kept warm  
If wet boots or socks unavoidable, continually exercise feet / toes (*never wear tight boots*)

### **First Aid Care**

Handle feet gently, don't scratch them  
Witch hazel or calamine will take away most of the discomfort.  
If the chilblain has ulcerated, apply an antiseptic dressing  
If the chilblain hasn't broken you can paint them with an over-the-counter preparation. At night,  
rub some lanolin ointment well into the feet to help retain heat  
Stay with the victim until medical help arrives.  
Seek professional medical assistance as soon as possible.

## **Snow Blindness**

Inflammation of the eye caused by exposure to reflected ultraviolet rays when the sun is shining brightly on an expanse of snow.

### **Symptoms:**

Sensation of grit in the eyes, made worse by eye movement, watering, redness, headache, and increased pain on exposure to light.

### **Treatment:**

Blindfold the victim and get rest. Further exposure should be avoided. If unavoidable, the eyes should be protected with dark bandages or the darkest sunglasses.

The condition heals in a few days without permanent damage once exposure is stopped.

### **Prevention:**

Wear sunglasses when any danger is present. Do not wait for discomfort to begin.

# MISCELLANEOUS COLD WEATHER CAMPING TIPS!

The hints listed below are in a random manner. There is no order of importance to the list, just some suggestions that have proven true for me over the years.

## CLOTHING

1. **Layer your clothing. Wear several layers of lighter clothing instead of one heavy layer. This way you can better regulate the amount of insulation. If you get warm you can take layers off and add some more clothing layers if you get cold.**
2. Keep yourself dry, both from the weather and perspiration.
3. **Wear loose fitting clothing, to optimize insulation.**
4. Remember when buying clothes for cold weather that wool retains most of its insulation properties when wet, while cotton loses most of its.
5. There are also excellent manmade fibers and insulation that retain their insulation properties as good as or better than wool. Other benefits include light-weight, wide design options & wind-blocking.
6. Remember your rain gear is water proof and will not allow perspiration to exit. During rainy weather change your clothing several times a day.
7. Athletic shoes and nylon hiking boots do not provide enough insulation. You should wear either mukluks, waterproofed leather hiking boots, rubber overshoes or rubberized boots.
8. **Waterproof your leather hiking boots with the appropriate commercial treatment. Be sure to use only silicon-based products on leathers which require it. Check the care tag that came with the boots.**
9. If you choose to wear rubberized boots, remember they do not allow for ventilation, therefore you will need to change your socks several times a day. Also you may want to get some felt inserts for insulation.
10. Wear a pair of cotton and a pair of wool socks to increase insulation and take the perspiration away from your feet.
11. Pull trouser legs over top of shoes to keep out snow. You may want to use nylon gaiters (leggings), or tie or tape them to make sure of the seal.
12. **Wear mittens instead of fingered gloves when you do not need independent use of your fingers. This will allow the fingers to help keep each other warm.**
13. Use a pair of socks to cover hands if mittens get wet.
14. Wear a stocking cap or other warm hat. One that covers the ears and neck area is particularly effective. Remember, most heat loss is through the head. Wearing a warm hat warms the rest of your body, too.
15. **Wear a scarf to reduce heat loss around the neck. Use a "ski mask" or scarf over your face for protection from the cold and wind.**
16. In an emergency use your neckerchief to cover your ears.
17. **If you need a fire to keep you warm you are not dressed properly. If the heat can get to your body, so can the cold.**
18. Paper is a good insulator and can be wrapped around the body (under your clothes) to add insulation.

## BEDDING DOWN

1. Natural fiber sleeping bags do not maintain their insulation properties when damp, down bags also fit here. A 3 to 4 pound synthetic bag will take care of most of your needs.
2. A mummy style bag is warmer than a rectangular, as there is less space for your body to heat. Also, most mummy bags have a hood to help protect your head.
3. If you only have a rectangular sleeping bag, bring an extra blanket to pack around your shoulders in the opening to keep air from getting in.
4. **Do not sleep with your head under the covers. Doing so will increase the humidity in the bag that will reduce the insulation properties of the bag and increase dampness.**
5. Remember to air out your sleeping bag and tent, when weather permits. Perspiration and breath condense in the tent at night and the water will reduce insulating properties of your bag.
6. **Wear a stocking cap to bed in order to reduce heat loss.**
7. Wear a loose fitting hooded pull over type sweatshirt to sleep in.
8. Make a loose fitting bag from an old blanket or carpet padding to put both feet in when in your sleeping bag.
9. A bag liner made from an old blanket, preferably wool, will greatly enhance the bags warmth.
10. Insulate yourself from the ground as much as possible to avoid cold spots at the shoulders and hips.
11. **Use a sleeping pad of closed cell foam instead of an air mattress.**
12. A good rule of thumb is that you want 2 to 3 times the insulation below you as you have over you.



13. **Use a ground cloth to keep ground moisture from your bag. Your body will warm up frozen ground to a point where moisture can become important.**
14. Space blankets, if used as a ground cloth, will not reflect the body heat. Instead it will conduct the cold from the ground to your body.
15. **Cold air will be above and below you if you sleep on a cot.**
16. Put a hand warmer (in a sock) at the foot of your sleeping bag before getting into it.
17. Fill a canteen with hot water (not boiling) and place at foot of bag to keep warm. Be careful with plastic canteens.
18. **Exercise before bedding down to increase body heat. This will help to warm your bag quicker. Be careful not to start perspiring.**
19. Remove the clothes you are wearing before bedding down if they are damp with perspiration. Put on dry clothing or pajamas before entering the sleeping bag.
20. Build a wind break outside your tent by piling up snow or leaves to a height sufficient to protect you when laying down.
21. Hang your sleeping bag up or just lay it out, between trips, so the filling will not compress and lose its insulating properties.
22. **Before you get out of bed bring the clothes you plan to wear inside your bag and warm them up some before dressing.**
23. Place an empty capped plastic bottle outside your tent door for "night calls." This will reduce your exposure when you have to answer that call. Think twice before using it inside the tent, you do have a tent mate. Remember to empty the bottle away from the camp in the morning.

## ODDS AND ENDS

1. **If at night you get cold, let the adult leadership know so action can be taken before injury from cold weather health problems occur. In other words it's better to be kidded about forgetting your sleeping bag than risking hypothermia.**
2. Organization and proper preparation is very important in cold weather camping. Good meals, proper shelter and comfortable sleeping arrangements make for an enjoyable outing.
3. **Drink 2 quarts of fluids per day besides what you drink at meals.**
4. Learn to recognize and treat cold weather health problems. These include frostbite, hypothermia, dehydration, chilblains, trench foot, snow blindness and carbon monoxide poisoning.
5. Use the buddy system to check each other for cold weather health problems. Notify the adult leadership if symptoms do occur.
6. If you feel cold gather some wood or do some other type of work. Working will help warm you.
7. **Eating ice or snow can reduce your body temperature and it is not pure. Don't eat it.**
8. Snow and ice can be used for drinking water but only after boiling.
9. **No open flames (candles, matches, etc.) inside the tents. Wiggling your toes inside your boots will help keep feet warm. If your feet get cold put on a stocking cap.**
10. Take and wear dark sunglasses if snow is in the forecast. The glare of the sun off the snow could lead to snow blindness. The sunglasses will reduce the glare.
11. Use the solid fuel hand warmers. They are cheaper and you can light them yourself.
12. The solid fuel hand warmers tend to have a flare-up of heat after burning for a while and then they start to cool down. Placing them in an old sock will help to protect you from this "hot spot".
13. **Keep off ice on streams, lakes and ponds.**
14. **It takes longer to cook food in cold weather, so plan accordingly. Before going to bed pour enough water for breakfast into a pot. It is easier to heat the pot than a plastic water can.**
15. Keep your matches in a metal match safe as plastic can freeze and break if dropped.
16. **Gather twice as much fuel as you think you'll need for fires.**
17. Carry tinder from home. It may be hard to find in snow or wet conditions.
18. Space blankets make good wind shields only. The metallic properties take over the insulation properties in cold weather and become cold conductors.
19. Carry extra plastic bags in cold weather. They can be used as personal wind shields and ponchos by slitting a hole in the top for your head to go through.
20. Carry extra matches because the more you need a fire to warm up the less likely you will be able to start one easily.
21. **Flashlight batteries are affected by cold. You can revive a dead battery by warming it up near the fire.**
22. You may want to take a bottle of propane into your tent with you at night. This will keep it warmer and make it easier to light your stove for breakfast.
23. **Heaters inside your tent can lead to carbon monoxide poisoning.**
24. Tie colored string to items like your pocket knife so you can find it if you drop it in the snow.

# COLD WEATHER CAMPING GUIDE

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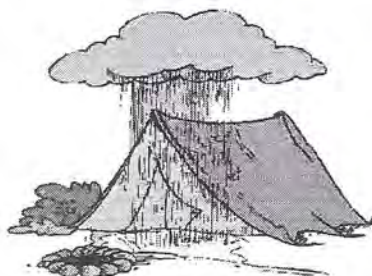


## Cold Weather Camping

**Cold weather camping. Why do we do it?? There are a number of reasons.**

- **There aren't any bugs.**
- **It's quieter.**
- **And, there aren't as many campers because not everyone is willing to put in a bit of extra effort to enjoy the outdoors in the cold months.**

**But, winter isn't just about being cold. It can be the most beautiful of seasons, but if you're not prepared, it can also be the worst of seasons. It will take planning, experience and the right equipment to camp in the winter. If you venture to the out of doors unprepared, you may very well subject yourself to dehydration, hypothermia, and/or frostbite. With proper planning, though, cold weather camping can be the most enjoyable of outings.**



## What is "COLD WEATHER?"

**Boy Scouts of America considers cold weather camping to be "camping in weather where the average daily temperature is below 50 degrees Fahrenheit (50° F) and conditions are cold, wet or windy."**

**There are three types of cold – wet, dry and arctic. Happily, Troop 964 has the potential of being exposed only to the first two of them:**

- **Wet cold: 50° F to 14° F This is the most dangerous, because of the swing in temperatures, which go from melting during the day to freezing at night. It's hard to dress properly, but dressing for the weather is the most**

important issue you have to deal with. Staying dry is the key, but damp conditions from melting snow or rain can make that pretty difficult.

- **Dry cold:** 14° F to -20° F The ground is frozen and the blanket of snow is dry and crystallized. There can be strong winds to deal with, causing the most concern when you're trying to keep warm. Extra layers of clothing and wind-proof outer garments are a must.
- **Arctic cold:** below -20° F These conditions require the most insulation and wind-proofing, and is recommended only for the most experienced campers. Troop 964 won't be camping in these conditions.



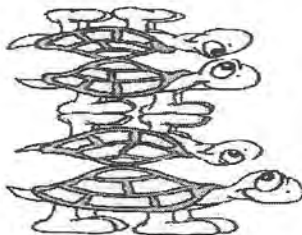
### Heat Loss

Think of the human body as a furnace, producing heat through chemical reactions and physical activity. That heat is lost through conduction, convection, evaporation, radiation, and respiration. As physical activity increases, your body increases heat production. But, as activity decreases, your body doesn't generate the same level of heat, and we must now keep warm by adding insulation to the body.



### Insulation

Dead air is defined as any enclosed unit of air that is small enough that natural convection currents would not arise in it. You can think of it as non-circulating air. The dead air next to the skin is heated up by the body and provides a layer of warmth around the body. So, it's not the clothing that's keeping you warm, but rather the warm air in the space between your body and your clothing.



### The Layering Principle

The key to staying warm in the winter is having proper layers of clothing and knowing how to use them effectively. The key to creating this dead air space is

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to have multiple layers of clothing, one on top of the other, with each layer creating its own dead air space. This allows you to add or remove layers of clothing to increase or decrease your accumulated dead air space as the temperature changes and/or as your activity levels change. Your body is the heat source, the clothing layers only serve to trap the heat and slow down your heat loss. If you have too much clothing on, you will overheat and start to sweat. It's important that you find the proper balance between the number and types of layers and your activity level. Remember, to stay comfortable in cold weather, you must be able to add or remove layers of clothing.



### To be "WARM", you need to think "COLD"

As you may have guessed, the most important part of cold weather camping is to KEEP YOURSELF WARM. Not cold, and not hot, but WARM.

Believe it or not, we use the C-O-L-D method to remind ourselves of what we need to do to stay warm. Here's how it goes.

**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 sweat can mat down those air spaces and reduce the warmth of a garment.

**O = Overheating** - Avoid overheating your body 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 compromising your circulation.

**D - Dry** - Damp skin and clothes will make your body cool quickly, which can lead to frostbite and hypothermia. Keep DRY by avoiding clothes that absorb moisture, such as cotton. Always remove excess snow from your clothes before going indoors, to keep it from melting and soaking through. Keep the clothing around your neck loosened so that body heat and moisture can escape, instead of soaking several layers of clothing.



## Recommended Clothing and Clothing Materials


### The Body And How To Protect It:

1. **Head** – you **MUST** bring along multiple hats on a cold weather camping trip. Not because you have more than one head, but because one of the hats will become wet, and you'll need something dry at all times with which to cover your head. Yep, even in your sleep!
2. **Hands** – you **MUST** have more than one pair of mittens or gloves. I suggest mittens, which are warmer than gloves because your fingers are sharing the same pocket of dead air, which will aid in keeping all the fingers warmer (think of it as the buddy system). A pair of gloves would be used when you want independent use of your fingers. On a campout, I use mittens about 90% of the time.
3. **Feet – socks**. Multiple layers of socks will keep your feet the warmest. You can start with a thin polypropylene sock next to the skin to wick moisture away. Then, add one or two pair 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're too tight, they'll restrict blood circulation in your feet, and frostbite will occur. (we'll learn about frostbite in the pages to follow)
4. **Feet – boots**. Cold feet may be the worst thing to have on a campout. Finding just the right boot for cold weather camping can be difficult, because your needs change depending on the activity you're doing. Snow boots, or boots with rubber soles and leather or nylon uppers are best. Avoid boots with rubberized uppers because they don't breath, so moisture will be retained, and we know how bad moisture is in the cold, right?? Boots with removable liners would be the preferred choice, but aren't necessary if you purchase the boots large enough to accommodate multiple layers of wool or wool/nylon blended socks. Removable foam or woolen insoles add an extra layer of warmth between the ground and your foot. When all is said and done, and you've got the layers in place, you should be able to wiggle your toes very easily. Tight boots mean cold feet.

