

## LECTURE # 3

### Snow Travel, Snow Camping, GAR, and Leave No Trace Ethics

Lecture 3 Readings and Topics											
Snow Travel and Camping											
Introduction to GAR											
Leave No Trace											
Avalanche Hazards											
Field Trip Leader Q & A (Field Trip #3)											
Assigned Reading (complete prior to Lecture #3)											
<p><b><i>The Freedom of the Hills, 9th edition</i></b></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">Leave No Trace</td> <td style="width: 50%;">Chapter 7</td> </tr> <tr> <td>Access and Stewardship</td> <td>Chapter 8</td> </tr> <tr> <td>Snow Travel and Climbing</td> <td>Chapter 16</td> </tr> <tr> <td>Avalanche Safety</td> <td>Chapter 17</td> </tr> <tr> <td>Mountain Weather</td> <td>Chapter 28</td> </tr> </table> <p><b><i>Basic Rock &amp; Glacier Climbing Course Manual</i></b> All Lecture #3 Material</p>		Leave No Trace	Chapter 7	Access and Stewardship	Chapter 8	Snow Travel and Climbing	Chapter 16	Avalanche Safety	Chapter 17	Mountain Weather	Chapter 28
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Access and Stewardship	Chapter 8										
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Avalanche Safety	Chapter 17										
Mountain Weather	Chapter 28										
Additional Resources											
<p>Avalanche Resources: Northwest weather and Avalanche Center: <a href="http://www.nwac.us">http://www.nwac.us</a> Northwest Avalanche Institute: <a href="http://www.avalanche.org">www.avalanche.org</a></p> <p>Weather Forecasts: Mountain Weather Forecast Resource - <a href="http://www.mountain-forecast.com/">http://www.mountain-forecast.com/</a> NOAA Mountain Weather Forecast <a href="http://www.wrh.noaa.gov/sew/forecast03.php">http://www.wrh.noaa.gov/sew/forecast03.php</a></p> <p><b>Books:</b> <b><u>Staying Alive in Avalanche Terrain</u></b> by Bruce Tremper, Mountaineer Books, 2001 <b><u>Mountain Weather</u></b> by Jeff Renner, Mountaineer Books <b><u>The ABC of Avalanche Safety</u></b> by E.R. LaChapelle, Mountaineer Books</p>											

## **SNOW CLIMBING AND CAMPING**

### **PLANNING AND PACKING**

Spending the nights or many nights in the wilderness requires more time for planning. Necessary research needs to be done on the area, conditions, and weather, and preparations need to be made for shelter, food, clothing and equipment. Snow camping in winter conditions requires far more thought in planning due to the harsher weather conditions and additional consideration needed to keep you warm and comfortable. Many campers like to have the comforts of home but since you will be carrying everything on your back, you will need to streamline what you take with you without compromising your safety.

The most efficient way to streamline gear is to plan with your team/tentmate(s) in advance, and coordinate shared equipment (tents, stove/pot/fuel, water purification system, snow shovel, and other group gear). Make a checklist of each of the items and dole out the group gear amongst the team members (many partners do it by weight).

Try packing a few days before the trip to see if all fits in your pack. You may want to reread *Freedom of the Hills* 9th Edition Tips on packing (page 33) to see how to distribute weight. Make sure you have your pack properly fitted and adjusted, and then try walk around with it loaded. Make sure it is within the weight you can carry comfortably for a long distance. If everything does not fit or the load is too heavy, go through the checklist and identify what you can leave out or substitute with something smaller or lighter, without sacrificing safety.

It is a good practice to try out any new (and rented) equipment, such as tent, stove, and water filter, while you are home (BEFORE the trip) so that you can make sure you know how to use it, it is in working order, and you will be able to set it up quickly even after a long hike as the temperature drops. When you get back home after each trip make notes on your checklist, what worked and what didn't, and what could be improved; it will be extremely useful when you prepare for the next camping trip.

