



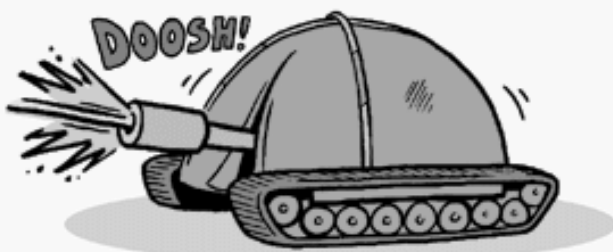
Troops 344 and 9344
July 10-22, 2023



RANGER DROOLY HERE! NOW THAT LOADED, CONCEALED WEAPONS WILL BE ALLOWED IN NATIONAL PARKS, YOU'LL NEED TO PREPARE FOR VACATION... AND BATTLE! CHECK OUT THE LATEST GEAR FOR...

The **COMMANDO CAMPER**

THE **BRADLEY FIGHTING TENT**



SURROUNDED BY RIFLE-WIELDING YAHOO'S STRUNG OUT ON CRYSTAL METH? SCARE THEM OFF EASILY WITH THIS LIGHTWEIGHT ASSAULT DOME. SLEEPS FOUR.

EXPLODING DECOY CHILDREN



AN ANIMATRONIC DECOY CHILD FILLED WITH TNT IS THE LAST THING THE BAD GUYS WILL EVER EXPECT!



AVAILABLE IN 12 ETHNICITIES!

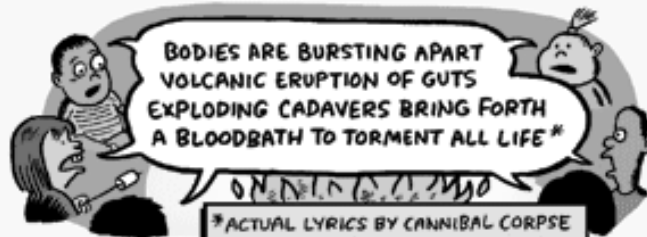
KILLER WEENIES

FROM THE MAKERS OF NAPALM S'MORES, THESE HOT DOGS SQUIRT FLESH-DISSOLVING ACID!



GET IN THE SPIRIT WITH

DEATH METAL CAMPFIRE SONGS



"BECAUSE IT'S NOT JUST A SCOUT TRIP - IT'S WAR!"

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Introduction to the Sawtooth Mountains

The Sawtooth Range is a mountain range of the Rocky Mountains in central Idaho. It is exceptional in scenic beauty and is characterized by high granite peaks and narrow glacial valleys. It encompasses an area of 678 square miles. There are 57 peaks with an elevation over 10,000 feet in the Sawtooth Range, all between 10,000 to 10,751 feet in elevation.

The Sawtooth Range and Wilderness are home to nearly 400 lakes created by receding alpine glaciers. Not surprisingly, this striking mountain landscape was a favorite playground of Ernest Hemingway, who is buried in the Ketchum area.

The spectacular beauty and solitude of the Sawtooth Wilderness is experienced by people from all parts of the country. It is considered the "crown jewel" of the Gem State. First protected in 1937 as a "Primitive Area," the rugged Sawtooth Wilderness was officially created by Congress in 1972.

Also hidden within its boundaries are deep, secluded valleys covered with enormous stands of trees. These mountains hold the headwaters of the North Fork and Middle Fork of the Boise River, the South Fork of the Payette River and contributes significantly to the headwaters of the Salmon River. The snowpack in the winter provides runoff throughout the summer and keeps streams and wetlands charged with water for habitats and ecosystems. Average snowfall is about six feet or more of snow in the winter with temperatures ranging from 9-29 degrees for the highs in the winter and 80 degrees or above in summer with it usually 70 degrees or below, and nights can be cold with possible summer frosts.

Nearly 350 miles of trails provide a wide range of routes and many of the high lake basins do not have constructed trails to reach them. The hiking season is short. Alpine wildflowers bring the high meadows alive with color in the months of July and August. An abundant population of wildlife thrives upon the lush, grassy meadows and many species of fish make their home in the thousands of streams that feed the headwaters of four major rivers.

Hiking and Camping in the Sawtooth Mountains

There's no reason to fear the Sawtooth Mountains, as long as you approach it with proper respect and preparation. As with anywhere else, recklessness and a lack of forethought can get you into trouble.

- **Lightning** – is a serious hazard for hikers on the trail, especially when traveling along an exposed ridge or above the tree line on a hot and humid July afternoon. Thunderstorms can form with little warning from saturated air rising up the slopes.
- **Giardia** - Giardia is a microscopic organism found in lakes, streams, and possibly snow. It also lives in the digestive systems of wildlife and humans. Giardia enters surface water when animals or humans defecate in or near water. Giardia can cause diarrhea, cramps, bloating, and weight loss. To prevent giardiasis, never drink water directly from a stream or lake. We will use a water filtration system that eliminates this organism.
- **Mosquitoes and Black Flies** – These insects can be bothersome here, of course, but no more so here than in most mountain ranges. Repellents containing DEET help keep them away. To keep insects from biting you a loose, lightweight, long-sleeve shirt is preferable along with long, lightweight pants and a mosquito head net. Flies decrease at higher elevations. A stiff breeze keeps them grounded, just like mosquitoes. Don't let them keep you from stopping to drink, rest, or enjoy the scenery.
- **Hypothermia** – A cold rain can be the most dangerous weather for hikers, because it can cause hypothermia (or "exposure") even when conditions are well above freezing. When the wind blows, its chill effect can make you much colder than the temperature would lead you to suspect, especially if you're sweaty or wet. Hypothermia occurs when wind and rain chill the body so that its core temperature drops if the condition is not treated in time. Avoid hypothermia by dressing in layers of synthetic clothing, eating well, staying hydrated, and knowing when to take refuge in a warm sleeping bag and tent or shelter. Cotton clothing, such as blue jeans, tends to chill you when it gets wet from rain or sweat, increasing your risk of hypothermia. Natural wool and artificial fibers such as nylon, polyester, and polypropylene all do a much better job of insulating your body in cold, wet weather.
- **Heat** - Hot dry summers are surprisingly common along the Trail, particularly in the Virginias and the mid-Atlantic. Water may be scarce on humid days, sweat does not evaporate well, and many hikers face the danger of heat stroke and heat exhaustion if they haven't taken proper precautions.
- **Sunburn** - Lather up with sunscreen, even if there's cloud cover. The higher elevations means you have less protection from the sun's powerful ultra violet rays. Don't forget to wear UV-rated sunglasses, as well.

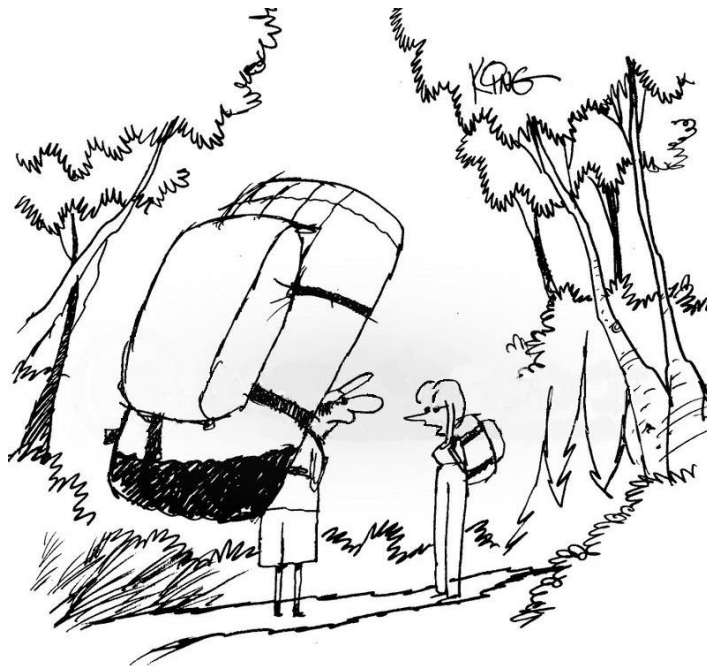
- **Dehydration** - When you engage in strenuous outdoor activities, be sure to replenish your fluids as you go. You will be losing moisture through your mouth and nose and through sweating. This may result in dizziness, intense thirst and elevated heart and breath rates.

Before you commit yourself to our high adventure trip, know what you're in for. The Sawtooth Mountains will test you, both physically and mentally. Climbs can be steep and often leads miles from the nearest road or dwelling. Yes, it can be hard. That's what makes hiking the Sawtooth's an adventure. Part of the joy of hiking is learning to deal with and overcome its challenges, to feel resilient and self-sufficient in a wild, rough place that has few of the amenities of civilized life. Don't underestimate the Sawtooth Mountain challenges - or ignore its timeless rewards. Even so, it need not be an ordeal. Proper planning and preparation will make your experience easier, safer, and more enjoyable.

Hiking and camping in the Sawtooth Mountains can be an exhilarating experience, but it can also be a sweaty, painful, and grimy one too. Preparation is the key for a healthy trip. Ask yourself tough questions. If you've never gone backpacking before, are you really ready to head into the mountains for a week? What basic equipment do you pack? Are your gear and clothing adequate for the range of temperatures you might encounter? How do you hike responsibly? Where will you camp? How do you handle essential issues such as food and sanitation? If you're out of shape, can you manage a two-thousand-foot climb? Be realistic about your conditioning and your needs. If you haven't carried a quarter of your body-weight up a two-thousand-foot mountainside before, don't expect it to come naturally.

Because most hikes start at the foot of a mountain, the first and last few miles of any hike are often the toughest. Ascents challenge your wind; descents challenge your knees and feet. Expect the hike to test your conditioning. Being in shape and having a good mental attitude go hand in hand. Even the best-made plans can be ruined if you're not in a position to enjoy where your physical efforts have taken you. Prepare yourself both physically and mentally, and be ready for what the trail will throw at you. Any physical edge you can bring to your trip will pay handsome dividends over the first few steep miles and help your attitude. We will help you prepare for this experience with at least two training hikes to get used to your boots and equipment. You'll be surprised to find how much stuff you can do without after you carry it on a few practice hikes. Walking a few brisk miles a day, several days a week, will do wonders for your conditioning as well as break in your boots.

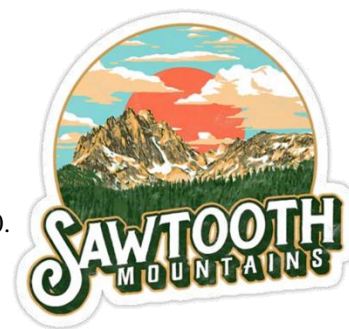
You and your parents should carefully read the provided information. It contains a wealth of information to help explain and prepare you for the trip. Any questions you or your parents have should be brought to the attention of the scoutmasters. We will attempt to provide answers to make this trip enjoyable and safe for all.



*"I think you might've over-packed. We'll only
be gone for an hour."*

Sawtooth Mountains Itinerary

July 10-July 22, 2023



Monday, July 10, 2023

5:00PM ET Depart from School in Pemberville.

8:30PM ET Arrive at Days Inn, 750 Stelzer Road, Columbus, OH 43219 (614) 238-9010.

Tuesday, July 11, 2023

3:30AM ET Drivers shuttle participants to airport, return to Days Inn to park vehicles,

4:00AM ET Drivers depart Days Inn on airport shuttle.

4:10AM ET Drivers Arrive at Columbus Airport. Everyone checks in and goes through security.

5:35AM ET Flight Departs Columbus Airport (Flight: Southwest Airlines #1070).

6:40AM MT Flight arrives at Denver Airport.

8:05AM MT Flight departs Denver Airport (Flight: Southwest Airlines #485).

9:55AM PT Flight arrives at Boise Airport. Pick up vans and SUV.

Stop for supplies, Walmart Supercenter, 8300 W Overland Rd, Boise, ID 83709

Stop to pick up stoves and fuel bottles at The UPS Store, 6568 S Federal Way, Boise, ID 83716

Stop at fast food for lunch (McDonalds, Burger King)

4:00PM PT Arrive at Elk Creek Campground. Pick up wilderness permits at Stanley Ranger Station, south of Stanley, ID 83278 (208)774-3000

4:30PM PT Pick up wilderness permits at Stanley Ranger Station, south of Stanley, ID 83278 (208)774-3000

Wednesday, July 12, 2023

7:30AM PT Depart Elk Creek Campground

8:00AM PT Arrive at Iron Creek Trailhead. Dayhike to Goat Waterfalls and Goat Lake (7.6 miles, +1694') or Sawtooth Lake (9.6 miles, +1730').

Thursday, July 13, 2023

7:30AM PT Group 1, 2 and 3: Depart Elk Creek Campground

8:00AM PT Group 3 drops off Group 1 and 2 and continues to Pettit Lake Trailhead.

Group 1: Take ferry on Redfish Lake to trail head. Hike 3.7 miles and camp near Flatrock Junction +853'

Dayhike to Alpine Lake. 3.2 miles +800', -800'

Group 2: Begin hiking at Fishhook Creek Trailhead. Hike the Redfish Creek/Baron Creek Trail (#101). Hike 6.8 miles and camp near Flatrock Junction +1000', -160'

Group 3: Begin hiking at Pettit Lake Trailhead to Alice Lake. Day mileage – 5.5 miles +1600'

Friday, July 14, 2023

8:00AM PT Group 1 and 2: Hike from Flatrock Junction to Cramer Lakes – 3.9 miles +500'

Group 3: Hike from Alice Lake to Toxaway Lake – 4.1 miles +904', -1177'

Saturday, July 15, 2023

8:00AM PT Group 1 and 2: Hike from Cramer Lakes to Virginia Lake – 5.6 miles +1100', -1200'

Group 3: Hike from Toxaway Lake to Virginia Lake – 4.0 miles +977', -1000'

Group 3 gives Group 1 and 2 the van keys.

Sunday, July 16, 2023

7:00AM PT Group 1 and 2: Dayhike the loop to Edna Lake, Ardeth Lake, around to Virginia Lake – 6.8 miles +1200', -1200'

Group 3: Dayhike the loop to Edna Lake, Ardeth Lake, around to Virginia Lake – 6.8 miles +1200', -1200'

Monday, July 17, 2023

7:00AM PT Group 1 and 2: Hike from Virginia Lake to Toxaway Lake – 4.0 miles +1000', -977'

Group 3: Hike from Virginia Lake to Cramer Lake – 5.6 miles +1200', -1100'

Tuesday, July 18, 2023

8:00AM PT Group 1 and 2: Hike from Toxaway Lake Alice Lake – 4.1 miles +1177', -904'

Group 3: Hike from Cramer Lake to Flatrock Junction – 3.9 miles -500’
Dayhike to Alpine Lake. 3.2 miles +800’, -800’

Wednesday, July 19, 2023

7:00AM PT Group 1 and 2: Hike from Alice Lake to Pettit Lake Trailhead – 5.5 miles -1600’
Group 3: Hike from Hike from Flatrock Junction to Redfish Lake, take ferry to Trailhead – 3.7 miles -853’
Group 1 and 2 picks up Group 3
12:00PM PT Depart Redfish Lake to Stanley, Idaho. Pick up groceries for lunch.
2:00PM PT Depart Stanley, Idaho
2:45PM PT Arrive at Bradley Scout Reservation - BSA Scouts - Mountain West Council, National Forest Development
Road 158, Stanley, ID 83278 (208) 376-4411
6:30PM PT Pizza at Papa Brunce’s, 37 Ace of Diamonds St., Stanley, ID 83278, (208) 774-2536

Thursday, July 20, 2023

8:15AM PT Depart Bradley Scout Reservation
9:00AM PT Arrive at Payette River Company 14 Memory Ln, Lowman, ID 83637, 208-259-3702
9:45AM PT White water rafting on the Canyon Section of the Payette River
4:30PM PT Depart Payette River Company
7:00PM PT Arrive at Quality Inn, 2526 Airport Way, Boise, ID 83705 (208) 336-0077
7:30PM PT Dinner at the Golden Corral Buffet, 8460 Emerald St, Boise, ID 83704 (208) 373-7118

Friday, July 21, 2023

8:30AM PT Breakfast at Denny’s. 2580 West Airport Way, Boise, ID 83705 (208) 344-9092
10:30AM PT Arrive at airport and return vans.
5:35 PM PT Flight leaves Boise Airport (Flight: Southwest Airlines #366).
7:25PM MT Flight arrives at Denver Airport.
8:20PM MT Flight departs Denver Airport (Flight: Southwest Airlines #3555).

Saturday, July 22, 2023

1:05AM ET Flight arrives at Columbus Airport. Drivers shuttle to Quality Inn to pick up vehicles.
4:30 AM ET Arrive at School in Pemberville.



*"Maybe we should just
watch the rest of it on YouTube."*

Sawtooth Mountains Estimated Trip Expenses 2023

Air Fare	31 passengers @\$515/person, 1 passenger @ \$29	\$15993
Van Rental	Van Rentals (2-12 passenger & 2 trucks)	\$4705
Boat Shuttle	\$22 x 12 (12 round trip tickets)	\$264
Group Campsite	2 nights @ \$116/night	\$232
Camping	Bradley Scout Reservation	\$100
Gas	1600 miles @ 12 MPG, 134 gallons of gas @\$4.00/gallon	\$536
Food	\$12/person/day, 29 people x \$12 x 11 days	\$3828
White Water Rafting		\$4349
Motel	2 nights	\$1870
Miscellaneous	Maps, equipment, parking, etc.	\$1000
T-shirts	\$20/person x 29 people	\$580

Total Expenses \$33457

Income

Cost per participant \$1080 X 29	\$31320
Non-hiker payment	\$2285

Total Income \$33605

Surplus \$148



"What you hate is walking. This is hiking—hiking is different from walking."

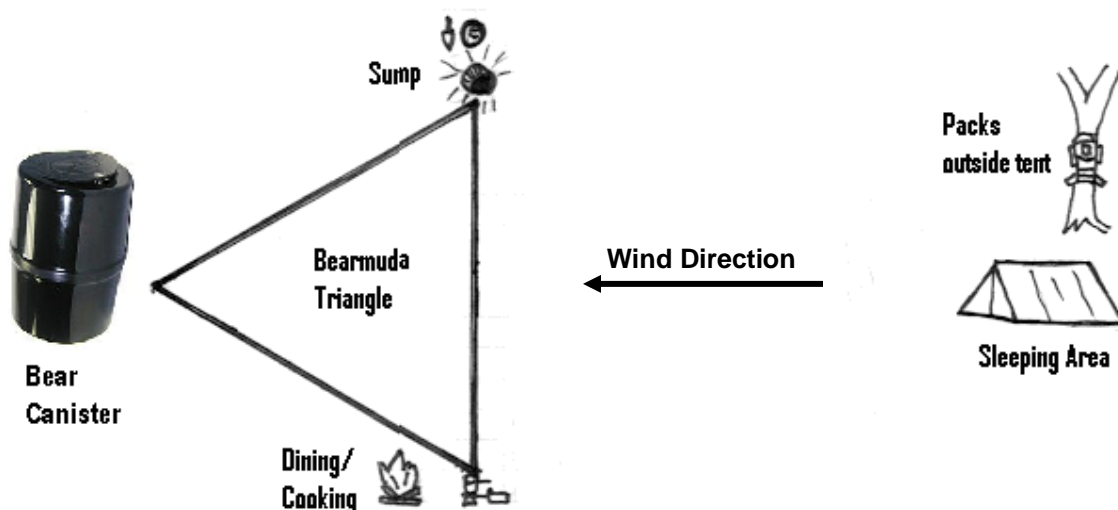


Camp Layout and Setup

"Bearmuda Triangle"



The primary objectives of laying out camp are to find a safe sleeping area and to leave as little trace that you were there as possible. This means respecting wildlife that might be interested in your "Bearmuda Triangle" and insuring that you don't contaminate ground water or leave anything behind. The Bearmuda Triangle is formed by the (1) the fire ring & cooking (dining), (2) the bear canister, and (3) the sump (cooking wastewater) "smellable/bear areas". The Backpacking Equipment List indicates which items are stored in the bear canister [BC] and sump or dining areas [SD]. The tenting area should be safely outside this triangle because animals are likely to travel between these areas, and scouts don't want to be in their path. To prevent being a bear lollipop, no food should EVER be in the tent, packs (with cover) should be hung outside, and a sleeping bag stuff sack or tent bag NEVER used as a bear bag. Shoes should not be left on the ground. Actually, in the mountains, bears are not the only "critters" to guard against. Scouts may encounter raccoons, porcupines and skunks. All are attracted to smells or salt and can "maul" a pack. Below is a simple illustration of an appropriate camp layout.



Hey! If you think this is being overly cautious or want to read more, check out the National Park Services (NPS) Bears and Leave No Trace pages, the USDA Forest Service (USFS) Outdoor Fire Safety Tips and USFS -- Safe Campfires pages, a Philmont Guidebook to Adventure (PHL) or the "Wilderness Use Policy of the Boy Scouts of America" (WUP). Since good safety procedures are pervasive, it's not surprising that they agree in almost every aspect. Here are a few guidelines from these sources:

Cooking and Fires

It is the cooking - dining - fire corner of the bearmuda triangle that often ends up closest to the tenting area. Food spills occur and they must be cleaned up by treating the spill like any other food -- putting it in the "yummy" bag and packing it out. Lightweight fueled stoves are more efficient and faster for cooking than fires, and they leave minimal impact. Always read and follow instructions provided by the stove manufacturer. Cool stoves before refueling, refuel them and store fuel away from where the stove will be lighted or used. Let any spillage dry before lighting. Never use stoves inside a tent. Open fires are usually discouraged, and sometimes prohibited. However, when a fire is built, always check for and follow local regulations.

- Fires should not be built near overhanging branches, slopes, stumps, logs, dry grass, leaves or firewood. Use an existing fire ring if available. Otherwise, dig a fire pit about six inches deep, keeping the sod intact for replacement. Scrape away any burnable material within 10 feet.
- Have plenty of water handy and a shovel for throwing dirt on the fire.
- Keep the fire small to reduce impacts and the danger of a wildfire. Start with dry twigs and small sticks, followed by larger sticks and logs, pointing them toward the center to be gradually pushed in. Burn dead and down wood only and only that which is necessary.
- Be sure your match is out, holding it until it is cold, and then break it so that you feel the charred portion.
- Never leave a fire unattended, even for a few minutes.

- Allow the fire to burn down to white ash; do not try to put a fire out by scattering it. Drown the coals thoroughly with water, stir the remains, drown it again, and stir again (where water is scarce, damp dirt and sand may also be used).
- Feel all materials with your bare hand to make sure it is "dead out". Make sure that no roots are burning. Do not bury coals--they can smolder and break out.
- Only after the fire is definitely dead out, accumulated ash from the fire pit is scattered away from camp.

Bear Canisters

In many areas where bear-human conflict repeatedly occurs, use of bear-resistant containers has been made mandatory. When the prize is your food and the setting is the wilderness, never bet against the bears. "You can't count on food being safe if you put it in a nylon sack and hang it in a tree overnight," says Harold Werner, Fish and Wildlife Biologist at Sequoia and Kings Canyon National Parks since 1980. "If you've never lost food by counterbalancing (suspending 2 bags of food high on a tree branch), it's only because you're lucky, no matter how well you do it." Too many campers and backpackers have learned this lesson the hard way. Resourceful black bears, driven by a powerful sense of smell (100 times stronger than a dog's), have become some of the cagiest, most determined creatures on earth when it comes to snitching food from humans. Increasingly drastic measures are needed to protect your food in some North American wilderness areas—and to protect bears from being put to death when their desire for human food makes them too aggressive. Other than standing guard by your trail mix all night, the preferred solution is to store food inside a bear-resistant container.

Bears: Smart, Motivated, Relentless

Black bears, particularly those in the Sierra Nevada mountains, have become "habituated" to human food. That means once they get a taste of it, bears want more of it—lots more—and will do just about anything to get it. They often succeed. Why? Because of the bear's brute strength, persistence, surprising ingenuity and, crucially, the lackadaisical food-storage practices of humans. Wildlife managers remind us that such a dilemma is not a "bear problem." The real problem occurs when humans take a casual, indifferent approach to storing food.

A bear's food-stealing repertoire includes:

- Bashing windows of locked vehicles to get to food coolers (which bears have grown to visually recognize and associate with food). Bears have broken open vehicles just because a soda can or gum wrapper was left visible. (Solution: Don't leave such items inside a vehicle, or at least conceal them thoroughly—only if no other food-storage options are available.)
- Breaking the rear windows of cars, then clawing through the back seats in order to get at aromatic items locked in trunks. (Solution: Remove food from a vehicle when you park; store it in a bear box if available.)
- Sending cubs up trees to dislodge nylon food bags dangling from limbs. (Solution: Use a portable, bear-resistant food container.)
- Gnawing through limbs several inches thick to make suspended food bags drop. (Solution: Same as above.)



"I've never seen it myself, but I've heard that some bears will walk out on a branch and make Kamikaze jumps at food bags to bring them down," says Michelle Gagnon, a bear technician at Sequoia/Kings Canyon since 1996. "I believe it. You can see blood on the branches they've chewed through to make bags drop. They'll actually hurt themselves to get at food."



Packing a Bear-Resistant Food Canister

With forethought and planning, it's amazing how much food you can fit into a canister. If you choose the right foods and repackage them into baggies or small containers, you can maximize canister space. By measuring out every meal, you can make sure you are not packing more than you need. Who wants to pack out leftovers? It takes a little effort and time but the results are rewarding. Remember, when you are using a canister ALL scented items – food, toiletries and garbage – must fit inside the canister *throughout your entire trip unless you are in attendance or actively preparing your food*. At the trailhead, make sure that ALL food, trash, toiletries and scented items will fit inside the canister the first night. Carry the first two meals outside of the canister: lunch and dinner.

Food Choices – Choose foods that are compact, compressible and high in calories. This includes rice, tortillas, jerky, flat pastas, dehydrated powders, nuts, dried fruits, peanut butter, candy and nutritional bars. You are trying to put as much food in the canister as possible so think about volume when you purchase food. For example, instead of bread rolls, buy tortillas. Instead of macaroni, choose spaghetti. You get the picture - don't waste space on bulky food items.

Plan Your Menu – Carefully count every meal that you will be eating. By doing this, you will save weight and space. Put all the food on a table and plan each meal, snack, drink and condiment. Pre-measure and pre-mix your food.

Repackage Your Food – Take food out of its original package. This allows you to fit more food inside a canister and reduces the amount of garbage you generate. Repackage food from boxes, bottles, jars and cans into resealable plastic bags. These bags are flexible and fit into small spaces. Force air out of packages. Poke tiny holes in freeze-dried packages to release the air. Save instructions for cooking and put inside meal bags. Write food contents on outside of bags with a permanent marker.



Toiletries – Pack toiletries similarly to foods. **Put toothpaste, soap, sunscreen, bug repellent, etc. into small containers.** Stores sell small, lightweight plastic containers that work well for this. Don't take more than you need.

Benefits of Using a Canister

- Less stress, increased peace of mind
- More time at camp to relax instead of thinking of ways to store food
- Guaranteed food supply if bears or other animals visit your camp
- No aborted trips because bears ate your food
- Freedom to camp anywhere: above tree line or away from food storage lockers
- No need to search for the right tree or carry ropes and food sacs for counter-balancing
- More time at camp to relax instead of thinking of ways to store food
- A small table to use, something to sit on
- Increased safety for you and protection of wild animals

Place ALL food and scented items in a canister at least 50 feet from your tent (downwind if possible) in a depression or between rocks or logs so it cannot be rolled away. Leave the canister on the ground. Do not hang the canister from a tree. A bear's curiosity may attract them to any odor, even if it isn't food-related; so all "smellables" go in the canister. Avoid contaminating sleeping gear with food odors. Do NOT use sleeping bag stuff sacks, tent bags, or clothing bags for food/smellables storage. NEVER eat or keep any food, or anything that held food, in your tent because the odor will linger (that means your backpack too!!). Do NOT sleep in clothes with food odors; they should be hung like food. Keep separate clothes inside your sleeping bag just for that purpose and only those clothes and boots remain in the tent.