## Tent camping

hang a line inside, put a cotton towel, sheet  
to absorb water. 1qt per person overnight  
Don't rip up tent - need circulation

bucket w/ essentials, seat lid, block of wood to stand on.  
whistles, candy, dry soup mix, clothing, first aid kit  
long rope for rescue

Bedding -   
blue board  
3 pieces w/ duct tape  
- under sleeping bag  
- closed cell phone

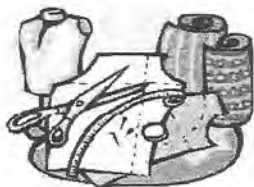
tightly closed/wrapped sleeping bag destroys the hollow fill  
ability to create air space to keep you warm.

Army surplus wool blanket - slit in middle - poncho  
Lattach

Flying tigers - oak forest

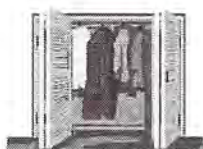
**NEVER** wear gym shoes, dress shoes, or cowboy boots on a cold weather trip. They offer no insulation whatsoever.

5. **Outer Layer** – you’ve got to have an outer layer that is windproof and at the least, water-resistant. Your coat is the most important piece of your winter clothing. A coat with an attached hood will prevent heat loss around your head and neck, and is highly advisable. If it’s snowing or raining, consider wearing your rain gear as your outer layer, which will prevent your heavy winter coat from becoming saturated.



#### **Suggested Materials For Winter Clothing And Insulation:**

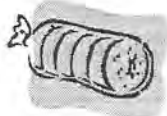
1. **Wool** gets its insulating quality from the elastic, three-dimension wavy crimp in the fiber that traps air between fibers. Depending on the texture and thickness of the fabric, as much as 60-80% of wool cloth can be air. Wool can absorb a good amount of moisture without giving a damp feeling because the water seems to disappear into the fiber spaces. So, even with water in the fabric, wool still retains dead air space and will still insulate you.
2. **Pile or fleece fabrics** are synthetic materials usually made out of plastic. Yes, you read it correctly -- plastic. It has a similar insulative capacity as wool, it holds less water than wool, but dries more quickly.
3. **Polypropylene fabrics** are synthetic, plastic fibers that offer dead air space and cannot absorb moisture. The fiber is hydrophobic (isn't that the fear of water??) so it moves the water vapor away from your body. Under Armour is an example of this polypropylene fabric.
4. **Down** consists of feathers, which are a very efficient insulator. They provide excellent dead air space and weigh next to nothing. You'll find down filled sleeping bags, vests and coats. Down will absorb water, however, which is a huge problem, as we've already learned. Once the feathers get wet they clump together, and there goes your dead air space. If you're going to use clothing or bags filled with down, you have to be sure not to allow them to become wet.



The only thing worse than being cold for a whole weekend is being cold **AND** wet for an entire weekend. For cool weather, you don't have to go out and buy special clothes – what you need is probably hanging in your closet or crammed somewhere in the back of a drawer. We're talking about **LAYERS** of clothing. Three layers of clothes that can be put on or taken off as needed are much better than just one heavy winter coat. Layering your clothing not only

provides more flexibility for changeable weather, but the air between each layer serves as additional insulation.

If an outer layer gets wet, it can be stripped off. In cold weather, bring a combination of sweaters, heavy shirts, sweatshirts/sweat suits, and a good heavy coat or parka. Cut back on the use of cotton during cold or wet weather, because it absorbs moisture. Wool or synthetics are better. But, you can certainly live with nothing more than cotton, IF you take the precautions to keep it dry, or change often if it does become damp or wet.



Which brings us to another topic -- how to pack your gear for a cold weather campout. We've learned that moisture is what makes us cold, so we need to protect our clothes - even clothes sitting in our tent - from becoming damp. Much like we keep foods in plastic to keep it fresh, we need to protect our dry clothes by enclosing them in a plastic or dry float bag. If you don't want to invest in a dry float bag, Ziploc bags are perfectly good, and I use them all the time. They now make large bags (1 gallon, 2 gallon, 2.5 gallon), and since they're so durable, you can reuse them from one campout to another. So, in your duffel bag you should have multiple sealed bags of clothes - underwear, shirts, pants, hats & gloves, socks, etc. This is an added assurance of keeping moisture out of your clothing until you're ready to wear it.



In cold weather you need a couple of hats that cover your head and ears. You should use one hat for sleeping in, and the other to wear during the day.



You also need to have a good pair of water-resistant mittens or gloves with long wrists that will tuck under the cuffs of your coat. You can't keep your hands in your pockets when camping. Mittens keep your fingers somewhat warmer than gloves.



Camping in the cold weather, or any weather for that matter, is not about having the most expensive equipment, bringing color coordinated clothes or having the fanciest gear. No one gives out prizes for nicest stuff on a campout. We're there to have fun. It's certainly not about color coordinating your outfit so you look good. As long as we're safe, we can look any way we want to. So, go ahead and mix pinks, browns, greens & yellows with stripes,



plaids, polka dots and solids – as long as you're warm, it really doesn't matter what you look like.



## Clothing Techniques

1. When you first get up in the morning, your activity level will be low, and so will the temperature. You will need to have many, if not all, of your layers on at this point until breakfast is over and you've started to become active.
2. When you get ready to be active, you will need to take off layers since your body's furnace will begin generating heat. Remove just enough clothing until you begin to feel cool, but not cold. If you don't peel off a layer or two, and you begin physical activity, you'll start overheating, sweating, losing heat and you will have to stop in 10 minutes to take layers off. Opening 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, so keep your layers close by.
4. Whenever you get covered with snow, be sure to brush yourself off. It's important to keep snow off your clothes so it doesn't melt into your clothing and refreeze as ice near your body.
5. At the end of the day, as your activity decreases and the outside temperature drops, you're going to be adding layers of clothing. Once your body starts to cool down, it's going to take a lot of the body's resources (calories) to heat up again (remember, your body is like a furnace), so do your best to anticipate and add layers before you get chilled. It's better to put on more than you think you need – you can always remove layers, take off your hat or unzip your coat to reach a comfortable temperature.



## Let's review what we've learned so far:

1. **Layer your clothing.** Wear several layers of lighter clothing instead of one heavy layer. This way you can decide on the amount of insulation. If you get warm, you can take layers off and add some more clothing layers if you get cold.
2. **Wear loose fitting clothing, to optimize insulation.**
3. **Wear mittens instead of fingered gloves when you do not need independent use of your fingers.** This will allow the fingers to help keep each other warm.
4. **Use a pair of socks to cover hands if mittens get wet.**
5. **Wear a stocking cap or other warm hat.** One that covers the ears and neck area is particularly effective. Because most heat loss is through the head, wearing a warm hat warms the rest of your body, too.
6. **Wear a scarf or turtleneck shirt to reduce heat loss around the neck.** You can use a "ski mask" or scarf over your face for protection from the cold and wind.
7. **If you need a fire to keep you warm, you aren't dressed correctly.** If the heat from a fire can penetrate your clothes and warm your body, cold air can get through, too.
8. **Don't wait until you're cold to put on more clothes.** Add another layer when you first begin to feel cooler.
9. **What does C-O-L-D stand for????** (*Go ahead – you can look back*)
10. **Of the following pictures, circle the best choices of footwear for a cold weather campout.**





## SLEEPING IN COLD WEATHER

### What do we need??



**Tents** – Troop 964 provides tents for all campers

- **Strength** – your tent needs to be relatively strong to combat the wind and snow.
- **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.
- **Room** - you need lots of internal space on a winter trip for all the bulky gear you bring along. So, you are limited to two boys per tent.
- Troop 964 provides dome type tents, which are recommended because they're durable, they shed snow fairly well and they provide ample interior space for occupants and their gear.



### Sleeping Bags

Sleeping bags for winter camping should be rated to temperatures below what you will be exposed to. For example, if the temperature can drop to 30° F, then your bag should be rated to 10° F. If the bag is too big, you will have large spaces of cold air, and as you may have guessed, you will be cold. In a bag that has too much space, you may need to wear extra clothes to stay warm, or fill the dead air with unused clothes to reduce the size of the "cold air" space in your bag. Just as with clothing, it's not the bag that keeps you warm, it's your body's furnace that is warming that dead air space. So, minimize the open space or you'll be cold all night.

Unless you have a sleeping bag with a very low degree rating (0° or better), it would be a good idea to bring a fleece bag liner or camping blanket to put inside your sleeping bag during cold weather for additional insulation. In warm weather, the blanket can be used instead of a sleeping bag or you can sleep on top of your bag in the blanket.



## Sleeping Pads

Sleeping pads are useful for two reasons -- first, they keep you comfortable when you're sleeping on hard, uneven ground. Second, they provide an important layer of insulation between you and the ground, which cuts down on conductive heat loss.

How do they work? Sleeping pads insulate the same way that sleeping bags and clothing layers do. They trap and hold a layer of dead air between your body and the cold ground. Your body gradually warms this layer of dead air and it becomes an insulating barrier.

The primary variables to consider when choosing a pad are:

- **Insulation**
- **Comfort**
- **Weight/Bulkiness**
- **Durability**

Let's look at some sleeping pad options:

- Air mattresses - basic, inflatable air bladders

**Positives** - They're comfortable, adjustable and inexpensive.

**Negatives** - They tend to be heavy, bulky and they can be punctured/ripped easily. Air inside is free to circulate, so they tend to be poor insulators. It's like lying on a pillow of cold air.

- Cots - basic, elevated

**Positives** - They're comfortable, and you're off the ground.

**Negatives** - They can be heavy, bulky and awkward. Air circulates all around your body, making them very poor insulators.

- **Open-cell foam pads** - sponge-like foam pads made up of tiny, open air cells

**Positives** - They're comfortable, lightweight and inexpensive. The tiny foam cells restrict air circulation, so they are also more effective insulators than air mattresses.

**Negatives** - Open-cell foam is absorbent, which can cause problems in wet conditions. It's also less insulating than closed-cell foam (it must be cut about four times as thick to get the same insulation). Open-cell foam tends to be bulky, difficult to compress (for packing) and not very durable.

- **Closed-cell foam pads** - pads made out of dense foam filled with tiny closed air cells

**Positives** - They're cheap, durable (won't pop when tromped on) and extremely insulative (almost no circulation of air in pad, so they can be cut thin yet still provide good insulation). Closed-cell foam is also non-absorbent.

**Negatives** - They're relatively stiff and firm, with far less cushioning than open-cell foam (so you'll need a thicker, heavier piece to be as comfortable).

- **Self-inflating pads** - open-cell foam pads wrapped in air-tight, waterproof nylon shells

**Positives** - They're as comfortable as open-cell foam, but much more insulating (the nylon shell limits air circulation, while also protecting against water absorption). They're adjustable (built-in air valves let you control the amount of air inside and thus the firmness of the pad) and they're extremely compact when rolled up.

**Negatives** - They're more expensive than the options listed above. Can be punctured or ripped (though field repairs are not difficult). Heavier than open- or closed-cell pads.





## **Bedding Tips & Pointers:**

- 1. A mummy style bag is warmer than a rectangular, as there is less space for your body to heat. Also, most mummy bags have a hood to help protect your head.**
- 2. If you only have a rectangular sleeping bag, bring an extra blanket to pack around your shoulders in the opening to keep air from getting in.**
- 3. Do not sleep with your head under the covers. Doing so will increase the humidity in the bag that will reduce the insulation properties of the bag and increase dampness.**
- 4. Wear a loose fitting hooded pull over type sweatshirt to sleep in. Sometimes, it's nice to have the ability to pull the hood up and over your hat on really chilly nights.**
- 5. A bag liner made from an old blanket, preferably wool or fleece, will greatly enhance the bags warmth.**
- 6. Use a sleeping pad of closed cell foam instead of an air mattress or cot.**
- 7. A good rule of thumb is that you want 2 to 3 times the insulation below you as you have over you.**
- 8. Use a ground cloth to keep ground moisture from your bag. Your body will warm up frozen ground to a point were moisture can become important.**
- 9. Cold air will be above and below you if you sleep on a cot.**
- 10. Put a hand warmer (in a sock) at the foot of your sleeping bag before getting into it.**
- 11. Exercise a little bit before bedding down to increase body heat. This will help to warm your bag quicker. Be careful not to start perspiring, or you'll have to change clothes.**
- 12. Remove the clothes you wore during the day, and put on clean, dry clothes before climbing into your bag.**
- 13. I use a pair of wool socks to cover my hands at night. My four fingers keep my thumb warmer because all my digits are sharing the same dead air space.**

*How are you doin'?? You still with me??*

*If you are, see if you can answer this question.*

**What does C-O-L-D stand for??**

*Did you look back, or did you remember?? It really doesn't matter, as long as you know it.*



**Okay, let's move on to a few health issues we must be aware of when we go cold weather camping.**



## **COLD WEATHER**

### **FIRST AID**



#### **What is Dehydration?**

Dehydration is the excessive loss of body water. It can interfere with your ability to think clearly, so you may not react properly. Dehydration is not just a summertime sickness.

#### **Prevention:**

- Drink at least 2 quarts of water a day.
- Avoid dehydrating foods (high protein) and fluids (coffee, caffeine).
- Increase fluid intake at first signs of darker, yellow urine.

#### **Symptoms:**

- Early stages consist of an increased pulse rate
- Nausea and loss of appetite
- Dark urine or constipation
- Irritability, fatigue
- Thirst
- Next comes headaches and dizziness
- Difficulty breathing
- Tingling
- Absence of saliva
- Inability to walk
- Cyanosis (bluish or grayish skin color)

#### **Treatment:**

- In mild cases, drink liquids and keep warm.
- In severe cases of dehydration, get professional medical treatment.





## What is Hypothermia?

Hypothermia comes from two Greek words meaning "low heat." It is the condition that develops when the body loses heat faster than it can generate it. Oddly enough, hypothermia usually occurs when the temperature is not extremely cold, typically between 40° and 50° F, and even as high as 70° F. More often than not, the victim is unable to think clearly, and won't recognize the symptoms for himself. Severe injury or death may result from hypothermia, so it's very important to understand it.