### CLOTHING

Your body basically acts as a furnace, producing heat through chemical reactions (food) and activity. As you increase your physical activity your body increases heat production; when you decrease or stop activity the body decreases heat production and starts to lose heat. You will need to find/figure out/pack a layering system that will keep you cool and dry during physical activity, but warm at rest. The key to staying warm in winter conditions is to stay dry. You will typically want to start with a moisture wicking base layer and a shell during heavy physical activity, and add mid insulating layers as physical activity decreases or temperatures drop. When at rest, put on additional layers before you become chilled since it is more difficult to get warm again once your core temperature drops. When you/the team is ready to be active take off layers until you feel just cool, since your body will start producing heat as soon as you start moving, and you absolutely do not want to break a sweat. When you get into camp, try to change into dry clothes as soon as possible. This will help you stay warm for the rest of the evening and into the night. NOTE: even sweaty cotton underwear and bras make it harder to stay warm. It is not recommended to wear cotton on backcountry camping trips.

### FOOD AND WATER

Try to take foods that are light weight, compactable, simple to prepare and require minimal clean-up. Prepackaged or repackaged foods save on both bulk and weight. For some climbers, “carb loading” can give you a head start on your energy needs, it’s a good idea to eat a carb heavy breakfast. Be as creative as you’d like when planning your meals— but make sure they work at home before trying them out on a trip.

It is important to stay hydrated during an outing, and this can be even more difficult when the temperatures drop. Many climbers use an insulating Nalgene sleeve to store water, in their pack or even better in your jacket. Make sure to store the Nalgene upside down, so if the water does begin to freeze, it freezes at the bottom of the container. If you prefer a bladder and tube system, make sure you use an insulating tube sleeve and store the mouth piece in your jacket to keep it from freezing.

Either keep water inside your tent at night, or bury it in the snow. Snow acts as an excellent insulator and can keep water from freezing, but make sure you mark where you buried it.

### CAMPING

If there is an adequate amount of snow and you have a lot of time you can build snow shelters, such as igloos, snow caves or snow trenches. They tend to be more secure and warmer in wintery condition than tents, but take a lot of time to build. A tent for winter camping needs to withstand both wind and snow and it must have a roof line that allows snow to fall off. Four-season tents generally meet these criteria. A ground sheet is useful to help protect the tent floor (the snow underneath can turn to ice from your weight and body heat and sharp ice can tear the tent floor). Anchor the tent using snow tent stakes or deadman anchors.

Some considerations in choosing a winter snow camp:

- Camping regulations
- Other campers
- Wind – avoid ridge tops and open area where wind can blow down tents or create drifts
- Be aware of dead branches hanging in trees (“widow makers”)
- Avoid low lying area where the coldest air will settle
- Select sites that do not pose any risk from avalanches
- Exposure – south facing areas will give longer days and more direct sunlight
- Water availability (lakes or streams nearby) – always camp 200 ft or more from a body of water

When packing up and leaving the campsite, work together to camouflage the camping areas, so it will be undetectable after 2-3 inches of snow has fallen. Pick up any trash, collapse snow structures, cover up discolored snow, and fill snow pits that can pose cave-in hazards for other visitors and wildlife.

### SLEEPING, SLEEPING BAGS AND INSULATION PADS

You will probably wake up a number of times during the night. This is normal at altitude and in cold weather. Your body needs to change positions to allow for circulation to compressed tissues and to move around a bit so that muscle movement generates heat.

Some tips to stay warm and get a good night rest:

- Use the restroom before you get in your tent, so you don't have to get up and possibly go out into the cold at night. You may want to use a "pee bottle" in your tent– make sure you mark it well.
- Brush off any snow from your boots or packs with a whisk broom so you don't bring any snow inside the tent.
- Put water bottles with hot water or tea (to drink in the morning) into your sleeping bag. Put them in a dry sac in case they leak.
- Remove any wet/damp layers and replace them with dry ones, particularly socks. Wear layers of dry clothes for the night.
- Wear a hat, fleece booties, thin gloves and scarf around the neck to help keep you warm.
- Get warm before you get into your sleeping bag. Do some jumping jacks, etc. .
- Pre-warm your bag with your body (get it nice and toasty). Place damp items in the sleeping bag with you near your trunk. This will help dry them overnight.
- Sleep with your face out of the bag. This reduces moisture build-up inside the bag.
- Ventilate the tent so moisture can escape.
- Bring ear plugs, many people tend to snore at elevation

Sleeping bags for snow camping should be rated to temperatures below what you will likely experience if you want to be comfortable. It is recommended to use two insulating pads when camping on snow, they are indispensable for sleeping comfortably at night.