Tenting

Pitch tents on high ground where they will not damage vegetation and do not dig trenches around them. Be careful not to camp too near to streams that could rise in a flash flood -- where the valley is narrow but drains a large area. Although you want to avoid low ground, you may want to avoid the tops of bald hills when there is the possibility of lightning.

Sleeping inside a closed tent is preferable because it puts a barrier between you and rodents or other animals that may carry and transmit diseases and insects whose bite hurts or may stimulate an allergic reaction (insect repellent should be used sparingly in the evening because it is a "smellable"). Rodents are a problem at many camping shelters/grounds, because of the attraction of food remnants. Hantavirus pulmonary syndrome infections from Washington to Florida, California to New York have been linked to rodent bites and droppings. Ticks may transmit Lyme disease. Rodents are a primary food source for snakes, which are known to snuggle up to warm objects. Reportedly, a lady hiking the Appalachian Trail awoke one morning to a tickle on her tummy, only to find that a Copperhead had crawled into her sleeping bag with her to take advantage of the warmth on a cool night. Most modern tents have good ventilation when the rain fly is left off on warm dry nights.

Every scout should follow procedures based upon Federal, State and Local Laws/Regulations and Boy Scouts of America publications covering that particular trek/tour. If you aren't following safety precautions, and insisting that those with you do, you are putting yourself, those around you, and those that follow you, at risk. A scout would not knowingly do that! We are responsible for "knowing".

The "Wilderness Use Policy of the Boy Scouts of America" charges us to

- Conduct pre-trip training that stresses proper wilderness behavior, rules, and skills for all the potential conditions that may be encountered", to
- Treat wildlife with respect and take precautions to avoid dangerous encounters with wildlife", and to
- Emphasize the need for minimizing impact on the land through proper camping practices ..."

Increasing the "knowing" part is a major motivation for this packet.



Backpacking Water Treatment Basics

You can rack up quite a thirst while hiking, but you don't want to be drinking water out in the woods without doctoring it up some. Yes, the good old boys in the old Westerns used to sip from the creek when thirsty (unless of course there was a skull nearby), but like a lot of movie stuff, don't try that at home – or at camp. Instead of bringing gallons of water with you on a trip, a backpacking water treatment method allows you to safely use water available to you on the trail. This is really helpful because staying hydrated is vital. And carrying all your water for more than a day trip would be heavy and cumbersome.

Today's natural water sources are nearly always home to such invisible characters like *Giardia lamblia*, *Cryptosporidium*, and other nasty "bugs". Generally, these protozoa and bacteria and viruses won't kill you, but just make you wish you were dead before they run their course – run being the operative word here. Where did these nasties come from? The worst come from mostly other people, or rather their feces to be more exact, but animal feces cause problems too – so sipping from the creek 100 years ago was still a risky proposition. Since you can't tell if water is safe to drink just by looking at it, the best idea is to use something that will eliminate harmful or undesired pollutants. You really don't want to spend your backpacking trip battling diarrhea, nausea, cramping or worse, all because you drank untreated water.

Four Ways to Treat Water

Chemicals – Iodine and chlorine are two common chemicals used to treat water. Referred to as halogens, they are able to kill bacteria and viruses, but are not able to kill all protozoa. This type of backpacking water treatment is inexpensive, light and easy to pack. On the downside, the chemicals can make water taste bad unless a neutralizer or flavoring agent is used. Furthermore, chemicals can take a while before they have effectively treated the water. Chlorine usually takes longer, which is why iodine is a more popular choice. However, some people are allergic to iodine and it is not recommended for use by pregnant women or people with thyroid issues.

Heat – Boiling water is a highly effective way to kill protozoa, bacteria and viruses. Boiling water renders all organisms ineffective. However, you don't necessarily need to bring water to a complete boil to treat it. Heating water to 149°F (65°C) for 5 minutes will kill 99.99% of all harmful organisms. While you need a thermometer to gauge this, it allows you to use less fuel and time in order to prepare your water than if you brought it to a complete boil. Drawbacks include needing a stove, fuel and time. Boiling water also doesn't remove sediment, so you may want to run the water through a coffee filter if it's dirty.

UV Radiation – The use of ultraviolet rays to fight bacteria, protozoa and viruses, is a more recent backpacking water treatment. The UV rays damage the microbe's DNA, rendering them unable to replicate and multiply. These devices are simple, effective and fairly quick to operate. Downsides include the fact that they are battery operated, expensive, and less effective on cloudy or murky water and require additional filtration to remove sediment. However, some do come with their own filtration attachment.

Filtration – Using a filtration system forces water through a finely porous internal element within a filtering unit. They can be a speedy way to filter water compared to other options and, depending on how the filter is designed, can eliminate bacteria, protozoa, viruses and sediment. This is the most commonly used backpacking water treatment method.

However, not all filters are created equal and therefore do not all eliminate the same contaminants. Unless it has a purifying system included, which adds to the cost, it will not kill viruses. Drawbacks include the cost, weight, maintenance and sometimes they can be difficult or tiresome to operate.

Backpacking Water Filter Explained

Picking out a backpacking water filter can be a bit daunting. Here is a helpful overview about water filters, how they work and what to look for when buying one. It is important to clarify some terminology you might come across in your research. There is a difference between a water filter and a water purifier. In simple terms, a filter does not remove or destroy viruses, while a purifier does. A filter allows water to pass through an internal device that has many, many tiny holes. And we're talking tiny. These holes are measured in microns. As the water passes through these holes, the filtration system catches and removes organisms and debris from the water. If the water filter is also a purifier, there will be an additional chemical or electrostatic process that renders viruses inactive.

What to Look for in a Filter

Filter Type – This is referred to as the cartridge. It is the internal device that filters out organisms and debris. There are different types of filter cartridges, such as ceramic or fiberglass. Their construction can affect the quality and price of the filter. Some can be cleaned and reused, while others must be replaced. Although the initial cost might be more, a filter that can be cleaned easily and reused is much more efficient in the long run.

This is also where the purification system will be if your filter also purifies water. Pay attention to the internal components of a filter. Some purification systems use an iodine resin. If you are pregnant, have thyroid issues or are allergic to iodine, such a system should be avoided.

Pore Size – The pores that allow water to pass through and filter out organisms vary in size. When looking at a backpacking water filter, you will see the terms “absolute pore size”, “nominal pore size” and “average pore size.” You want to pay attention to the absolute pore size. Absolute pore size is the size of the largest particle that can pass through. Pick a filter that has an absolute pore size of at most 0.2 microns, as this is the standard for the smallest of microorganisms.

Cleanability – As a filter is used, the organisms and particles it removes remain in the filter. This can cause clogging and make the filter work slower. A filter that allows you to remove and clean the cartridge in the field is very handy.

Life Expectancy – How frequently you backpack will determine your needs, but the longer a backpacking water filter can last between cleanings or replacements the better. Usually manufacturers will list approximately how many liters of water can be filtered before maintenance is required. Remember that this number can change depending on the quality of water you’re filtering.

Pump Force/Pump Strokes – If you are looking at a hand pump operated filter, pay attention to the pump force and pump strokes. Pump force tells you how many pounds of force are needed per stroke. The higher the number, the more of a workout you’ll get when filtering your water. Pump strokes tell you how many pump strokes are required per liter of water. This gives you an idea of how effective each pump action is and will also give you an idea of how hard you’ll have to work to filter your water.

Output – This number tells you how many liters of water can be filtered per minute. This is an estimate of course, but it gives you a good idea of how long it will take to filter your water. This number will change with each use as the filter becomes increasingly clogged.

Weight – It’s good to pay attention to how much a backpacking water filter weighs. They can easily weigh over a pound and you don’t want to get one that will add too much weight to your pack.

Tips On Treatment

Water filters are like a vacuum cleaner – they get clogged if you don’t clean them. Most filters have a replaceable element. Unless you’re pumping many, many gallons of water you should not have to worry about clogging a filter under normal water conditions. But, muddy water will reduce the cartridge life span. To extend cartridge life, always use the best water source available. In heavy sediment conditions, wrap a coffee filter or bandana around the intake bulb with a rubber band. Where possible, place untreated water in a container and wait for sediment to settle out and the water appears clear; then filter from water above the sediment. If the handle becomes very hard to pump, the filter cartridge may have become clogged. As a temporary solution in the field, remove the cartridge and swish it around in water. Do not allow contaminated water to enter the cartridge output barb. This will usually provide enough additional cartridge life to complete your trip.

Another tip may seem counterintuitive – pump your water from still, rather than running sources. Sure, the running creek water looks cool, clear and inviting, but the churning water leaves various nasties suspended within it. Pooled water, on the other hand, gives the chemicals and heavier particles a chance to settle to the bottom – that further reduces the likelihood of something bad getting through to your stomach.

As you pump water, or storing the filter in its bag between loading sessions, be careful not to let the intake filter or water dripping from it contaminate the outlet hose or cap that goes into your water bottle or bladder. If it does, be sure to rinse it off with filtered water before using again. Take a small baggie to wrap around the outlet cap with a rubber band when not in use. Finally, watch for contamination potential within your water bladder or container between uses or refills. Various bad things can start to grow with just a few drops of stale water left alone for a few days. Let the container air dry completely between uses. Sanitize by adding a capful or teaspoon of bleach to enough water to fill the reservoir. Allow to bleach for an hour to overnight.

Rinse very thoroughly with 4 or more changes of water. This is the best way to kill fungus and bacteria, especially if you see visible growth. To remove the chlorine taste after bleaching the bladder, fill the bladder, add 1 tablespoon of vinegar and shake it, then add 1 tablespoon baking powder then shake it. Now drain and rinse thoroughly.

Additional Backpacking Water Tips

- Avoid using water where there is obvious animal activity. Though they can be cute, animals are carriers for organisms you want to avoid.
- Avoid water near highly trafficked human activity. Move upstream from campsites, trail crossings, outhouses, etc.
- Avoid water that is downstream from factories, plants, mines, largely populated areas, etc. as the water could be contaminated by chemicals.
- Try to draw water from a still, clear source. In still water, many organisms sink to the bottom and can be avoided. Avoid stagnant water however, as harmful algae can reside in it.
- Never collect water from a source that has dead animals in or around it.
- Snow and ice can be used, but remember that freezing does not kill bacteria. A backpacking water treatment is still necessary. Avoid snow with a pink tint to it as it may have algae. And avoid yellow snow for obvious reasons.

How Much Have You Had to Drink?

So if you now have safe water to drink from filtering or other treatment, how much do you need? At home, the average person uses maybe 80 gallons a day, so obviously something has to give when you're out in the woods. OK, so you're not flushing or showering, or watering your lawn, or washing your car, but that still leaves a lot of water to account for.

Heat and elevation gain are the biggest consumption variables. On a sharp uphill climb on a hot summer day, you can suck down an easy quart an hour. That's why you don't want to be boiling water as a treatment method; it would take forever to get very far. That's also why you want to make sure you have some reliable water sources along the way when you hike – choose trails and routes that will take you near water at least every now and then so you can reload your water container(s). Try to camp reasonably close to a water source as well. You can figure going through at least a gallon a day per person in moderate weather and exertion conditions; 2 gallons a day when it's hot.

You can carry water on a hike in 16- to 32-ounce bottles of various shapes and sizes on short day hikes, or on longer trips move up to water bladders that will hold up to a gallon of water with drinking tubes you can sip from as you hike. The water you carry can easily be the heaviest thing on your back, so carry the bag within or on your pack so it is as close as possible to your back and higher up – that helps keep you balanced and puts the heaviest weight where it will cause less strain. If water is reasonably available on your route, a lot of hikers will compromise between frequent refills and weight by carrying around 2 quarts on them at most. But on a long arid trail, you might need to carry 2 gallons when you start out. You also need extra water when hiking at higher elevations to avoid altitude sickness arising from dehydration.

One helpful precaution is to start out your hike fully hydrated. If camping near water, drink a lot before heading out for the day – your body will appreciate it, and it's that much less you'll have to filter or carry during the day. How do you know how much water is enough? As a general rule, drink before you become thirsty; it seems the thirst mechanism is behind the body's actual need for water. It's somewhat like your car's red engine light – by the time it comes on, something has already been wrong for a while. Drink as you go. Also, check out the color of your urine – if it's clear, you're probably well hydrated. If it's dark yellow, it means you need some more water inside you - drink up!

Sanitation

Dishes -- Scrape off food scraps and seal them in an airtight plastic bag ("yummy bag"), store it with other food, and pack it out. Under no circumstances should food scraps be buried! Discarded or buried food scraps attract animal life. It is common to see chipmunks, ground squirrels, and various species of birds gathering around camp kitchens. These "camp robbers" have become attracted to campers as a food source. Human food is not natural to wild animals, and their natural feeding cycles and habits become disrupted when they are fed by humans. A conscientious no-trace camper always keeps and leaves a clean camp. Use a scrub pad to remove tough "cooked-on" parts. Once all visible food is removed, wash dishes at least 200 feet from water sources. If soap must be used, use biodegradable soap. Leave No Trace principles discourage campers from using any soap, if possible, because even biodegradable soap will contaminate fresh water if precautions aren't taken. Rinse dishes, pots and utensils in boiled or filtered water. Everything should be left to air-dry (even if "towel-dried" first) in the sump or dining area. These procedures guard against inadvertently contaminating your pack or its contents. Proper washing and rinsing will prevent diarrhea, dysentery and other ailments. Anyone who has suffered from these on a backpacking trip takes cooking cleanup vveerrrry

seriously! Strain dishwater through a small strainer or bandana. Put the food particles in a sealable plastic bag and pack them out. Broadcast the strained dishwater over a wide area at least 200 feet from the nearest water source, campsite, or trail. Scattering dishwater in a sunny area will cause the water to evaporate quickly, causing minimal impact. You should not wash dishes near a water spigot because of possible contamination of ground water. Don't throw food, scraps or garbage/trash into "pit" toilets [ones which just use a hole in the ground], nor bury it, because bears and rodents will easily retrieve it. Do not burn trash, scraps, or garbage, pack it out. Any food falling into the fire must burn to ash or be removed and packed out. A bear drawn to a camp by the smell of buried food scraps or garbage in the fire pit may begin to associate food with people, a lesson it will remember all its life. Then they have to be killed. As they drill into scouts at Philmont: *"Feed a bear - Kill a bear"*.

Bathing and Laundry

Do not bathe or do laundry in or near a stream. Instead, use biodegradable soap and a shower or wash bag at least 200 feet from the nearest water source, campsite, or trail.

Human Waste

Proper disposal of human waste is important to avoid pollution of water sources, avoid the negative implications of someone else finding it, minimize the possibility of spreading disease, and maximize the rate of decomposition.

If an outhouse or bathroom is available, use it. In most backcountry locations, burying human feces in the correct manner is the most effective method to meet these criteria. Solid human waste must be packed out from some places, such as narrow river canyons. Land management agencies can advise you of specific rules for the area you plan to visit.

Contrary to popular opinion, research indicates that burial of feces in soil actually slows decomposition. Pathogens have been discovered to survive for a year or more when buried. However, in light of the other problems associated with feces, it is still generally best to bury it in humus (decomposing plant or animal matter that forms organic soil). The slow decomposition rate emphasizes the need to choose the correct location, far from water, campsites, and other frequently used places.

Catholes are the most widely accepted method of waste disposal. Locate catholes at least 200 feet (about 80 adult steps) from water, trails, and camp. Select an inconspicuous site where other people will be unlikely to walk or camp. With a small garden trowel, dig a hole in humus that is 6 to 8 inches deep and 4 to 6 inches in diameter. Cover and disguise the cathole with natural materials when finished. If camping in the area for more than one night, or if camping with a large group, widely disperse cathole sites.

Use toilet paper sparingly and use only plain, white, nonperfumed brands. Toilet paper must be disposed of properly! It is now a requirement in many wilderness areas to place used toilet paper in plastic bags and pack it out, which is the best way to practice Leave No Trace. Never burn used toilet paper. Used toilet paper does not burn well (I wonder why?) and you increase the danger of starting a wildfire.

The best toilet paper for backpacking may actually be paper towels. Regular toilet paper just doesn't stand up to the humidity and shreds too easily leaving Klingons (not the Star Trek variety). Brawny paper towels are great to use because they're scored down the middle of each sheet to make it easy to tear off a half sheet. In packing toiletries for a trip, tear off five half sheets for each day. Cut each half sheet in half again, producing ten quarter sheets for each day.

Pack ten quarter sheets in a quart Ziploc bag along with wag bags (the bags people use to put pet feces in) and individually wrapped antibacterial moist wipes such as "Wet Ones". Make sure to get the unscented moist wipes to avoid attracting bears. Prepare a quart bag for each day to be spent in the backcountry along with one extra. Place these prepared quart bags along with a gallon Ziploc bag inside of a second gallon Ziploc bag. Don't forget to include a small bottle of hand sanitizer.



"This will teach them to clean up after themselves after they camp in our woods!"

The moist wipes serve two functions. They contain aloe which can be soothing when necessary and they can help ensure that your butt crack is clean. Monkey butt (diaper rash) can become very painful if you are hiking long distances over multiple days. The best cure is prevention. If that fails, break out the medicated Gold Bond and use liberally (if you are tough enough).

When nature calls in the backcountry, dig a cathole in an appropriate site and make your fecal deposit in the hole. Clean yourself with the contents of one of the quart Ziploc bags. Paper towels are biodegradable, but don't bury them in a cat hole or drop them in a composting privy. Pack out the used towels and Wet Ones in a wag bag sealed inside of the quart Ziploc bag. Place the quart bag in the separate gallon Ziploc bag (you should only need one for a seven-day trip). Finally, cover and disguise the contents of the cathole and use the hand sanitizer to thoroughly clean your hands. The most common cause of diarrhea in the backcountry is poor hand sanitation, not what was ate.

Urine has little direct effect on vegetation or soil. In some instances, urine may draw wildlife that is attracted to the salts. As a result, wildlife may defoliate plants and dig up soil. Because urine has an objectionable odor, be sure to urinate at least 200 feet from water, campsites, or trails. Urinating on rocks, pine needles, and gravel is less likely to attract wildlife.

Waste Disposal

Dispose of waste properly. Pack out what you pack in. This common saying is a simple yet effective way to get backcountry visitors to take their trash home with them. There is no reason why people cannot carry out of the backcountry the extra food and packaging materials that they carried in with them in the first place. Trash and litter in the backcountry ranks high as a problem in the minds of many backcountry visitors. Trash and litter are human impacts that can greatly detract from the naturalness of an area.

Reduce litter at the source. Much backcountry trash and litter originates from food items. Perhaps the easiest way to practice the principle of – *pack it in, pack it out* – is to follow the principle of *planning ahead and prepare*. It is possible to leave most potential trash at home if you take the time to properly repack food supplies. Reduce the volume of trash you have to pack out. Save weight by repackaging solid foods into plastic bags and liquids into reusable containers.

Your first preference for dealing with trash should be to pack it out. Most trash will not be entirely consumed by fire and conditions frequently make fires unacceptable. Areas are often closed to fires because of high fire hazards or excessive campsite damage. Some areas, such as desert settings, are impractical for fires because of the scarcity of firewood.

How Long Does It Last?

Packing out trash is increasingly important as greater numbers of people visit the backcountry. Here are some estimated life expectancies for different kinds of litter:

- Paper: two to four weeks
- Rubber boot sole: 50 to 80 years
- Banana peel: three to five weeks
- Tin can: 80 to 100 years
- Wool cap: one year
- Aluminum can: 200 to 400 years
- Cigarette butt: two to five years
- Plastic six-pack holder: 450 years
- Disposable diaper: 10 to 20 years
- Glass bottles: Thousands or millions of years
- Hard plastic container: 20 to 30 years

Backpacking Equipment List (Non-Winter)

(Bring packed to shakedown)

Consider borrowing equipment you don't already own. Everything must be packed in. Keep weight down; bring as little as possible but be sure to bring essentials. Total pack weight is not to exceed 25% of body weight. All clothes, sleeping gear and food are stored in waterproof bags (Ziplocs). [BC] = goes in bear canister, away from tent area. [SD] = stored in sump or dining area away from tent area.

Basic Gear

- ___ Frame pack with hip belt
- ___ Pack cover (packs stay outside tent; heavy garbage bag OK)
- ___ Sleeping bag in waterproof (garbage) bag
- ___ Sleeping pad (optional)
- ___ Hiking Boots not on ground at night
- ___ Water bottles/bladder 1 qt. for every 100 lbs. Weight
- ___ Extra plastic bags for trash, dirty clothes, etc. (Ziplocs and garbage bags)

Camping/Hiking Gear

- ___ Map (supplied) in Ziploc
- ___ Compass
- ___ Pocket knife/Leatherman
- ___ Small flashlight or headlamp with new batteries
- ___ Whistle - accessible; not packed
- ___ [BC] Matches in waterproof container or disposable lighter
- ___ Walking stick/trekking poles

Clothes (wearing + packing)

- ___ Socks (3 heavy wool pairs, 3 liner pairs)
- ___ Shorts/pants (2) not cotton

- ___ Tee shirts (3)
- ___ Underwear (3) not cotton
- ___ Sleepwear
- ___ Fleece jacket
- ___ Long sleeve shirt
- ___ Poncho or rain suit
- ___ Hat, bandanna, bug netting
- ___ Sandals/light sneakers to relax in camp (optional but highly recommended)

Toiletries/Personal (BB items not used after 5:00pm)

- ___ [BC] Biodegradable soap
- ___ [BC] Toothbrush/paste
- ___ [BC] Sunscreen
- ___ [BC] Lip balm
- ___ [BC] Insect repellent
- ___ [BC] Small first aid kit -- moleskin, bandages, drugs for medical conditions (allergies) or to self-administer (Advil), medical card
- ___ Toilet paper in Ziploc bag
- ___ [BC] Hand sanitizer (inside of toilet paper roll)
- ___ Watch
- ___ Money
- ___ Sunglasses with hard case
- ___ Camera

- ___ Mesh bags
- ___ Backpacking towel

Cooking & Eating

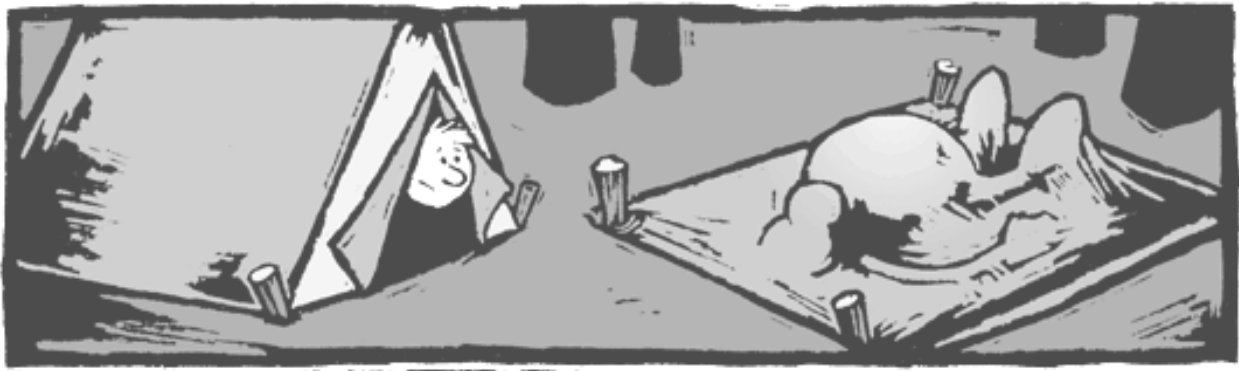
- ___ [BC] Food
- ___ [SD] Spoon
- ___ [SD] Bowl
- ___ [SD] Cup (preferably with measured markings)

Shared with buddy

- ___ Tent
- ___ Ground cloth for under tent
- ___ [SD] Backpacking stove
- ___ [SD] Fuel bottle
- ___ Stove repair kit
- ___ Water filter, iodine or chlorine
- ___ Parachute cord (25 ft.)

Shared Crew Equipment

- ___ [SD] Pots for heating water, etc.
- ___ [SD] Cleaning/scrub pad
- ___ Bear canister
- ___ 75-100 ft. parachute cord
- ___ Trowel (for cat holes & sump)
- ___ [BC] Repair kit - needle, thread, duct tape, wire ties, etc.
- ___ Dining fly (optional)
- ___ Wilderness permit
- ___ Shower/wash bag



I went camping once with some friends and no one had bothered to see if the tent had all the pieces. It looked a lot like this.



Packing That Equipment



There are lots of different ways and philosophies on where things go in the pack. Suggested below is just one of those ways. Recent versions of internal and external frame packs are shown as illustrations. Internal and external frame pack designs seem to be converging, with external frames sometimes taking on nearly the same profile as internal frames -- tall and narrow with a lower (sleeping bag) compartment -- and internal frames adding many external pockets and places (web daisy chains and lash patches) to hang things off the top, sides and back outside the pack -- areas where external frame have traditionally excelled. Some external frame packs have also become more flexible with poly/PVC frames. Both have added mechanisms to adjust the shoulder strap position, a feature first found only on a few external frames. We now see in the blending together of the "best" features of traditional external and internal frames designs. This should all but finish the debate as to which is best -- you can "have your cake and eat it too".

Pockets and Compartments for Stowing Gear



External Frame

To the left and right are somewhat typical external and internal frame packs. As the name implies, the external frame (often looks like a ladder) can be seen from the back of the pack (the side against your back). The frame stays of internal packs are often two 3/4" to 1" wide flat aluminum bars 20" to 30" long sewn into the back of the pack itself. One main difference is that the sleeping bag and tent are often lashed to the outside of an external frame at points #8 and #9, while, internal frames are designed so that, all gear can either be stored inside the main compartments or in the outside pockets. The first internal frames and specialized climbing ones have fewer outside pockets and require that much of what should be accessible be buried inside the large main compartment.



Internal Frame

After you've decided on your list of backpacking equipment to carry, you'll need to pack for the trail. Before getting into the details of matching equipment to compartments and pockets, consider the following observations:

- Small, frequently used items should go in your pants pockets, "throw" pockets on the pack, hung from your shoulder straps, or placed in other readily accessible place. These include knife, compass, map, whistle and watch.
- Other items that need to be readily accessible to you or others should be in conspicuous outside pockets. These may include rain gear, first aid kit, sun and insect protection, trail snacks and lunch, bandana, some matches, toilet paper, digging trowel, and perhaps camera, binoculars and paper and pencil.
- Packing several small similar items together in heavy plastic (Ziploc) bags organizes items that could get "lost" inside the pack and keeps the contents dry even if the pack gets soaked.
- Items that must be kept dry but are too large for Ziploc bags, like a sleeping bag, should be placed inside a heavy plastic bag and the opening closed with a "gooseneck".

- Your water bottle should be easy to retrieve. The harder it is to drink, the more likely you are to get dehydrated.
- Equipment you won't need until you make camp can be buried deep in the pack, but reserve an outside pocket for isolating your fuel and any other "smellables" that might contaminate food, clothing, tent or sleeping bag.
- Assign each item a specific "home" in your pack so that it can be located quickly and always return it to that home.
- Normally, arrange the pack's contents so that its center of gravity (heavy gear) is high and close to your back. Compression straps can help. Where stability is vital, some comfort can be traded for the stability of a lower center of gravity by placing heavy gear in the bottom of the pack.