### Conditions that may contribute to hypothermia:

- Poor physical condition.
- Inadequate nutrition and water intake.
- Thin build.
- Non-protective clothing.
- Getting wet.
- Inadequate protection from wind, rain and snow.
- Exhaustion.

### Symptoms:

- Loss of ability to reason.
- Shivering.
- Slowing, drowsiness, fatigue.
- Stumbling.
- Thickness of speech.
- Inability to do something simple, such as zipping a zipper or tying a knot.
- Amnesia.
- Irrationality, poor judgment.
- Hallucinations.
- Cyanosis (blueness of skin).
- Dilation of pupils of eyes.
- Decreased heart and respiration rate.
- Appears to be in a trance.

### Treatment of Hypothermia:

- Shelter the victim from wind and weather.
- Insulate the victim from the ground.
- Change wet clothing.
- Put on windproof, waterproof gear.
- Increase exercise, if possible.
- Put in a pre-warmed sleeping bag.
- Give hot drinks, followed by candy or other high-sugar foods.
- Apply external heat; hot stones, hot canteens.
- Huddle for body heat from others.
- Place victim in a tub of 105° F water. Never above 110° F.

### Prevention:

- Stay rested, and maintain good nutrition.
- Consume plenty of high-energy food.
- Wear proper clothing.
- Make camp early if tired, injured or lost.
- Get plenty of exercise. Don't sit around much.
- Appoint an experienced person to watch the group for signs of hypothermia.
- Take immediate corrective action for any noticeable signs.



## What is Frostbite?

Frostbite is the actual freezing of the skin and underlying tissues. Recovery is very slow, and severe frostbite can lead to the need for amputation. Once exposed, the victim will be susceptible toward frostbite in the future.

### Conditions which may contribute to Frostbite:

- Prolonged exposure to temperatures 32° F or below.
- Brief exposure at extremely low temperatures, -25° F and below.
- Exposed body parts
- Restriction of circulation.
- Fatigue, poor nutrition, low liquid intake, poor physical condition.
- Previous case of frostbite or other cold injury.

### Symptoms of Frostbite:

- **First Degree (Frostnip)**
- **Redness, pain, burning, stinging or prickly sensation.**
- **Pain disappears and there is a sudden blanching of the skin.**
- **The skin may look mottled.**
- **Skin is firm to the touch, but resilient underneath.**
- **On thawing, there is aching pain or brownness. The skin may peel off, and the part may remain cold for some time.**
- **Second Degree (Superficial Frostbite, Frostbite)**
- **No pain, the part may feel dead.**
- **Numbness, hard to move the part.**
- **Tissue and layers underneath are hard to the touch.**
- **After thawing (takes 3 to 20 days) pain, large blisters, sweating.**
- **Black or discolored skin sloughs off, leaving tender new skin.**
- **Third degree (Severe Frostbite)**
- **Full thickness of the skin is involved.**
- **After thawing, pain continues for 2 to 5 weeks.**
- **Fourth degree (Severe Frostbite)**
- **Skin and bone are frozen.**
- **Swelling and sweating occur.**
- **Gangrene may develop, amputation may be necessary.**

### Treatment:

- **Do not rub affected area with snow. Hold it over fire, or use cold water to thaw it.**
- **Exercise the affected area to promote blood circulation.**
- **Use any warmth available to thaw area.**
- **Do not attempt to thaw frostbitten limbs in the field. It is less harmful for the victim to walk out on a frostbitten limb than to thaw it in the field. Thawing only risks additional injury and the victim will be in too much pain to walk.**
- **Check for hypothermia.**

### Prevention:

- **Proper clothing.**
- **Good nutrition, drink water, maintain core temperature.**
- **Use buddy system to check face, nose, and ears.**
- **Immediate treatment of minor symptoms.**



## Packing



### Personal equipment suggested for a 2 night cold weather camping trip:

- Tent (Troop 964 provides tents for all campers)
- Food (Troop 964 provides food, stoves & fuel for all campers)
- Sleeping bag
- Fleece or wool bag liner
- Sleeping pad
- 3 large plastic bags
- Toothbrush and paste
- Medications
- Nalgene or other unbreakable water bottle
- 3 pair of underwear
- 2 t-shirts
- Ski/snow pants
- 2 long sleeved shirts
- 2 turtleneck shirts
- 2 hats which completely cover the ears
- Sleeping clothes
- Rain gear able to fit over many layers
- 2 pair of mittens, 1 pair of gloves
- 2 pair of pants
- Boots (Waterproofed)
- 4 pair of heavy socks (wool or wool/nylon blended)
- 2 pair of lighter socks
- Parka or heavy jacket, with hood
- Extra boots
- Flashlight with fresh batteries
- Scout Handbook
- Pack clothing in sealed plastic bags
- Label as much of your gear as possible

## ODDS AND ENDS, AND BITS AND PIECES

1. If you can't get warm or you get cold at night, let the adult leadership know so something can be done before injury occurs.
2. Organization and proper preparation is very important in cold weather camping. Good meals, good shelter and comfortable sleeping arrangements make for an enjoyable outing.
3. Learn to recognize and treat cold weather health problems. These include frostbite, hypothermia, dehydration, and carbon monoxide poisoning.
4. Use the buddy system to check each other for cold weather health problems. Notify the adult leadership if your buddy seems to be showing any symptoms. Better safe than sorry.
5. If you feel cold, gather some wood or do some other type of work. Working will help warm you up.
6. Contact lenses can be a problem. Will your saline solution freeze??
7. Eating ice or snow can reduce your body temperature and it is not pure. Don't eat it.
8. Snow and ice can be used for drinking water but only after boiling.
9. Wiggling your toes inside your boots will help keep feet warm. If your feet get cold put on a stocking cap.
10. It takes longer to cook food in cold weather, so plan accordingly. Before going to bed pour enough water for breakfast into a pot. It is easier to heat the pot than a plastic water can.
11. Keep your matches in a metal match safe as plastic can freeze and break if dropped.
12. Gather twice as much fuel as you think you'll need for fires.
13. Carry tinder from home. It may be hard to find in snow or wet conditions.
14. Gather your wood and tinder for the morning fire in the evening so that you will be able to start the fire quickly in the morning.
15. Carry extra plastic bags in cold weather. They can be used as personal wind shields and ponchos by slitting a hole in the top for your head to go through.
16. Heaters inside your tent can lead to carbon monoxide poisoning. **NO FLAMES OR FIRES IN TENTS.**
17. If you feel tired, sleepy or cold, tell a leader.
18. Keep close tabs on your buddy and others in your group. Watch for signs of hypothermia, frostbite, dehydration, and exhaustion. Talk to each other. Encourage each other to have a drink of water, eat something, slow down, or sit and rest. If you suspect a problem, notify one of the leaders.
19. There's one more – and it's the most important thing you can remember.

Can you guess what the last one is??



## 20. C-O-L-D stands for:

C – keep yourself and your clothes Clean

O – avoid Overheating

L – wear clothes loose and in Layers

D – keep Dry



*Sadly, not all Boy Scout Troops camp year round, because they don't realize how simple it can be. Troop 964 is fortunate to have a number of leaders trained in cold weather camping. OKPIK is the training course offered by Boy Scouts of America, teaching cold weather camping techniques to adults and Scouts over the age of 14.*

*If you have questions or concerns, I encourage you to contact any of the following Troop 964 leaders, because we're all OKPIK graduates!!*

*Debbie Heine, Terry Aldridge, Linda Bomya, Patrick Bomya, Mike Dietzen, Mark Dunne, Andy Gebhardt, Rich Mullen and Mike Tangen.*



# Cold Weather Tips

## Cold Weather Camping

### COLD WEATHER COMFORT & SAFETY

Cold weather camping as defined by BSA is "camping in weather where the average daily temperature is below 50 degrees Fahrenheit and conditions are cold, wet or windy."

The most important thing to remember about cold weather camping is to **KEEP DRY**. Moisture will reduce the insulating properties of almost everything. To keep yourself warm, remember the word **COLD**.

- **C** keep yourself and your clothes Clean.
- **O** avoid Overheating.
- **L** wear clothes loose and in Layers.
- **D** keep Dry.

The hints listed below are in a random manner. There is no order of importance to the list, just some suggestions that have proven true over the years.

### CLOTHING

1. Layer your clothing. Wear several layers of lighter clothing instead of one heavy layer. This way you can better regulate the amount of insulation. If you get warm you can take layers off and add some more clothing layers if you get cold.
2. Keep yourself dry, both from the weather and perspiration.
3. Wear loose fitting clothing, to optimize insulation.
4. Remember when buying clothes for cold weather that wool retains most of its insulation properties when wet, while cotton loses most of its.
5. There are also excellent manmade fibers and insulation that retain their insulation properties as good as or better than wool. Other benefits include light-weight, wide design options & wind-blocking.
6. Remember your rain gear is water proof and will not allow perspiration to exit. During rainy weather change your clothing several times a day.
7. Athletic shoes and nylon hiking boots do not provide enough insulation. You should wear either mukluk, water-proofed leather hiking boots, rubber overshoes or rubberized boots.
8. Waterproof your leather hiking boots with the appropriate commercial treatment. Be sure to use only silicon-based products on leathers which require it. Check the care tag that came with the boots.
9. If you choose to wear rubberized boots, remember they do not allow for ventilation, therefore you will need to change your socks several times a day. Also you may want to get some felt inserts for insulation.
10. Wear a pair of cotton and a pair of wool socks to increase insulation and take the perspiration away from your feet.
11. Pull trouser legs over top of shoes to keep out snow. You may want to use nylon gaiters (leggings), or tie or tape them to make sure of the seal.
12. Wear mittens instead of fingered gloves when you do not need independent use of your fingers. This will allow the fingers to help keep each other warm.
13. Use a pair of socks to cover hands if mittens get wet.
14. Wear a stocking cap or other warm hat. One that covers the ears and neck area is particularly effective. Remember, most heat loss is through the head. Wearing a warm hat warms the rest of your body, too.

15. Wear a scarf to reduce heat loss around the neck. Use a "ski mask" or scarf over your face for protection from the cold and wind.
16. If you need a fire to keep you warm you are not dressed properly. If the heat can get to your body, so can the cold.
17. You should plan on wearing at least two pair of socks at all times when it's cold. Bring a change of socks for each day, plus one or two extra pair (your feet might get wet). Wearing two pairs of socks is a good idea for hiking even in warm weather; it helps prevent blisters; bring more socks when hiking

The clothing that your son brings on a winter camping trip will be one of the most important determinants of his warmth. While the clothing will not directly provide warmth, it rather provides insulation to preserve body heat from activity.

Clothing material can primarily be broken down into wool, synthetics, cottons, and blends. Each type of material holds its own advantages and disadvantages. Wool, although itchy, provides warmth when wet. Synthetics provide waterproof and windproof advantages yet lack breath ability. Cottons are primarily used in warm weather camping by providing lightweight, cool clothing. Finally, blends represent a mix between cotton or wool and synthetics. The Scout uniform represents an ideal example of blends.

First, perspiration can prove to be a serious side effect of intense winter activity. To avoid this, it is important that the first layer of clothing be able to wick moisture away. Polypropylene long underwear is the solution. Commonly referred to as "Wicker's", poly's wick moisture away from the body allowing your body heat to evaporate your sweat and ultimately reduce any chilling.

The second important issue concerns breath ability. Waterproof materials do a superb job in keeping us dry; however, they hold one important drawback. They lack breath ability. What this means is that they counteract the effects of Poly's by trapping the moisture that the thermal underwear attempts to wick away. Ultimately, when this occurs, it is important to change layers throughout the day to avoid excessive moisture build-up that brings down the body temperature.

Finally, the proper clothing on your feet is important to enjoying a cold weather weekend. Poly liners should be worn under wool or wool synthetic socks in order to wick away moisture. Wool socks help combat cold feet in the event that your socks get wet. Wool, unlike other fabrics, will still keep you relatively warm if wet. Be sure that your socks are not too tight, as this can reduce blood circulation and lead to cold feet. In the event your feet get wet, be sure to change into a dry, clean pair of socks as soon as possible!

If it is at all possible to single out one important feature of clothing, it would be that no Scout should have sweat suit material in his pack. The only exception to this rule is a hooded sweatshirt for sleeping at night. We cannot over emphasize how important this is, sweatpants absorb moisture like a sponge and hold no wind breaking capabilities.

## SHIRTS

The outer shirt or 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 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.



## LAYERED CLOTHING SYSTEM

While clothing will provide the insulation to maintaining a constant body temperature and steady warmth, it is useless if not worn properly. Layering represents an individual's personal thermostat. As you begin to feel cool, you can put on another layer. As your body begins to sweat, you simply remove a layer.

### Clothing layers

- Long, thermal underwear. polypropylene
- Shirt or inner layer
- Sweater, light jacket
- Wind or rain gear
- Long, thermal underwear. polypropylene
- Inner pants wool, wool blend
- Wind or rain pants
- Wicking inner socks polypropylene
- Insulating socks wool or wool blend
- Boot liners insulated insoles
- Footwear, boots waterproof, loose-fitting, mukluks or snow boots
- Head coverings
- Gloves and mittens

More often than not, this body temperature regulation can be performed through the wool cap. The body loses 80% of its heat through its head. A wool cap helps maintain this heat within your body, warming you rather than your surroundings. The layers begin with the polypropylene long underwear and work their way up to the parka. In short, the primary importance of the layer system lies in body temperature regulation. For this reason, it is important to have various layers packed in order to properly regulate your body temperature.