### MOUNTAIN WEATHER

Mountain weather is a primary concern to the mountain traveler. For a climber, some knowledge and understanding about mountain weather is more than just a convenience, it is a matter of safety. Weather is often the critical factor when making a go or no-go decisions before or during a climb. In Washington State, the variability of the weather makes knowledge and observations an essential part of mountaineering. **Every member of a climbing party should be aware of the weather**, not just the leader. Continue to monitor the weather while packing, and try to check the weather the morning of the trip. Checking RELIABLE weather forecasts, topped-off with a good understanding of mountain weather can help make for a more safe and enjoyable outing. To better understand weather, you should concentrate on increasing your knowledge of:

1. Regional weather patterns
2. Effect of regional patterns on local mountain weather
3. Recognize how each of the following indicate weather change:
  - a) Sudden major change in wind direction
  - b) Sudden temperature change
  - c) Obvious barometric pressure changes
  - d) Changes in cloud strata directions
  - e) Cloud level rising/falling
4. How these weather influences drive changes in the snow pack causing avalanches.

### METEOROLOGICAL FUNDAMENTALS

*From: National Avalanche School, 1981. Reno, Nevada*

#### **Some Rules of Thumb for Forecasting Mountain Weather without Weather Maps**

- Steadily falling barometric pressure usually indicates an approaching storm.
- Steadily rising barometric pressure usually indicates clearing.
- The second night of a storm is usually the coldest.
- Cirrus clouds can precede a storm by 24 hours or more. (A ring around the moon is caused by thin cirrus.)
- Thickening and lowering clouds (usually approaching from the west) indicate an approaching storm.
- Thickening mountain wave clouds indicate increasing moisture and winds aloft and a possible approaching storm.

- Frontal passage is often indicated by the lowest point of the barograph trace, a wind shift, and the sudden appearance of heavily rimmed snow crystals or graupel.
- There is little chance of precipitation continuing when barometric pressure is 30.10 inches or higher.
- Thinning and lifting clouds indicate clearing weather.
- When the temperature during a storm drops to 5 °F or colder, snowfall will rapidly diminish.
- On clear and calm nights, valley temperatures will be colder than ridge-top temperatures. (Inversion)
- Valley fog clearing before noon indicates fair weather.
- Snow plumes on ridges and mountain wave clouds indicate strong winds at high elevations.
- If the wind veers with height (turns clockwise; e.g., southwest at ridge-top, northwest aloft), expect a warming trend.
- If the wind backs with height (turns counterclockwise; e.g., west at ridge-top, south aloft), expect a cooling trend.
- If the wind veers with time (turns clockwise; e.g., south turning to west), expect mostly fair weather: low pressure is passing to the north.
- If the wind backs with time (turns counterclockwise; e.g., northwest turning to southwest), expect snow: low pressure is passing to the south.
- Temperatures change 3-5 degrees Fahrenheit every 1,000 feet in elevation change.

## AVALANCHE HAZARD AWARENESS & AVOIDANCE

Snow avalanches are complex, natural phenomena. Experts do not fully understand all of their causes. No one can predict avalanche occurrences with certainty, but we know that avalanches can have a tremendous force and are life-threatening to snow travelers year-round.