Now on to matching the compartments/pockets with the gear. The pockets and compartments in the illustrations are designated as follows:

1. **Upper Main Compartment.** It usually holds the bulky and heavy things (to keep weight over your skeleton). The external frame shown is "front-loading", meaning that it has a zippered door/flap that allows scouts to place gear when the pack is lying down. The internal frame pack is "top-loading". The top pocket (#6) is swung off and all gear is loaded from the top like putting groceries into a shopping bag. On most newer design packs, that compartment has a draw string at the top to close it before it is covered by the top flap/pocket. Some external frames are also top loading. Top-loading main compartments are often quite a bit larger than front-loading main compartments. Basically, everything that doesn't go somewhere else gets "dumped" into here.
2. **Lower Main Compartment.** It is often called the sleeping bag compartment, after its usual contents in internal frames. Generally, this compartment is front-loading with a heavy zipper. On an external frame this compartment can be used for clothing because the sleeping bag is put in a stuff sack and lashed on the outside (at #8 or #9). Many external frames (especially ones with top-loading main compartments and older designs) don't have this second main compartment, so more is stored in the upper compartment. Sometimes the two compartments have a removable (drawstring or zipper) separator and it is incomplete so that long things (like tent poles) can "passed-through" both compartments. Instead, sometimes one of the external side pockets is not fastened to the main pack at the top and bottom to allow tent poles to be "passed-behind" or "tunnel" it to rest in a lower pocket.
3. **Left Upper Pocket.** Because of accessibility, this is a good place to put rain gear.
4. **Right Upper Pocket.** Because external pockets allow isolation of potentially contaminating items, this is a good place for the stove fuel bottle and other potential contaminants (toilet articles) and things that can be washed if contaminated (cat hole/sump trowel).
5. **Front Pocket.** It is sometimes called a "shovel pocket". Because of accessibility and its prominent visible position, this is a good place for important things like the first aid kit, tour permit and medical forms. It may also be a place for a camera and binoculars. Frames without this pocket often have a "top pocket" that can be used for the same purpose.
6. **Other External Pockets.** They may include the top pocket on a top-loading main compartment (#6 of internal illustration), lower external pockets (lower-left #6 of external illustration) and elasticized throw pockets (middle #6 of external illustration). Don't put the fuel bottle or other contaminants in a top pocket for fear of contaminating the contents of main compartments; they can be used to distribute the contents of #3, #5 and #6. The lower left pocket is where you can keep a compass, flashlight, ziplocked toilet paper and iodine bottle.
7. **Water Bottle Holder Pockets.** Sometimes they are specifically designed for this function. Other times extra external zippered or elasticized pockets can be used. Some packs have the bottle pockets near the top where #3 and #4 are pictured, with these pockets positioned lower. This provides "over-the-shoulder" access instead of "under-the-shoulder" access. Both work. If none of these are available, bottle bags [from Campmor] or canteen holders with belt loops or clips [Army surplus stores] can be used on the hip belt.
8. **Top Lash Points.** These points are often used for sleeping bags (in stuff sack), sleeping pads, tents (in bag) and ground cloths, especially on external frames (as pictured). The same purpose can be achieved by placing things between the top pocket (#6 of internal illustration) and the top-loading upper main compartment (#1 of internal illustration) and tightening the fastening straps. This isn't recommended if you don't have a drawstring on that compartment.
9. **Bottom Lash Points.** They serve the same purpose as those on top.

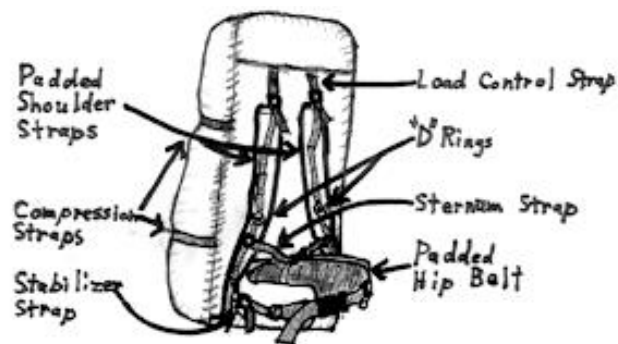
Straps for Comfort and Control of Your Pack

One of the biggest advances in pack technology has been the addition of helpful, functional straps.

- **Padded Shoulder Straps** go from the pack just behind/below the top of the shoulder, over the shoulder, and back down to the pack somewhere near the hip belt (bottom). When scouts experience sore shoulders it is often because too much weight

is being carried by the shoulders -- the shoulder straps are lifting the weight off the hip belt. Two remedies are (1) loosening the shoulder straps, and (2) changing the position where the straps attach to the pack. If loosening the straps causes the pack to "fall away off the back" and the straps attach to the pack well below your shoulders, the pack (or adjustment) may be too short for your torso length and the shoulder straps could be moved up on the pack (or some allow the hip belt to be moved down). If it "falls away" and the straps attach above your shoulders, you may need to move them down (move the hip belt up) on the pack. The shoulder straps should attach to the pack just below shoulder level.

Another potential remedy for the "falling away" problem is to tighten the load control straps, if the pack has them. If problems persist and you are out of adjustments, a different pack may be necessary.



- **Sternum Strap** goes from one shoulder strap to the other across the chest. Not all packs have this strap, but it is one that may be a near necessity. Sternum strap retrofit kits are available and a lashing strap with a quick release buckle from one shoulder strap to the other is a potential in-the-field substitute. This strap, when pulled tight, relieves the pressure of the shoulder straps on the arms and distributes the pressure across the chest. When scouts experience numbness in their arms, tightening the sternum strap can often relieve it.
- **Padded Hip Belt** attaches to the bottom of the pack and goes around the waist. *The weight of the pack should rest on your hips, not your shoulders.* This requires that the hip belt be pulled fairly tight and that the shoulder straps do not lift the pack. You should be able to slide at least two fingers under the top of the shoulder straps. The shoulder straps should mostly just keep the pack from falling backwards off of the back.
- **Stabilizer Straps** go from the sides of the hip belt to the pack on internal frames (and some external frames). They are needed because the "block" of padding at the bottom of the pack rests on the hips just above the tailbone. It also provides a nice fulcrum for the pack to rock on as you walk, which causes instability. By tightening these straps, the pack is restricted from side-to-side motion.
- **Load Control Straps** extend from shoulder straps just in front of the shoulder to the top of the pack. Not all packs have these. When pulled tight, they pull the pack weight in close to the shoulders. When loosened, they allow the pack to "fall off the back". These are useful features on steep and/or rocky climbs. Tightening them while going uphill brings the weight in closer so you don't need to bend over quite as much to maintain your balance. Going downhill, you may want the weight to be off the back (straps loosened), so that if you stumble, you fall backward against the hill rather than forward down the hill.
- **Compression Straps** generally go horizontally around the main compartment of external frame packs from the edges of the pack near the frame, or the frame itself. They serve two purposes. First, if you have a "front-loading" pack with a zipper flap opening [like the traditional "book bag" pack], they relieve stress off the zipper, so it is very important that you snug them. Some internal frame "rucksacks" and "daypacks" also are front-loading. Especially with heavy firm loads, zippers can rupture and spill the guts of your pack. Second, the straps keep the contents from shifting and help organize the weight. Without compression straps, the contents of a large compartment will be loose and always settle to the bottom (yet we usually want weight high and close to the shoulders). The compression straps constrict the compartment's diameter, forcing the contents to stay higher. Think of it like squeezing the middle of a tube of toothpaste to get contents out the top. Large compartment top-loading internal frames are very analogous to the toothpaste tube example. Internal frames may have zigzag compression straps (or elasticized "bungees") on the two sides or across the front. You will usually only find the zigzag straps on climbing or "small contour" packs because they are just where the external pockets usually are. Their purpose is also to squeeze up and secure the contents. Some internal packs already have tall narrow profiles, so squeezing up the contents is not as crucial, but holding the contents steady is still important. They may have vertical compression straps running up and down almost the length of the pack. These straps relieve the pressure off the lower (sleeping bag) compartment zipper, secure the top cover, and compress the contents down to make the pack more stable. They sometimes are left long at the bottom so that they can double as lashing straps for securing things external to the pack.
- **Load Lifting Straps** (not shown in illustration) are appearing on higher end internal (and a few external) frame packs to keep them from sagging and close to the torso. They attach to the bottom of the shoulder strap and to the bottom/side of the pack and are designed to lift and snug the lower part of the pack into the lumbar area of the back. This is not just a shoulder strap length adjustment as on many packs but specifically designed for this function.
- **Loosening Straps in Unsure Footing** allows you to jettison the pack if you falter. Your pack can be shed quickly, if the hip belt and sternum strap buckles are disconnected, by simply lowering/relieving your shoulders. This is something should be done for walking on logs across streams or rivers.

Where to Pack Your Gear

Upper Main Compartment (#1)

- Cookware -- utensils, cup, bowl, cleaning pad, dish towel and stove inside cook kit, all in mesh bag
- Food and matches in Ziploc bags stowed in a bear canister used only for "smellables"
- Toiletries in bag -- sunscreen, lip balm, insect repellent, biodegradable soap, toothbrush and paste, bathing towel,
- Bear canister and rope (lashed on outside if soiled)
- "Yummy bag"
- Extra garbage and Ziploc bags
- Water bag or collapsible container

Lower Main Compartment (#2)

- Complete change of clothes -- light "liner" socks, heavy wool socks, underwear, pants, shirt, each "rolled" and sealed together in gallon Ziploc bag (wear other set)
- Clothing appropriate for the season in gallon Ziploc bag(s) -- gloves, ear muffs, other hat (wear brimmed hat), wool/flannel shirt, sweater or coat

- Camp footwear (if not hung on exterior compression strap)

Left Upper Pocket (#3)

- Rain jacket or poncho
- Pack cover

Right Upper Pocket (#4)

- Stove fuel bottle in Ziploc bag
- Matches (spares) or lighter and fire starters in waterproof container
- Repair kit -- duct tape, sewing kit, tent pole sleeve, zip ties in Ziploc bag
- Light rope or twine
- Trowel for digging sump, cat holes

Front Pocket (#5)

- First aid kit and personal medicines
- Bandana (with first aid kit)
- Camping/tour permits
- Medical forms
- Maps inside Ziploc bag (usually in pants pocket)
- Pencil and paper, diary
- Advancement, training materials

Other External Pockets (#6)

- Lower Left Pocket
 - Flashlight
 - Regular compass
 - Pocket knife & watch (if not in pants pocket)
 - Toilet paper in Ziploc bag
 - Iodine
- Shoulder Strap Pouch
 - Camera
 - Binoculars
- Whistle and mini compass hang from shoulder strap

Water Bottle Holders (#7)

- Two 1 qt. plastic water bottles - one for "clear" water, other for "mix" (only need 1 if your pack has a hydration bladder)

Top Lash Points (#8)

- Tent, stakes, poles and ground cloth rolled together inside tent bag

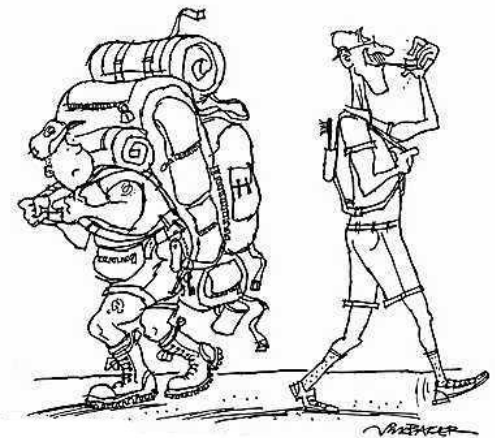
Bottom Lash Points (#9)

- Sleeping bag in plastic bag inside stuff sack
- Foam sleeping pad wrapped around stuff sack

Shakedown

A scout is always prepared. And, one way to make sure is to have a pack shakedown. This is especially true for inexperienced backpackers, but is also useful for everyone, since what you leave behind can't be retrieved and whatever you take will burden you. Even those experienced scouts who go to Philmont are subjected to dumping their pack contents onto their bunks and having a ranger comb through it with them. So, it is even more important for the novice. Bring your equipment checklist to the shakedown.

How do shakedowns work? The crew gets together a day or two before departure on a trek/tour and each spreads all equipment, clothing, and provisions on a table, bunk, floor or ground cloth. Each item is considered carefully. Is it necessary? If so, it is put in one pile. If not, it is put in a separate pile (to be left home). Each item on your list is checked off to be sure all the basics but nothing more is in the "keep" pile. It helps to pair off in "buddies", for one to call out each item on the list and for the other to hold that item up. The first then checks it off. Then they switch roles. Buddy newbies with experienced scouts, so they can offer advice. After going through everything once, go through it again. Finally, take one last look through the pile designated to stay home. If you aren't already at maximum pack weight, you may ask yourself if some of the items could make your trip more pleasant. The answer may be yes for a book, binoculars, or a camera, but remember that ounces add up quickly. An ounce



in the morning feels like a pound at night. The more thorough your shakedown, the lighter your load will be. Another interesting concept is to do a shakedown after you get back from a trek to remove items that you didn't need and won't pack again. The more experience scouts get, the lighter their pack is likely to become.

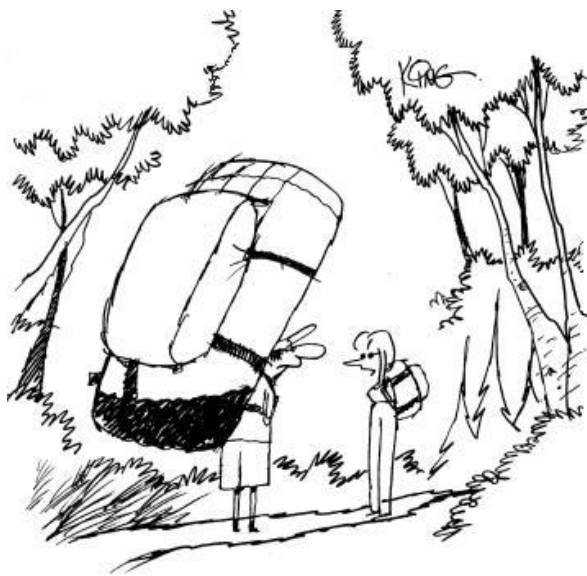
Total Pack Weight

How much your pack weighs depends upon the length of the trek, the food and equipment you must carry, and your personal preferences for optional (luxury) items. Traveling with a crew allows tents, food, cooking gear, and other crew gear to be divided. *For longer treks, pack weight may start initially higher than desired because of the amount of food that needs to be carried.* Pack weight will decrease during the trip as food is eaten. The amount of weight that a scout can carry depends on a lot of physical factors (size, physical condition, age, experience) and terrain. A pack weighing up to 20% of body weight usually can be carried pretty well. A useful rule is that MAXIMUM packing weight not exceed the greater of 20 lbs. or 25% of body weight [That is 20 lbs. up to 80 lbs.; 25 lbs. for 100 lbs.; 30 lbs. for 120 lbs.; 35 lbs. for 140 lbs. 40 lbs. for 160 lbs.; above 50 lbs. -- get real and repack; much higher and you should leave the kitchen sink at home.] Remember that these are maximums and many scouts may struggle at these weights. Aim for 20% of the body weight. This weight includes food and full water bottles. A large hand-held fish scale can be used to measure a scout's pack weight. In almost all excess weight cases, nonessential items can be found to be left behind or shared/troop gear can be redistributed to bigger, stronger, more experienced scouts. Remember, excessive weight and the resultant fatigue from overexertion can lead to loss of fun, irritability, and injuries.

Hoisting the Pack onto Your Back

Prevent "Pack Lifting" injury. Jerking a heavy pack off the ground and swinging it onto your back is a good way to injure your back. There's several popular, and safe, ways to do it. The best way to learn how to get the pack onto your back without straining is to watch experienced backpackers do it, then practice imitating them. The first time, do it with an empty pack, and then work yourself up to the full weight you will carry. At the beginning or when the pack is heavy, it helps to loosen the shoulder straps a little. Bring the pack up to rest on your knee/thigh/hip with the back (strap side) facing me, and then lean it to one side. Slip the closest arm through the shoulder strap and, with a smooth motion, swing it around behind you, reach down and catch it by sliding the other (free) arm through the other (free) shoulder strap. A couple of small jumps or jiggles allows you to position it squarely high on your shoulders (for stability and so that the hip belt is above your hips). Then clip the hip belt, followed by adjusting the shoulder straps and fastening the sternum strap.

This may have taken a lot of words to explain, but it's relatively fast and safe. Another method is to rest the pack on a tree stump or embankment and squat down to slip into the shoulder harness. Yet another method is to have someone hold the pack while you slip into the harness.



*"I think you might've over-packed. We'll only
be gone for an hour."*

Keeping Moisture Out and Letting It Out

Top Ten Ways to Keep from Getting Wet

1. Get in out of the rain.
2. Drink from a cup, never from a water fountain.
3. Stop crying; laughing too hard is risky too.
4. Don't walk near water puddles and creeks.
5. Never break a sweat; don't hike.
6. Go to the restroom.
7. Don't wash your hands or take a bath.
8. Don't visit Old Faithful or other geysers.
9. Never coach a winning football team and, even if you coach a losing one, watch the Gatorade bucket.
10. Stay home, under a new roof, on a hill, in a desert.



Otherwise, you might consider some bits that follow.

Seriously, one of the most perplexing problems for newbies is keeping things dry -- both themselves and their gear. One common fallacy is to seek the "ONE" solution to this problem rather than to think in terms of redundant moisture barriers. What is described below is a system of redundant steps to keep things dry. For example, the combination of properly fitted pack cover, water resistant pack fabric, and waterproof packaging provides good assurance against moisture spoiling packed gear. Redundancy may add some weight, but plastic bags, the usual efficient solutions, are light in weight relative to other gear -- and a lot lighter than water soaked gear. Additionally, redundant bagging is good storage for those "extra" bags packing lists usually call for. When not needed, they provide security. When needed for alternative uses, you rely upon the primary system. A useful mental exercise is to imagine your pack dropped into a creek and which of the contents would still be usable afterward. Weight conscience backpackers, after gaining experience and confidence in their "primary system" procedures and packing abilities, can peel selected redundancies off on less crucial gear -- but not from your sleeping bag. You can be comfortable for a long time under adverse conditions with just a water- diverting canopy (dining fly, tent fly, military poncho) and a dry sleeping bag to keep you warm and cozy. Without it, before very long, you are miserable and risk hypothermia. **DON'T TAKE CHANCES WITH KEEPING YOUR SLEEPING BAG DRY.** As an additional precaution, it is recommended that newbies use synthetic-fill bags, so that they can recover quickly if they do falter.

Things to consider about moisture (getting wet) while backpacking

- **Packaging in waterproof (Ziploc) bags.** Packing several small similar items together in heavy plastic (Ziploc) bags organizes items that could get "lost" inside the pack and keeps the contents dry even if the pack gets soaked. When clothes and other pliable material are rolled tightly and placed in these bags they become more rigid, less spacious and waterproof. If you sit on the bag while zipping the lock, when you get off it will have that "vacuum-sealed" look, be less "puffy", and store in about half the space. This is your primary defense if your pack does drop into a creek and you hope to use the contents afterward.
- **Gooseneck closure.** Goose necked heavy plastic bags should be used for items that must be kept dry but are too large for Ziploc bags, like a sleeping bag. The gooseneck closure is formed by twisting the bag end, folding it over, then fastening it in place with a rubber band or twine. Note that, unless the bag is completely submerged, water would have to run uphill to get in. If a stuff sack lined with a plastic bag is going to be compressed further using webbing straps & buckles and the gooseneck twist is wound real tight, a small pin hole in the bag may be necessary to allow the air to escape unless the compression is done in slow incremental steps.
- **Raingear (for you).** It should be "vented", or else the moisture you avoid from outside will be replaced by moisture from your body that can't escape. Traditional raingear includes mesh vents protected by overhanging flats across the back and under the armpits. New, and more expensive, solutions are raingear made of waterproof "breathable" materials such as



Gore-Tex. You can improvise raingear by cutting a head and two armholes into a heavy garbage bag. Two approaches to raingear are a jacket & pants "rain suit" combination and use of a poncho. Regardless of the approach, at the first sign of rain, stop and don your rain gear and cover your pack. Don't assume it will be a short, light rain. Raingear doesn't function well inside your pack or once you are wet.

- **Military-type poncho.** This is one of the most versatile pieces of gear you can pack. Although specialized equipment does each function better, it can serve as raingear, unfold into a ground cloth and be used in lean-to fashion as an effective dining fly when hiking self-contained. Sturdy ones are made of coated nylon and should have side snaps to form raingear when folded and tie down corner grommets for when used as a cover or shelter (cost \$15 – \$30). Vinyl ones just aren't durable enough for repeated use. Some are available with a "hunchback" specifically intended to cover the hiker and pack together. With a little care, this type of poncho can eliminate the pack cover. However, unless weight is a paramount concern, continuing to use a pack cover is a good idea.
- **Pack cover.** Your pack cover should always be accessible. Nylon coated ones are readily available and a heavy garbage bag can be fashioned into one.
- **Hanging a bear bag under a plastic cover.** That can help keep contents dry. Contents that might be damaged should already be in waterproof bags from when they were in the pack. Although not always necessary, the redundancy could help. It might also somewhat inhibit climbing rodents from coming down the rope.
- **Hanging pack under a cover.** Water will run off. A pack on the ground may accumulate water. Below are photos of a completely waterproof way of hanging a pack or bear canister using a garbage bag, 2 feet of cord and a "bulb" end with a hole. The first one shows three types of "bulbs"; a plastic mustard lid with a hole; a complimentary hotel shampoo bottle with a lengthwise hole (attached to pack); and an office tape core. After the bulb is attached to the pack, the bag is placed over the bulb and pack and a rope is placed around the bag below the bulb (where it won't slip), then hung from a tree -- as shown in the second photo. Because nothing passes through the bag, there is no hole for water to get in. For added protection when windy, use a long bag and tie the bottom shut.



- **Water resistant pack fabric.** Quality packs will have some kind of coating (urethane or silicon) to make the bag moisture resistant -- but don't count on it keeping everything dry by itself. Few or none are totally waterproof, at least not at the seams and compartment openings, so a pack cover is a necessity. Further, the best assurance of dry food, clothes and sleeping bag is to pack them in Ziploc or "goose necked" plastic bags. [Go to discussion of backpack criteria]
- **Ground cloth.** A ground cloth under your tent does two things: (1) it provides a moisture barrier between the cold ground and your warm body and (2) it smoothes out any imperfections in the ground under your tent by "stretching" across the dimples. It also protects your tent floor from jagged rocks and sticks.
- **Sleeping pad.** It acts as a moisture barrier, but also elevates you above any moisture that might seep into your tent. Self-inflatable pads are convenient but relatively heavy, especially full-length ones (2 - 3 lbs.). Closed-cell ones are lightweight (10 - 16 oz.) and cost about 25% of self-inflatables. However, it is bulky. Bulkiness is less of a problem if it is rolled and lashed on the outside. Newer closed-cell designs fold like an accordion.

- **Avoid the low ground.** Consider the terrain around your tent. Be careful not to set up over an indentation because water will accumulate there and standing water is likely to penetrate your tent before water that is running off. Setting up on a slight "knob" results in water running away from your tent, but don't dig a trench around it. Also, be careful not to camp too near streams that could rise in a flash flood -- where the valley is narrow but drains a large area. Although you want to avoid low ground, you may want to avoid the tops of bald hills when there is the possibility of lightening.



- **Full-coverage tent fly.** Water "beads" and runs off a properly coated fly. This process is interrupted when a "wick" is provided to draw the moisture through the minute fabric holes remaining. (The reason for "seam sealer" or "taped seams" is to fill the bigger ones around stitches.) An object against an outside wall provides that "wick" to draw moisture in. Even though a single-walled section of a tent can be made of the same material as the fly, double wall construction puts a space between the wet fly and the sleeping compartment (which is often made of breathable lighter cloth or screen netting). Full-fly construction puts this space between you (your gear) and the wet fly all over the tent. A partial ("umbrella") fly leaves a single wall down where you and your gear are, can touch the single wall, and potentially provide a wick to draw in moisture. The full coverage fly also drops the water off a little away from the tent, which somewhat inhibits it from running or wicking back under the tent. Full-coverage flies come in two general types of construction; one uses a tent pole attached to the fly across the top to create an "awning" over the door and rear window (for ventilation) and the other stakes the fly directly to the ground all around to create a covered vestibule (storage area) in front of the door. Full coverage usually costs a few ounces in weight. If you are using a partial fly tent, use caution not to have anything touching the single wall.
- **Wide-brimmed hat.** You wouldn't think a cloth hat would keep you dry, but it does. Water is wicked to the edge of the rim, where it falls off. Non-felt water-resistant coated ones are also available. The wide rim also provides an effective sunshade and prevents things from "dropping down your neck". Vents are a feature to look for. They allow body moisture to escape during warm weather and when high humidity would otherwise trap it. Rain will run around grommetted vents. Gore-Tex lined hats provide moisture protection and some degree of breathability even without vents.
- **Dining fly.** It is an optional item that comes in handy for the crew to "get under shelter", packs and all, in a hurry to wait out a flash downpour. During a persistent rain, this may be your only escape from your tent to meet with other scouts and to prepare and eat food. WARNING: don't even think about using your stove in a tent and, even with a dining fly, the stove should be kept outside the edges. A small polyethylene tarp gives protection at reasonable weight. Nylon coated rainflies/tarps have reduced weight at a price.
- **Gaiters.** One problem with hiking in the rain is that your socks can "wick" the moisture into your shoes even if they are waterproof. Waterproof pants that cover the boots will prevent this. Another solution, especially if you are hiking in shorts, is to use gaiters. These are like pants legs from the knee down and attach at the top with elastic and/or a draw string and often strap under the boot to prevent them from "riding up with wear". They are also good protection in brushy areas -- and some protection from low-lying poisonous plants or animals.
- **Waterproofed boots.** Leather soaks up moisture unless treated. Several preparations, including silicon- and grease-based coatings/penetrators, are available. The other solution is waterproof breathable liners in the boot. Examples are Gore-Tex liners sewn into the boot lining or in sock form. Even plastic bread-bag liners work for short periods, but aren't breathable. Rubber/plastic over boots tends to be heavy and or not durable enough for rocky trail work.
- **Polypropylene/synthetic liner socks.** When combined with wool socks, they allow the moisture from your feet to be "wicked away", leaving your feet dryer. They also allow friction to occur between the sock layers rather than against the skin, reducing the chance of blisters. Wool retains some insulating qualities when wet.

- **Polypropylene/Lycra or other synthetic under shorts.** Cotton holds sweat/moisture and dries slowly, allowing bacteria to grow and creating an irritating surface for "chaffing". That can be a particularly real problem for people with oversized thighs. Polypropylene or Lycra shorts (short workout tights, form-fitting biking shorts without the pads) are non-absorbent and allow the moisture to escape. Further, because they typically are longer than boxers or briefs and have a "slippery" surface, they eliminate the skin-to-skin rubbing that causes chaffing. They dry incredibly fast. This is the idea behind Lycra lined (double-layer) mountain biking shorts.
- **Synthetic-fill sleeping bag.** This is more in the category of "getting the moisture out" once it is in. Synthetic fill tends to dry quicker, retain insulating properties better when wet, and retain water weight less than down or cotton.
- **Hand warmer.** Consider carrying a "Hot Hands" type disposable warmer (hunting and construction worker item) with the crew first aid kit to put into a sleeping bag for dealing with hypothermia or to help in drying it out. Because they entail combustion, they are not recommended for using them with a person in the bag except for the emergency hypothermia case.





Advice on Buying a Pack



A backpack is one piece of gear that you could hold off on buying. A serviceable one can be relatively expensive and, with all the different styles and sizes, you could end up with one you will regret. Borrow one, or several of different styles and sizes, to get a feel for what is right for you. Most of the following observations for buying a pack are also applicable to renting or borrowing one. The objective of getting your gear there and back is the same and either way you want something that is reliable and comfortable. The difference is that, if you buy the pack, you are stuck with it. You may be able to resell it, but usually at a substantial discount. So, gain experience regarding what you need and want and become sure that backpacking is not just a passing fad for you before you take the plunge. Alternatively, for a starter, consider buying a good quality used pack from someone who has outgrown, upgraded, or no longer uses his or hers. Be careful though, to not get a pack that is too dated because pack technology has advanced quite a bit, especially with regard to straps that increase comfort and help control your load. Many older packs don't have sternum straps, load control straps, compression straps and integrated water bottle holders. Some don't even have a padded hip belt, just a bare strap/belt.

Interestingly, the choice between external- (left illustration) or internal- (right illustration) frame packs is considered to be a relatively less important choice than the criteria listed. Internal and external frame pack designs seem to be converging, with external frames sometimes taking on nearly the same profile as internal frames -- tall and narrow with a bottom (sleeping bag) compartment -- and internal frames adding many external pockets and places (web daisy chains and lash patches) to hang things off the top, sides and front outside the pack -- areas where external frames have traditionally excelled. External frames have also become more flexible (use materials other than steel or aluminum). Both have added mechanisms to adjust the shoulder strap position, a feature first found only on a few external frames. General-purpose external and internal frame packs have merged functionally (specialized climbing and "contour" packs are exceptions). That is why your focus should be on function, not style. If you want to make a fashion statement, you can do it with a \$1,000 custom hot pink and yellow space-aged cloth pack with carbon fiber or heat-treated titanium stays or frame, carboplast buckles and silk-lined shoulder straps. The rest of us will buy a functional pack and use the rest of the money to go on an adventure. Check the "packing bit" for a detailed illustration of internal and external frame pack configurations and packing/storage possibilities.