## BEDDING DOWN

1. Natural fiber sleeping bags do not maintain their insulation properties when damp, down bags also fit here. A 3 to 4 pound synthetic bag will take care of most of your needs.
2. A mummy style bag is warmer than a rectangular, as there is less space for your body to heat. Also, most mummy bags have a hood to help protect your head.
3. If you only have a rectangular sleeping bag, bring an extra blanket to pack around your shoulders in the opening to keep air from getting in.
4. Unless you have a sleeping bag with a very low degree rating (0° or better), it's good to bring a fleece camping blanket to put inside the bag during cold weather for additional insulation.
5. Do not sleep with your head under the covers. Doing so will increase the humidity in the bag that will reduce the insulation properties of the bag and increase dampness.
6. Remember to air out your sleeping bag and tent, when weather permits. Perspiration and breath condense in the tent at night and the water will reduce insulating properties of your bag.
7. Wear a stocking cap to bed in order to reduce heat loss.
8. Just as with other clothing, don't sleep in the cap that you're going to wear the next day.
9. Wear a loose fitting hooded pull over type sweatshirt to sleep in.
10. A bag liner made from an old blanket, preferably wool, will greatly enhance the bags warmth.
11. Insulate yourself from the ground as much as possible to avoid cold spots at the shoulders and hips.
12. Use a sleeping pad of closed cell foam instead of an air mattress.
13. Use one or two ground pads.
14. A good rule of thumb is that you want 2 to 3 times the insulation below you as you have over you.
15. Use a ground cloth to keep ground moisture from your bag. Your body will warm up frozen ground to a point where moisture can become important.

16. Space or reflective blankets, if used as a ground cloth, will not reflect the body heat. Instead it will conduct the cold from the ground to your body.
17. Cold air will be above and below you if you sleep on a cot.
18. Put a hand warmer (in a sock) at the foot of your sleeping bag before getting into it.
19. Exercise before bedding down to increase body heat. This will help to warm your bag quicker. Be careful not to start perspiring.
20. Don't sleep in clothing that you wore that day or that you will wear the next day.
21. Wear fresh socks to sleep in. (You can wear the same pair both nights; change them each morning and leave your sleeping socks out to air.)
22. Hang your sleeping bag up or just lay it out, between trips, so the filling will not compress and lose its insulating properties.
23. Before you get out of bed bring the clothes you plan to wear inside your bag and warm them up some before dressing

Sleeping in the winter is really no different than camping out in the summer. However, there are a few important tips that require mentioning. The first most important tip is to *never* wear wet clothes to sleep. Not only will it decrease your body temperature, it will also cause moisture in your sleeping bag that will decrease the insulating properties of the bag.

Secondly, if you do get cold during the night, *do not* place your head inside the sleeping bag as this will cause moisture from your breath to have the same effect as mentioned above. Wearing a hat while you're sleeping will produce the same results as sticking your head inside the bag.

Finally, the insulated capabilities of the bag come from warmth being trapped in the dead air space of the synthetic fibers (or bag fill), be sure that the bag is as fluffed out as possible to increase the insulating characteristics. In addition, it is recommended to keep the bag in a stuff sack until you are ready to bed down, this will keep moisture in the air from finding a place on or in your bag before you bed down. When storing your sleeping bag at home, hang it in a closet rather than in the stuff sack in order to avoid crushing the fill in the bag.

Preparing your bed roll for winter camping requires a little more effort than a summer night under the stars. Insulation under you is the key to enjoying a warm winter night.

The first layer down should be a plastic ground cloth to keep moisture from the cold ground from coming in contact with and ultimately penetrating your sleeping bag. On the ground cloth layout the sleeping pad. On top of the pad layout a folded wool blanket (army blankets work great) to add extra insulation from the cold ground. Place your sleeping bag on top of the wool blanket. In extreme cold weather, newspaper, cardboard or more natural materials such as leaves and pine needles can be placed under the sleeping pad to provide more insulation. Finally, get warm before going to bed. Increasing activity by cutting wood for the morning fire or doing jumping jacks increases your metabolism and body heat before hitting the sack!

### **SOME ADVICE ON KEEPING THE TENT DRY**

-- Examine your camp site carefully before setting up the tent. That nice flat spot, is it a low point? If you camp in a hollow, you may end up camping in a puddle if it starts raining or melting.

-- A canvas under the tent is a good idea, but watch out. If your canvas extends out further than your rain fly, rain will run off the rain fly and onto the canvas. Depending on the slope, the rainwater may then run *\*under\** your tent.

-- Condensation will form on the tent's interior walls, unless you keep the tent ventilated.

-- Placing the sleeping bag on a pad is a good idea. It will not only improve your sleep by keeping you warmer and the bed softer, it will also keep you up off the tent floor should you get water in the tent.

Dress properly for current and possible conditions. Be prepared for sudden weather changes especially at elevations. Have at least one wool garment for the upper and lower parts of your body. Wool is the only material with any insulating value when wet. Carry or wear a windproof, waterproof garment. Always have a wool hat and wool mittens. Have extra clothing available especially mittens and hats. A large proportion of body heat is lost through the head. Wear suitable boots, insulated if necessary; wear wool socks, and always carry extra wool socks. Avoid getting overheated and perspiring; this cools you down - fast. Wear layers and remove clothing as necessary. Better having extra than too little. Dress sensibly and expect the worst.

### **Special Winter Camping Equipment**

This section is intended primarily to introduce equipment concerns that need to be addressed when camping in extreme cold weather. The first, single most important piece of special equipment is fortunately the cheapest. Zip Lock Bags! All underwear, socks, and long underwear should be packed in zip-lock bags. All other clothing should be stored in something waterproof. This can range from a garbage bag to stuff sacks. All the wool and polypropylene in the world won't do any good if it is wet from the beginning. Dryness is the key to success.

Foam pads are the second most important piece of special equipment. The ground is cold! When you are sleeping, it is important to have that added insulation under you to avoid losing body heat to warming the Earth. Remember the rule of thumb; it is a good idea to have two to three times as much insulation under you as you do above you.

The next most important piece of equipment will more than likely not cost anything because you probably have it lying around the house. All Scouts should carry a wool blanket with them on the cold weekend campouts. If you cannot locate a woolen blanket (Army blanket), ask around. Someone is bound to have a wool blanket somewhere in a closet.

Finally, in cool weather, have a good pair of water-resistant mittens or gloves with long wrists that will tuck under the cuffs of your coat. You can't keep your hands in your pockets when camping. Mittens keep your fingers somewhat warmer than gloves, although you might not be able to work quite as easily in them. Make sure the mittens or gloves fit well (e.g. the fingers aren't too long), or you won't be able to work efficiently and safely.

### **ODDS AND ENDS**

- If at night you get cold, let the adult leadership know so action can be taken before injury from cold weather health problems occur. In other words it's better to be kidded about forgetting your sleeping bag than risking hypothermia.
- Organization and proper preparation is very important in cold weather camping. Good meals, proper shelter and comfortable sleeping arrangements make for an enjoyable outing.
- Drink 2 quarts of fluids per day besides what you drink at meals.
- If you feel cold gather some wood or do some other type of work. Working will help warm you.
- Eating ice or snow can reduce your body temperature and it is not pure. Don't eat it.
- Wiggling your toes inside your boots will help keep feet warm. If your feet get cold put on a stocking cap.
- Take and wear dark sunglasses if snow is in the forecast. The sunglasses will reduce the glare from the snow.
- It takes longer to cook food in cold weather, so plan accordingly. Before going to bed pour enough water for breakfast into a pot. It is easier to heat the pot than plastic water can.
- Carry tinder from home. It may be hard to find in snow or wet conditions.
- Space blankets make good wind shields only. The metallic properties take over the insulation properties in cold weather and become cold conductors.
- Carry extra plastic garbage bags in cold weather. They can be used as personal wind shields and ponchos by slitting a hole in the top for your head to go through.
- Flashlight batteries are effected by cold.
- Use a ground cloth (or poncho) to keep ground moisture from forming your bag.
- Put a hand warmer (in a sock) in the bottom of your sleeping bag to warm it up before bedding down.

- Using deodorant on your feet before a day in cold weather reduces the chance of sweating which can cause a chill in your feet.
- Place the next day's clothes inside your sleeping bag as added insulation and to warm them up.
- Stay warm and dry. *Have Fun!*

## Nutrition

Menu planning and a properly balanced diet become crucial in cold weather camping. Unfortunately, it is sometimes difficult to do. Who wants to cook and clean a full course dinner or grand slam breakfast in zero degree weather?

Most important to realize is that you will require a greater calorie intake in cold weather. In addition to increased activity, increasing your metabolism is a good way to increase your warmth. A proper diet should be high in carbohydrates and protein.

We would recommend foods high in protein result in a slow release of body heat as your metabolism digests the foods. Candy and other high sugar foods result in a quick release of body heat that causes your body temperature to drop below what it was originally.

Ultimately, it is important to have a high calorie diet that is high in protein and carbohydrates.

You need *personal water* just as much in winter as in hot weather. People dehydrate in winter because they don't feel thirsty even though they're working just as hard as in summer and losing just as much fluid.

# COLD WEATHER COOKING & MEAL EXAMPLES

## Nutrition:

Nutrition is a very important factor in the success of a campout. Food is both a necessary fuel and vital for body repair. More food is required for strenuous activity, and specific mixes of types of food are needed for cold-weather/winter camping. Where a normal calorie requirement may be between ~2,000 and 2,800 calories/day/person, the energy requirements for a strenuous or high adventure trip are 3,000 - 5,000 calories/day/person and winter treks require 1,000 MORE calories/day than summer treks. This translates to about 2 - 2.5 lbs. of (lightweight) food per day per person, and the food should be nutritionally balanced at ~50% carbohydrates, ~25% fats and ~25% protein.

Just as you need extra water when hiking in summer, extra amounts of liquids during winter activities are essential. In summer it is essential to take plenty of water when hiking - and ALWAYS in 2 containers. Even with a large platypus or nalgene bottle that you think will be more than enough water, a second bottle is advisable - what if the large one develops a leak? In winter warm drinks and soups should be fixed several times a day. It takes extra energy to warm your body after eating snow, so melt snow over a camp stove rather than taking it straight from the snow bank!

In winter camping the patrol cook should start water heating AS SOON AS YOU START TO SET UP CAMP while the rest of the patrol does the camp set up, so hot drinks are available as soon as possible.

The other "basics" for camping are to keep it simple and have an easy clean-up. You don't want to waste precious fuel heating extra water for greasy pans. Summer car camps are the right places to do your fancy Dutch oven and grill menus. In the snow or cold weather, you need hot food fast, and you will probably only be using a small camp stove. The warm water is more for making hot cocoa and instant cider and soup than for cleaning dirty pots and pans, so try for one-dish meals cooked in zip-lock freezer bags or that can be "cooked" by just adding hot water to the mix in your bowl.

Another tip is to always put a lid on your pot while the water/contents is/are heating up. The contents of the pot will heat up faster, and you can use the lid as a "griddle" to start heating something up in foil. And you can start to thaw bagged frozen food on the warm lid - just check the bag periodically to make sure the plastic is not melting onto the lid and turn it over!

## Kinds of food

**Carbohydrates** are easily digested and release energy in minutes, but their energy is rapidly consumed. During cold, wet weather it is important to continuously stoke up with carbohydrates and it is recommended that you eat lunch "from breakfast to dinner" or snack frequently on carbohydrates during the day.

Carbohydrates come from starches (potatoes, rice, pasta), cereals, fruit, nuts (trail mix or gorp!), honey and candy (esp. hard candy).

**Protein** is more difficult to digest and the energy boost takes longer to take effect. High protein foods should be taken in small amounts during the day and concentrated at the evening meal so energy is available for "body repair" and generating body heat while you sleep. Meat is high in protein - and whole meats are particularly recommended for winter camping. Jerky is a great trail snack for late in the day as you set up camp.

Foods high in protein (other than meats) include instant milk (add to your instant oatmeal, which also has protein, and to your hot cocoa and packaged pasta mix), nuts (peanut butter), and cheese.

**Fats** produce energy that is consumed by the body over comparatively long periods and have over twice the energy of proteins. Carbohydrates and protein-rich foods tend to be more light-weight than fatty foods, but the fats are essential to keep your metabolism running high in the cold weather. Fats, like proteins, are harder to digest, so they should be consumed in small quantities during the day and most of the daily fat intake should be concentrated in the dinner menu.

Nuts are one of the best high-fat foods to eat - also high in protein and easy to carry and eat on the trail. Another fatty food is butter. Margarine is usually suggested for camping (comes in a nice tub for easy transport and stays "fresh" longer), but for short trips in cold weather your butter will keep just fine and has more healthy fats than margarine. Add butter to your oatmeal in the morning and your one-pot meal at night. Pre-cooked sausages (smokies) that can be heated in a bag in boiling water (to keep the clean-up to a minimum) are also a high-protein, high-fat food that is good for breakfast or added to the dinner menu.

## **Cold Weather 2-night Camp Menu EXAMPLES**

### *1st Dinner*

Spanish Rice w/Turkey  
French Bread w/Butter  
Cherry Tomatoes & Celery Sticks  
Hot Chocolate and/or Hot Cider  
Chocolate Pudding

### *2nd Dinner*

Chili w/grated cheddar  
Oyster Crackers  
Canned peaches  
Hot Chocolate and/or Hot Cider  
Jello

### *1st Breakfast*

Hot Chocolate or Tea  
Pancakes (from just add water mix) w/syrup  
(in small Tupperware or plastic container)  
Smokie Sausages  
Winter Melon

### *2nd Breakfast*

Hot Chocolate or tea  
Instant Flavored Oatmeal w/Powdered Milk  
Blueberry muffins  
Oranges

### *1st Lunch*

Teriyaki beef on steak rolls  
Raw baby Carrots  
1/2 can Pringles each  
Cookies  
(water to drink)

### *2nd Lunch*

Baby Bell and String Cheese  
Chicken strips  
2nd half can Pringles  
Apples  
Gummy worms  
(water to drink or crystal lite lemonade)

### *Trail snacks*

peanuts  
raisins  
lemon drops

### *Notes:*

- Spanish Rice will be prepared at home, bagged and frozen. Precooked turkey bagged to add later when heating up. Or look for the new "5 minute" mixes.
- Heat French Bread in foil on lid of hot water pot.
- Cool pudding in pot in snow drift! Also jello!
- Sausages can be heated in bag they came in, in boiling water (or in freezer-weight bag - regular baggie may stick to pan sides and melt...).
- Teriyaki is marinated and broiled at home, taken ready to eat.
- Chicken strips are precooked at home and frozen for packing. Heat up in foil on lid of water pot if still frozen/too cold at lunchtime.

