

A typical layer system consists of an inner "**W**icking" layer of thin material to remove moisture from the skin, a thicker middle "**W**armth" layer to trap air and provide insulation, and an outer "**W**eather" layer, a shell to keep off the wind and rain while allowing perspiration to pass through.

#### ■ **Wicking Layer**

- Thin polypropylene ("poly-pro") underwear.

#### ■ **Warmth Layer**

- Synthetic, wool, or non-cotton shirt
- Fleece or wool top
- Optional sweater to go immediately over underwear

#### ■ **Weather Layer**

- Breathable or waterproof shell.
- Windproof shell to go over the warm wear in dry, windy conditions.
- Down or synthetic-insulation-filled garment in camp and during rest stops in cold weather.
- If the weather is wet as well as cold, another pile or fleece jacket could be substituted for the down garment under the outer shell.

A general rule is to be sure that all of your clothes are loose fitting. If the clothing is tight, the outside cold will be able to seep through as the inside heat leaks out at those points, and you will not keep warm. Remember that the layer system will only work when the clothing is loose enough to trap air between the layers.

The secret to staying warm is to wear layers of clothing, control sweating by taking off a layer before you begin to sweat, and to keep out of the wind.

*Note: For Campout Equipment Checklists, see : [Equipment Lists](#)*

Good quality camping gear is important because you depend on your equipment in the wilderness. If cost is an important factor, consider purchasing camping equipment in used sports equipment outlets, and camp clothing in thrift stores.

## **Jackets**

A jacket should keep out wind, rain, and snow and is a very important layer of clothing. If this layer fails, it doesn't matter how good your other garments are, because wet clothing exposed to the wind will chill you quickly no matter from what material it is made.

Remember, uncontrollable shivering is always the first stage of [hypothermia](#). Avoid jackets that have *any* cotton content.

## **Types of Material**

**Breathable Shell:** Typically made from nylon or nylon blends, wind-proof jackets are lightweight and tightly woven, so there are no open spaces for the wind to penetrate. They dry quickly and make excellent outer shells.

- ▶ **Pro:** Windproof. Allows body moisture to escape. Lightweight. Inexpensive.
- ▶ **Con:** Not waterproof.

**Waterproof Shell:** These are fabrics that use some type of impermeable waterproof coating (i.e. coated nylon). These will keep you dry from rain but allow water vapor from perspiration to build up in layers underneath.

A good waterproof shell will have vents under the armpits and under a flap located between the shoulder blades. Make sure that your rain suit includes rain pants. Avoid ponchos, which catch in the wind and offer no protection for your legs.

- ▶ **Pro:** Very waterproof. Windproof. Inexpensive.
- ▶ **Con:** Exertion may cause body moisture build-up.

**Waterproof and Breathable Shell:** There are a number of ways to make a waterproof and breathable outer shell. All rely on the principle that water droplets from rain are more than 20,000 times larger than water vapor. With fabric that has a layer with very small pores, water vapor can pass through from the inside to the outside while the outside remains impenetrable to water droplets.

At least that is the theory. Before you invest in a breathable shell jacket, ask people you know how well a specific brand really works in an extended downpour. There is *always* a trade-off between the degree of waterproofness of a fabric and its breathability. Some fabrics use a microporous membrane (GoreTex); others have an added microporous coating (Ultrex).

- ▶ **Pro:** Degrees of waterproofness. Degree of breathability. Windproof.
- ▶ **Con:** Degrees of waterproofness. Degree of breathability. Some body moisture buildup. Expensive.

## Boots

Your boots are perhaps your most important camping equipment. They should be selected according to your needs: trail conditions, terrain, pack weight, and personal requirements. Boots are an investment. Selecting, fitting, breaking in, and caring for your boots will help them last a long time and will maximize your own comfort. For [Leave No Trace](#) camping, you should also pack a pair of lightweight footwear to wear around the campsite.

The proper fitting of boots is essential. You should try new boots on in the afternoon, since your feet swell during the day. Select your new boots while

wearing a sock combination of a liner sock under a heavy-duty hiking sock. Usually a hiking boot will be a half-size larger than your normal shoe size to make room for this combination of liner and heavy hiking socks.

The boots should fit comfortably with moderate tension on the laces so you can tighten or loosen the boots as needed. With your foot flat on the floor, try to lift your heel inside the boot. There should only be 1/4 to 1/2 inches (6 to 12 millimeters) of heel lift.

Break in a new pair of boots before your trip. Begin with short walks and gradually increase the time you wear them to allow the boots to soften and adjust to your feet.

Boot care varies with the type of material - leather, synthetic leather, nylon, and combinations of these. If you have leather hiking boots, find out what type of leather it is. Oil-tanned leather is usually treated with a wax or oil. The primary reason for treating boots is not to completely waterproof them, but to make them water repellent and to nourish the leather to prevent it from drying and cracking. Boots should be treated when they are new and on a regular basis to keep the leather supple.