Basic Criteria for Choosing a Pack

- It fits your build now and later (is adjustable).** Adjustability is particularly important for novices who haven't quite figured out how to make a pack comfortable or who may change height or weight. Check the range of adjustable torso lengths (shoulder straps and/or hip belt adjust so that the distance between them can be changed). Further try not to be at the outer end (high or low) of this range. You are likely to be most comfortable if you hit the midpoint of the adjustment range. All packs are different and manufacturers use different measurements to distinguish between "small", "medium" and "large" or between "adult" and "junior"/"scout" sizes. However, if you are shorter than 5'4" you may want to check out the "smalls" first. If you are taller than 5'10" - 6'0" you might try a "large". A medium may be your size from 5'2" to 6'0". Some manufacturers have packs specifically designed for women and non-adults. Better packs are somewhat adjustable and overlap in size ranges. There is no substitute for trying on the pack you buy (with weight in the pockets and compartments) or for borrowing one that is similar in size, construction and manufacturer to the one you are considering. Those wanting a more precise starting point might look to the pack manufacturers stated "torso length" range. What is torso length? Run your hand down the back of your neck until you feel a lump very near the tops of your shoulders. People tell me this is on the 7th vertebra. Anyway, measure from here down to near the top of your pelvis (hip crest), as shown in the illustration. This is your approximate torso length and you probably want to start by choosing a pack size that has this measurement near the



midpoint of its torso range. If you are robust around the waist, an "extension belt" can often be fashioned from a foot or two of compatible width webbing (usually 2") and a quick release buckle. Mate the original buckle male and female ends on one side of the extension and the ends of the new buckle on the other end (that way you don't worry about buckle compatibility).

- **Well-designed system of straps.**
 - Padded Shoulder Straps.
 - Padded Hip Belt.
 - Sternum Strap installed or retrofitted.
 - Load Control Straps considered a plus.
 - Stabilizer Straps on internal frames.
 - Compression Straps necessary across large zippered front-loading compartments, considered a plus for load positioning and stability for all packs.
- **Sufficient storage space, but not so much that it is bulky and heavy.** A starting point might be 3,200-4,500 cubic inches for an external frame and 4,500-6,000 cubic inches for internal frames. Smaller (100 lb.) scouts may be able to get by with 500 fewer cubic inches because of the smaller size of clothes and sleeping bag. Packs sold as "day packs" are too small and even those sold as "rucksacks" and "day-and-a-half packs" are marginal in size for all but the smallest scouts and you should stay away from them.

How pack size is measured can be confusing. Sometimes different packs claim the exact same capacity, but one holds much more gear than the other. This is baffling—especially because the measuring process has been standardized for several years. The standard entails using 20mm plastic balls as the filler. Packs are loaded up and then contents are emptied into a measuring device. According to the standard, capacity measurements should not include any compartments that are not entirely sealed by zippers—such as shovel pockets, bottle holders, compression pockets, etc. It is suspected that some of the overstated pack figures erroneously include the capacity of these pockets. This can be very deceiving and frustrating, especially if you're shopping online and don't have the ability to compare sizes in person.

Another point of confusion is that some packs are measured in cubic inches and some are measured in liters. Most companies are stating capacities in liters these days, but not everyone. In general, a daypack will be under 2,500 cubic inches or 40 liters. Weekend packs are typically 2,500 to 4,000 cubic inches or 40 to 65 liters. Weeklong packs range from 4,000 to 6,000 cubic inches or 65 to 95 liters. Expedition packs are 6,000 cubic inches or 95 liters and up. For rough comparison purposes you can convert liters to cubic inches by multiplying the liters by 60. Vice versa, you can convert cubic inches to liters by dividing the cubic inches by 60.

The most foolproof way to be sure that you're getting the size you need is to compare in person. Bring your typical hiking load to the store with you to make sure it fits. But if you're shopping online, it pays to ask questions. Make some phone calls (to the manufacturer, not the online retailer) and pry. It just might save you \$15 in return shipping.

- **At least three external pockets, one set of lashing points (two sets for external frames) and "D" rings on shoulder straps.** "Contour" packs just don't make much sense for general backpacking because they lack enough external pockets. On the other hand, impressive are the number and design of external pockets on the Cabela's Wind River and the Kelty Red Cloud -- affordable internal frame packs that blend together the "best" features of traditional external and internal frame designs. External pockets are a necessity for accessibility and for isolating potential contaminants (like stove fuel). In addition, expect separate main and sleeping bag compartments on internal frames. Lashing points combined with lashing straps, light rope or twine provide "expandability" for any pack, just in case you want to carry something extra out (garbage or a share of the load of an injured or weaker scout), want to isolate something (soiled bear canister or contaminated clothes). They are a "must have" on external frames, since basic equipment is attached on the outside. Some method (preferably "D" rings) should be provided on the front of shoulder straps to hang things (compass, event pass, whistle or camera bag).
- **Places for two water bottles or a hydration bladder.** At least one bottle needs to be accessible without taking the pack off. Inaccessibility leads to dehydration. Packs can be retrofitted with a hip belt bottle bag from Campmor. For western treks (like Philmont) and even "ridge-running" eastern treks, two quart bottles may not be sufficient but extras can be stowed or lashed in less convenient places. Nowadays, many packs come with a hydration sleeve to house a hydration bladder. Hydration bladders typically can hold 1-3 liters and have a drinking tube that clips to the shoulder strap. These hydration

bladders make water even more accessible thus helping to reduce dehydration. If your pack does not have a hydration sleeve, many companies also make add-on bladders which can be secured onto or inside most packs.

- **Solid construction using standard components.** Look for reinforced stress points:
 - Grommets, webbing or other reinforcement where pack attaches to frame.
 - Double cloth or other reinforcement where straps attach or where lashing points are provided.
 - Heavier material on bottom of internal frames where they "sit" on the ground.
 - Compression straps across front-loading zippered major compartments.
 - Seams that are "rolled and wrapped" -- you can't see the edges of panels of fabric that make up the main compartments. This cuts down on the possibility that the edges of the panel will stretch and pull apart the cloth weave. Visible "zigzagged" edges usually indicate lower-quality construction.

Standard buckles, quick releases/snaps and pin & rings pay off. Some expensive packs use proprietary hardware. Once broken, one has to order the special piece or rip out, replace and reattach/sew both the male and female ends (female ends are usually sewn secure to the bag or strap, but it is the male "fingers" that often break). Not only that, but making "field fixes" becomes less practical because a broken end can't be mated with a standard one "borrowed" from somewhere else (like a spare lashing strap) or from someone else's pack.

- **Weight less than 6 pounds (preferably about 4 lbs.).** Generally, the heavier your load the more substantial your pack will need to be and along with that usually comes more weight. One advantage of internal frames is generally lower weight for the same space. Another is that more equipment is "protected".
- **Rain (Pack) cover and weather resistant fabric.** The pack fabric should have some kind of coating to make the bag moisture resistant. However, few are totally waterproof, at least not at the seams and compartment openings, so a rain cover is a necessity. They cost \$15-\$35. Further, the best assurance of dry food, clothes and sleeping bag is to pack them in Ziploc or "goose necked" plastic bags. The combination of properly fitted rain cover, water resistant fabric, and waterproof packaging provides good assurance against moisture.
- **And VERY LAST, which kind of pack you consider "cool" or "with it" this year.** So, what will you pay for such a pack? \$75 - \$175. You can pay a lot more but it isn't necessary for normal backpacking activity. The more serious you are the easier it is to justify an elite pack. External frames packs tend to be cheaper than internal frames because of the extensive sewing and reinforcement necessary for internal frames to carry the same volume and weight. At the lower-priced end of this range are some Camprails and Peak 1 (Coleman's upscale line) packs. In the intermediate portion you will find Cabelas, JanSports, Kelty, and Lowe. Gregory, North Face and some Lowe's are examples of premier packs but also command a premier price, probably too premier (even on sale) for all but the most serious backpackers. Because styles change from year-to-year, catalogs like Campmor often have special prices on last year models (<http://www.campmor.com/> -- 1-800-226-7667). That could be the way to get a pretty good pack at a reasonable price. If you stick to the specifications above, you should be able to find a serviceable pack at a reasonable price.



Camping accessory # 151 which is necessary if you have camping accessories 1 through 150:
The backpack side view mirror.

Backpack Care

The old adage, *"Take care of your equipment and it will take care of you"* is an important truth to live by for campers, hikers and backpackers, and one that is very true when it comes to your backpack. Throughout a long day of hiking, you'll want your backpack to be well-fitted, comfortable and able to withstand the constant punishment of scraping tree branches, rubbing against rocks and enduring the elements, whether they are harsh sunlight, torrential rain or blinding snow. Follow the suggestions below and you'll have a backpack that will take care of you and give you years of service because you take care of it.

Pack Carefully

Don't throw things into your backpack at random. That hard corner of that science text book that you like to carry around to impress members of the opposite sex (We need to talk.) may rip a hole in the backpack's material. Making sure you pack those hard-edged and sharp items (such as a stove, cookware or tent stakes) carefully will avoid having them poke you in the back while wearing the pack, but will also keep them from poking into the backpack material and causing wear spots or, even worse, ripping holes in the backpack. Pack deliberately and carefully to ensure that weight is distributed properly. Distributing the load equitably will help your pack stay balanced, making it easier and more comfortable on your back as you are hiking.

Carry a Small Repair Kit

When NASA launches a space shuttle they have redundant back-up systems in place, just in case a primary or even secondary system should fail. As we trek out into the wild, it would behoove us to have at least some small ability to make repairs while in the great outdoors. Bring along a couple of extra clevis pins and split rings, a heavy duty sewing needle with upholstery thread, a small can of silicone spray and a roll of universal patching material, otherwise known as duct tape. **Fix holes quickly.** The smaller a hole is the easier it is to repair. A large hole, even properly patched and sewn shut, can reduce the structural stability of the pack. See the section below on repairing rips and tears.

Animal Damage

Packs are often damaged by furry creatures. These creatures are either going after any food kept inside of your pack, or the salt deposits that form on the pack exterior. With use, salt deposits will form on your backpack's shoulder straps and back panel. Animals, especially rodents, are attracted to salt, and will gnaw at the fabric, causing damage. To prevent animal damage, keep your food and your pack separate at night. Consider leaving your pack open and unzipped, so that animals are less inclined to chew through the fabric.

Clean Your Pack Properly

It can happen to the best of us; no matter how careful we try to be, we find food items spilling into the pack, or something melting and making a sticky mess when it escapes a badly sealed zip-lock bag. As soon as you discover such a problem, clean it immediately and as thoroughly as possible. Food particles or liquid stains can cause the pack fabric to wear prematurely. Almost as bad; if you set the backpack down and take an afternoon nap, you could awake to ants or worse crawling into and through your pack, enjoying the snack you left for them. When returning from a hike, empty the pack completely, shake all the loose items out. To preserve the integrity of your pack's fabric coating, the interior should only be wiped down with a damp cloth to remove crumbs or stains.

Dirt and grime will abrade the fabric and wear it out. On the trail, be careful of tree sap, plants that secrete liquids or even the rare occurrence when your backpack becomes ground zero for bird droppings. At the first sign of any type of stain, use a damp cloth to clean off as much as possible to minimize damage to the pack fabric. Back home use a mild, non-detergent soap to thoroughly clean any stains, but be careful not to ruin the fabric's waterproof coating. When cleaning the entire pack, wash in a bathtub filled with cold water. Dry completely in a cool, airy place to avoid dampness causing mildew.

Never Do This

- Never machine wash or machine dry your pack.
- Never use hot water, bleach, dish-washing liquid, pre-soaking solutions, or spot removers. Always use a non-detergent soap.
- Never use solvents to clean your pack as solvents may irreparably damage the fabric, frame material, and water-resistance of the zippers.

Perform Regular Maintenance

Take care of problems while they are small and, preferably, while you're at home. Sew any small rips or tears, patch any worn areas of fabric and tape seams that may be loose. Check high-stress points such as the hip belt, suspension stabilizers and shoulder straps for wear or separation. Keep zippers clean and free of obstructions such as stray threads or items that could damage the teeth, and spray with silicone spray to keep them easy to zip and unzip.

Store the Backpack Properly

Keep your backpack in a cool and dry storage area to keep mildew from forming and to extend the life of the waterproof coating on most packs. Do not stack heavy objects on top of your pack and, if possible, stuff with clothing or newspaper to help maintain its shape.

Zipper Maintenance

Maintain your zippers' longevity by keeping them clean, free of sand and grit, and out of the dirt. Most zippers fail due to wear and tear to the coating on the inside of the zipper slider (the metal toggle on your zipper). Once the coating wears off, the metal abrades rapidly, and the zipper slider no longer joins the plastic coils securely, causing the coils to separate from the slider. Hand wash your pack frequently to remove dirt and grime, and preserve the coating on your metal zipper slider. Keep loose threads trimmed.

How to Repair a Broken Zipper

A backpack with a broken zipper is unusable -- new or old, shabby or not. Instead of abandoning it, repair the zipper, or replace it with a new one.

Tools: needle, sewing scissors needle-nosed pliers, seam ripper, straight pins, sewing machine.

Materials: thread, small safety pin, old zipper of similar size; replacement zipper, if required.

Time: 5 to 15 minutes for repair; 1/2 to 1 hour for replacement.

Before you decide to replace a zipper, examine it carefully to see if you can repair it. If a tooth is missing in the upper two-thirds of the zipper's tracks, the zipper should be replaced. If a tooth is missing near the bottom of one of the tracks, zip up the zipper so that the slider is above the damage. Thread a needle and make several stitches around both rows of teeth, just above the missing tooth, to make a new stop for the slider. Stitch over the new stop several times to make sure it's firm.

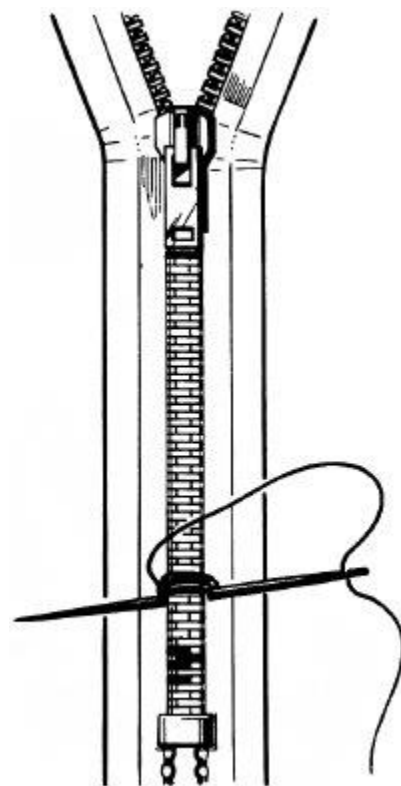
If the problem is a missing pull tab, check to see whether the slider has a hole where the pull tab was attached. If so, slip a tiny safety pin or paper clip through the hole to serve as a substitute. If there is no hole, try to salvage a clamp-on pull tab from an old zipper of a similar size; put the tab onto the slider with a needle-nosed pliers.

If the slider is off the track on a metal zipper, carefully rip out the stitching around the lower ends of the zipper tapes. Pry off the metal stop at the bottom of the zipper, being careful not to tear the tapes. Remove the zipper foot entirely.

Guide the track tapes into the grooves of the slider, inserting them into the top and pushing them through the slider to the bottom; use a pin if necessary to work the track tapes through. Pull the tapes carefully so that the slider is evenly seated on the tracks.

When both tapes have been threaded through the slider, carefully pull the slider up until the locked track teeth appear at the bottom. Make sure the slider is evenly seated on the tracks, or the zipper won't close evenly at the top. Sew a new stop at the bottom of the tracks with needle and thread, and repair the stitching that holds the zipper in the garment.

If the zipper is beyond repair, replace it with a new one of the same length. Buy a zipper in a matching color, and be sure it's the right weight and kind for the backpack.



With a seam ripper, carefully remove the stitching holding the old zipper in place. As you work, note how the old zipper was put in, and in what order the various lines of stitching were made. Remove the old zipper and pull out all loose thread ends. Following the directions on the zipper package, pin the new zipper into place and stitch it the same way the old zipper was stitched; use a sewing machine with a zipper foot. Make the final topstitching on the outside of the garment, by hand or by machine.

How to Mend Rips and Tears

Small holes and tears to the backpack's fabric can be repaired in the field using a needle and thread, adhesive repair tape, or liquid urethane such as McNett Seam Grip). Once you return home a backpack can be saved from discard by a skillful mending job, and usually the job requires only a few minutes' work.

Tools: steam iron and ironing board, sharp scissors, sewing needles in a variety of sizes, sewing machine, tailors' chalk or pencil, sponge.

Materials: iron-on mending tape, thread in appropriate colors, patching materials, heavy brown paper, tissue paper.

Time: 15 minutes or more, depending on damage.

The mending technique you use should depend on whether it matters how much the mend shows, and whether the piece is worth spending much time on. The easiest and most effective method is making the repair with iron-on mending tape, or with a sewing machine's straight or zigzag stitch.

Most tears are either straight or L-shaped, because they tend to follow the grain of the fabric. Use mending tape. Cut a piece of tape about 1 inch wider and 1 inch longer than the tear, and round off the corners.

Lay the piece to be mended on an ironing board so that the torn portion faces up, wrong side up. If it's hard to lay out the item so that the edges of the tear stay together, make a large temporary patch of either fabric or heavy brown paper, and baste it lightly to the side of the fabric *opposite* the side where the mending tape will be attached. Be sure the basting threads are far enough from the tear so they won't be caught by the mending tape.

Lay the mending tape, adhesive side down, over the tear. Position it carefully; then use tailors' chalk or a pencil to mark around it at several points. Take it off temporarily and preheat the torn area by ironing it briefly.

Replace the mending tape over the tear inside your markings. Iron it down according to the directions on the mending tape package; make sure the tape is completely bonded to the fabric. Let the patch cool completely before moving the mended item. If you used a basted fabric or paper holding patch, remove it when the item is completely cool.

Sometimes the edges of a tear can't be brought together neatly because some of the fabric is missing or is so badly damaged it has to be cut away. When this happens, use iron-on or fabric patches, or hide the damage with decorative patches. Zigzag machine stitching is ideal for applying a patch.

To repair a straight or L-shaped tear by machine, set the machine for a straight stitch, with about 10 to 12 stitches to the inch. Lay the piece under the presser foot so that the tear runs crosswise in front of you and the left-hand end of it is 1/2 inch to the right of the presser foot. Put the needle and the presser foot down on the fabric and sew in a zigzag pattern back and forth across the tear, switching the machine from forward to reverse and back again, pull the fabric gently with your left hand to keep it moving slowly from right to left under the presser foot. The mended tear should be held together by even zigzag rows of straight stitching, making a very strong but usually conspicuous mend.



Sleeping Bags



A sleeping bag would probably be the first piece of equipment to buy. It is not real expensive, it is kind of personal and it has alternative uses in the off season or after you lose your lust for backpacking (hope not) -- during sleepovers at friends' and relatives' houses or as a cocoon for watching TV on cold winter nights. Besides, on a typical backpacking trek, you spend about one-third of your time in your sleeping bag.

The Basic Criteria for Choosing a Sleeping Bag

- **Weight less than 3 ½ pounds for a 6' bag.** Shorter bags should be proportionately lighter and longer bags a little heavier. If it is low in weight, it will likely stuff into a small shape for packing. Sleeping bags are relatively bulky items. Tapered "mummy" bags (see pictures above) hold weight down and the heat in. Stay away from department store rectangular bags; they generally are low priced, less efficient heat preservers and usually weigh a minimum of seven pounds -- way too much for a 100 lb. scout who needs to keep total pack weight below 25 lbs. (25%).
- **The bag is rated for 20°-30° temperatures.** This is a good balance of weight and function, and the rating of the majority of bags on the market. Such bags span three seasons - Spring, Summer, and Fall. With additional clothing or a liner, they can go lower.
- **The bag uses synthetic fill of Hollofil, Quallofil or Polarguard.** Down is lightweight, stuffs into a small shape, is expensive and has great insulating qualities, but is disastrous when wet. Further, once wet, it is heavy and hard to dry. Leave down to the experienced crowd. Synthetic fill is more forgiving for newbie scouts. Don't worry too much about the outer shell of the bag; most are made of some form of serviceable washable nylon. Most synthetic bags wash and dry easily.
- **It fits your build.** If you are 5'4", why carry the weight for fitting a scout 6 feet tall? If you are 6'4", a standard 6' bag will be cramped. Most people will fit a 30" width bag -- lower weight. Those over 200lbs should stick to 32" widths and those very full bodied (well-muscled) should consider "oversized" bags that are 36" wide.

So, what will you pay for such a bag? \$50 – \$150. Campmor (<http://www.campmor.com/> -- 1-800-226-7667) has many selections. You can request a free catalog. If you stick to the specifications above, you should be able to find a serviceable bag at a reasonable price.

Now a few hints on packing. During storage (non-use), sleeping bags should not be stuffed in small sacks because constriction can reduce the "loft", reducing its insulating qualities. When in use, stuff the bag into the smallest stuff sack it will fit. Some compression sacks use webbing to get size even lower. This is particularly important for internal frame packs because they go inside (lower zipper opening) and displace other gear. Size is not as crucial for external frame packs because they get strapped on the outside (bottom or top) of the frame pack. Stuff sacks should be lined with a plastic bag before inserting the sleeping bag. A "gooseneck" closure on the opening will keep the water out. External plastic bags work but tend to get snagged. **Never use your sleeping bag stuff sack as a bear bag.** The food smell gets transferred from the stuff sack to the sleeping bag. Do you want to be a bear lollipop?



IT'S A 'FOUR SEASONS' SLEEPING BAG

How to Care for Your Sleeping Bag

Care

Want to extend the useable life of your sleeping bag? The following are a few tips to help you:

- Don't pack your bag wet. If your bag does get wet hang it out to air dry or fluff dry it in a dryer *without heat*.
- Hang your bag out after each trip and allow it to air out. Washing your bag after each trip is not necessary (unless each trip is one month in the backcountry). When your bag needs a bath follow the directions provided by the manufacturer. Washing your bag in a large laundry mat style machine is better than using your home machine. A machine without an agitator is best (front loading) so drawstrings and straps don't get wrapped around the machine in the washing process or worse, torn off. (See the section below on cleaning.)
- When hiking or going into the backcountry, store your bag in a waterproofed compression sack. Trust us, you will be glad you did. The bag will stay dry, even if you take a dump into a river by accident when traveling the backcountry. Having a dry bag and the ability to make a fire can greatly aid you in the event weather conditions sour. Also, the compression sack will reduce the amount of space your sleeping bag takes up in your pack by as much as fifty percent.
- Remember the best secret weapon when in the outdoors, duct tape. Your six to twelve feet of emergency duct tape can be used to patch a tear or seal up a broken zipper.
- Don't be lazy with your zippers. If your bag has two zippers that meet at a middle point don't use one end to go all the way around the bag. This puts a lot of strain on the zipper and increases the chances of a zipper jumping off of its teeth and jamming. Try to have those zippers meeting at a near halfway point to balance the load and the distance the zipper has to travel.
- Always stuff your sleeping bag, never roll it.
- Be gentle with your sleeping bag when removing it from the stuff sack, never yank it.
- Store your bag uncompressed in a large, breathable storage sack or king-sized pillowcase. Hanging it or storing it flat also works.
- Accumulated body oils, sweat and dirt can rob your sleeping bag of its insulating power. Keep them away from your bag by sleeping in clean, long underwear, socks and a hat. If it's warm out, wear clean cotton clothes to bed. Just don't fall into bed in the same clothes you hiked in. You'll drag dirt into the bag with you, and you're likely to sleep colder because of accumulated perspiration in the clothes (even if they feel dry). And never sleep in the clothes you cooked or ate in. This is extremely important in bear country!
- Never lay your bag directly on the dirt; use a ground cloth.
- Don't store your bag rolled up tightly in a compression sack. Bags stored for a long time that are compressed tightly can lose their loft. Stuffing is actually easier on the fabric and fill. Store your bag rolled up loosely and in a breathable sack made of canvas.
- Air and fluff your bag after each use and never leave it compressed for long periods. Take your bag out every three to six months and fluff it up to help maintain its loft.

Cleaning

Every sleeping bag, down or synthetic, must be cleaned. Accumulated body oils, trail dust and grime all serve to decrease the effectiveness of a bag's insulation, and increase obnoxious odors and fiber-weakening microbes. Note: Dry cleaning is not appropriate for sleeping bags, especially down. Solvents used in dry cleaning can strip the natural oils from down that help it retain loft. Solvents are also very difficult to remove from synthetic insulation. If you decide to wash your bag yourself, use a gentle, non-detergent soap such as Nikwax Down Wash 2.0, which is made for washing down- and synthetic-filled items.

- **Down:** For down bags, hand-washing in a bathtub works best. Fill the tub with warm water and add one of the above-recommended cleaners. Put the bag in and gently work in the soap, then allow it to soak for 15 minutes. Drain the tub and press out any remaining water. In a cold-water rinse, work the soap out gently, let the bag sit for 15 minutes and drain. Press out any remaining water. Repeat the rinse until all the soap is out. It's also possible, (according to some bag manufacturers) to machine wash a down bag, as long as a front-loading washer is used. Never use an agitator-style machine as the motion can damage the stitching and insulation. Make sure to wash on the gentle cycle in cool water with one of the aforementioned down soaps.
- **Synthetics:** Synthetic bags can be washed in the same way. Hand-wash in a bathtub, or use a large, front-loading washer with no agitator. Use cool water and mild soap. Rinse several times to make sure all the soap is removed. An extra spin cycle or an extractor may be used to remove excess water.

Drying

- Air drying is the safest way to dry your bag, but obviously the longest.
- If you tumble dry your bag, use very low heat or a no-heat setting and keep an eye on it. Dryers have varying heat outputs, so you need to check periodically to make sure the shell and insulation aren't overheating, which can actually lead to melting.
- Add a couple of clean tennis balls when the bag is nearly dry. This will help break up any clumps of insulation and help restore the loft.

Restoring DWR

The original DWR (durable water repellent) finish on a sleeping bag's shell eventually wears off. You can restore water repellency and help keep the bag cleaner if you reapply this finish. There are several products available to restore the DWR to your sleeping bag shell fabric.

Leaking Down

Many, but not all, goose-down bags feature "down-proof" liners and shells made of very tightly woven fabric which prevent the down from getting through. If a few feathers escape through the shell or liner of your bag, don't become too concerned. This is normal, especially along the seams. The sharp quills of the feathers may poke through, especially when the bag is new and the down hasn't totally settled. Work the feathers gently back inside, pulling from the opposite side; the holes should be minimal and close back up.

Fabric Tears

For small holes or tears in the sleeping bag shell, a patch of nylon repair tape will do the trick until you get home.



Sleeping Pads

The Secret to a Restful Night on the Trail

Many hikers, especially beginners, overlook the importance of a good backpacking sleeping pad. Even if you have the best sleeping bag in the world, you can still end up spending a miserable night under the stars if you lack a sleeping pad. Every good sleep system includes a sleeping pad. First, it provides another layer of insulation between you and the cold, hard ground. When you sleep on a sleeping bag only, your body weight crushes the insulation in the sleeping bag against the ground, making it much less effective. Also, sleeping pads are important because they provide cushioning. Let's face it - the ground is usually uncomfortable. You can try to cushion yourself with by making a pile of leaves or pine needles, but using a sleeping pad has much less impact on the environment. The more comfortable you are, the better you will sleep-and the happier you'll wake up in the morning!

Now that you know why a sleeping pad is a necessity, you need to know what kinds of pads are available so that you can choose the one that's right for you. There are four types of backpacking sleeping pads on the market today: backpacking air mattresses, open-cell foam pads, closed-cell foam pads, and self-inflating pads. Each type of sleeping pad has its pros and cons.