**WHAT KEEPS YOU WARM?** - When you really, study what keeps you warm, it becomes clear that it is you! Your body produces all the heat you need. Your clothing is designed to hold in whatever heat you need to feel comfortable under a variety of conditions and activities. You will notice all our clothing is loose. That is because

tight clothing constricts the flow of blood so the body heat cannot move around - just like when a faucet is turned off. That is why tight boots mean cold feet and a tight belt means cold legs.

## C O L D

C.O.L.D. - That is an easily-remembered key to keeping warm.

**C** - Keep yourself and your clothes **CLEAN**. Dirt and body oils which build up on clothing destroy its insulating properties.

**O** - Avoid **OVERHEATING**. Clothing is designed to be taken off or added to in layers to maintain an even body heat.

**L** - Wear clothes **LOOSE** and in **LAYERS**.

**D** - Keep **DRY**. Wet clothing removes body heat 240 times faster than it will dissipate through dry clothing. Wet is trouble.

**VENTILATION** - To regulate the amount of heat, yet not get overheated and wet with perspiration, adjustments can be made to loosen up the waist, the cuffs and the neck opening, allowing more heat to escape.

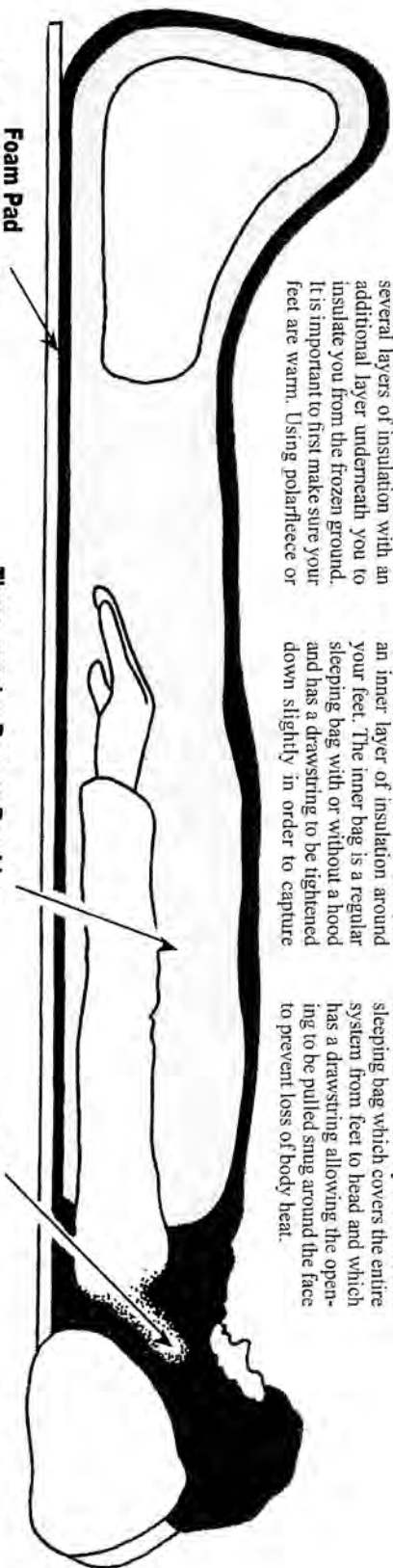
**WET, WINDY, COLD** - This is the combination that spells danger to the winter camper. We avoid it by keeping dry, getting out of the wind when possible, and wearing the correct clothes.

## Your Sleeping System Is Designed to Keep You Warm

Essentially, you are sleeping in several layers of insulation with an additional layer underneath you to insulate you from the frozen ground. It is important to first make sure your feet are warm. Using polarfleece or

other types of booties will give you an inner layer of insulation around your feet. The inner bag is a regular sleeping bag with or without a hood and has a drawstring to be tightened down slightly in order to capture

heat. The outside layer is a hooded sleeping bag which covers the entire system from feet to head and which has a drawstring allowing the opening to be pulled snug around the face to prevent loss of body heat.



**Foam Pad**

**Stops Cold From Below**

**SLEEPING PADS** - These are essential for insulating the body from the cold ground. They come in three types: 1. Closed cell foam; 2. Open cell foam, used with a closed cell pad; 3. Insulated air mattress or Therman Rest® style pad.

**Three-quarter Bag, or Bag Liner**

**Hooded Outer Bag Covers Everything**

**TYPES OF BAGS** - Inner bags and outer bags may be made of synthetic fiber which can be stuffed compactly for travel. These are particularly tailored for long distance trips in the winter. The cold weather outer bag is very warm and while somewhat bulky, can be compressed down into a serviceable size for travel.

# Your Sleeping System Works Best When Kept Clean And Dry

# Outdoor Action Guide to Winter Camping

by Rick Curtis

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**Winter travel can be hazardous.** The information in this article is taken from a number of excellent sources which are referenced in several bibliography sections throughout. The information provided here is designed for educational use only and is not a substitute for specific training or experience. Princeton University and the author assume no liability for any individual's use of or reliance upon any material contained or referenced herein. When going into cold weather conditions it is your responsibility to have the proper knowledge, experience, and equipment to travel safely. The material contained in this article may not be the most current. Copyright 1999 Rick Curtis, Outdoor Action Program, Princeton University.

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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. These are covered completely in the [Hypothermia and Cold Weather Injuries](#) article.

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# 1. 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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# 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 or 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 bivvy 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 breath 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

*hand/foot warmers!!*

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 that 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 that 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. This is especially important when you are on skis. 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 rate 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.*

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### 3. Food

Planning food for winter activities must take into account the great demands the cold weather and physical activity placed on the body along with the difficulty of preparing foods in the winter (it takes time, stove fuel) and having a menu which appeals to the group). Appetite is generally reduced during winter activity even though the food needs of the body have increased. If the meal isn't appealing, it won't get eaten. In some situations you literally need to force yourself to eat.

#### Food types

All foods are made up of varying proportions of the three basic food types - carbohydrates, fats, proteins, and water, vitamins and minerals. Each of the three major types can be converted into simple sugars and burned by the body to produce energy but the time required for conversion increases as the complexity of the molecule increases, so carbohydrates are quicker to convert than proteins and proteins quicker than fats.

Dietary Percentage for Winter Camping	Food Type	Nickname	Description
50%	Simple Sugars	kindling	5 calories/gram (1,800 cal./lb.) - released quickly.
	Complex Carbohydrates	sticks	5 calories/gram (1,800 cal/lb.) - released quickly. They are easy to digest. Candy, cereal, bread, rice, macaroni, dried fruit, vegetables.
20%	Protiens	logs	5 calories/gram (1,800 cal/lb.) - generally released slowly. Proteins are primarily used for maintenance and building of body tissue. Meat, fish, cheese, milk, eggs, nuts, grains.
30%	Fats	logs	9 calories/gram (4,100 cal/lb.) - released very slowly but are useful because they release heat over a long period. However, it takes more energy and more water to break down fats into glucose. Margarine, nuts, cheese, eggs, and fats from pepperoni, salami.

**Vitamins and Minerals** - are generally found in most foods we eat and for a trip less than 7-10 days no special resources are needed. For longer trips and expeditions vitamin and mineral supplements are necessary. See a physician to get specific recommendations for expeditions.

#### Caloric Requirements

General caloric requirements increase in the winter due to the energy expended in keeping the body warm. Caloric requirements for different activity levels are summarized below.

Activity	Caloric Requirement (kg-cal/day)
Basal metabolism	1,500 calories
Sedentary occupation	2,500 - 3,000 calories
Three season backpacking	3,500 - 4,000 calories
Winter backpacking	4,500 - 5,000+ calories

Keep in mind that there are definite individual variances on these figures based on age, body metabolism, health, etc.



## Meals

- One pot meals to minimize clean up + water consumption

Avoid taking fresh food in the winter (fresh fruit, vegetables, eggs). These all contain water and weigh a lot (and you have enough to carry). The exception to this is cheese, butter, or meats (needed for their high fat content). Take mostly dry foods (cereal, pasta, rice, wheat, oatmeal,) baked goods (brownies, cookies), or freeze dried foods (expensive but very lightweight and quick to cook which can save on stove fuel).

**1. Breakfast** - should not be a complicated meal but should be a complete one since it supplies the foundation for a full day's work. Time is also a factor since you probably want to get up and moving. Just standing around in camp in the early morning (cold) hours only leads to cold feet and bodies. Since the easiest thing to cook is water it is best to go for items which can be made in each individual's cup. Suggestions include: instant oatmeal with hot milk & margarine, hot Tang, Granola with hot milk, hot Jello, hot chocolate with extra milk & margarine.

It is best to supplement some of these items with extra powdered milk to add additional protein and margarine for fats. This is the meal to be careful *not* to dump too much sugar into the bloodstream at once, but rather to eat a good mix of all three major food types. The sugars will get you started and the proteins and fats will keep you going through the morning.

**2. Lunch** - There are two approaches to lunch on a winter trip. One is to stop for a traditional lunch and take a long break. This means cessation of activity which can lead to people getting cold. Additional layers would need to be put on and taken off. All of this adds up to a lot of time. But this also allows time for exploring an area and taking it easy. You can break out the stove and cook up a hot meal if you like. The other approach is carrying a personal lunch which can be eaten throughout the day, at scenic points, water stops, clothing breaks, etc. The second approach minimizes the amount of time people would be standing around, but also doesn't provide a major rest stop. In both cases you should include all the food groups by having some of the following items: meats, cheeses, nuts, dried fruit, raisins, cookies, candy, granola bars.

In the case of an "eat through the day lunch" a general formula is to take the following per person per day:

- 1/2 - 3/4 lb. GORP - raisins, peanuts, M&M's, sourballs coconut, chocolate morsels etc.
- 1/4 - 1/2 lb. Lunch Meat and/or Cheese - cut into bite size chunks so you don't break your teeth
- Other items include cookies, brownies, peanut butter, bagels, etc.

**3. Dinner** - It is often good to start dinner with an instant soup or a hot drink that can be made in each person's cup. This gives some internal warmth while waiting for the main course. In the winter, the main dish is usually some form of one pot glop/stew. This is to save time and stove fuel. A glop starts with a soup or gravy base, and includes a starch (rice, noodles), some vegetables (frozen-vegetables keep well on winter trips), whatever protein you are carrying (lunch meat, cheese, canned chicken, tuna). This should be spiced to make it tasty. Remember, at the end of the day you will be more tired than hungry and having an interesting meal is essential to get you to eat.

The other approach to dinner is freeze-dried foods. These have the advantage of simply adding the dish to boiling water so less fuel is needed and they weigh very little. There are a number of companies offering these items. They are generally more expensive than what you would pay for basic staples like rice & noodles. Be aware of portion size. Some companies give an unrealistically high estimate on how many their meal pack will feed.

The meal is concluded with hot drinks (tang, tea, hot chocolate, Jello etc.) and possibly dessert. At the end of the meal water should be melted/heated up for personal water bottles at night. (See *water section below*).

Desserts - Dutch Oven Cooking -

Dehydrated foods (which are different than freeze dried *are not* recommended because they require large quantities of water to rehydrate them).

**4. Food for sleeping** - you need to take some of your lunch for the next day to bed with you. This allows fresh items like the meat and cheese to thaw. If you wake in the middle of the night and are cold (or just before you go off to sleep) it is best to eat proteins. The protein will be broken down more slowly so the heat will be released over a longer period of time. If you eat a sugar, you will get a quick "heat high" and then your body temperature will drop back down, sometimes falling below its previous level.

**5. Utensils** - all the personal utensils you will need is a large plastic cup (insulated if possible) and a plastic spoon. (*Do not bring metal utensils in winter*). It is also recommended that you tie an idiot string between the cup and the spoon. Cleaning these utensils is generally only scraping out the remainder with snow. Anything left will be part of your next meal.

**6. Food Packing** - You will need to repack your food to minimize the amount of trash you bring in with you. It is best to combine food items by meal or type into separate stuff sacks (breakfast bag, lunch bag, dinner bag, hot drink & dessert bag). Label them or color code them so you can easily distinguish them.

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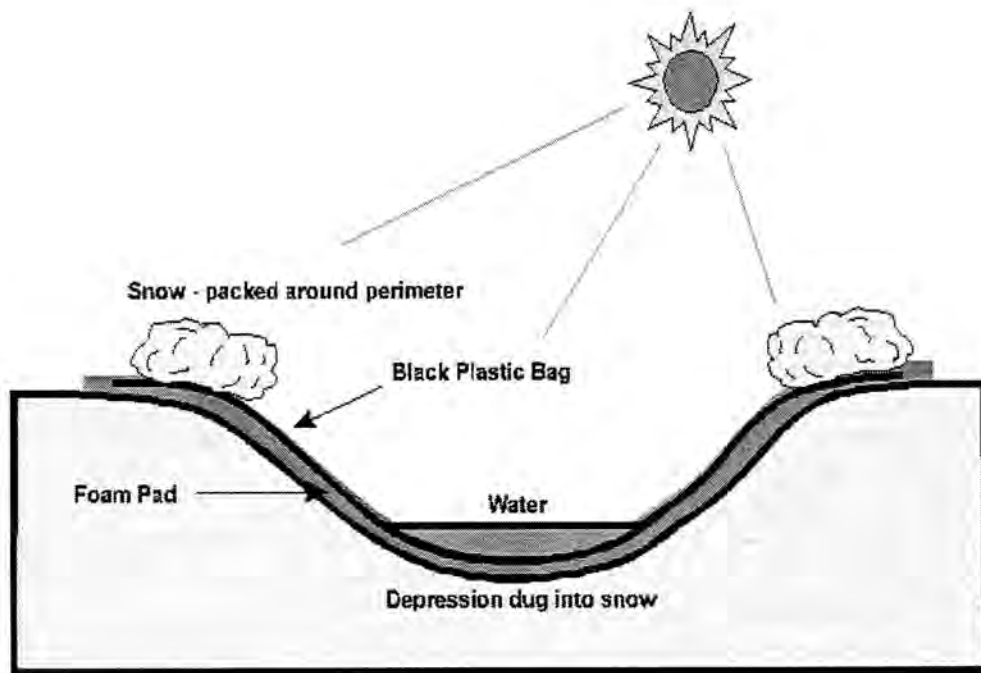
## 4. Winter Water - *keep hot water available as much as possible*

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.