The more time you spend skiing, snowboarding, snow shoeing, snowmobiling, and enjoying other snow activities, the greater your chances are of being caught in an avalanche. Take the time to learn and understand avalanche safety by enrolling in an AIARE course. Knowledge of avalanche terrain analysis and good route selection can help you avoid being caught in an avalanche. Check the avalanche hazard forecast ([www.nwac.us](http://www.nwac.us)) for the area in which you plan to travel. Think about the changing weather, terrain and snow pack conditions around you **AND constantly update your assessment of the avalanche hazard!**

### ROUTE SELECTION AND PRECAUTIONS

**Avalanches don't typically happen by accident** and most human involvement is a matter of choice, not chance. Hence, always practice safe route finding skills, be aware of changing conditions, and carry avalanche rescue gear. Learn and apply avalanche terrain analysis and snow stability evaluation techniques to help minimize your risk. Remember that avalanche danger rating levels are only general guidelines.

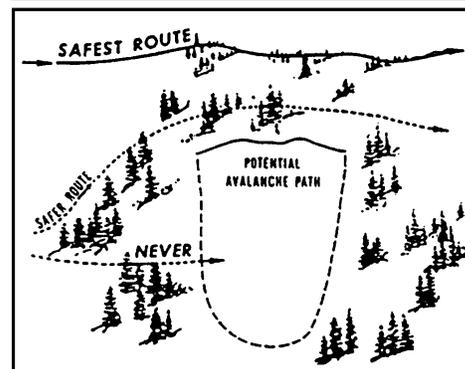
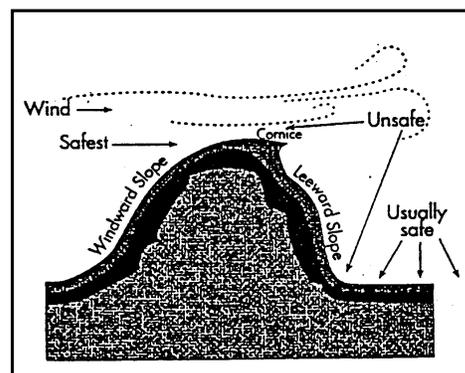
-The safest routes are on ridge tops and slightly on the windward side, away from cornices. Windward slopes are usually safer than leeward slopes. If you cannot travel on ridges, the next safest route is out in a valley, far from avalanche paths and other slopes.

-Avoid cornices. Move towards ridge tops by detouring out of the path of cornice snow pack.

-If you must cross a potentially dangerous slope, stay high and near the top. If you see cracks, or avalanche fracture lines in the snow, avoid them and similar slopes.

-Only one person at a time should cross a potentially dangerous slope. All other people in the party should watch. Before crossing the slope, remove ski pole straps, ski safety straps, and loosen all equipment, (except small backpack, which can act as a floatation device) so they may be discarded should a slide be triggered. Fasten all clothing, put on your hat and gloves, and raise your parka hood.

-Each person in the party should carry, and know how to use, an avalanche transceiver, sectional probe poles, and a shovel.



-If you must ascend or descend a dangerous slope, go straight up or down; do not traverse back and forth across the slope. Take advantage of dense timber, ridges, or rocky outcrops as “islands of safety.” Use them for lunch and rest stops. Spend as little time as possible on open slopes. As the hazard increases, route selection becomes more important

### **AVALANCHE SURVIVAL**

#### ***If You Are Caught in an Avalanche:***

- Discard all equipment and get off and move away from snowmobiles you may be riding.
- Make swimming motions. Try to stay on top; work your way to the side of the avalanche.
- Before coming to a stop, get your hands in front of your face and make an air space in the snow. If you know you are close to the surface, try to stick a hand or foot out of the snow so you can be easily found.
- Try to remain calm, and breathe slowly.

#### ***If You See Someone Caught in an Avalanche:***

- Mark the location where you last saw the victim.
- Search directly down slope, below where the victim was last seen. If the victim is not on the surface, scuff or probe the snow with a ski pole or probe pole, or use avalanche transceivers if the victim is wearing one.

#### ***You Are the Victim’s Best Hope for Survival:***

- Do not desert the victim by going for help, unless help is only a few minutes away. Remember, you must consider not only the time required for you to get help, but also the time required for help to return.

#### ***First Aid:***

- Treat for suffocation, shock, impact injuries, and hypothermia.

#### ***Time is the Key to Survival:***

- After 1/2 hour, the buried victim has only a 50 percent chance of surviving.