Backpacking air mattresses are small, thin inflatable mattresses. The idea of sleeping on air after a long day on the trail may sound heavenly, but air mattresses are not always the best choice for backpacking. They are undeniably comfortable, but they have several drawbacks. The first is the possibility of leaks. Backpackers put their gear through a lot of stress, and even a durable air mattress can spring a leak. Leaks are a pain to fix in the field, especially at night, but if you don't fix it, you'll be sleeping on cold, hard ground. Backpacking air mattresses also do a poor job of insulating. The large, open space of air inside the mattress chills to outside air temperature and circulates that air underneath you. Thus, most backpacking air mattresses are only suitable for warm-weather use. Some backpacking air mattresses remedy this problem by adding insulation.

Closed-cell foam pads are the warmest type of backpacking sleeping pad available. They are also the least comfortable in that they pad provide very little in the way of cushioning. Closed-cell foam is a dense, thin foam made up of tiny closed cells that stop air circulation (retaining heat) and block water absorption. Thus closed-cell foam pads are water-repellent, warm, light, and may last forever. They are also cheap, so if you are on a budget, this is the sleeping pad for you.

Open-cell foam pads have open air cells. Open air cells can squish further so they feel softer and have more "cushion", but as a result have to be either larger or heavier to compensate. Not so good for backpacking. Also, the open air cells absorb both water and allow some air circulation, meaning they are poor insulators in cold weather and worse than useless if the ground gets wet. They are warmer than uninsulated air mattresses, and more comfortable than closed-cell foam. They are also cheap.

Self-inflating pads combine the comfort of open-cell foam pads with the warmth and weather-resistance of closed-cell foam. A self-inflating pad consists of open-cell foam covered in waterproof, airtight material. An air valve lets you inflate the mattress as much as you like-just open the valve and the open-cell foam sucks air in. They tend to be heavier than closed-cell foam and they are more expensive. Nonetheless, these pads are very popular and are probably the best choice for backpacking in terms of comfort and versatility. If you take care of them, they will give you many years of comfort and enjoyment. To help your self-inflating pad last as long as possible, store it flat with the valve open. This allows any moisture inside the foam to dry out and prevents the foam from breaking down. To minimize the amount of moisture that gets inside, allow the pad to self-inflate as much by itself as possible; then blow any additional air into it to get it to the firmness you desire.

Length and shape is another consideration. Some backpacking sleeping pads are only made to fit the upper half of your body. This saves weight, and is great for summer trips. For winter trips, however, you need a full-length pad. Also, make sure that the pad material has some texture to it so that you don't slide off.

Choosing a backpacking sleeping pad is much like choosing any other piece of gear. First, you have to consider the conditions you will be backpacking in, the features that are most important to you, and the price you are willing to pay. Then, you will be able to select the perfect sleeping pad to complete your sleep system. Pleasant dreams!

Tents



Dome



Tube/Bivy



A- Frame



Frog without rainfly)

What tent should you use? This is a very important decision because the tent is your front line of defense against moisture and, along with your sleeping bag, where you spend about a third of your time. Many troops have tents that scouts can borrow, but eventually you may want your own or parents may need to invest in one in order to share the camping experience. As with other equipment, the mistake that is often made is buying the \$50 special at the local department store. These tents are generally too heavy and unreliable for backpacking and tend to be difficult to set up.

Tents generally are some variation of one of the four basic designs shown at the top of this page. As with other equipment, a wide range of tents are serviceable as long as they meet some basic criteria and the limitations of some designs are considered. For example, although tube/bivy tents are a favorite of light through-packers for summer because they tend to be light and easy to set up, they are not such a good choice for winter camping because the absence of a free-standing frame allows them to sag under snow weight. Geodesic dome expedition tents are great in winter, but hardly the choice for summer backpacking because their extra frame structure and heavier cloth cause them to weigh twice the desirable backpacking weight and often have marginal circulation.

Basic Criteria for Choosing a Tent

- **Total pack weight less than 6 pounds for a two-person tent.** You should be able to find a comparable single-person tent that is less than 4 lbs. Be cautious to look at the "packing weight" because it is likely 1/2 to 1 pound more than the "tent weight" because tent weight only includes the tent body, fly and poles while packing weight also includes the rope/cords, stakes, stake bag, pole bag and tent bag.
- **Double-wall construction and a full coverage water repellent (coated) fly with taped or sealed seams.** Other designs risk wicking water when items lean against the side.
- **Nylon (not polypropylene) floor with taped or sealed seams.** There is a reason that cheap tents use poly flooring but more expensive ones don't -- they use coated nylon. Poly is inexpensive but tends to leak around the stitching, is non-forgiving if even slight separation of the "strands" occurs and small holes tend to expand into large ones. The solution for poly floor problems is duct tape -- sewing just creates more holes. For nylon floors use adhesive nylon patches (available at most outdoor stores), which can also be sewn and seam sealed. For larger holes, like a 1" burn hole in a troop tent floor, use a patch on each side -- they seal to each other in the whole area.
- **Two (cross) ventilation ports.** Often this is screening in the door and a rear window. Many tents have small vents in the top to let vapor escape and have "breathable fabric for walls above the rainfly area. Ventilation can be a problem during summer for full-coverage tents with vestibules unless the vestibule flap is open and fastened back. Also make sure that the sleeping compartment (body) is fully enclosed from insects, reptiles and rodents.
- **Heat-treated aluminum poles/hoops a plus.** Fiberglass poles work OK but tend to split after repeated use and are somewhat heavier. Setup may also be a little more difficult with fiberglass poles because of the external joining collars may hang up on long fabric tent body sleeves or catch attachment clips. Because aluminum poles usually have internal connecting collars, they slid easier through fabric and don't have raised portions to catch the clips when stretching out

the fabric. Very few tents under \$100 use aluminum because of the cost. Replacement fiberglass poles can be cut from generic repair parts available at most department stores that carry tents. Although, they are durable, aluminum replacements often require a visit to specialty (outfitter) shops or catalogs (like REI). As long as weight is acceptable, don't fret about an otherwise serviceable tent having fiberglass poles.

- **Freestanding a plus.** Some A-frame and almost all tube/bivy style tents are not freestanding. That means the tent will not hold up under its own weight without stakes driven into the ground to "stretch" it out. Even freestanding tents require staking in wind and to "stretch" out the tent (rain) fly. A non-stretched fly often leaks because moisture doesn't bead off or runs against the tent body fabric (which may not be waterproof or may allow "wicking"). As mentioned earlier, absence of a full frame structure may also allow sagging during heavy rain or snow. Free standing tents are a plus if you also use your tent in congested campgrounds because their stakes tend to be placed very near the main tent and, therefore, are less susceptible to "tripping" passersby. Because framing weighs, non-free standing tents often weigh less and are good choices when conditions aren't extreme.
- **Adequate headroom.** To sit up in a tent you need at least 36 inches of height. Most tents have 42 inches. Many tube and bivy tents don't have this. Part of the rationale for the "frog" tent was to add a freestanding frame and headroom to the bivy design -- which often has 24 or less inches of headroom. This is important if you want to do something in your tent, other than sleep, during inclement weather. Some people refer to bivies as "coffins".
- **Short pole sleeves and clip fastening of fabric to frame.** Until recently, fabric sleeves that hold the poles or hoops to the tent body tended to run from the bottom of one side, over the top and down the other side with only a short intermission at the top. This required that poles be "fed" through the sleeves, made them hard to setup, and sometimes resulted in broken poles. Raised collars joining fiberglass poles compounded the problem. Now, some tents use only clips. The trend seems to be to have short sleeves (for support) at the top combined with clips down the sides. Besides ease of setup, non-full sleeves allow for better air circulation. Full-sleeve tents were quite stable in wind because of the structural support offered by the full sleeves and the fly was fastened just at the bottom. Part sleeve and clip-only tents are not so stable and their frame poles tend to "move around" in wind (leading to collapse and breakage) unless they are fastened to the fly. Most of these flies have Velcro fasteners about half way up the wall to wrap around the tent poles to make the frame more rigid. Short sleeves and clips are an important feature for ease of setup, but make sure that the tent has these mechanisms for fastening the fly to the poles for rigidity. If it doesn't, reject it. Further, if you aren't going to religiously fasten these stabilizers, stay away from this style of tent.
- **Consider investing in a ground cloth.** It both provides a moisture barrier and protects the floor from sharp rocks and sticks. Both nylon and polypropylene ones are available. A poly tarp provides protection and comfort in smoothening out the sleeping place. Ground clothes can also be cut from construction plastic.



Tent Care and Cleaning

Your tent is your shelter in bad weather and your protection from the elements in the great outdoors. With proper care, a quality tent can last many years and provide you with many days and nights of clean, warm, comfortable shelter.

Always practice preventive care.

Remember what your grandmother told you, "An ounce of prevention is worth a pound of cure". Investing in some preventive care will mean a long life for your tent. Before you take your tent camping, set it up somewhere out of direct sunlight. Check the tent and make sure nothing is missing. Put on the fly and make sure to anchor it down and draw it tight. A tent that is properly cared for can offer years of service. Proper care of a tent is simple.

Buy some seam sealer recommended by the manufacturer and painstakingly seal all the outside seams of your fly and the floor of your tent.

I know, the tent instructions say it is waterproof and that all the seals have been treated and sealed. Trust us; seal them, if you don't even a \$1,000 four season tent can leak when it rains. This job isn't much fun, but will give you a completely watertight fly and floor. If you are feeling extremely eager, you can even seal the inside seams as well, but this is usually unnecessary. You will appreciate your efforts when the first downpour comes.

Seam sealing is mandatory on single wall tents. Although seam taped from the inside, single walls have exposed seams on the outside which need to be sealed. Especially because they do cost so much and you cannot replace a fly, you need to seal your single wall to keep it water tight longer.

Practice setting up your tent.

Learning to setup your tent should not be done at the campsite with the sun going down. Improper setup can cause tents to sag, broken poles, cut guy lines and ripped tents. Know how to set it up and pack it. A common mistake when packing your tent is folding it into a neat little package. Your tent stuff sack is called a stuff sack for a reason. Take the sack, put in the poles, then the fly and then the tent body. This makes sense; consider this if you are setting up your tent in a windstorm. Are you really going to take the time to fold you tent nicely? No, you shouldn't be either. Also, consider this, same windstorm, you pull out your fly first, since this is the last piece to go on, it will just get in the way and get blown away while you are setting up the tent body. Put in the tent body last and it will be the first thing you grab when you set up your tent, as it should be. The other and more important reason for not folding the tent is the fly can form creases and cracks after being repeatedly being folded in the same way. While your tent may look nice and pressed, you will feel rather silly when water is seeping through the creases.

Check your campsite before pitching your tent.

You're looking for two things; to make sure you're not placing your tent on top of rocks, roots or uneven ground that can cause damage to your tent and an uncomfortable night for you, and that the nice, flat, smooth area you find is not the lowest point on the campsite. Otherwise you could be flooded out in a storm when all the water runs downhill into your tent.

Use a ground cloth.

This helps protect the exterior floor of the tent as well helping to prevent water from gathering under the floor. The best way to do that is to take a tarp or piece of 3 mil plastic sheeting and cut it just a little smaller than your tent's "footprint" so that the edges of the tent floor extend out slightly beyond the ground cloth's edges. If you don't make the ground cloth smaller, then water will gather on top of the ground cloth and then run in between the ground cloth and the exterior floor of the tent. Not a comfortable feeling in the middle of the night.

Keep it clean - Inside.

Remove your footwear at the door to avoid tracking dirt and water inside the tent. If you can't or don't want to leave your shoes or boots outside the tent, use a plastic bag or the built-in pockets on most later model tents to store them inside. If you do get dirt or a stain inside, clean it up immediately to reduce the chance of further damage.

Keep it clean - Outside.

There is almost no way to avoid getting dirt, stains, bird droppings, tree sap droppings and lots of other various things on the exterior of your tent. Always use clean water and a rag or sponge to clean up those stains or dirt as soon as possible.

Don't pack your tent wet.

If your tent does get wet and you have to break camp, set it up as soon as you can and let it dry out. Just like a sleeping bag, let your tent hang out after each trip. If your tent does mildew, wash it gently with warm water. For serious cases we recommend contacting the manufacturer. Don't use detergent or chemicals as this can ruin the tent or neutralize its waterproofing. If after you have cleaned your tent you still have a mildew smell, contact the manufacturer. Once the mildew has gotten into the material, it is very difficult to get rid of it.

Mildew cleaning tips.

A musty odor, and/or small cross-shaped spots on the tent fabric indicate mildew formation. Mildew, a fungus spore, requires a dark, warm, moist environment to grow. Mildew uses the dirt and soil found on many tents as nutrients to grow and reproduce. This fungus actually penetrates the urethane coating of the tent fabric and grows between the tent fabric and coating, eventually lifting the coating from the fabric. Waterproofness is thus lost and the fabric is eventually destroyed.

Should mildew begin to form, immediate action can be taken to retard further growth. Wash the tent as instructed above. Next, sponge-wipe the tent with a dilute solution of McNett MiraZyme. Sponge over the affected areas and allow to air dry, out of direct sunlight, without rinsing. This will kill the mildew on the tent, and prevent it from getting worse, but it will not remove the mildew marks.

Pole care.

DO NOT allow the shock cord to snap the pole sections together, this can damage the poles. Wipe poles with damp cloth to remove any saltwater, as saltwater can cause corrosion on the poles. Store your poles only after they are completely dry.

Zipper care.

Keep loose threads trimmed. Keep free from dirt. Spray periodically with a non-greasy, non-staining silicone spray designed for fabrics. To prevent salt water corrosion on zipper pulls, make sure you rinse with clear water after exposure.

Repair.

Science fiction author Carl Zwanig wrote, *"Duct tape is like the Force. It has a light side, a dark side, and it holds the universe together."* That may be a slight exaggeration, but duct tape is a tent's friend. You can use it to quickly patch a rip or tear and prevent it from getting worse, seal up split seams, fix broken support poles and many other repairs. The key is to make those repairs immediately, before they become unmanageable. Hopefully you will not need to repair your tent in the field, but there may come a time when you need to be prepared. Rips and tears can be temporarily alleviated by heated duct tape, which you should have in abundance.

Usually the poles are first items to break, since they receive the most stress. Think about the torturous bend they have to go through in order support your tent and the amount of stress this puts on the metal. The accessory kit that comes with your tent should have a repair sleeve. A little aluminum tube, the sleeve fits over the break, use liberal amounts of duct tape to keep it in place.

Another common problem is a ripped pole sleeve, again duct tape should be able to repair the tear. Just remember that duct tape does not stick to moist areas and useless when cold. Use a lighter to warm up the tape and apply it to the rip. Continue to use the lighter on the tape so it can meld to the tent fabric better. Perhaps the most annoying repair is a broken zipper. Tent zippers have the unenviable job of have to zip in circles or arch under incredible stress from the tent. When a zipper blows, it is hard to repair. Most tents have a mesh door, you can often "sew" the broken door to the mesh door as a temporary fix. Manufacturers offer zipper repair kits that can rejoin the broken zipper, but there is nothing for zipper with broken teeth. If the zipper separates and it is small, release tension on the tent by taking releasing the poles. The slack may be enough to run the zipper through and rejoin the teeth. As they say, an ounce of prevention can save you time and despair, so make sure your tent zippers are working well before you head out on your expedition.

Make sure your tent is ventilated.

On a cold night it is tempting to close up all of the windows and flaps of a tent tight but this can cause another problem. As you sleep you sweat and breathe out about a cup of fluid. Four people in a tent can release almost a quart of fluid. When the inside of the tent becomes warmer than the outside air, this moisture can start to condensate on the inside of your tent and make things pretty wet inside by morning. Make sure you have some ventilation point(s) open in your tent to help reduce condensation.

Stake down your tent.

Although freestanding tents don't require you to stake them down, the weather can. A strong enough wind can move a tent, even with occupants in it! If you are setting up your tent on a windy day, put your pack and gear in the tent to help hold it down. Make sure that the proper amount of tension is set as you stake down the tent, enough that it can flex in the wind, but not so much that the material will flap and beat itself.

Never, ever, ever keep food inside the tent.

Hungry critters will chew through the tent fabric in search of a snack. In bear country, it's an invitation for you to become a bear snack. If you are packing your tent in an interior pack compartment, keep it in a separate bag to avoid contamination from food or other smellables and **never** use your tent bag as a bear bag. The food smell gets transferred from the stuff sack to the tent -- your sleeping compartment. Do you want to be a bear lollipop?



I JUST LOVE HOW THEY COME INDIVIDUALLY WRAPPED
TO SEAL IN THE FLAVOR!



Stoves and Cookware



Stoves

Not everyone has to own and pack a stove. A rule of thumb that works well and is the one used at Philmont is that a crew needs at least two stoves and beyond that up to four people can share a stove. Just make sure that sufficient fuel is taken. Further, often water can be boiled for more than one person's cooking, cleaning and sterilization requirements at once, cutting down on time and fuel consumption. If two leaders carry their stoves, only one or two more is sufficient for an appropriately sized crew. On troop hikes, three per stove is adequate. So, it may be possible to defer your stove purchase until you get serious about backpacking and have experienced several types and know for yourself what you need. Sharing stoves also allows distribution of weight away from less able backpackers.

Two popular "component" stoves are the MSR Whisperlite Shaker Stove -- upper left illustration -- (14 oz. + 4.3 oz. for 22 fl. oz. bottle = 18.3 oz.) and the Peak 1 Apex II Stove (Coleman) -- lower left illustration -- (19 oz. including 22 fl. oz. bottle). The Shaker is very popular, with its rotating legs, for packing into a small profile. The Apex's advantages are that its second regulator valve is easier for newbies to adjust in simmer mode and has a built-in windscreen. The shaker uses white gas, while the Apex II uses white or unleaded gas. Both have variations on their basic design. Peak (Coleman) has varieties that have the gas tank integrated into the base. In general, the Peak's are bulkier. Peak also makes several butane/propane cartridge stoves. Butane and propane stoves light easily and are dependable, but require packing a second cartridge if the trip is long or the first cartridge is already partially used. Liquid fuel bottles can just be "topped off". Several people have indicated that butane stoves lose some of their ease and effectiveness in cooler higher-altitude settings. Don't forget the waterproofed matches or lighter!

How Much Fuel Should I Carry?

It's the age-old question answered only by backcountry experience and deep wilderness wisdom: How much backpacking stove fuel do I *really* need to carry on my next trip? Pack too little and you could go achingly hungry, to say the least. Tote too much and you'll bear the burden of hauling extra weight, which will only slow you down.

So how do you calculate the right amount? Going beyond number of meals and number of days, we'll look at the criteria you need to consider when thinking about your trip as a whole. Here's what to factor into your fuel formula and why, along with some tips.

Trip Criteria

Every adventure is different, but here are a few of the main variables to consider while packing fuel for your upcoming trip.

Know your numbers

As a baseline for fuel consumption in the backcountry, it's important to calculate how many people will be on your trip, and how many hot meals and hot drinks the group will require. If some members take their breakfast cold, you'll need less fuel, whereas firing up the stove for a morning cup of coffee will cut into fuel consumption in the long run. This is easiest to determine by multiplying the amount of people in your party with the amount of hot meals, then adding the number of hot drinks the party is planning on. This number will give you a rough sense of about how many liters of water you'll need to boil. If you're cooking a meal that doesn't require boiled water, still count that as a liter—the stove use time is likely about the same.

Once you've made this estimate, use the chart below to determine how many ounces/grams of fuel your stove uses to boil 1 liter of water. Then do the math for total ounces/grams of fuel. Keep in mind that this is a rough estimate, but it gives you some scope—a place to start.

Adverse factors like low temps, melting snow, and wind can end up requiring 3-4 times as much fuel as your baseline number. So next, we'll look those criteria and how to adjust our baseline number according to them.

Conditions Affect Consumption

Traditionally stoves are tested at sea level in 70°F (21°C) temperatures with no wind. But these conditions are rarely the case for most of our backpacking expeditions. Seasons (and their fluctuating temperatures), altitude, and wind are big players in a stove's overall fuel usage. In general, water temperatures reflect air temperatures, meaning the warmer the ambient temperature, the warmer the water and the quicker it can boil—and the less fuel burned.

Cold temperatures also affect the fuel canisters by causing their pressure to drop. Upright-canister stoves usually work down to about 20°F (-6.5°C). But the farther the mercury drops, the more the stove struggles and more fuel used. (For this reason, stove systems and liquid fuel stoves are go-to's for winter use.)

When it comes to altitude, the higher we go, it turns out, the faster our water will boil, but raw food will actually cook slower—much slower. For every 18°F (-8°C) drop in boiling point (roughly the change from sea level to 10,000 feet / 3,048 meters), cook time will double.

Wind is also a major consideration. For open-flame-burner stoves (like the PocketRocket), a 5 mph (8kph) wind can cause as much as three times more fuel use in a given cooking period.

In the high alpine, melting snow often becomes the main water source. This adds another step to the water boiling process and additional stove time, which increases fuel consumption. Water from cold glacial streams and ponds will also increase boil time, so keep that in mind.

What type of backcountry chef are you? Simple boil-only meals are going to use a lot less fuel, while a multi-step gourmet meal will require more.

As these criteria change, so too does the way we approach our trip and ultimately the amount of fuel we need in the backcountry. Remember, every trip is unique and plan accordingly.

Stove Efficiency

Now that you have a general idea about your environment, conditions and group needs, consider your stove itself. A stove's efficiency directly impacts how much fuel you'll need. Some stoves boil a liter of water much faster and use less fuel than others.

Here are some tips for getting the most out of your stove.

1. Be ready with your supplies— Have pouch-cook meals open and oxygen absorber taken out before the water boils.
2. Always use a windscreen with liquid fuel stoves and wrap it close to the cookware (about ½" all the way around the cookware diameter) to increase the stove's efficiency. The screen helps direct hot exhaust gases around the sides of the pot instead of losing that heat to the air, and it protects from even light winds blowing heat away from the pot.
3. Placing the canister in warm water before using it will help in cold temps.
4. Use a lid, and resist checking the water frequently (you can usually hear a difference in the sound or will see steam).
5. For sustainability and lower fuel costs long term, a liquid fuel stove is the way to go. It might be more expensive to purchase but the fuel is more economical over time and often easier to come by if you're traveling abroad. You also won't have to deal with empty canister weight on long trips, and you can always top off the fuel in your bottle rather than having partial canisters sitting around.

Final Thoughts on Fuel

There are many nuances that affect fuel use and the more time you spend in the backcountry, the more you'll start to recognize how they impact it. This fuel trip criteria offers a baseline to work from, but part of mastering fuel needs is experience, and a big piece of that process is trial and error. With fuel it's better to come home with some extra than to run out.

MSR's Conventional Canister Stoves	Water Boiled (per 1 oz. / 28 g of fuel)
MicroRocket	2L
PocketRocket 2	2L
SuperFly	1.8L
PocketRocket Deluxe	2.1L
WindPro II	1.8L

MSR's Liquid Fuel Stoves	Fuel	Water Boiled (per 1 oz. / 28 g of fuel)
WhisperLite Universal	White Gas	1.3L
	Kerosene	1.6L
	IsoPro	1.8L
WhisperLite International	White Gas	1.3L
	Kerosene	1.6L
	IsoPro	1.8L
WhisperLite	White Gas	1.5L
	Kerosene	1.6L
	IsoPro	1.8L
Dragonfly	White Gas	1.6L
	Kerosene	1.7L
	Diesel	1.7L
XGK EX	White Gas	1.5L
	Kerosene	1.7L
	Diesel	1.9L

Cookware

Unless you go to something like titanium (spelled with a "\$"), your basic choices are aluminum or stainless steel. Aluminum is much lighter but doesn't conduct heat as well, or clean up as easily, as stainless steel. Because food tends to stick to aluminum, stick resistant-coated wares are available. One important feature of cookware is that it stacks within itself, because it is bulky. Besides stacking, sometimes the stove can be packed inside the cookware. For one person, a 3/4-quart pan & lid for boiling water, a bowl, and a small plastic or aluminum-measuring cup are sufficient. A small fry pan could be substituted for the bowl. Quite often, these sets have both a bowl and fry pan. Such combination -- upper right illustration -- can easily be found in either aluminum (with anti-stick fry pan) or stainless steel. The non-coated aluminum versions are the cheapest. There are also some real nice two-person sets that, while heavier and costlier than a one-person set, are much lighter and cheaper than two individual sets. MSR makes a really nice stackable anti-stick aluminum set that would work for 3-4 people.

One set not recommended is the steel Army issue mess kit that includes a two-compartment plate and fold-over-handle skillet. These are re-e-e-eal heavy. Aluminum versions may be OK, but a better choice is the traditional Boy Scouts style cook set -- stackable bowl, fry pan (with swing-around handle), small pot and lid -- similar to that in the upper right illustration. Generic aluminum versions can often be found in department stores and work just fine.

"One-pot" cooking can be an interesting alternative and economical if the crew or troop already owns a multi-person camp-set. Eight to twelve people can easily split up a set containing an 8 qt. kettle & lid, 4 qt. kettle & lid, and a 10-inch fry pan, with each scout carrying their own bowl, cup and utensils. Texsport offer a copper bottomed stainless steel set.

Some people carry a 16 oz. (1/2 quart) stainless steel mountain or sierra cup to do double duty as a cup and small pot. Utensils should fit inside the cookware along with the stove. Lexan sets are lighter. Cut-down Rubbermaid or Lexan mini-spatulas work well. Use a tablespoon (rather than a teaspoon) so that it can triple as a stirrer, a ladle and an efficient food shovel after a long hungry day on the trail.

The examples from above can be found in most popular outdoor catalogs or websites. Department stores, such as Wal-Mart, are also potential sources. You should be able to find serviceable stoves and cookware at reasonable prices.



Hiking Boots

What You Need to Know to Buy a Pair



What's the big deal about boots? Jeez, they're expensive, aren't they? Most look like they could take you up the north face of Everest. Do you really need such an expensive item to start out?

I would say, "Yes". Hiking boots are recommended for long distance hikes over rough terrain. Old-style heavyweight mountain boots are usually unnecessary now that good quality lightweight boots are widely available. The most important thing is that your boots fit well and are well broken-in before you hit the trail. Nothing ends a hike quicker than blistered feet, and even minor blisters can become infected and cause serious trouble.

There are a number of reasons to buy a pair of good hiking boots. Boots are built sturdy to protect your feet. They accomplish this protection in a number of different ways.

- Good boots are "solid" on the bottom. You shouldn't be able to feel rocks or stones through the soles. If you can, there's a good likelihood that after many miles on the trail, your feet are going to start hurting. If you can press in the bottom of the sole with your thumb, the soles are probably too soft to give your foot proper protection. If you can "twist" the soles of the boot, it's also probably too soft. Trails are not like the pavement in front of your home. Trails are rocky, and you need good protection to avoid bruising the bottom of your feet.
- Good boots provide good protection on the sides. They are heavy because they either have extra padding to protect your foot from stones, rocks, and branches you may step on which could gouge into the side of the boot. Some fabric boots have protective "welts" 1/2-inch or more up from the soles to give added protection.
- Good boots provide good ankle support. Grab the top of the boot and try to bend it over side-ways. If it bends easily, it's probably not going to provide the level of protection needed on the trail. The top of the boot should be stiff to hold the ankle in place and provide it with good support.
- Good boots are either waterproof, or are capable of being waterproofed with special waterproofing solutions. I would avoid fabric boots that are not waterproof. While it's possible to treat non-waterproof fabric boots with liquid silicone, it generally doesn't waterproof the boot enough to be useful. Wet feet cause blisters. Stick with waterproof fabric boots, or leather boots that can be treated with Nikwax, beeswax solution, or other more durable waterproofing solutions. (If the boot that ends up providing you with the "best fit" is a non-waterproof fabric boot, you can always buy a "Gore-Tex" sock to put inside the boot to keep your feet dry. These socks are available from various outdoor mail-order merchants, such as REI. So there is actually a work-around if need be.)
- Good boots are heavy enough for their intended use. A "lighter" boot used for hiking may not have the necessary rigidity to provide your feet with good support under the heavier load of a backpack.