4) Winter Solar Water Collector - In a spot that will remain sunny for several hours, dig out a depression in the snow about 2 feet across and 1 foot deep. If possible, line this depression with a foam pad or other insulation (not essential but it speeds the process). Then spread a dark plastic bag (trash bag) over the depression forming a shallow dish pan. All over the raised margins pack **clean** snow. Drawn by the dark plastic the sun's energy will melt the snow and water will collect in the depression.



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.

8) Water purification - keep in mind that water gotten from streams in the winter time may have bacteriological or other contaminants. You should check with local rangers about any water problems before going in. If the water does need to be purified, the best methods during the winter are either:

1. **Boiling** - for at least 3-5 minutes (add 1 minute for every 1,000 feet above sea level so that at 10,000 feet you are boiling for 15 minutes). ***This is the best method in winter situations.***
2. Less Effective Methods:
  - o **Filtration**- using a filtration pump system such as the PUR, First Need, or the Katadyn is **not recommended** in subfreezing temperatures. Keep in mind that the water in filters can freeze preventing them from working. Also, as the water freezes, it expands and may crack the filter, rendering it inoperable or even worse transmitting harmful microorganisms into your system. For these reasons, filters should be used with great

caution in the winter. Be careful of inferior filters which do not strain out many organisms.

- **Chemical treatments** (iodination or chlorination) are ***not recommended*** because they become ineffective at low temperatures. Only use these methods if the water has been preheated to about 60o Fahrenheit.

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## 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 your 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."
- Whisk 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 whisk 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 night's 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.

## **Snow Shelters**

*The following snow shelters are also useful in winter. Keep in mind that there is great potential for getting your clothing wet while constructing these shelters. You should be dressed accordingly.*

**Snow Mound Shelter** (Quin-zhee) - If the party does not have the experience or the snow conditions aren't good for an igloo, a snow mound shelter can be made. In a selected spot, place an upright marker (ski pole, ice axe, etc.) to mark the center. Tie a cord to the marker and scribe a circle in the snow to indicate the pile size. The rule of thumb for size: if the snow in place is not to be dug out, the radius should be the interior size plus about 2 feet; if the snow in place is to be dug out, about 1 foot can be subtracted from the radius for each foot of in-place snow. Piling the snow for a two person shelter will take two people about an hour. Pile loose snow within the marked circle with shovels, tarp etc. Don't compact the snow. When the mound is the right size and shape, do not disturb it; allow it to compact naturally - minimum time one hour. Chances of collapse are greatly reduced if you let it settle for two hours. Thirty-five degrees is the natural angle at which loose snow rests. Be sure to allow the snow to settle at this angle. Otherwise you will have thin spots or a buckling roof when you excavate the interior. After compaction you are ready for digging. The entrance direction should be away from the prevailing incoming weather. From the entrance point start digging toward the marker. Pass the snow out to helpers. As soon as you reach the marker, do not disturb it. This is your guide for excavating the interior. Clear out the inside to the intended radius. To check on wall and roof thickness, measure with a stick poked through. When the dimensions check, remove the marker and trim the interior. Then install a vent in the roof. Get rid of waste snow promptly before it hardens. The process is a wet one so make sure you have waterproof gear on and good shovels for making the mound and digging out.

**Snow Cave** - A snow cave can be dug into a hillside. Dig the entrance up so that the door is below the sitting level. Also there are natural snow caves formed by the overhanging branches of trees covered with snow. By digging down you can get into the cave beneath the branches. In both cases you should poke a ventilation hole and keep it clear.

**Igloo** - can be constructed if there is snow of the proper consistency to pack into hard blocks. Keep in mind that building such a shelter takes a great deal of energy and time. Two skilled persons can build a two person igloo in 2-3 hours with proper equipment and good snow. Obviously several such structures would need to be built to hold a larger group. Building an igloo is a process that requires a certain amount of artistry, but is less of an energy expenditure than a snow mound shelter. In general, rectangular blocks roughly 24" by 18" by 6" are cut and stacked in an ascending spiral. The rectangular blocks are placed vertically and the bottom shaped so that only the two bottom corners are supporting the block. Then the block is tilted inward and the vertical edge contacting the adjacent block is cut away until the weight of the block rests only on the upper corner. The weight of the block is supported by the diagonally opposite corners, while the third corner prevents rotation. Once the first row is laid you shave off the tops of several blocks ( 1/4 - 1/3 of the circumference) to

create a ramp and build upward in a spiral. Once the structure is complete, snow is packed into all the open joints. (See the *Off Belay* reprint *Igloo*.)

**Snow Pit** - This structure can be created by digging a trench in the snow down to ground level (if possible). The structure should be a little longer than your body and 3 - 4 feet wide. Line the bottom with insulative material to insulate you from the cold ground (in an emergency you can use 5-6 inches of evergreen boughs). A roof can be made of skis and poles or overlapping boughs and sticks then covered with a tarp and then loose snow or blocks of hard pack snow. The doorway will be a tunnel in from the side. This can be plugged with a door of hard pack snow. **A ventilation hole must be poked into the roof for air flow.** Keeping a stick in this hole and shaking it every so often will keep the hole open. If possible, the entrance should be lower than the level of the trench, this keeps the coldest air in the entrance rather than in the trench.

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## 6. Leave No Trace Camping in Winter

Winter generally provides a blanket of snow which protects underlying soil and vegetation, the major concerns for minimizing impact. However, when thin snow cover is compressed and compacted in early or late season, snowmelt can be delayed, shortening the growing season. Also, early and late winter trips can run into melting conditions, where top layers of soil melted by the sun lie ovetop frozen ground. Erosion, and destruction of plant life is extremely likely at these times, and winter travel is best avoided. Otherwise travel in small groups and visit either remote places where your disturbances won't be compounded by others following you (allowing for recovery) or high impact areas that have already been disturbed. Special considerations exist for high altitude and glacier conditions (see [Soft Paths](#)).

### Backcountry travel and camping

- Winter clothing and equipment, even when "natural" colored will show up well against the snow. Brighter colors can be a safety measure, as people and equipment can easily be lost in a winter storm. Since there are less people out in the winter, the visual impact is less.
- Winter is an exceptionally quiet season in the backcountry. Travel quietly and avoid excess commotion at your campsite.
- One of the greatest impacts can be on wildlife. Animals in the winter have limited food supplies and are often stressed to their limits to survive. Being disturbed by backcountry travelers can drive them away from food sources, require them to use more energy, and can lead to death. Animals may seem more "approachable" in the winter. This is because they are trying to conserve energy. Do *not* approach wildlife too closely.
- Camping
- Tent, igloo and snow cave sites should be selected away from trails and open bodies of water if possible.
- All campsites and cooking areas should be disguised when you leave so that accidental stains are covered, and so that camping areas will be undetectable after 2 - 3 inches of snow has fallen.
- Large snow structures such as igloos and snow caves can be left intact, as long as the rest of the camping area is well camouflaged. Occasionally these snow structures can be used again by other grateful winter travelers.
- Camp away from animal feeding, watering, and bedding areas.
- **Fires** - Under winter conditions, it can be difficult to build a disguisable fireplace or to gather wood by acceptable means. Since any downed wood is under the snow and possibly wet, wood is both difficult to find and may not be usable for a fire. Gathering wood from lives trees can have significant impacts on an area especially at high use sites. Therefore, one should carefully examine the location, the ecosystem, and the ability to clean up the site after the fire before deciding to build one. Obviously, in a real emergency, a fire might need to be built in spite of the impact it might have on the environment

- **Sanitation** - Lack of sunlight and cold temperatures retard the decomposition of fecal material.
- Maximizing sunlight will help but will leave a visual impact if others are in the area. The best solution is to dig a cathole in just below the surface of the snow. Keep in mind that after the thaw, the feces will be resting on the ground. So pick a cathole site far from any water, summer trails, or summer camping areas. Locate a site with as much ground cover (grass or forest downfall), and as little slope as possible to minimize washing into surface water, and **maximize feces-soil contact**.
- For maximum fecal dispersion, persons should make personal holes as needed. There is no reason for a group's waste to be deposited in one place. Head away from camp. Snow should be kicked over urine stains to prevent the "yellow snow" effect. Toilet paper can be a problem in the winter. Burning it once it has hit the snow is very difficult. You can burn it in a tin can or pack it out. A better idea may be to use snow or ice (although powder snow is difficult to use).
- You almost never need to wash pans in the winter. A simple scouring with snow will freeze all particles. They can be packed out with garbage (or left for the next meal). Ending dinner with hot drinks usually takes care of any food particles. Water left over from pasta is full of carbohydrates and makes good drink water. If you do have leftover cooking water, solid food waste should be strained out of the water and packed out. The water should be concentrated in sump holes far from water sources to prevent massive unsightly stains on the snow. The sump holes should be covered when breaking camp. Leftover grease will cool to a solid and can be carried out. Minimize all solid food since animals will often dig up sump holes.
- Litter is especially difficult to check in the winter when dropped items can be lost so easily in the snow. Special attention should be given to plastic bags, white toilet paper (use colored or better unbleached, or use snow or ice), candy wrappers and candle wax. Candy wrappers should be removed from all candy before leaving town to prevent accidental litter. Candle wax should be caught in a cup and packed out.

## 7. Winter Travel

Travel in the winter depends a lot on what form of locomotion (feet, snowshoes, skis). There are some general travel techniques that are applicable to all forms of winter travel.

### Travel Tips

- When breaking trail, rotate the leader. Have the leader step off the trail and the rest of the group passes. This person drops into the last position (like a goose) for a rest while the second in line takes over. You can also have a lighter pack that is carried by the person in front and switched off.
- Map and compass is often critical in winter travel since you may be off trail or trails may be hidden by the snow. Feel for difference in the snow between a packed trail and unpacked. Look for opening line above in the trees which could indicate the trail
- When bushwacking, wear goggles to protect your eyes.
- When bushwacking or traveling through dense brush and forest, take your hands out of your ski pole straps. If the basket catches on something and you fall, being in the straps can lead to a dislocated thumb.
- Watch out for "spruce traps," evergreens with the lower branches covered with snow. Beneath there is an air pocket ready to swallow you up (this can be used for an emergency shelter - see above).
- Whiteouts can be extremely dangerous. Even skilled mountaineers have become disoriented and walked off cliffs. Decide 1) if it is safe to continue 2) if it is really necessary for you to continue. Otherwise, set up camp where you are if possible, or hunker down (in a group) with lots of layers on and wait until conditions improve. If you decide to continue, know where you are going and what possible dangers lie ahead. Stay close together and in constant voice contact with the people in front of you and behind you. If one person has to stop, the whole



group has to stop. If you are following cairns, have the group stop at the last cairn, send one person out tied into a rope (with a compass and on the right bearing) to find the next cairn. People can then follow the rope.

## Ice Crossings

Coming up to a frozen or snow covered lake in the middle of winter raises sudden safety questions for winter travelers whether you are on foot, snowshoes, or skis. Will the ice hold? What happens if I break through? Here is a collection of information to help with both of these questions.

## Ice Formation (temperatures based on fresh water)

As surface water on a stream or lake is chilled by the low atmospheric temperature, the water contracts and sinks to the bottom where it is chilled to the point of the greatest density of water, where molecules are packed as closely as it is possible for them to be. This critical temperature is 39° Fahrenheit (4°C). The dense, cold water sinking to the bottom displaces water at a higher temperature which rises to the top. Thus vertical convection currents are produced. This process continues until the entire body of water reaches 39° Fahrenheit. Then the water can no longer sink. Instead it is progressively cooled at the surface. As the water chills below 39° Fahrenheit it starts to expand, until at 32° Fahrenheit (0°C) it changes state and becomes a solid by expanding into a lattice structure that is lighter than the liquid state. From the description of this process, it is clear that flowing water will require a greater length of time to freeze than still water and that shallower depths near the shore of any body of water will reach a uniform 39° Fahrenheit sooner. Thus, ice on a small pond that can support a person's weight cannot be used to gauge the safety of ice midstream or in the middle of a lake.

Generally the first type of ice to form on a lake is called *black ice*. This is a misnomer because the ice itself is clear it is the water seen through the ice that looks black. If a prolonged spell of clear, cold weather occurs after the lake first freezes, this black ice initially grows quite rapidly. However, as it thickens it insulates the water underneath from the atmospheric temperature, and ice growth slows.

As snow accumulates on the lake, the stage is set for a major change in the characteristic of lake ice. The snow cover, when it's deep enough, begins to exert downward pressure on the black ice, and pushes it beneath the hydrostatic water level of the lake. If a period of cold weather follows, thermal contraction of the black ice produces cracks, which allow the lake water to rise up and flood the surface. This is called a slushing event.