Wet boots should be air-dried slowly or with low heat (put them in the sun). Don't try to dry boots quickly (for example, near a fire or a radiator). Different thickness of leather dry at different rates, which lead will to cracking and curling. While walking on the trail, the heat from your foot will help dry the boot.

At the end of the day, when you take off the boots, open them up as much as possible to help dry them out.

When you return from a trip, always clean your boots before you put them away, or the dirt will corrode the stitching at the seams. Use a stiff brush to remove the caked on dirt.

Store your boots in a cool, dry place to prevent mildew.

## **Clothing**

In order to plan the right equipment for a trip, you need to understand how your body reacts to the temperature and weather conditions you are likely to experience. Balancing the heat you are losing to the environment with the heat you generate from exercise and absorb from the environment is called thermoregulation or homeostasis.

According to the *Outward Bound Wilderness First Aid Handbook*, if you gain more heat than you lose, you experience a heat challenge. If you lose more heat

than you gain, you experience a cold challenge. The ability to regulate body temperature is critical for preventing hypothermia and hypothermia.

One way to regulate body temperature is to wear the right clothing and [layer your clothing](#) properly. Clothing items should be kept versatile enough to meet various seasonal and weather conditions you may encounter. Since each person's body is different, experiment to determine your individual requirements.

If you combine different fabrics in multiple layers, you can maintain a comfortable body temperature without excessive sweating. Throughout the day you will need to "layer up" and "layer down" as temperature conditions and activity levels change. Through experimentation, you can determine which of the inner, middle, outer, and shell layers you require in various situations. Also, different parts of your body may require different layering combinations. The layers should not constrict your movement. The outer layer should not be too tight, since tight layers can compress the dead air space between layers below, thereby reducing their insulating value.

Without a doubt, the worst clothing you can bring on a trip to the wilderness is *blue jeans*. In most climates and environments, you should minimize your use of cotton clothing. Although cotton is comfortable to wear, cotton fibers absorb water and retain water. Once wet, cotton loses heat 25 times faster than dry clothing. Wet cotton clothing can be a significant factor in [hypothermia](#). In warm weather, some cotton-synthetic blends can be used, since they dry faster than 100% cotton, and do not absorb as much water. Never wear cotton in cold conditions as a form of insulation. If you must wear a cotton-blend in warm weather conditions, make sure you bring additional non-cotton clothing in case of unexpected cool or wet weather.

## Sleeping Bags

When selecting a sleeping bag, you need to consider a number of factors. Unlike clothing layers, a sleeping bag doesn't offer much in the way of ventilation to control your body's temperature. Because of this, you may need more than one sleeping bag. For example you could have a heavy one for winter, and a light one for summer and fall.

***Sleeping Bag Styles:*** The following are the three styles of sleeping bags you can find in outdoor stores:

- ▶ Rectangular - Simple rectangular bag style typically does not have a hood.
- ▶ Mummy - A form-fitting bag with a hood. The bag tapers in width from the shoulders to the legs, with little room.
- ▶ Modified Mummy - A form-fitting bag with a hood. The bag tapers as does a mummy bag, but with more width.

**Sleeping Bag Fit:** Fit is important in a sleeping bag, as it is in clothing. In sleeping bags, you want the bag to snugly fit your body. If your bag is too big, you will have large areas where cold air can appear and you will be cold. If the bag is too tight it will restrict your movements and may compress the insulation to a point where it is not effective.

**Features to look for in a sleeping bag:**

- ▶ A hood allows you to insulate your head to prevent heat loss.
- ▶ The draft tube is an insulated tube that runs along the zipper line and prevents cold spots at the zipper.
- ▶ A draft collar provides a closure at the neck area to prevent cold air entering.
- ▶ Well-designed zippers will allow you to open and close your bag easily from the inside and outside.

**Types of sleeping bag insulation:**

There are different types of fills for a sleeping bag, but they can be broken down into two categories: synthetic and down. Insulation provides the loft in the bag, and it is loft that provides the amount of dead air space created by the fill. The dead air space provides the warmth.

**Synthetic Fibers:** Polarguard, and Quallofil. These are normally used in sleeping bags and heavy outdoor parkas. The fibers are fairly efficient at providing dead air space. They are not as efficient an insulator as down, it is hard to compress into a small size, and it tends to break down over time and use, but they do not absorb water and will dry fairly quickly.

**Super thin Fibers:** Microloft, Primaloft, and Lite Loft. These are lightweight and efficient. They do not absorb water and dry fairly quickly. It can be stuffed down to a small size.

**Down:** This is very lightweight and thermally efficient. It can be stuffed down to a very small size, and has the best weight to warmth ratio available. It does absorb water to the point of being useless when wet, and it is very expensive. Some people may also be allergic to the feathers.