If good boots are positively out of the question due to price, athletic shoes are always an option. But keep in mind that people have severely sprained ankles in athletic shoes, or in some cases, broken ankles in athletic shoes. Athletic shoes cannot be waterproofed either. Also keep in mind that there are many different types of athletic shoes, and some may be better suited to their original design (such as running) than use as a hiking boot. Calf-high work boots are a better option, but they generally aren't as comfortable as a hiking boot, can rub the Achilles tendon, and don't provide the kind of fit desirable for hiking. I recommend that you make the boot investment. Because even if you decide backpacking is not your thing, you can always wear the boots when you hike, shovel snow in winter, or mow the lawn in the summer. Your investment ultimately won't go to waste.

"Well I have an old pair in the closet that I bought about 15 years ago, I'll just use those!" Think again. Feet change over time. All those days your feet have been wedged into your favorite pair of Florsheims, Hush Puppies, or Nikes has caused them to change shape over time. Wear old boots on a long hike before you attempt a backpacking trip. You'll probably end up buying a new pair.

What's a Good Brand to Buy?

Anyone who tells you that "you should buy [insert your favorite company name here] brand boots" doesn't know what he or she is talking about. On the flip side of the coin, anyone who asks, "What boots should I buy?" is also asking the wrong question. The best boot for you, and the one you should buy, is the **one that fits YOUR foot**. It's really pretty simple. If it doesn't fit your foot, you shouldn't buy it. It may work GREAT for your friend's foot, and he may think XYZ Brand was forged by the right hand of God, but if they turn you into a cripple five miles down the trail, then what good are they?

Why doesn't your friend's boot work for you? Because, all boots are made on different "lasts". The last is the "form" the boot is built around at the factory. The size and shape of these lasts, even between identical sizes of boots, can vary greatly. For instance, some boots are built around a "European" last. This last is typically narrow in the front, which can cause some American toes to feel pinched, but may feel great to a European. Asolo brand boots are built on American-style lasts. Does that mean you should buy Asolo because you're an American? The answer is "NO". Why?

No two feet are alike. All come in different shapes. The best boot to buy is always the boot that fits YOUR foot. (Are you starting to follow me on this?).

The two questions you should really ask are:

1. "Which boot fits MY foot?"
2. "What do I need to know in order to find this boot?"

Unfortunately, the answer to the first question can only be supplied by one person - YOU. The salesman can't help you with this. No one in the backcountry can either. You have to let your feet "talk to you" on the matter.

Finding Your "Perfect Fit"

When shopping for new boots, I would recommend that you stay away from boot brands made for hunters (high-top boots) or those sold through shoe stores. "Hunting" boots generally go too high on the ankle, putting unnecessary stress on the Achilles tendon. "Shoe Store" boots are usually enhanced versions of street shoes. They "look" rugged, but they're probably not going to feel very good five miles down the trail. Shop at a reputable outdoor shop that specializes in hiking and backpacking equipment. These shops generally carry well-designed outdoor footwear for the hiker/backpacker.

A boot that fits well will not slip in the heel area, and provides your toes with plenty of room in the front when you're going downhill with a full pack load. For this reason, hiking boots are generally sized a little longer than your standard street shoe. Before you head to your local outdoor shop, grab the socks that you intend to wear in the boots. For beginners, I recommend that two pair be worn - a thin or lightweight pair on the inside, and a thicker pair on the outside. Two socks rub against each other, whereas one sock generally rubs against your foot, potentially raising blisters. Ideally, the socks should be synthetic or wool. Cotton socks get damp and soggy, and will raise blisters on your feet. Synthetic and wool socks do a much better job of wicking moisture away from your feet, thereby keeping them relatively dry.

In the Store

Choosing a well-designed boot with the right fit is the greatest challenge in reviewing your boot choices. Don't let the rugged appearance of the boot, the salesman's recommendation, or even the brand name steer you to a boot that won't work for your foot. After you have reviewed your choices and "tested" each boot design for sole and ankle rigidity (see the points outlined above), ask the salesman to bring you a pair.

The Finger Test

This is where you'll perform your first "test". With the boot fully unlaced, move your foot as far forward in the boot as possible. If the boot is the proper size for your feet, you should be able to slip your index finger down inside the boot at the back of the ankle. Your finger is just about the right size for determining if that all-important extra space is available in the front. Backpackers can expect their feet to swell. The extra space is also needed when backpacking downhill, when your foot has a tendency to slide forward in the boot under load.

The Sensory Test

Next, take off your thick socks (leave the thin liner sock on) and slip your foot into the boot. Using all your sensory powers, try to determine if any part of the boot feels tight. This is especially important in the area where the small toes are located. Some boots may be designed in such a way that your small toes will feel "pinched" or "jammed". This can be very difficult to feel through two pairs of socks. This test will bring all this to light. Does the boot feel too narrow on the sides in the area just behind your toes (the "ball" of the foot)? Is it too tight in the middle part of your foot on either side of the arch? If so, look for another boot. This test will quickly eliminate any boots that are clearly not designed for your foot.

Now perform the same sensory tests with your thick socks on. Make sure your socks are stretched smoothly over your foot, not loose, which can cause the sock to fold over when you slide your foot into the boot. The boot should not feel tight in any area. Inversely, it shouldn't feel loose in any area either. It should fit comfortably "snug". If any part of your foot feels "jammed", try a lighter, medium-weight sock on the outside. (Using different thicknesses of socks can always be used as an option for making size/fit adjustments.) If the foot still feels jammed (or inversely, loose), look for another boot.

The Stride Test

Walk around in the boots. Do they feel good? Does the boot "break" (or crease) across the top of the toes comfortably when you stride forward? If the top of the boot feels like it's jamming the back of your toes when you stride forward, then look for another pair. What about the heel? If you feel your heel sliding noticeably in the heel area, you probably have a boot that's a little too large, or one that's not going to work for you. New, rigid boots will always cause your heel to slide a little (and I emphasize, a little) when they're new, due to the newness and stiffness of the sole. If you think the sliding is due to a boot that's too large, go 1/2-size smaller, ensuring that the smaller size passes the "finger test".

The Slant Board Test

If everything still feels okay, ask the salesman if they have a "slant board" where you can test how they feel on an incline. Walk down the incline. If your foot jams into the front of the boot and your toes feel pinched, look for another pair. If your toes touch the end of the boot, ask the salesman for the next half-size larger.

If you've managed to locate a pair that meets all the criteria above, there's a good chance that you've found a reasonably good fit for your foot. If you haven't, keep trying on different brands until you find a pair that "makes the grade" so to speak. If none of the boots available meet the criteria, visit another outdoor shop. Boots can be expensive. Take the time to choose wisely. Your bank account and feet depend on it.

At Home

The "Paper Doll" Test – Once you have your boots home, slip on the socks you intend to wear while you're hiking. Then, place a blank sheet of paper under your foot, and carefully trace an outline of your foot with a pencil. Using scissors cut the foot outline from the paper. Then, very gently, slide your "foot cut-out" into the boot. Press the paper flat onto the bottom of the boot, working the paper into all corners of the boot, just as you would press pizza dough into the corner of a cookie sheet. Then, remove the cutout. Any spot where the paper is folded up (i.e. not flat) is a spot where the boot is tight. Now remember, some snugness is okay, but if you have spots where the paper is folded up 1/2", you may well have some problems later on down the trail.

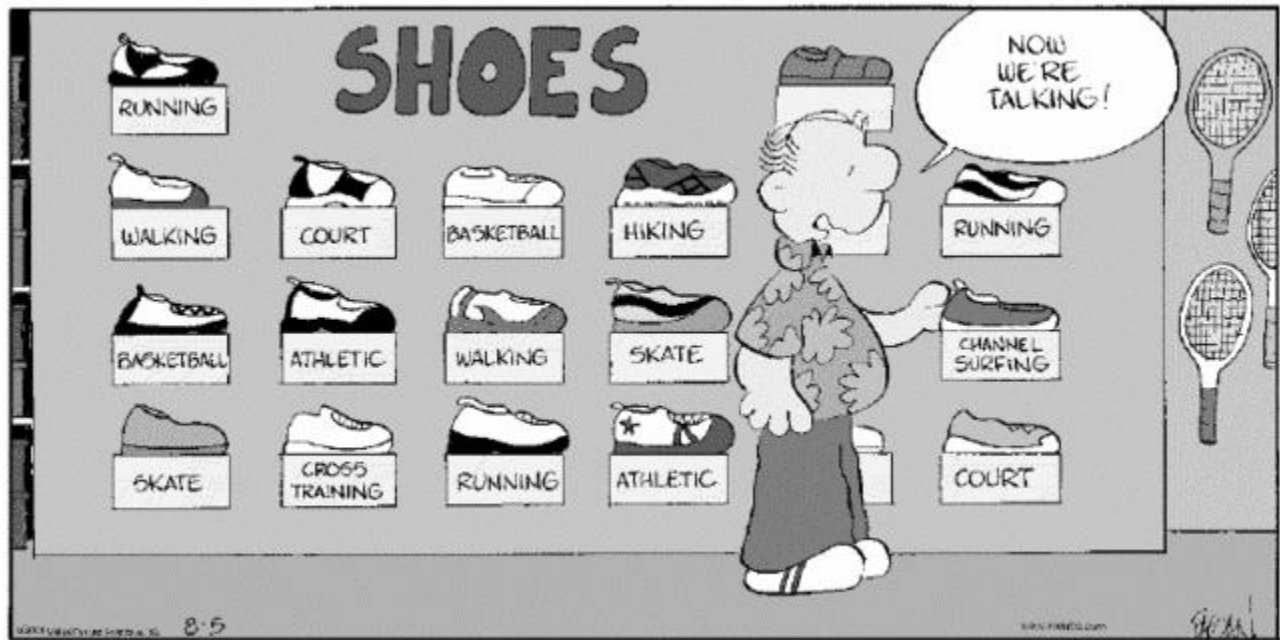
The Long Walk Test – Next, wear them around and see how they feel. I would recommend that you perform a "long walk" inside your home, or even better, inside a local shopping mall to see how they feel after a little distance. Wearing them while lounging at home will not give them the proper test. Put a little "indoor distance" on the boot. If they still feel good, you've found a reasonably good boot for your foot. If they don't feel good, resist the temptation to keep them - take them back and keep looking.

On the Trail

Break-in – Assuming that you've found the "Perfect Fit", the final step is breaking in your boots before you take them out on the trail. With the evolution of fabric Gore-Tex boots, this is not as great a factor as it used to be, but should still be performed. All-leather boots will definitely require some break-in time prior to backpacking. Wear your boots on progressively longer hikes until you're certain you can do some comfortable distance with the added weight of a backpack.

Being Prepared for Problems – Finally, even the best fitting boots can still cause you problems. Small spots may rub, or tender feet may require some toughening. Be sure to take along some "moleskin" on your hikes and backpacking trips. Moleskin, and

other similarly designed abrasion padding with adhesive on one side, and a felt-like padding on the other, will minimize the possibility that blisters are raised. (It will minimize, not eliminate the possibility.) Medical adhesive tape, with a smooth, slick covering (or duct tape) on the outside can also be used. Spenco "second skin" is also an outstanding option for providing relief for boot "hot spots". And finally, remember that sometimes it's your foot that needs conditioning, not the boot. Regular hiking and backpacking will help toughen your feet until they are prepared for the abuse you'll give them on the trail.



Hiking Boot Care

The old adage, *"Take care of your equipment and it will take care of you"* is an important truth to live by for campers, hikers and backpackers, and one that is absolutely true when it comes to your hiking boots. Throughout a long day of hiking, you'll want your boots to be well-fitted, comfortable and able to withstand the constant punishment of climbing up rocks, down hills and through streams.

It makes absolutely no sense to purchase an expensive pair of hiking boots if you don't know how to keep your hiking boots safe. Just remember that the boots are only the perfect boots if you learn how to take care of them. Taking a little extra time to care for your hiking boots can add years to their useful lives. There are a few different types of hiking boots and each type has its own maintenance. The following are some helpful hints and tips to help you maintain your hiking boots.

Waterproofing the Boots

Consult the manufacturer for the proper products to put on the boots for waterproofing. Whatever waterproof product is chosen, use a reputable brand product such as Nikwax for those expensive boots. Waterproof the boots before you use them for the first time. After returning from the wilderness, clean your boots and then when they are dry, make them waterproof so that they will stay dry once you return to the wilderness. When waterproofing your boots, try not to overdo it because you'll just be wasting excess product in the end. If your boots have a Gore-Tex lining, make sure to use silicon-based treatment on them instead of a wax-based one. This is to allow the boot to 'breathe' which is one of the functions of the special lining. Always make sure the attachment area where the boot and the sole meet have enough waterproofing. A very soft toothbrush or Q-tips will help get into those tough boot areas.

Cleaning Boots

When you have finished using the hiking boots for the day and are ready to put them away, completely clean and wash the boots. Take the stones out of the bottom of the soles and remove all mud. Most fabric boots can be washed on the outside with non-detergent soap and water to remove built-up dirt. Leather boots can also be rinsed off, but repeated washing and drying can dry out the leather over time and make it brittle. A soft toothbrush with a little water will help clean those hard to get areas. If the boots become really scuffed, check to see if it is time to waterproof the hiking boots again. NOTE: If your boots are wet and dirty, it's best to dry them first, and then brush the dirt off.

Drying Boots

Whenever possible, dry your boots completely after each trip. Remove the insoles to help aid in the drying process. Allow your hiking boots to air out in a shaded and ventilated spot, such as the garage with an open window. Keep the boots away from direct sunlight. Don't set your boots near a fire (or other heat source) to dry them more quickly, since high temperatures can damage boot materials and the cements used to hold them together. It might even effect how the boot fits. If you need to speed up the drying process, try stuffing dry newspaper inside your boots to absorb water. Replace the newspaper frequently for best results. The boots should dry slowly or else the leather might crack.

Smelly Boots

A light amount of regular foot powder or baking soda will remove most of the boot odor. Just don't overdo it and use light amounts.

Boot Storage

If you are a seasonal hiker and the boots are only used for a couple of seasons, don't store the boots in a cold attic or a hot basement for an extensive period of time. Keep the boots in a place that have normal air temperature. Always put them on every once and a while to keep the proper shape of the boot and also to keep the leather soft.

Break in the Boots

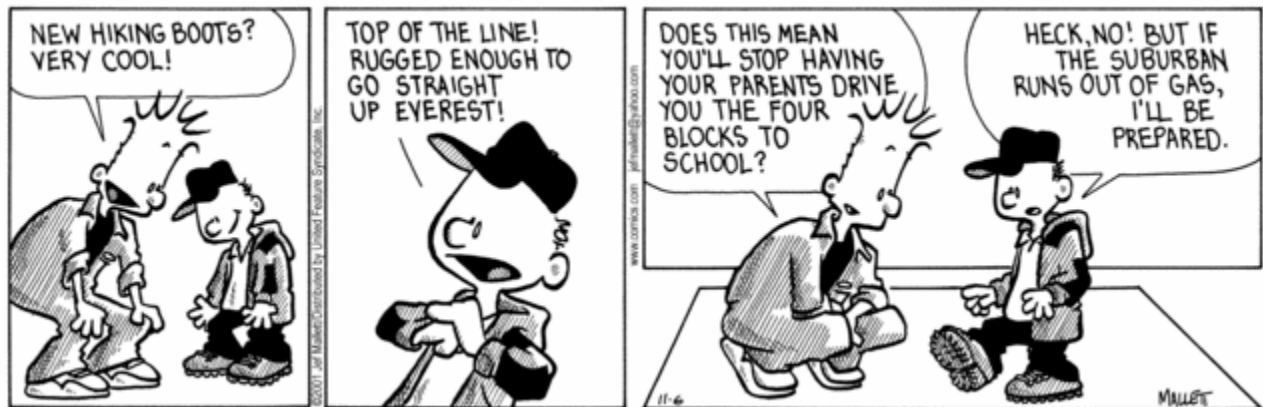
No boots can be used for the first time hiking without breaking in the boots first or your hiking experience will go downhill after the first mile. Wear the boots in an easy environment such as around the house. Then go for short walks around the block, etc. Once your feet feel ok, the boots are ready to go. If the boots still don't feel comfortable, bring them back to the retail store to see if any adjustment can be made. All hiking boots, especially leather ones, benefit from frequent cleaning and occasional conditioning with special boot treatments. These treatments condition leather and provide additional water protection to keep your feet dry.

Check Laces

Always check the boot laces for potential lace breaks. Catch the defective laces at home and replace them before they break on the trail.

Footwear Repair

If the boot is starting to separate from the sole, use a rubber glue (such as Shoe Goo), not super glue (super glue will shatter) to glue them back together.



How to Choose Hiking/Backpacking Socks

Anyone who's ever experienced blisters on a hike knows how critical quality socks are to foot comfort and injury prevention. The socks you wear on the trail can have a significant effect on your hiking/backpacking experience. Like footwear, socks must be chosen carefully to match the kinds of conditions you expect.

Sock Design

The design and look of socks will vary with each manufacturer as well as the weight class of the sock. However, the main components of a hiking/backpacking sock are as follows:

- The top of the socks is the section slightly above your ankle upwards. It often has an elastic material and ribbed design to keep the socks from falling down. This section is often what's seen above a boot and includes a cuff, which is the finish at the top.
- The instep covers the top of your foot from the ankle down to your toes. This area can feature minimal to average cushioning depending on the type and weight of the sock.
- The sole, like a boot, this section is the bottom of the sock. It includes the area slightly above the ankle to the toes and contains the majority of the cushioning, including sections for the ankle, heel, toes, and the balls of your feet.
- Side panels are found in some designs. These sections are sandwiched between the instep and the sole and may contain specific materials for airflow and moisture-wicking.
- The arch brace, or arch support, is the section of the sock that surrounds the arch of the foot, supporting the foot's arch and holding the sock in place.

Material Options

Natural Materials:

Wool is an extremely popular natural sock material. It is warm, cushioning, and retains heat when wet. Unfortunately, wool can take a long time to dry and it can be scratchy next to your skin. It can also wear out quickly if not reinforced with other materials. Gone are the days of the 100 percent wool socks. Today, natural and synthetic fiber blends is the sock standard because they address many of these problems. Yet wool still comprises a significant percentage of the fabric components of a hiking/backpacking sock (many manufacturers list the percentage of materials used on packaging). When searching out a sock, you will likely find wool will compose anywhere from 25 to 85 percent of the overall sock material

For those of you who have memories of extremely itchy, wool socks, fear no more. Merino wool will help you overcome an itchy wool phobia. Merino wool has the qualities of regular wool (excellent breathability, insulation, strength, and quick drying time) minus the itch. In fact, it's a soft and comfortable material to wear. Mohair and worsted wool are two other common wool types found in socks.

Silk is another natural fiber commonly found in socks. Silk is a natural insulator and is comfortable and lightweight, but not as durable as other options. It's occasionally used in sock liners for reliable wicking and a smooth feel.

Avoid socks containing large quantities of cotton for hiking or other outdoor activities. Cotton is a poor insulator and retains moisture. The latter trait is what leads to hotspots (i.e., friction areas) on your feet when you hike and ultimately causes blistering. Cotton socks are a recipe for disaster when hiking – do your feet a favor and don't wear them.

Synthetic Materials:

There are a number of man-made materials designed to insulate like wool and wick moisture, without the negatives mentioned above. These materials (Hollofil, Thermax, Thermastat, etc.) trap warmth like wool, but they are softer on the skin and are available in a variety of sock styles and thicknesses. They also dry more quickly and are more abrasion resistant. The synthetic wicking materials (like polypropylene and Coolmax) used in wicking sock liners are often woven into thicker backpacking socks as well, to enhance wicking performance.

Many hiking/backpacking socks provide extra cushioning around the heel, the ball of the foot and the toe area to increase comfort. The padding is created either by increasing the density of the weave in those areas, or in some cases by weaving long-wearing materials like acrylic into those areas. This extra padding can be a real foot-saver on hard trips over rough terrain.

Many of today's hiking/backpacking socks include a small percentage of either stretch nylon or Lycra spandex. These elastic materials help socks hold their shape and keep bunching and wrinkling to a minimum.

Selecting a Sock Style

Hiking/backpacking socks are designed to provide warmth, cushioning and abrasion resistance in a variety of conditions. The right sock for you depends on the kinds of trips you have planned and the weather conditions you expect. For example, a lightweight sock will compliment light hikers on easy trails for a few hours of hiking. Step-up your trail type or intensity and you'll want mid-weight socks. While heavyweight socks will be needed when tackling rough and difficult terrain for several hours. Here are the basic categories you have to choose from:

Liners: Sock liners are thin, lightweight wicking socks designed to be worn right next to your skin. These liners wick sweat away from the surface of your foot to keep you dry and more comfortable. Liners also limit the amount of abrasion between your outer sock and your skin. They are designed to be worn under other socks.

Lightweight hiking/backpacking socks: Designed for warm conditions and easy trails, lightweight hiking/backpacking socks stress wicking performance and comfort over warmth. These socks are thicker, warmer and more durable than liners alone. They also provide more cushioning. But they are relatively thin so that you can stay comfortable on warm weather trips. Because most lightweight hiking/backpacking socks are made from wicking materials, they can be worn with or without liner socks.

Mid-weight hiking/backpacking socks: These socks are designed to provide reliable cushioning and insulation in moderate to cold conditions. They tend to be thicker and warmer than lightweight hiking socks. Many models have extra padding built into high-impact areas like the heel and the ball of the foot for maximum comfort. These socks should be worn with liners.

Heavy-weight hiking/backpacking socks: These socks are the thickest, warmest and most cushioned socks available. They are designed for long trips, tough terrain and cold temperatures. Usually, heavyweight socks are too thick and warm for basic backpacking journeys in warm conditions.

How to pick what sock to buy once you've loosely chosen a weight category can be influenced by several factors, including: biomechanics, activity and your specific footwear, and weather conditions and temperatures.

Biomechanics:

Knowing about your biomechanics is not as complicated as it sounds. Biomechanics is the mechanics of muscular activity, and knowing the nuances of how you move can help you choose where you'll need cushioning in a sock. For example, after walking, or hiking, for a long period most of us have spots on our feet that are more prone to soreness or irritation than others. Granted, some of these spots may be irritated by improperly fitting footwear, but some of it has to do with biomechanics.

Look for extra cushioning in the areas that get sore when buying a sock. Often a sock with extra heel or toe cushioning is what's required. Another example may be someone who often finds the tops of their feet rub the tongue of their boots, causing discomfort. In this case, this individual should look for extra padding in the instep of a sock.

Footwear to Match Activity:

A straight match of sock and boot weight doesn't always cut it on the trails. In some cases, altering the sock-to-boot-weight formula makes more sense and is more comfortable. This often occurs when one wishes to temporarily stretch their footwear beyond its intended use by increasing the activity duration, intensity or the difficulty of trails and terrain. Note: this is often a temporary solution; in the long run, you'd be better off to buy the proper footwear for better support and cushioning, as well as reducing the chance of injury, like twisting your ankle.

For example, an individual with a pair of light hikers may want a pair of mid-weight socks to provide support and cushioning if planning to hike long hours, for several days on rough trails. In this instance, even though the socks do not match the boot's weight, they complement the activity and its intensity. Another situation could be an individual using heavyweight socks in mid-weight boots for extra cushioning at the toes to descend steep trails.

Climate and Temperature:

Climate and weather can also be factors in breaking the sock-to-boot-weight formula, whether it's adding weight for cool climates to reducing weight for warm environments. To illustrate with an example, a backpacker with mid-weight hiking boots could carry three sock weights on a multi-day, intermediate mountain climb. At the beginning of the hike lightweight socks could suffice in hot temperatures, yet as the trail difficulty increases and the temperature gets cooler, switching to mid to heavyweight socks may be necessary.

One point to keep in mind is moisture trapped in a boot leads to hotspots and will cause blisters at the friction points. The balance between keeping feet warm and properly cushioning, but not overheating them, is difficult. It is sometimes better to bring extra socks, changing them often, drying worn ones, to ensure your feet stay dry and warm.

One Sock or Two Socks

Today, most socks are individually designed to suit feet when hiking or backpacking. The fabric blends will insulate, wick moisture and cushion all at the same time. Yet another method to achieve these same results is a two-sock system. This system teams a thin, liner sock with a thicker, outer sock. It also follows the layering principle of outdoor wear.

The inner layer wicks moisture from the skin, keeping it dry. The outer layer cushions and insulates, but also wicks away moisture. Additionally, the liner acts as a second skin, providing additional protection from friction and reduces blister-prone hikers. Whether you prefer to wear one or two socks is really a matter of personal preference as both approaches work.

Fitting Tips

When possible, take a quick walk in the sock styles you are considering to get a feel for how much cushioning they have. And be sure to buy the right size – your socks should fit snugly. Bunched up sock material can make any hiking or backpacking trip an uncomfortable one.

Here are some quick tips on choosing the best fitting sock:

- Each weight classification varies in features and design from manufacturer to manufacturer, so try on a few different brands in the same weight class to find the best fit for your foot.
- When trying on socks look for a snug, but not tight fit. The material shouldn't pull too tight or be baggy in any area of the foot.
- Buy socks in various colors so you can change from worn to dry socks on long hikes as needed.
- Check washing instructions, as high maintenance ones may not suit you.
- Purchase a range of sock weights. In most cases a few light and mid-weight hikers will do fine, and one or two heavyweights may be necessary if you plan to hit difficult terrain or cold conditions.

Quality socks are just as important as proper fitting hiking boots to ensure comfort on the trails. When compared to cotton sport socks, hiking socks may seem a little expensive but it's a small price to pay for reducing blisters and providing proper cushioning.



Clothing for Backpacking

What backpacking clothing you choose is important. The clothes you bring with you on a backpacking trip must perform two important jobs. First, they must protect you from the elements (sun, rain, snow, wind, and insects). Second, they must keep you comfortable during a variety of activities and weather conditions. The best way to choose backpacking clothing is to build a "system" of clothing layers that can be mixed and matched to handle different trips and different conditions. Wear clothes appropriate for the terrain and weather conditions you expect to encounter. Since, weather is unpredictable, it's imperative that you prepare for the unpredictable. If you follow the layering principle, you should be able to equip yourself with the appropriate clothing for any type of weather.

How to Get the Outdoor Clothing Formula Right

You should expect your outdoor clothing to provide you with functions of breathability, wicking, rapid drying, insulation, durability, wind proofing and waterproofing. Comfort depends upon the appropriate balance between these functions. In addition, you also want your clothing to be lightweight and allow good freedom of movement. With four uniquely functioning layers, you can create a "personal climate" that keeps you comfortable and protected from the different weather conditions. Most items can be used as a different layer in different situations.

Some Basic Definitions

Layering

Layering is the practice of dressing in a number of lightweight clothing layers instead of one or two heavier layers. Layered clothing systems are versatile (you can add or remove layers in response to changing conditions) and efficient (a number of thin layers will be warmer than one or two thick layers, and they'll take up less room in your pack). It takes some practice to get your clothing formula just right, since every person has different insulation requirements, depending on body size, body temperature and fitness level. Your clothing must keep you warm and dry, but also provide ways to keep the body ventilated. The more options you have available, the more fine-tuning you can do and the more comfortable you will be. A general rule when choosing your clothing is to wear loose clothes in layers. Start with a base layer to manage moisture, and then add mid and insulation layers, as needed. In a temperate climate, top it all off with a weatherproof outer layer.

Wicking

Certain clothing layers enhance comfort by pulling sweat from the surface of your skin and transferring it into other clothing layers. This process, called wicking, keeps you dry and comfortable in warm conditions. It also keeps you warmer in cold conditions by reducing evaporative and conductive heat loss.

Breathability

You need clothing layers that let your sweat and body heat escape to stay comfortable when temperatures rise or your activity-level increases. A garment's ability to do this is referred to as its breathability. Breathability is affected by the materials that a clothing layer is made out of and the design of the layer itself.

Consider the Layers You'll Need

Backpacking clothing can be grouped into 4 basic categories: inner layer, mid layer, insulation layer and outer layer. Each type performs a specific task within a clothing system. Whether or not you need them depends on your backpacking plans.