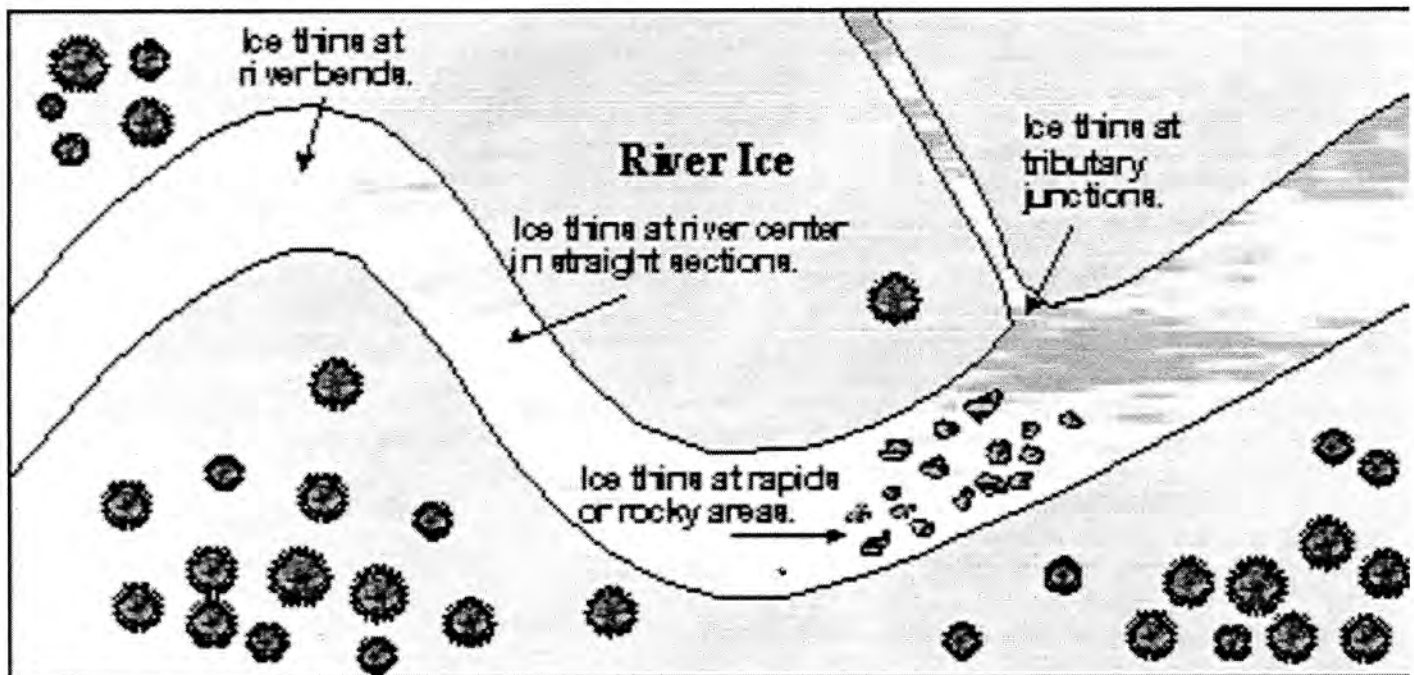
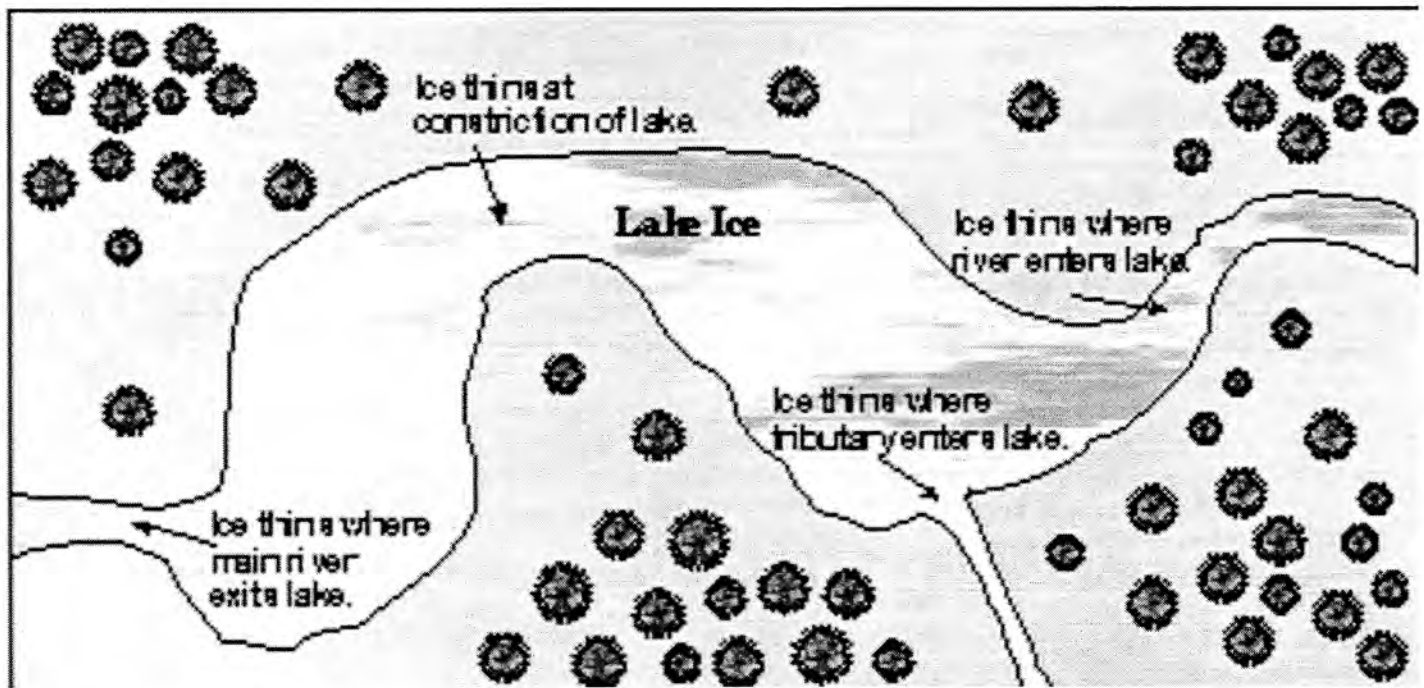
Since the lake is under pressure it spills out, and as it freezes, turns the snow cover to ice. The new ice layer contains many air bubbles between the snow crystals and therefore appears white. This *white ice* forms on top of black ice, and with further snowfalls and cold periods, the process may be repeated throughout the winter. When struck white ice gives a solid sounding "thump."

Because of the close link between snow accumulation and white ice production, it's not surprising to find a predictable pattern of ice types on a lake. Snow in the center of a lake may be redistributed onto the downwind sides of the lake and along the shoreline. Thus, it's not surprising to discover that these areas also have the greatest thickness of white ice. A lake's snow cover is frequently much thinner than the surrounding shore's due to removal by wind and conversion of snow to white ice during slushing events, and may be a preferred route for snowshoers or skiers.

## Selecting Routes

The following are guidelines which will help you determine which routes to follow across a frozen body of water.

- Lakes - watch for constrictions where rivers or streams enter or exit. These are likely to be thin.
- Rivers - care should be taken when crossing on the outside of bends or at the center of the river in straight sections. Also sections of rapids, where tributaries join, or where the river is constricted should be avoided. All of these areas have the greatest current flow which means less stable ice.
- Since thinning of ice by under-ice water currents is often difficult to ascertain especially when it's snow-covered, test the ice periodically by using your ski poles to tap out the ice in front of you. Vibrations will tell you about the ice thickness, structure and strength. If the ice is suspect, move around the area or move back to a safe location and chip a small hole to check the thickness and type of ice.
- Spring-fed bodies of water may have flow percolating up in different sites causing less stable ice.
- The continuity of ice and hence its structural strength is greatly diminished when freezing occurs in swamps with alder or cattail.
- Logs, stumps, rocks, earth hummocks, basically anything sticking up out of the ice picks up heat from the sun during the day; some of this heat melts the ice surrounding the object. These obstructions often have weak "moats" of ice surrounding them and are prone to breakthroughs.
- Ice formed during a snowstorm amounts to frozen slush that will appear grey to white and have a pebbly, opaque surface, the result of microscopic trapped air bubbles that resist cohesion, weakening tensile strength by as much as half.
- Water on top of ice is dangerous, especially during warm spells and in the spring. Water is heavier than ice, and as a result it leaks down through it, creating fractures known as *honeycombs*. No matter how thick it may be, honeycombed ice can give way.
- Beware of dark patches in ice. They may be a sign that the water underneath has melted and thinned the ice from below, a common situation around underground springs and current lanes. Moving water of any kind eats away at the ice above it.
- The surrounding landforms or lake geography also suggest some things about ice. The deeper the lake and the longer it takes to freeze tight, the harder and safer the ice will be. In the winter (in the northern hemisphere) the sun is to the south, so areas that face north get less sun exposure. This means that ice will be thickest along the south shore (north-facing) of a lake and thinnest along the north shore (south-facing).
- Straight open cracks may be safe to cross even if there is open water. If two or more cracks meet at open water, crossing is dangerous.
- Discolored snow over ice may indicate water or a slushing event. If the snow looks dark or slushy, avoid the area.
- A depression or slump in a normally even snow surface may indicate soft ice underneath.
- Ice jams with smashed blocks of ice piled on one another are often found downstream of rapids. This means the area upstream may not be safe to cross because of fast moving water.
- Overflow caused by water seeping up through cracks in the ice or over the edges near banks can saturate the snow cover and create deep wet slush. A new layer of ice can form on top. If this layer is covered with snow it may be indistinguishable from the snow surface (although a pole tap will give a very different sound).
- Remember that ice will support your weight best if you're on snowshoes or skis (greater surface for weight distribution), so don't stop to remove skis or snowshoes in the middle of a lake or river, especially if you think the ice could be thin. If your skis are icing up, wait until you reach land before scraping and rewaxing. It's not only safer, but you'll avoid getting your boots wet.



## Ice Safety and Rescue

- Keep in mind that, like avalanches, ice can give way on the first person or the last or not at all. You can cross any area safely during the morning and then have it give way on your way back in the afternoon. Therefore, you *always* need to be cautious.
- Spread the group out so as not to concentrate weight on the ice.
- The lead person should be probing ahead with a ski pole or similar object. Poke the ice fairly hard. If the probe goes through, turn back and find another route. You can also hear a different sound with solid ice (sound - tick) versus thin ice over an air pocket (sound - tock).
- Avoid the danger areas outlined above, why not try a trail around the lake if you are not sure about the ice?
- If you have serious concerns about the ice, make sure your pack hipbelt and chest compression strap are off. This will allow you to quickly jettison your pack if you fall through. If you go through, immediately shed your pack and kick to the surface.

- **Self-rescue** - Attempt self-rescue by extending your arms forward over the ice, kicking the legs up so that the body is in a level position in the water, and working forward onto the ice by kicking and carefully pulling with the arms. A pocketknife or other sharp object can be used in the hand to increase traction. This maneuver can be successful even if the ice continues to break ahead of the victim; it should be continued until firm ice is reached. After pulling the entire body onto firm ice, the victim should carefully roll or edge toward shore, distributing body weight as widely as possible.
- **Group rescue**
  1. Check on everyone and make sure the rest of the group is on safe ice. If not, have people crawl (not walk) to safety (crawling spreads the weight).
  2. Toss a throw rope to the person to stabilize them (an essential piece of equipment). This will also help minimize panic and give you something to help pull them out.
  3. Stay a safe distance from the hole. If necessary, lie down on the ice and extend objects towards the hole (skis, ski poles, etc.). If necessary, a human chain can be formed by laying down on the ice and grabbing the ankles of the person in front of you. The person closest to shore is "on belay" for the group. *Don't* try to reach the person with your body, in their panic and struggle (like a drowning person) there is a good chance they will pull you in.
  4. Span the edge of the hole with skis or saplings extended to the person. Since the ice is likely to keep breaking as they try to climb out, this gives them something to climb onto and distributes the weight. Use the rope to help pull the person out. They will need to kick their feet to the surface to be as horizontal as possible.
  5. Once the person is out of the water. **Begin immediate assessment and treatment for hypothermia.** Rolling them in the snow can blot up some of the water in their clothing.

## Ice Thickness

As a general guideline, 1 inch of black or white ice will probably hold you up. Two inches is safe, and six inches will hold up a moose. Thickness of suspect ice can usually be determined quite quickly by using an ice axe or auger to drill through. However, for advanced trip planning, you can use the following formula to estimate the thickness:

Z = ice thickness in inches

S = degree days accumulated below 32 °F

A = a coefficient which varies as follows:

(.8) - windy lake with no snow

(.5 to .7) - average lake with snow cover

(.5 to .7) - average river with snow cover

(.2 to .4) - sheltered small river with rapid flow

S is calculated as follows: Suppose ice is formed December 15 and the mean temperature for December 16 was 50 F. To find degree days, subtract 50 F from 320 F for a value of 27. If on December 17 the temperature is 40 F, subtract 40 F from 320 F for a value of 28. S would then have a value of 55 by December 17

(270 F + 280 F = 55). Next take the square root of 55 (7.4). To determine ice thickness, multiple 7.4 by the appropriate coefficient A (say .8 for a windy lake with no snow), and your answer is 5.9 inches of ice.

If you don't know the date of ice formation, you can estimate by the following technique:

1. For lakes 3 - 10 feet deep, freezing occurs very close to the date when the 3-day running mean temperature is 320 F and where temperatures remained mostly below that for the rest of the winter.
2. For lakes 20 - 50 feet deep, the date of freeze-over occurs when the 40-day running mean temperature reaches 320 F.

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## Avalanche Basics

### Types of Avalanches

**Loose Snow Avalanches** - These start from a single point incorporating more and more unconsolidated snow as they fan out. They are caused when the weight of new fallen snow succumbs to the forces of gravity. This occurs most often after periods of heavy snow (10-12 inches accumulation, or snowfall or 1 inch or more per hour) especially when piled on top of a smooth snow surface (from thawing, freezing, or rain) The smooth snow surface provides a slick ramp for the heavy new snow to run down.

**Slab Avalanches** - Are caused when well compacted and cohesive layers of snow aren't anchored to the slope. If there is a weak layer of snow underneath the compacted layer, the slope is primed to avalanche. Various forces, sun, wind, or a person can trigger the slab at the release zone.

**Avalanche Sites** - Open slopes between 25 and 45 degrees. Especially lee slopes (the direction toward which the wind is blowing) which get greater snow loads.

### Avalanche Safety

1. Most victims trigger their own avalanche.
2. Be aware of your surroundings. Watch for evidence of sliding, snow sluffs - small slides indicating avalanche danger, avalanche chutes or slides where trees have been torn away, or snow debris at the bottom of a slope indicating previous avalanches.
3. Keep track of the weather. The first 24 hours after a heavy snow, high wind, rain, or thaw is the most dangerous period. Check local avalanche forecasts and be prepared to postpone your trip if the danger is high. Delaying for 24-48 hours can significantly reduce the danger.
4. Recognize danger zones and be conservative about planning your route or crossing a slope.