Inner layers

Inner layer clothing is worn right next to your skin. Its job is to keep you comfortable by wicking the sweat from your skin and providing an extra layer of insulation. Inner layer clothing is usually worn in moderate to cold conditions when a little extra insulation is needed and the chance of aerobic activity is high. It's available in a variety of thicknesses for different activities and weather conditions.

Mid layers

Mid layer clothing consists of the items you use every day: shorts, T-shirts, lightweight pants and long-sleeve shirts. The primary function of mid-layer clothing is to provide basic insulation and protection in warm conditions. Mid layer items are often worn alone on short trips in good weather conditions. The pieces you choose should be comfortable, lightweight and built

to last. Include a synthetic long-sleeve shirt in your pack. Besides keeping you warm when it's chilly, a long-sleeve shirt will protect you from sun and insects.

Insulation layers

Insulation layer clothing is designed specifically to provide additional warmth. It's typically worn whenever mid layer and/or inner layer pieces are not warm enough for the current conditions. The insulation layers you use should be warm, lightweight and as non-bulky as possible. They should also breathe well to let sweat and body heat escape.

Outer layers

The primary job of outer layer clothing (both tops and bottoms) is to protect you from the wind, rain and snow. But it needs to be somewhat breathable as well, to let sweat and body heat escape. Backpackers should always carry protective outer layers. Headgear is an important outer layer that can provide sun protection and warmth, but the type of headgear you will choose will depend on the weather. If it's sunny, a good alternative is a wide-brimmed hat, to protect both your face and neck from the sun. A baseball cap is great when carrying a backpack. If the weather is cold or windy, a warm hat will be good.

Consider Your Fabric Options

Inner Layers

Cotton - Cotton is comfortable when it's dry, but it absorbs sweat and holds it right next to your skin (which can lead to significant heat loss). Cotton also takes a long time to dry, which can cause discomfort. For these reasons, cotton is not recommended for inner layers used in cold conditions.

Silk - Silk is an effective wicking and insulating material. It's extremely comfortable and lightweight, but not as durable as the options below. Some silk layers require special care when washing and drying.

Polypropylene - One of the very first man-made wicking materials that wicks sweat away from the skin effectively. Early versions tended to retain odors and pilled after repeated washings. Newer Polypro fabrics have overcome these difficulties.

MTS 2® (Moisture Transport System) - MTS 2 is a durable, reliable polyester-based fabric that wicks sweat like polypropylene--without its drawbacks. It's comfortable like cotton, and it's available in a variety of "weights" for different conditions.

Capilene® - Capilene is another comfortable, reliable polyester-based wicking fabric. It performs like MTS 2®, with a special chemical treatment to help spread sweat throughout the fabric so that it evaporates quickly.

Mid Layers

Cotton - Cotton is a common choice for warm-weather backpacking clothing. It's comfortable, lightweight and it keeps you cool. Cotton is best for warm weather uses because it takes a long time to dry and is an ineffective insulator.

Nylon - Lightweight, durable and (generally) non-absorbent, nylon is great for backpacking shorts, pants and shirts. It is available in a variety of styles, for both warm and cold weather uses. Most modern nylons are soft and comfortable against your skin.

Wicking materials - Some backpackers wear wicking inner layers like MTS 2® and Capilene® as mid layers. Why not? These layers help you keep dry and comfortable and they provide good insulation.

Wool - A great natural insulator, wool is perfect for moderate to cold weather backpacking clothes. It's available in shirts, pants, over-shirts, sweaters, jackets and more. Wool insulates well when wet but it can be somewhat scratchy and/or bulky.

Insulation Layers

Wool - Wool is a great natural insulator. It's available in knickers, pants, long-sleeve shirts, pullovers, sweaters and jackets. It insulates when wet but can take a long time to dry. Wool also can be heavy and bulky.

Pile/Fleece - These popular man-made insulation materials are available in a wide variety of styles and thicknesses. They are comfortable, warm (even when wet), fast drying and lightweight (half as heavy as wool). Pile/fleece products are available in shirts, pants, vests, jackets, pullovers and sweaters. Traditionally, pile/fleece layers have provided only minimal protection from the wind. But new pile/fleece garments are available today with wind- and weather-stopping liners built right in.

Outer Layers

Weatherproof outerwear is essential if you are heading for an extended backpacking trip. The outer layer of your outdoor clothing seals out weather and protects you from wet, windy, and extreme elements. Your outer layer will depend on where you are and what you are doing. Unfortunately, there is an inverse relationship between breathability and waterproofness. The more breathable it is, the less waterproof it will be. The same goes for the reverse. Weatherproof outerwear that covers the body from head to foot is recommended for any wilderness backpacker or hiker. A waterproof jacket with a hood and a pair of

waterproof pants is a good choice. A good complement is a rain poncho; this is also lighter and packs smaller. Make sure the outerwear is roomy enough to fit easily over other layers and not restrict your movement.

Outer layer clothing can be divided into 3 basic categories (see below). Each has its own set of characteristics, and each protects backpackers from precipitation, wind and sweat build-up to different degrees. To choose the right outer layer clothing, focus on the general category that sounds best for your needs. Then consider the design features listed at the end of this section to choose a specific model.

Water-resistant/breathable fabrics

- **Positives:** These repel wind and light precipitation while providing excellent breathability. They tend to be less expensive than other options.
- **Negatives:** They are not waterproof enough to protect you in harsh weather conditions or extended periods of rain.
- **Typical Uses -** Water-resistant/breathable fabrics are perfect for backpackers who travel in arid and/or warm conditions where good breathability is important and the chance of heavy precipitation is low. They are popular among backpackers who plan short trips in good weather and those who enjoy strenuous activities like trail running.

Waterproof/Non-Breathable Fabrics

- **Positives:** These are completely waterproof, and they're less expensive than waterproof/breathable fabrics.
- **Negatives:** They provide very little breathability, which can be extremely uncomfortable if it's hot or if you're working hard on the trail. To let moisture out, layers using waterproof/non-breathable fabrics have to be cut extremely loose (like ponchos) or they must have special vents or openings built in to let the heat and sweat out.
- **Typical Uses -** Because of the lack of breathability, most backpackers stay away from waterproof/non-breathable outer layers (unless temperatures are very low or the chances of heavy precipitation are very high). They are used occasionally in moderate conditions in inexpensive rain pants and emergency ponchos.

Waterproof/Breathable Fabrics

- **Positives:** These fabrics are both waterproof and breathable (to a degree). They are good performers in a wide range of weather conditions.
- **Negatives:** Even waterproof/breathable fabrics heat up and trap sweat during strenuous backpacking. Exact performance depends on the specific type of fabric used, the outside temperature, the amount of activity and other factors. Waterproof/breathable fabrics are more expensive than other types of outerwear.
- **Typical Uses -** More and more wilderness enthusiasts are choosing waterproof/breathable fabrics for their outer layers. These fabrics are comfortable in a wide variety of situations and conditions. And performance levels keep improving all the time.

Outer Layer Design

There is more to choosing the right outer layers than just deciding on a type of fabric to use. You must also consider the design features included in different jacket and pant models. When you start comparing different styles head-to-head, consider the following:

Fit - Outer layers should be roomy enough to fit over your clothing layers but snug enough to cinch down tight in nasty conditions. They should also allow for a full range of motion.

Access - Full-zip jackets and full-zip pants are easier to get in and out of than pullover tops or pull-on pants. However, more zippers mean a higher chance of leaks.

Specific Features - Specific features can have a significant effect on an outer layer's performance and comfort:

Adjustable Openings - The waist, cuffs and neck should seal tight for bad weather but open easily for extra ventilation.

Vents - Vents enhance breathability no matter what type of fabric an outer layer is made of. Larger vents are typically more effective than small ones, but they may leak more. Typical vents include under-arm zips, side zips, mesh-lined pockets and draft flaps.

Pockets - The more pockets an outer layer has, the easier it will be for you to store essential gear items. But keep in mind that pockets increase the weight of the layer. Pockets should be easy to reach, easy to open and close, and well-protected against leaks.

Hoods - Any outer layer top you use for backpacking should have a hood to keep your head dry. Integral (permanently attached) hoods offer the best resistance against leaks. Hoods that can be rolled up and/or folded away when not in use are

easier to deal with in changing conditions.

Storm Flaps - Storm flaps cover zippers, pockets and other openings to protect against leaks. They are commonly found on front zippers, under-arm zips and external pockets.

Sealed Seams - Sealed seams are a must for any waterproof outer layer. They're not necessary for water-resistant ones.



"Now, that's a welcome sight! I was just beginning to miss decision-making."

Trekking Poles

The Advantages of Trekking Poles

When you hike with a set of trekking poles you are balancing the weight distribution and shock over four limbs, instead of two. People who have used trekking poles discover an almost immediate benefit to their knee joints and leg muscles, especially on long downhill treks. Arm and shoulder muscles support and relieve the leg muscles. With the basic "hands above the heart" position necessitated by the poles, circulation is improved and heart rate is reduced. The "rhythm" created by walking with poles leads to relaxed, more regular breathing and increased stamina.



A landmark study published by Dr. G. Neureuther in 1981 proved that use of "ski poles" while walking reduces the pressure strain on the opposite leg by approximately 20%. Furthermore, while walking on level ground, poles reduce the body weight carried by the legs by approximately 5 kg every step. Move to an incline, and that reduction increases to 8 kg. This translates into tons of weight -- yes, tons -- for even a two-hour hike. Backpackers with heavy loads often find them valuable for maintaining balance with a higher center of gravity.

Jacquie Hunt, editor of a popular hiking newsletter, weighs in with additional health benefits: "An advantage that I found once I started using poles is that my hands no longer swell up when it is hot. Keeping your arms moving so the blood doesn't pool in the hands is a lot safer than keeping hands high on pack straps and risking a smashed face if you trip."

Finally, poles help many people with balance issues. We all have different comfort levels when balancing along logs, crossing streams, walking on slippery surfaces, and hiking over loose rocks and scree; for some hikers, trekking poles are worth their weight in gold.

Not all poles are created equally. When you are adding trekking poles to your outdoor gear, there are a few key features you need to consider that will have a dramatic effect on your satisfaction.

Trekking Pole Materials

What distinguishes different models – and affects price – are pole construction, shock absorption, and the materials used in handles and wrist straps. Most trekking poles are made from aluminum and weigh in at 18-22 ounces per pair. These are the cheapest. Some poles incorporate a lighter weight titanium-aluminum alloy, which reduces the total heft to roughly 14-17 ounces and are more expensive. Ultralight carbon fiber can reduce the weight to as little as 11 ounces but are the most expensive

While lighter is righter, the cost of saving a few ounces also lightens up your wallet, and focusing on other features may provide better returns. For instance, consider the handles. Cheaper poles use stiff plastic, which can be hard on your hands after many hours of use. Better are poles that use dense foam, which has some give and provides a good grip. Some models extend the foam down the shaft —nice for choking up on the pole in steep sections. The best handles are made of cork, which become custom-molded to your hand with use.

A few styles also angle the handle forward by 15 degrees for a more ergonomically correct grip. Wrist straps vary in construction. Many inexpensive models include only a basic nylon strap, which can be uncomfortable and chafe your wrists after prolonged use. Look instead for straps that include some sort of padding.

Many poles feature a shock-absorption device, usually a spring, which is designed for downhill use. As the poles absorb the shock of downhill impact, the spring flexes to spare your arms and wrists some stress. This feature can, and should, be turned off for uphill sections, so you don't waste energy compressing the spring as you push off. These devices can be a nuisance, however, and some hikers claim they provide minimal difference in upper-body fatigue.

Pole Position

Look for poles that have a telescopic adjustment. Poles that telescope offer several key benefits. First, multiple people can use the same set of poles simply by adjusting the length. Some poles practically collapse, much like an antenna on a portable radio. These poles are ideal if you don't plan to use them all the time and want to stow them in your pack, safely out of the way.

What is the best way to use trekking poles? It's pretty much "to each their own" – watch hikers with poles and you'll see a variety of methods employed. Some plant the pole with every step; some only after 2-3 steps. Some plant the poles on the same side as the forward foot; some the opposite. The "best" way is what works for you, but here are some general suggestions and comments:

When extending the pole, keep the three sections equal in length and do not extend any section out all the way—this can stress the pole and cause it to break or bend. Most poles have markings to help calibrate length. Set the pole length so your arms are bent at 90 degrees when the tips are on the ground and your hands are on the grips. This is a good compromise setting for flat, uphill or downhill. For extended incline segments, shorten the poles some so you can get better leverage to help you up the hill when you plant the pole. For extended decline segments, it's worth taking a few seconds to lengthen the poles so you're more upright as you plant the poles in front of you. If you are traversing a slope, shorten the uphill pole and lengthen the pole used on the downhill side as needed to support both sides of your body equally.

Critical to trekking pole use and enjoyment is proper use of the wrist straps. Many hikers simply stick their hands through the loop from above and let it dangle loosely over their wrist. This is incorrect, and accomplishes little other than preventing the pole from falling if you drop it. To properly use the straps, first insert your hand through the loop in an upward motion from underneath. Then grasp the handle, positioning the portion of the strap closest to the pole between thumb and index finger. Part of the strap should now lie between your hand and the grip, with the rest wrapping snugly around your wrist. Adjust the size of the loop to fit closely. With the straps properly fitted, you can much more effectively transfer energy between the ground and your upper body. And one final word of caution: Once you use a pair of trekking poles, you may never go back.

Different Uses of Trekking Poles

A trekking pole can be used as a tent pole for a hiking fly or tent – either as the main pole or as a back-up in case of failure. If you're in the lead on the first hike of the day, a pole can be great for breaking down spider's webs strung across the track, or for chasing snakes and other wildlife. Some trekking poles have compasses in the top, or even a camera screw that can turn your trekking pole into a mono-pod for your camera. A pole can be a great resting spot for the forehead during those short breaks at the end of a particularly long trudging session. Simply lean forward and place your forehead on the pole. And have you ever taken a heavy pack off after a long walk and had no-where to lean it? Usually it is left lying on the ground with bits and pieces falling out and other stuff crawling in. A pole can be a perfect prop to keep the pack upright.

Care of trekking poles

Many of us use trekking poles for hiking and climbing. Most of us probably also toss them in the corner after a trip, assuming they'll be ready to go next time. That is a bad idea. Almost all poles are made of some form of anodized or painted aluminum alloy and this alloy can and will corrode. The good news is that with proper care and a little regular maintenance, these poles can last a lifetime. Here's some tips on how to make your investment last.

- After a trip, totally disassemble the poles. The only exception to this is the expander at the top of each section. You can remove this as well but it adds to the re-assembly time.
- Rinse off the mud and debris and clean the telescoping tubes with a damp sponge.
- Dry everything with an old towel.
- Let the units sit for a day or two to dry thoroughly.
- Corrosion can and will build up over time on the inside of the barrels reducing the ability of the expander to grip the barrel.

An appropriate wire brush used for cleaning the bore on a shotgun work well to clean these. This unit is composed of a wire brush mounted on a smaller threaded shaft. They are available at sporting goods stores that handle guns. Get a size that looks like it will match up to the bore of your poles. To remove corrosion, you will need to mount it on something that can be inserted into the tube. If you happen to have a shotgun cleaning kit, you can use the rod that is specifically designed for these. You can make your own. Use a 1/4" hardwood dowel and drill a hole in the end of it slightly smaller than the threads on the shotgun wire brush mounting. The brush easily threads into it. Once you have this unit in hand, insert it into the tube and pull it back and forth as you rotate it. Blow out the dust and do a final wipe with a soft felt or cotton swab attached to a long rod.

Get in Shape Stay in Shape



It's important for hiking, and especially backpacking, that you have strong lower back, upper back, and abdominal muscles, in addition to strong legs. Find exercises that strengthen those muscles. A bicycle is an excellent place to start. Lifting weights and jogging is also appropriate and very helpful. The only activity that really keeps you in shape for backpacking on a trail is hiking. Below are some suggestions for getting in shape, staying in shape, and staying healthy:

- **Know your physical condition.** Know as much as possible about your current condition before you even start an exercise program (if you are not already one). That knowledge will also minimize potential problems in the backcountry. If you have a health condition, of any consequence, understand the implications and consequences of strenuous exercise and venturing into the backcountry, beforehand. Scouts and the adult leaders will need a Class III physical to participate on a high adventure trip involving hiking in the backcountry. A medical check-up is a good way to find out if you have anything to be concerned about. The backcountry is not the place for medical emergencies. There is no 911 out there!
- **Already in Shape?** If you exercise regularly, you may already be in good enough shape to tackle day hikes over easy to moderate terrain. However, walking on pavement is not the same as carrying a pack over a rough trail tread. A good suggestion is to put on a pack loaded with five more pounds than you would be carrying on your hike, then truck around the neighborhood for a few miles to see how it feels. Next, plan a short hike to see how you fare on a trail with the pack on. Gradually, in addition to your regular exercise program, take more difficult hikes that keep challenging you as well as increasing your level of conditioning and endurance. This method is the least painful because it leverages off of what you already have and gets you on the trail immediately. What could be better than hiking yourself into hiking condition?
- **Not in Shape?** If you're not in good physical condition, you should take the time to set up a regular exercise program. It must be consistent and it must be a priority (or, guaranteed, you will not be consistent and you'll always be on the brink of getting in shape -- but not quite). Just start somewhere. Swimming, biking (human powered), weight lifting, walking, or jogging. It's good to have a variety of activities that exercise a variety of muscles. Start a program you're comfortable with and stick to it on a consistent basis.
- **Anticipate level of difficulty, and train accordingly.** You will put yourself and your fellow packers at risk, if you think you can wait until the trip and then get in shape on the trail. Get in shape to carry your anticipated weight before the trip. Several weeks before a trip, anticipate how much weight you will be carrying, then prepare a pack that weighs about the same. That, then, should become your training pack for the next several weeks -- about four or five nights a week -- right up to two or three days before the trip. In addition, continue with your normal exercising routine. Doing this should allow you the confidence that you will be successful on the trail and that your fellow packers can count on you to be strong and healthy.
- **Stretching is important.** Stretching muscles reduces muscle tension and allows better, more flexible movement. Prior to your daily workout, whether in the backcountry, or at home, take some time to stretch your lower back, legs, torso, neck, etc. Stretching is necessary and will help prevent soreness and injury, both on and off the trail.



Guide to High Altitude Acclimatization and Illnesses

High Altitude Trekking and Climbing

The pleasures of trekking in the world's highest mountain ranges cannot be overstated. Neither can the dangers. Altitude sickness can occur in some people as low as 8,000 feet, but serious symptoms do not usually occur until over 12,000 feet. Even then it is not the height that is important, rather the speed in which you ascended to that altitude.

Acute mountain sickness (AMS) is actually more common in fit young men because they are more likely to attempt a rapid ascent by racing up the mountain like some indestructible super hero! As a general rule, it is far safer (and more enjoyable) to avoid altitude sickness by planning a sensible itinerary that allows for gradual acclimatization to altitude as you ascend, (you can race back down as fast as you like!)

What is High Altitude?

High	2,500 to 4,000 meters	8,000 to 13,000 feet
Very High	4,000 to 5,500 meters	13,000 to 18,000 feet
Extremely High	Over 5,500 meters	Over 18,000 feet

It is difficult to determine who may be affected by altitude sickness since there are no specific factors such as age, sex, or physical condition that correlate with susceptibility. Some people get it and some people don't because some people are more susceptible than others.

Most people can ascend to 2,500 meters (8,000 feet) with little or no effect. If you have been at that altitude before with no problem, you can probably return to that altitude without problems as long as you are properly acclimatized. If you haven't been to high altitude before, you should exercise caution when doing so.

The Causes of Altitude Sickness

The percentage of oxygen in the atmosphere at sea level is about 21% and the barometric pressure is around 760 mmHg. As altitude increases, the percentage remains the same but the number of oxygen molecules per breath is reduced. At 3,600 meters (12,000 feet) the barometric pressure is only about 480 mmHg, so there are roughly 40% fewer oxygen molecules per breath so the body must adjust to having less oxygen. In addition, high altitude and lower air pressure causes fluid to leak from the capillaries in both the lungs and the brain, which can lead to fluid build-up. Continuing on to higher altitude without proper acclimatization can lead to the potentially serious, even life-threatening altitude sickness.

Acclimatization

The main cause of altitude sickness is going too high too quickly. Given enough time, your body will adapt to the decrease in oxygen at a specific altitude. This process is known as acclimatization and generally takes one to three days at any given altitude, e.g. if you climb to 3,000 meters and spend several days at that altitude, your body will acclimatize to 3,000 meters. If you then climb to 5,000 meters your body has to acclimatize once again.

Several changes take place in the body, which enables it to cope with decreased oxygen:

- The depth of respiration increases.
- The body produces more red blood cells to carry oxygen.
- Pressure in pulmonary capillaries is increased, "forcing" blood into parts of the lung, which are not normally used when breathing at sea level.
- The body produces more of a particular enzyme that causes the release of oxygen from hemoglobin to the body tissues.



Cheyne-Stokes Respirations

Above 3,000 meters (10,000 feet) most people experience a periodic breathing during sleep known as Cheyne-Stokes Respirations. The pattern begins with a few shallow breaths and increases to deep sighing respirations then falls off rapidly even ceasing entirely for a few seconds and then the shallow breaths begin again. During the period when breathing stops the person often becomes restless and may wake with a sudden feeling of suffocation. This can disturb sleeping patterns, exhausting the climber. This type of breathing is not considered abnormal at high altitudes. Acetazolamide is helpful in relieving this periodic breathing.

Acute Mountain Sickness (AMS)

AMS is very common at high altitude. At over 3,000 meters (10,000 feet) 75% of people will have mild symptoms. The occurrence of AMS is dependent upon the elevation, the rate of ascent, and individual susceptibility. Many people will experience mild AMS during the acclimatization process. The symptoms usually start 12 to 24 hours after arrival at altitude and begin to decrease in severity around the third day.

The symptoms of Mild AMS include:

- Headache
- Nausea & Dizziness
- Loss of appetite
- Fatigue
- Shortness of breath
- Disturbed sleep
- General feeling of malaise

Symptoms tend to be worse at night and when respiratory drive is decreased. Mild AMS does not interfere with normal activity and symptoms generally subside within two to four days as the body acclimatizes. As long as symptoms are mild, and only a nuisance, ascent can continue at a moderate rate. When hiking, it is essential that you communicate any symptoms of illness immediately to others on your trip.

Moderate AMS

The signs and symptoms of Moderate AMS include:

- Severe headache that is not relieved by medication
- Nausea and vomiting, increasing weakness and fatigue
- Shortness of breath
- Decreased co-ordination (ataxia)

Normal activity is difficult, although the person may still be able to walk on his or her own. At this stage, only advanced medications or descent can reverse the problem. Descending only 300 meters (1,000 feet) will result in some improvement, and twenty-four hours at the lower altitude will result in a significant improvement. The person should remain at lower altitude until all the symptoms have subsided (up to 3 days). At this point, the person has become acclimatized to that altitude and can begin ascending again.

The best test for moderate AMS is to have the person walk a straight line heel to toe just like a sobriety test. A person with ataxia would be unable to walk a straight line. This is a clear indication that an immediate descent is required. It is important to get the person to descend before the ataxia reaches the point where they cannot walk on his or her own (which would necessitate a stretcher evacuation).

Severe AMS

Severe AMS results in an increase in the severity of the aforementioned symptoms including: shortness of breath at rest, inability to walk, decreasing mental status, fluid build-up in the lungs. Severe AMS requires immediate descent of around 600 meters (2,000 feet) to a lower altitude.

There are two serious conditions associated with severe altitude sickness; High Altitude Cerebral Oedema (HACO) and High Altitude Pulmonary Oedema (HAPO). Both of these happen less frequently, especially to those who are properly acclimatized. But, when they do occur, it is usually in people going too high too fast or going very high and staying there. In both cases the lack of oxygen results in leakage of fluid through the capillary walls into either the lungs or the brain.

High Altitude Pulmonary Oedema (HAPO)

HAPO results from fluid build-up in the lungs. This fluid prevents effective oxygen exchange. As the condition becomes more severe, the level of oxygen in the bloodstream decreases, which leads to cyanosis, impaired cerebral function, and death.

Symptoms of HAPO include:

- Shortness of breath at rest
- Tightness in the chest, and a persistent cough bringing up white, watery, or frothy fluid
- Marked fatigue and weakness
- A feeling of impending suffocation at night
- Confusion, and irrational behavior

Confusion and irrational behavior are signs that insufficient oxygen is reaching the brain. In cases of HAPO, immediate descent of around 600 meters (2,000 feet) is a necessary life-saving measure. Anyone suffering from HAPO must be evacuated to a medical facility for proper follow-up treatment.

High Altitude Cerebral Oedema (HACO)

HACO is the result of the swelling of brain tissue from fluid leakage.

Symptoms of HACO include:

- Headache
- Weakness
- Disorientation
- Loss of co-ordination
- Decreasing levels of consciousness
- Loss of memory
- Hallucinations & Psychotic behavior
- Coma.

It generally occurs after a week or more at high altitude. Severe instances can lead to death if not treated quickly. Immediate descent of around 600 meters (2,000 feet) is a necessary lifesaving measure. There are some medications that may be used for treatment in the field, but these require proper training in their use. Anyone suffering from HACO must be evacuated to a medical facility for follow-up treatment.

Prevention of Altitude Sickness

This involves proper acclimatization and the possible use of medications.

- Get at least two 8-hour nights of sleep, and make sure you're well hydrated before you start.
- If possible, don't fly or drive to high altitude. Start below 3,000 meters (10,000 feet) and walk up.
- If you do fly or drive, do not overexert yourself or move higher for the first 24 hours. You can help yourself acclimatize by camping at the trailhead.
- Climb slower than your normal walking pace. If you need to rest after ascending only 20 meters, you're flirting with exhaustion and need to slow down.
- If you go above 3,000 meters (10,000 feet), only increase your altitude by 300 meters (1,000 feet) per day, and for every 900 meters (3,000 feet) of elevation gained; take a rest day to acclimatize.
- Climb high and sleep low! You can climb more than 300 meters (1,000 feet) in a day as long as you come back down and sleep at a lower altitude.
- When your legs turn to stone or you feel nauseous, use pressure breathing. This is done by taking a deep breath and then forcing air out through pursed lips, like you're blowing out a candle, 3 or 4 times a minute. Vigorous respiration pushes more oxygen from the lungs into the bloodstream.
- If you begin to show symptoms of moderate altitude sickness, don't go higher until symptoms decrease.
- If symptoms increase, go down, down, down!
- Keep in mind that different people will acclimatize at different rates. Make sure everyone in your party is properly acclimatized before going any higher.
- Stay properly hydrated. Double your normal water intake. Acclimatization is often accompanied by fluid loss, so you need to drink lots of fluids to remain properly hydrated (at least four to six liters per day). Urine output should be copious and clear to pale yellow.

- Take it easy and don't overexert yourself when you first get up to altitude. But, light activity during the day is better than sleeping because respiration decreases during sleep, exacerbating the symptoms.
- Avoid tobacco, alcohol and other depressant drugs including, barbiturates, tranquilizers, sleeping pills and opiates such as dihydrocodeine. These further decrease the respiratory drive during sleep resulting in a worsening of symptoms.
- Eat a high calorie diet of primarily easily digestible carbohydrates in frequent, small amounts while at altitude. Carbohydrates help your body transport oxygen through your bloodstream. Limit your fat and salt, because these impede your already compromised ability to supply your body with proper amounts of oxygen.
- Remember: Acclimatization is inhibited by overexertion, dehydration, and alcohol.

Preventative Medications

Acetazolamide (Diamox): This is the most tried and tested drug for altitude sickness prevention and treatment. It seems to work by increasing the amount of alkali (bicarbonate) excreted in the urine, making the blood more acidic. Acidifying the blood drives the ventilation, which is the cornerstone of acclimatization. For prevention, 125 to 250mg twice daily starting one or two days before and continuing for three days once the highest altitude is reached is effective. Blood concentrations of acetazolamide peak between one to four hours after administration of the tablets.

Studies have shown that administration of acetazolamide at a dose of 250mg every eight to twelve hours before and during rapid ascent to altitude results in fewer and/or less severe symptoms (such as headache, nausea, shortness of breath, dizziness, drowsiness, and fatigue) of acute mountain sickness (AMS). Pulmonary function is greater both in subjects with mild AMS and asymptomatic subjects. The treated climbers also had less difficulty in sleeping.