5. Travel on ridge tops or heavily wooded areas as much as possible.
6. Avoid the midslopes or the release zone near the top of the slope.
7. Detour completely around a suspect slope.
8. If you must cross an avalanche slope, gather as much information as you can about the snowpack. Probe the snow to see if there is even resistance (if so the danger may be reduced). If there is uneven resistance to the probe (breaks through a crust, punches into layers of loose or unconsolidated snow) then the avalanche danger may be high. Even better, find a safe location on an adjacent slope with similar exposure, snow level and steepness and dig a test pit. Look at the different layers. If you see layers characterized by course, grainy, crystals, the slope is probably not safe. If layers are firm and bonded it *might* be safe.

## **Crossing Avalanche Zones**

1. Remove ski pole straps and undo all pack buckles.
2. Put on additional warm clothing in case of entrapment.
3. Zip on and fasten all clothing securely to keep snow from entering (cuffs, collars, etc.)
4. Use avalanche cords or an avalanche beacon.
5. Look at the crossing. Are there any islands of safety along the way, a rock outcropping, a stretch of trees? If so, head to the island of safety ASAP if a slide is triggered.
6. Cross one at a time with all other group members watching.

## **Self-Rescue**

1. Yell to alert the group.
2. Jettison your pack and head to an island of safety if possible. Otherwise, try to stay on top of the snow using a swimming motion.
3. Before the snow stops, try to make an air pocket in front of your face by punching out the snow with your hands. Take a deep breath to expand your chest before the snow settles. The snow will quickly set like concrete. If your chest is not expanded, you may not be able to breathe.
4. Try to reach your hand to the surface to provide a clue for rescuers (if you can tell where the surface is).
5. If possible, try to dig yourself out.

## **Group Rescue**

1. Watch the victim in the slide. Where was the person when they were first hit by the slide (point A) and where were they when you last saw them (point B)?
2. Wait until the slope has settled and there is no indication of further avalanche. You don't want to complicate the scenario with another victim(s).
3. Mark point A and B on the slope with visible objects
4. Visualize the line between point A and B. This is the path the victim was swept down. Look for any clues on the surface (clothing, skis, etc.) that might give more indication of the person's position. Mark these spots.
5. Turn your avalanche beacons to receive and begin search procedures.
6. Probe the snow below point B. Stand shoulder to shoulder and advance downslope in a line.
7. If you locate the victim, dig them out quickly.
8. Treat for hypothermia and shock.
9. There is a good chance of head and spinal injuries in an avalanche as well as fractures. Be careful moving the person.

## **Bibliography**

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-

## Resources

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## Snowshoeing Basics

### Types of Snowshoes

There are a number of general types of snowshoes. The major design features are the following:

- Width - a wider snowshoe means better flotation. This means the shoe can be shorter and still provide sufficient flotation. A shorter, wide shoe is more maneuverable, especially good in brush and wooded areas. It does force a wider stance.
- Length - a longer snowshoe also means better flotation. This means the snowshoe can be narrower and still provide good flotation. A longer snowshoe is easier to move quickly like a ski, especially good for open country.
- Weave - the finer the weave, the greater the flotation. Modern metal snowshoes utilize a decking that provides excellent flotation in a small snowshoe.
- Tip - tips may be flat or upturned. An upturned tip rises clear of the depression the snowshoe makes without catching. It is useful on steep uphill. But an upturned toe is more difficult to kick steps into the snow with than a flat toe.
- Tail - long tails help snowshoes track in a straight line which is good when travelling fast. The tail also provides a counterweight to keep the tip up.

The particular size of the snowshoe depends on the weight of the person (including pack), the terrain, and the snow conditions. Cold, deep powder requires more flotation than hard pack. Open country allows for longer, faster snowshoes; deep forest or steep areas may require shorter, more maneuverable snowshoes. Keep in mind that smaller people will need narrower shoes otherwise they have to straddle too much. This can lead to an injury known as *mal raquette* which is inflammation of the front hip tendons.

Heavy Woods and Frequent Turning - Bearpaw or Green Mountain Bearpaw

Deep Snow - Maine or Alaskan

### Construction

Current snowshoes are either wood with neoprene lacing or aluminum frame with a plastic decking. The aluminum models are very strong and lighter weight than wood models. The decking also provides superior flotation over an equal area of laces. Remember that 1 pound on the feet is like 5 pounds on the back. So go with the lightest model that fits the conditions.

### Bindings

The two major bindings are the H Binding which wraps over the toe and the Super A Binding. The Super A binding is easier to put on and much sturdier. The H Binding allows too much foot play. The toe of your boot should fit through the toe hole of the snowshoe without catching (going out or coming back). In cases where you are going on hard pack snow or ice, you should have some form of snowshoe crampon attached to the snowshoe under the ball of your foot for traction. Aluminum snowshoes often have such a traction device built in.

## **Snowshoe Travel**

1. Using snowshoes is mostly strapping them on and walking.
2. When traversing a slope, edge your snowshoes into the hill like a ski.
3. Traversing a hill often requires repetitive high steps with the uphill leg which can tire faster.
4. On step sections you can kick the snowshoe tip into the snow to create a platform to stand on. You can also kick your toe into the slope through the toe hole.

Rising on the ball of your foot while going uphill tires the calf muscles. But letting the heel sag down flat on the snowshoe stretches the muscle. Either produces some leg fatigue. Alternating between the two may reduce repetitive stress syndrome. Stretching before travel, especially the hamstrings, will help reduce the chances of injury.

## **Repair**

Wooden snowshoes can be splinted like a bone fracture using wood and lacing. Broken lacing can also be repaired.

## **Bibliography**

- Snowshoeing, The Mountaineers Books, Seattle.

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## **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 hand washing - food poisoning

## Outdoor Action Winter Camping Trip Teaching Plan

The general plan for the trip will be to hike in on snowshoes and set up a base camp. Day trips and will be done from the base camp which may include snow cave and igloo construction, cross-country skiing, ice axe self arrest training, roped climbing techniques, crampon techniques, and a peak ascent.

## Equipment

- Winter Clothing
- Layering
- Tents
- Stoves & Cooking
- Snowshoes
- X-C Skis, Boots, Poles (optional)
- Ice Axe (optional)
- Crampons (optional)

## Camping Techniques

1. Tent
  - Platform
  - Set Up - Snow Stakes
2. Cooking Area - Stove platform
3. Minimal Impact
4. Getting Winter Water

## Sleeping

1. Water bottles
2. Meat & Cheese
3. Dry Clothing
4. Dry Out Clothing - keep boots warm

## Snow Travel Techniques

1. Direction finding in winter
2. Direction of travel
  - Traverse
  - Straight up
3. Kicking Steps
  - Soft snow
  - Hard snow
4. Cutting Steps
5. Descending
  - Plunge Stepping

- Glissading - sitting, crouching, standing
- 6. Stream/Ice Crossing

## **Snowshoeing**

1. Proper Lacing
2. Stride
3. Using Ski Poles
4. Kicking Steps
5. Sliding
6. Snowshoe Crampons

## **Ice Axe & Crampons**

1. Carrying the Axe - pack, cane, horizontal, ready
2. Self-belay - hand grasp
3. Self-arrest - various positions, with rope, pack
4. Probing with axe
5. Walking with crampons - watch insteps!
6. Side Stepping
7. Front pointing

## **Snowshelters**

1. Snow Cave
  - Dug into pile, hillside
  - Snow pit covered with blocks, boughs, ski poles & tarp
  - Tree Moat - as emergency shelter
2. Igloo

## **X-C Skiing**

1. Getting Into Equipment
  2. Step Turn
  3. Kick Turn
  4. Kick & Glide
  5. Diagonal Stride
  6. Double Poling
  7. Getting Up After A Fall
  8. Herringbone
  9. Sidestep
  10. Snowplow
  11. Snowplow Turn
  12. Step Turn
  13. Climbing Grades
  14. Traversing (up & down)
-

# Outdoor Action

## 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

#### Travel Equipment:

- \_\_\_\_\_ \* Snowshoes with binding & snowshoe crampons
- \_\_\_\_\_ \* Ski poles - 1 pair
- \_\_\_\_\_ \* Ice Axe
- \_\_\_\_\_ \* Crampons with binding and point protectors
- \_\_\_\_\_ \* Skis and boots (if skiing)

#### 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

#### Food (individual):

- \_\_\_\_\_ 1/4 - 1/2 pound meat & cheese per day
- \_\_\_\_\_ 1/2 - 3/4 pound gorp per day

#### 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.
-

# Outdoor Action

## Winter Camping Group Equipment List

Additions to standard trip Group Equipment List

### SHELTER:

- \_\_\_\_\_ Winter tent with fly
- \_\_\_\_\_ Snowstakes for each tent (may need regular stakes e.g. Chouinard depending on conditions)
- \_\_\_\_\_ Wisk broom - one per tent, one for Quinzee
- \_\_\_\_\_ Thermos (metal) - one per tent
- \_\_\_\_\_ Spare tent poles

### COOKING:

- \_\_\_\_\_ Stoves - Optimus 111 MF or MSR X-GK - 2/group of 8
- \_\_\_\_\_ Fiberboard with ensolite stove platform - 1/stove
- \_\_\_\_\_ Large nesting pots with lids - 1/stove
- \_\_\_\_\_ Small nesting pots with lids - 1/stove
- \_\_\_\_\_ Pot grippers - 2
- \_\_\_\_\_ Fuel bottles with Fuel - figure 1/2 pint/person/day - ADD 1 EXTRA BOTTLE FOR EMERGENCY
- \_\_\_\_\_ Funnel - 1/stove
- \_\_\_\_\_ Plastic cooking spoons, other utensils
- \_\_\_\_\_ Dip Cup
- \_\_\_\_\_ Waterproof matches - strike anywhere - large supply
- \_\_\_\_\_ Scrubbies
- \_\_\_\_\_ Garbage Bags

### REPAIR:

- \_\_\_\_\_ Pliers
- \_\_\_\_\_ Visegrips
- \_\_\_\_\_ Screwdrivers - regular, phillips, posidrive (if ski)
- \_\_\_\_\_ Ripstop & Duct tape - lots
- \_\_\_\_\_ Sewing awl and heavy thread
- \_\_\_\_\_ Regular needles and thread
- \_\_\_\_\_ Hose clamps - 4
- \_\_\_\_\_ Parachute cord - many yards
- \_\_\_\_\_ File
- \_\_\_\_\_ 1/4" waterproof rope - 100 ft.
- \_\_\_\_\_ Extra snowshoe binding
- \_\_\_\_\_ Neoprene straps
- \_\_\_\_\_ Wire
- \_\_\_\_\_ Epoxy glue - something good down to low temperatures
- \_\_\_\_\_ Pack repair parts
- \_\_\_\_\_ Stove repair parts
- \_\_\_\_\_ Pole patch kits - 2 (ski or tent)
- \_\_\_\_\_ Spare bails for XC bindings (if skiing)

### FIRST AID KIT: (ADDED TO STANDARD FIRST AID KIT LIST)

- \_\_\_\_\_ Throat lozenges
- \_\_\_\_\_ Antacid tablets
- \_\_\_\_\_ Heavy space blankets - 1
- \_\_\_\_\_ Heat packs
- \_\_\_\_\_ Hypothermia thermometer

### MISCELLANEOUS:

- \_\_\_\_\_ Snow shovels - 2 - packable
- \_\_\_\_\_ Ice hammer (1-2)
- \_\_\_\_\_ Goretex bivy sack

- \_\_\_\_\_ Spare ski pole
- \_\_\_\_\_ Lots of parachute cord
- \_\_\_\_\_ Thermometer
- \_\_\_\_\_ Altimeter/barometer
- \_\_\_\_\_ Signal mirror
- \_\_\_\_\_ Extra sleeping bag straps
- \_\_\_\_\_ Oil lantern - 1/tent, oil
- \_\_\_\_\_ Candles
- \_\_\_\_\_ Extra batteries/bulbs for headlamps
- \_\_\_\_\_ Toilet paper & lots of ziplocks
- \_\_\_\_\_ Alarm clock
- \_\_\_\_\_ Extra spoon
- \_\_\_\_\_ Extra garbage bags
- \_\_\_\_\_ Guide book(s) & Maps
- \_\_\_\_\_ Snowsaw - inside snow shovel (2 if igloo planned)
- \_\_\_\_\_ 2 Throw bags with 1/4" polypropylene rope - 1 (for ice rescue, snow belays)

**EXTRAGEAR:**

- \_\_\_\_\_ Food - group gorp and extra days rations
- \_\_\_\_\_ Clothing - balaclava, pile/wool pants, pile/wool mittens, goggles, face mask

**DAY TRIP/SUMMIT EQUIPMENT:**

Day packs - each person with appropriate **extra clothing, food, water technical gear (ice axe, crampons etc.), face mask, goggles, headlight** - figure out how to get snowshoes, ice axe, crampons on day packs if necessary - have enough straps. Extra Gear to be carried by group members:

<input type="checkbox"/> Sleeping bag	<input type="checkbox"/> 75 feet 1/4" rope	<input type="checkbox"/> Small ensolite pad
<input type="checkbox"/> Extra Balaclava	<input type="checkbox"/> Bivy sack	<input type="checkbox"/> Altimeter for peak climbs
<input type="checkbox"/> Heat Packs	<input type="checkbox"/> Extra mittens	<input type="checkbox"/> First aid kit
<input type="checkbox"/> Thermos	<input type="checkbox"/> Stove with fuel	<input type="checkbox"/> Pot with lid
<input type="checkbox"/> Matches	<input type="checkbox"/> Compass	<input type="checkbox"/> Map
<input type="checkbox"/> Shovel	<input type="checkbox"/> Candle	<input type="checkbox"/> Knife
<input type="checkbox"/> Whistle (each person)		

**VAN CHECK PRE-TRIP:**

<input type="checkbox"/> battery	<input type="checkbox"/> snowtires
<input type="checkbox"/> oil	<input type="checkbox"/> antifreeze
<input type="checkbox"/> brake and transmission fluids	<input type="checkbox"/> lights

**BRING ALONG:**

<input type="checkbox"/> chains/cables	<input type="checkbox"/> flare kit
<input type="checkbox"/> extra antifreeze	<input type="checkbox"/> jumper cables
<input type="checkbox"/> scraper	<input type="checkbox"/> shovel, and sand

**ON ARRIVAL:**

<input type="checkbox"/> have gas tank full	<input type="checkbox"/> disconnect battery
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