Gradual ascent is always desirable to try to avoid acute mountain sickness but if rapid ascent is undertaken and acetazolamide is used, it should be noted that such use does not obviate the need for a prompt descent if severe forms of high altitude sickness occur, i.e. pulmonary or cerebral oedema.

Side effects of acetazolamide include: an uncomfortable tingling of the fingers, toes, and face; carbonated drinks tasting flat; excessive urination; and rarely, blurring of vision.

On most treks, gradual ascent is possible and administration of acetazolamide tends to be discouraged. Certainly if trekkers do develop headache and nausea or the other symptoms of AMS, then treatment with acetazolamide is fine. The treatment dosage is 250 mg twice a day for about three days. A trial course is recommended before going to a remote location where a severe allergic reaction could prove difficult to treat if it occurred.

Other Treatments/Medicines Used for Prevention of Altitude Sickness

Ibuprofen: Ibuprofen can be effective in relieving altitude-induced headache. (600mg three times a day).

Conditioning: Working out before you go is another great preventative measure. While this doesn't guarantee an easier time when up high, it can enhance your lungs' ability to cope with the challenges of high elevations



The Hiker's First-Aid Manual

Treating injuries miles from the ER is an essential skill, but don't pack a medical text. Instead, learn what really matters. The Wilderness Medicine Institute has identified essential tips every hiker should know. Read it, learn it, and go forth to save lives.

Minor Wounds

No wound, no matter how minor, should go ignored in the backcountry. Check out these quick tips to clean it up and keep trekking.

Blisters

Clean well with an antiseptic wipe. Sterilize the point of a pin or knife with flame or an alcohol swab and gently pierce the blister. Massage the fluid out, leaving the roof of the blister intact. Cover with a friction-reducing dressing by cutting a donut-shaped piece of moleskin and place it over the blister. Fill the hole with antibiotic ointment and cover the moleskin with athletic or duct tape.



Abrasions

Scrub the wound with soap and a gauze pad or bandanna, making sure to remove all debris (warning: It'll hurt). Rinse off all of the soap, then apply a layer of antibiotic ointment to a gauze pad and tape it in place. (You can also use a commercial pad with adhesive edges.) The pad should completely cover the wound.

Burns

Immediately plunge the burn site into cold water. Second best: Apply a water-soaked bandanna, a burn gel, or aloe vera. Continue cooling until pain has substantially subsided, then cover the burn with ointment and a gauze pad. If blisters form, prevent the blisters from popping as long as possible.

Heavy Bleeding

Check out what to do when it's much more than a simple scrape or puncture wound.

Apply direct pressure until bleeding stops. Pack the wound with absorbent gauze, apply direct pressure on top, and elevate it above the heart. If it soaks through, add more gauze on top and keep applying pressure. When bleeding stops, clean the wound thoroughly with a high-pressure stream of water. Apply antibiotic ointment to a sterile dressing and completely cover the wound, securing it with tape or roll gauze. Gaping wound? Press the edges together gently and hold them there with wound closure strips. Then apply the ointment and sterile dressing.

Check all wounds (including burns and abrasions) regularly for signs of infection:

- 1) Increasing pain, heat, redness, and swelling;
- 2) More than a little white pus;
- 3) Appearance of red streaks just under the skin near the wound; and
- 4) Fever. If these signs appear and grow steadily worse, find a doctor.

NOTE: Do not close wounds caused by animal bites or crushing injuries; anything involving damaged tendons, ligaments, or bones; or those too heavily contaminated to clean thoroughly. All have a high risk of infection. Instead, pack the wound with moist gauze, cover with dry gauze, and evacuate the patient.

Sprains and strains Here's what to do in the case of a distressed limb. Remember **RICE**: This stands for **R**est, **I**ce, **C**ompression and **E**levation. The ankle should be quickly rested and iced if possible or soaked in cold water from a stream. Even snow can be used as a substitute for ice. Ice the ankle for 20 minutes to half an hour and then remove the cold and let the injured area warm naturally for 10 to 15 minutes before use. Compress the injury with elastic wrap or athletic tape (the basket-weave pattern, right, works well for ankle sprains). Apply it snugly, but not tight enough to cut off circulation, and wrap it toward the heart (for example, up the leg, not down). Elevate the injury by keeping it higher than the heart. Repeat three to four times a day until pain and swelling subside.



Animal and Insect Bites

Though we love backcountry wildlife (well, mostly), sometimes we get no love back. Read up on what to do when Mother Nature bites.

Bees and Wasps

If the stinger remains in the skin, remove it immediately. Apply a cold pack for pain and swelling, and give an oral antihistamine. If the patient has an allergic reaction—difficulty breathing, tightness of the chest, swelling of the throat, dizziness—give a dose of injectable epinephrine (prescription required) and the antihistamine. Evacuate to medical attention ASAP, keeping a second dose of epi on hand and giving more antihistamine every four to six hours.

Ticks

These bloodsuckers can transmit disease if allowed to embed in the skin (sometimes a few hours is all it takes), so check yourself twice a day. Found one? Remove it immediately with tweezers. Grasp the tick at skin level, perpendicular to the long axis of the tick, and pull it gently straight out. Wash the site. If illness and/or an unusual rash develop, consult a doctor.

Venomous Spiders

Black widow bites can be tough to diagnose (many victims don't feel the bite when it occurs). Look for vomiting, weakness, headache, fever, and intense abdominal and/or back pain. Brown recluse bites might sting or itch. For both, clean the wound, apply cold to the site, and give the patient an antihistamine (for itching) and ibuprofen for pain. Hike out to a doctor (don't worry: death is rare).

Venomous Snakes

First, keep the victim calm (a low heart rate minimizes venom circulation, and death from snakebite is unlikely). Remove jewelry, watches, and any snug clothing that could cut off circulation when the bite site swells. Splint the bitten arm or leg, but do not elevate it. Carry the victim out if you can; otherwise, have him slowly walk out for a dose of antivenin.

Mammals

Stop the bleeding. Immediately wash the wound thoroughly with soap and water. Rinse clean, cover with a sterile dressing smeared with antibacterial ointment, and find a doctor ASAP. These bites have a high risk of infection, including rabies—and in that case, the victim needs a vaccination within 72 hours for the best chance of survival.

Gastrointestinal Illness

Ugh. It's happened to us all. Here's how to handle a bad belly when you're away from far from home.

Diarrhea

In all cases, give lots of fluids to prevent dehydration and pop an Imodium AD tablet. For more severe diarrhea, add electrolyte tablets, such as NUUN, to the water. Give him easily digested foods (such as rice or oatmeal); avoid fats, dairy products, and caffeine. If it's not under control within 24 hours, find a doctor—sooner if bloody bowel movements, fever, and pain exist.

Vomiting

Give as much fluid as the patient can tolerate and have him rest—but evacuate if the problem persists for more than 24 hours.

Wash Your Hands

A *Journal of Travel Medicine* report found that 61 percent of Appalachian Trail hikers who "rarely or never" washed their hands after a bathroom break got diarrhea, compared to just seven percent of those who did scrub. Here's how to wash up right:

- Wet hands (hot water is best) and add a drop of biodegradable soap.
- Work up a lather and scrub for 30 seconds—especially fingertips and under nails.
- Rinse, repeat, then dry hands with a bandanna reserved for this purpose.

Dental Emergencies

Soothe tooth pain with these helpful remedies.

Toothache Rinse your mouth with a solution of half a teaspoon of salt and eight ounces of water several times a day. If pain, sensitivity to hot and cold, and swelling exist, get to a doctor—it could be an abscess.

Broken tooth Rinse the tooth thoroughly with drinking water, and then protect the sensitive nerve by placing a chewed piece of gum over the break. Apply a cold-water bladder to the patient's cheek to reduce swelling, and take ibuprofen for the pain. Hike out to your dentist.

Snowblindness

Recognize: Redness, tearing, and a sandpapery pain when opening or moving the eye are signs of sunburned corneas.
Treat: First, don't let the patient rub his eyes; it could further damage the corneas. Give ibuprofen for the pain, apply a cold compress, and cover eyes with gauze. Wear sunglasses and stay in a dark environment until vision returns to normal (usually in about 18 hours).

Hypothermia

Recognize: The person complains of feeling cold and shivers. More advanced hypothermia patients exhibit "the umbles:" stumbling, fumbling, mumbling, and grumbling.
Treat: Get the patient into warm, dry clothes and place him in a sheltered area—such as in a sleeping bag, inside of a tent. (Don't have a tent? Protect him from the elements by wrapping the sleeping bag in a tarp, plastic sheet, or garbage bags.) Give water and simple sugars, such as hot chocolate or candy, to generate quick body heat. For more advanced cases, build a fire nearby and put the patient in a "hypothermia wrap:" Start with a sleeping pad, put a zipped sleeping bag on top, then lay the patient (in a second sleeping bag) on that. Give him a hot-water bottle wrapped in clothing to hold in his hands. Put another sleeping bag on top, then wrap it all, burrito-style, in a tarp or plastic sheet.

Stay or Go?

Use this chart to determine if you can finish your trip—or should hightail it to the ER.

Problem	Stick it out if . . .	Head for help if . . .
Hypothermia	Person warms up and feels fine	Pulse slows; shivering stops; person becomes incoherent or unconscious
Frostbite	Tissue warms and looks normal	Blisters or black tissue form
Heat illness	Persons cools off and feels fine	Person has altered mental status and red, hot skin
Muscle/bone injury	Person can use the injured part	Person cannot use the injured part
Diarrhea	Problem resolves within 24 hours	Problem persists for more than 24 hours
Wounds	They are cleaned, properly dressed, and don't require closure	They are large enough to require closure; they're deep wounds on the face or neck
Burns	Pain is manageable and no large blisters form	Pain is intense; blisters are large; face is burned

Extreme First Aid

When you're miles away from medical help and it is serious: Here's how to handle extreme injuries in the backcountry:

Heart Attack

Look for chest pain that radiates to the shoulder, arm, or jaw (especially on the left side), nausea, lightheadedness, and pale, cool, sweaty skin. Keep the person comfortably at rest, cover him with clothing or a sleeping bag to prevent heat loss, and keep him as calm as possible. Give an aspirin tablet (to inhibit artery-clogging blood clots). Don't let the person walk. Get help.

Shock

Look for rapid, weak pulse; shallow breathing; clammy skin; and nausea. Caused by an inadequate flow of oxygenated blood, shock can result from any major injury, including blood loss, severe dehydration, and spinal cord damage. If the cause can be treated—such as rehydrating the dehydrated—do it. Put him in a sleeping bag or cover him with extra clothing. Keep the person calm and lying down on a sleeping pad with his legs comfortably elevated about 10 inches. If vital signs don't improve with treatment or the patient becomes less responsive, go for help. Left untreated, shock can be fatal.

Broken Back

Move the person as little as possible (if movement is necessary, don't bend or twist the spine). Place a SAM splint around the neck to restrict the head. Do not leave the patient alone. Have someone keep a hand on the person's head to discourage movement. Go for help.

Mushroom Poisoning

Treat all unknown mushrooms as deadly. Induce vomiting as soon as possible after ingestion by having the person stick a finger down their throat to stimulate the gag reflex. Give plenty of fluids to dilute the poison, keep a sample of the mushroom, and get to a doctor. Poisoning symptoms take six to 24 hours to appear—and by then, it's often too late.

Brain Injury

A blow to the head that results in unconsciousness often causes the brain to swell. Early signs include progressive disorientation, irritability, and combativeness (after consciousness returns). Evacuate the patient immediately. If he's unconscious, carefully roll him onto his side and go for help.

First Aid Improvisation

"Be prepared" is a great motto, but who packs a cervical collar on a backpacking trip? Many items can serve as medical equipment in a pinch.

Antacid: Eat two teaspoons of menthol toothpaste mixed with cold water.

Antibacterial Ointment: Use honey to discourage infection and promote healing. (it's a natural antibacterial agent). Spread it over the surface of minor cuts, burns, abrasions, and frostbite (but not directly in a wound) and cover with gauze.

Bandage: Cut a thin strip of fabric out of a T-shirt (snip in a circular pattern around the shirt to get the longest dressing possible).

Cervical Collar: Roll a bulky jacket or fleece, leaving the sleeves out, and wrap it around the patient's neck. Tie it in place with the sleeves. Or cut a foam pad into a collar and tape it in place.

Cold Pack: Soak the injury in cold water, or wrap soaked bandannas or cotton T-shirts around the site.

Irrigation Syringe: Force water out of a hydration tube or squeeze a zip-top bag with a pinhole poked in it.

Medical Gloves: Put your hands inside clean zip-top bags.

Sling: Pull the bottom of the patient's short-sleeve shirt up and over the injured arm and pin it to the front with two safety pins. Long-sleeve shirt? Pin the sleeve of the injured arm (with the arm in it) to the shirt.

Wound closure strips Cut 1/4-inch-long strips of duct tape; punch pinholes to let fluid drain.



Evacuate or Wait for Rescue?

Your buddy just slid down a steep scree and broke his leg. Should you go for help—or haul him out? It's a tough call. The answer depends on several factors. Here's how to decide.

Your buddy just slid down a steep scree slope and broke his leg. Should you go for help—or haul him out? It's a tough call. The answer depends on several factors. Here's how to decide.

How bad is it? Patients with life-threatening injuries should usually stay put and wait for trained medical professionals; those with less serious injuries can walk or be carried out. If the patient can handle it, walking out is the best option.

How far is the trailhead? One fit hiker can move a lot faster than a group carrying a litter. If you're deep in the wilderness, a messenger might bring back help before you could carry the patient out.

Can the rescuer(s) handle it? You'll need strength, stamina, and skill to navigate the terrain with an injured person in tow.

What's the weather like? Stay put if severe weather puts the rescuers in danger of getting lost or injuring themselves.

Is there imminent danger? Even severely injured patients might need to be moved if the current location is unsafe—e.g., lightning is striking or you're on an unstable slope.



Blister Prevention and Treatment for Hikers

Introduction

No one is immune to blisters. However, blisters are preventable if you understand the conditions that cause them and they will heal faster if you know how to treat them properly.

Consider your average ripe peach. Press your thumb against the juicy fruit and gently move it back and forth. What happens? The skin moves under your thumb. Now press harder and rub. The skin rips and wrinkles, and peach juice dribbles down your hand. The same pressure-and-friction principle comes into play when you hike. The outer layers of your foot's skin can move more than the sensitive inner layers can. Boots and socks apply pressure and friction as you walk, causing these skin layers to separate and fluid to fill the void a blister.

Now, let's get back to that peach. Say you dunk it in hot water. When you rub it, it peels more easily, right? Again, it's the same with your feet: Warm, moist skin blisters quicker than cool, dry skin. The obvious lesson here is to keep your peaches out of hot water. You might also want to keep your feet dry, cool, and friction-free so you avoid blisters.

What Causes Blisters?

The most common cause of blisters resulting from hiking is friction. When your feet get hot and sweaty, your socks stick to your feet and begin to rub against the inside of your shoes or boots. The skin at the point of friction becomes red and irritated. Lymphatic fluid flows to the friction site gathering between the layers of skin to protect the area like a small balloon, eventually forming a bubble of fluid known as a blister. Blisters can also occur when your socks, boots or shoes get wet from the rain, snow, or a stream crossing.

Blister Prevention

The key to preventing blisters is to eliminate friction. Shoes and boots should be well broken in and you should make an effort to keep your socks as dry as possible by changing them when your feet get hot and sweaty or by taking your shoes or boots off periodically to let your feet and socks dry out when you take a snack break. If this means bringing along one or two extra pairs of socks, it may be well worth a few more ounces of pack weight.

If you expect to do a lot of stream crossings you should consider bringing along a pair of sandals or crocs to wear instead of your boots to keep them dry. Bringing along a pair of camp shoes also gives your boots and socks an opportunity to dry for a longer period of time before you need to put them back on again.

Other effective ways to reduce friction include applying petroleum jelly to a hot spot or sprinkling foot powder or corn starch on your feet to prevent moisture buildup. Many hikers prefer wearing two sock layers; a liner sock which absorbs moisture and wicks it away and can be changed frequently, and a heavier outer sock. This moves the site of friction between the socks, away from your skin and a sock. Be careful to avoid any wrinkles in your socks.

Early Treatment of Hot Spots

If you feel a hot spot forming on your feet, you should stop immediately. Don't tough it out and keep going. Blisters develop over a period of time and often you can feel one coming on. Early detection and treatment is the key to preventing full grown blisters. If you feel a sore spot or irritation on your foot, do the following:

- Take off your boots and hiking socks immediately and find out what is causing the rubbing. Remove any sand, pebbles, seeds, and dirt from your feet.
- Let your feet dry and cool down.
- Cover the sore area with duct tape, band-aid, or even better special blister moleskin. Moleskins are artificial skin that you can cut to shape and stick to your own skin. Moleskin can be purchased in most drugstores in a variety of brands and features.
- Remove the moleskin once you stop hiking and let the skin recover during the night. The next morning, you can judge for yourself to apply a new cover or not. In general, take precautions and apply duct tape and/or moleskin even if the area is only moderately irritated.

If you have a vulnerable trouble spot, put a piece of moleskin on it and cover it with duct tape before you head out. You can also use crazy glue to add an extra layer of skin over a hot spot. This can sometimes be more comfortable than moleskin.

Blister Treatment

Blisters come in different shapes and sizes. The first stage in determining how to treat a blister is to assess it. Small blisters that are not painful should be left alone because the best protection against infection is the blister's own skin. These will heal by themselves and will be reabsorbed in a few days as long as you protect the area with a cover.



Creating a donut of moleskin will relieve pressure from the blister.

Unbroken blisters that are painful should be drained. This is caused by the build-up of fluid in the blister, so removing it will help relieve the pain. A blister in a high-stress area is going to pop if you keep walking on it. It's better to drain it in a controlled setting than have it burst inside a sweaty, dirty boot and sock.



To properly drain a blister:

1. Clean the area with soap and water, alcohol, or an antiseptic towelette. Dry thoroughly.
2. Sterilize a needle or sharp blade, either by holding it over a flame until it is red-hot or submerging it in boiling water for 2 minutes.
3. Puncture the bottom end of the blister so gravity can help drain it. The opening should be no bigger than is necessary to get the fluid out. Starting at the top of the blister, massage the fluid toward the opening.
4. Apply antibiotic ointment to prevent infection, then wrap with the dressing or blister product of your choice.

If the bandages get wet, reapply the antibiotic ointment and redress the blisters. After a few days, the skin under the blister should have healed and you can cut away the remaining dead skin.

If a blister has broken, it first should be cleaned, disinfected and then bandaged. You can clean and disinfect the wound by irrigating it with chlorinated water, wiping it with an alcohol swab, or rubbing it with a dab of hand sanitizer. If the skin over the blister is ragged and dirty it should be carefully cut off. Otherwise it should be left intact to prevent infection. Before bandaging the wound, an antibiotic ointment should be applied. Research has shown that the application of Neosporin or triple antibiotic gel will kill off infecting bacteria after two applications and accelerate the healing process.

Other Folk Remedies

If you hang around long distance hikers and backpackers long enough, someone will suggest using Superglue to help heal a blister or make it possible to keep walking with one. This suggestion is actually a lot less far-fetched than it sounds. Superglue is widely used by surgeons to bond together organs or parts of the body that respond poorly to stitches. It is also effective in closing skin shears like cracked calluses where the sides of a wound must be bonded to accelerate healing.



Superglue can be used to treat blisters by squirting it between top of a popped blister and the skin beneath it. This bonds the roof of the blister to the underlying skin reducing the risk of infection and creating a hardened shell over the blister site. The downside of this technique is that the solvents in the Superglue will hurt like you can't believe when they are applied to the wound. To be on the safe side, make sure that you have sterilized the blister with alcohol before applying Superglue to it.

Tincture of Benzoin is another bonding agent that also can be used to seal the roof of the blister to the exposed skin underneath. It already contains alcohol, so a separate application is unnecessary.

Once a blister forms, it can take weeks to completely heal. On backpacking trips, blisters are especially subject to infection and to being exacerbated by continued pressure. By utilizing a few simple preventative steps, hikers, whether on long-distance trails or short day-hikes, can avoid this common, painful – but usually preventable – problem.



Backpacking First Aid Kit

ID Card

On a 3" X 5" index card print the titles illustrated below legibly in black ink. Complete the cards with the requested information and in **RED** ink write your allergies. Laminate the card and place it in your personal first aid kit.

Front

Name: _____
Address: _____

Phone numbers: _____
DOB: _____
Insurance Co. & numbers: _____

Emergency contacts: _____

Back

ALLERGIES: _____
Medical conditions: _____

Medicines you take: _____



What to Pack

Emergency first aid in the wilderness begins with your own personal first aid kit. The kit should be small and waterproof. Doubled heavy-duty Ziploc bags or a waterproof ditty bag can be used. It should contain the essential medical instruments and bandage materials listed in the following chart. Asterisked items (*) need only to be carried by the group leaders. All medications should be stored in separate air-tight plastic containers and clearly labeled as to the name of the drug, dosage, and expiration date.

First Aid Kit Checklist

Bandage Materials		
Qty	Description	Uses
10	1" X 3" Band-Aids	Covering small cuts and scrapes
10	2" X 4" Band-Aids	Covering small cuts and scrapes
10	Butterflies	Close long cuts and wounds
4	Knuckle Band-Aids	Covering cuts and scrapes on knuckles
4	2" X 2" gauze pads	Used to cover wounds
4	4" X 4" gauze pads	Used to cover wounds
4	4" X 4" Telfa pads (non-adherent dressing)	Place directly on wound, under sterile dressings
1	2" or 3" gauze roll (self-adhering)	Hold dressings in place
*2	Trauma dressings (surgipad or sanitary napkins)	Large wound or abrasion pressure dressing
9'	Duct tape (wrapped around a short pencil)	Hold dressings in place, preventing blisters
Wound Management		
1	.5oz tube triple antibiotic ointment	For cuts, scrapes, burns
1	Tincture of Benzoin	Increases the stickiness of wound closure strips
1	6oz bottle of camp soap	Cleansing wounds
Medications		
24	Ibuprofen tablets	Reduces inflammation, relieves pain
6	Immodium/Pepto-bismol tabs	Controls the symptoms of diarrhea
6	Antihistamine tablets (Benadryl or Sudafed)	For treatment of allergic symptoms
Blister Care		
1	Moleskin pad	For preventing and protecting blisters
1	Molefoam pad	For preventing and protecting blisters
Personal Protection		
*2	Nitrile examination gloves	To help prevent the spread of infectious disease
*1	Microshield CPR mask	To help prevent the spread of infectious disease
Hardware		
*1	Small scissors or trauma shears	Removing clothing, cutting bandages
1	Tweezers	Removing ticks or embedded objects
*1	Razor	Removing hair around wounds
6	Large safety pins	100's of uses
*1	Mirror	Removing specks in eye, signaling device
1	Whistle	Signaling device
1	Lighter/matches in waterproof container	Starting a fire, sterilizing instruments
Other Essential Items		
1	1.5oz SPF 15 sunscreen	Prevent sunburn
1	Lip balm tube with SPF protection	Prevent dry, chapped, sunburned lips
1	2-4oz tube of Insect repellent (DEET)	Repel mosquitoes, ticks, and flies
*1	Water purification tablet system	Emergency clean water supply

Airline Regulations

Adult Passengers

Customers 18 years of age or older are required to have one of the following: An official photo identification issued by a government authority, or two forms of identification, one of which must be issued by a government authority.

Child Passengers

Children ages 12-17 traveling alone will need one of the following: An official photo identification issued by a government authority, or two forms of identification, one of which must be issued by a government authority. Or, be accompanied by an adult with appropriate ID.

Stupid Jokes

It is against the law to make threats such as, "I have a bomb in my bag." Threats made jokingly (even by a child) can result in the entire group being delayed and could result in fines.

Checked Baggage/Carry-on Baggage

A. Checked Baggage

- **Screening and Identification:** Checked baggage will be screened and is subject to physical inspection as mandated by the TSA. Customers may be required to present identification. Regulations require name identification on the outside. We recommend placing identification on the inside of baggage, too. Name labels are available at Southwest Airlines ticket counters. Once you've checked your luggage, make sure you receive a separate claim check for each piece of baggage you've checked. Check to make sure that the city shown on the claim check(s) matches your final destination.
- **Please see the TSA's web site for a complete list of prohibited items.**
- **Baggage Allowance:** Southwest allows two (2) checked pieces of baggage per ticketed Customer. Size and weight limitations apply.
- **Excess Baggage:** Effective June 17, 2009, your 3rd through 9th bag or item will incur a charge of \$50 per piece, and any bag or item thereafter will be \$110 per piece.
- **Weight and Size Allowance:** Maximum weight is 50 pounds and maximum size is 62 inches (length + width + height) per checked piece of luggage. Effective June 17, 2009, overweight items from 51 to 100 pounds and oversized items in excess of 62 inches but not more than 80 inches (e.g.; surfboards, bicycles, vaulting poles) will be accepted for a charge of \$50 per item. Any item weighing more than 100 pounds must be shipped as Air Cargo. However, Customers cannot use SWA Cargo unless classified as a Known Shipper as defined by the TSA or TSA approved Indirect Air Carriers (IAC).
- **Liability:** Unless excess value is declared and charges paid at the time of check-in, Southwest Airlines' liability for lost, damaged or delayed baggage is limited to \$3,300.00 per fare-paying Customer.
- **Claims:** Damaged or lost baggage must be reported, in person, within four hours of Customer's arrival at destination.
- **Valuables:** Be smart and safe. Don't put valuable items in your checked luggage. Place them in your carryon luggage.

B. Carry-On Baggage

Per TSA regulations, carryon items are limited to one bag plus one smaller, personal-type item.

- Personal-type items include purses, briefcases, cameras, food containers, or laptops (case included).
- Southwest Airlines limits carryon bag dimensions to 10x16x24 inches.
- All Customers and their items are subject to a thorough, physical search.
- The following items are not considered carryon bags or personal-type items and are not counted against the "one-bag plus one personal-type item" limit:
 - Outer garments or other wearable articles of clothing.
 - Food for consumption during flight contained in disposable packaging.

Can I Take It?	Carryon	Checked
Nail Clippers	Yes	Yes
Personal care or toiletries with aerosols, in limited quantities - (such as hairsprays, deodorants) (**see additional information below)	Yes	Yes
Safety Razors (including disposable razors)	Yes	Yes
Tweezers	Yes	Yes
Disposable Lighters	Yes	No
Strike-anywhere Matches	No	No
Note: Some personal care items containing aerosol are regulated as hazardous materials. The FAA regulates hazardous materials. This information is summarized at www.faa.gov , click on <i>Passengers</i> , then <i>Preparing to Fly</i> .		
Camcorders	Yes	Yes
Camera Equipment - The checked baggage screening equipment will damage undeveloped film in camera equipment. We recommend that you either put undeveloped film and cameras containing undeveloped film in your carry-on baggage or take undeveloped film with you to the checkpoint and ask the screener to conduct a hand-inspection.	Yes	Yes
Laptop Computers	Yes	Yes
Mobile Phones	Yes	Yes
Note: Check with your airline or travel agent for restrictions on the use of these and other electronic items during your flight.		
Ice Axes/Ice Picks	No	Yes
Scissors - metal with pointed tips and blades shorter than four inches	Yes	Yes
Knives - except for plastic or round bladed butter knives	No	Yes
Razor-Type Blades - such as box cutters, utility knives, razor blades not in a cartridge, <u>but excluding safety razors.</u>	No	Yes
Note: Any sharp objects in checked baggage should be sheathed or securely wrapped to prevent injury to baggage handlers and inspectors.		
Ski Poles/Trekking Poles	No	Yes

**Air travelers may now carry liquids, gels and aerosols in their carry-on bag when going through security checkpoints. With certain exceptions for prescription and over-the-counter medicines, and other essential liquids, gels, and aerosols, the following rules apply to all liquids, gels, and aerosols you want to carry through a security checkpoint:

- All liquids, gels and aerosols must be in **three-ounce or smaller containers**.
- Larger containers that are half-full or toothpaste tubes rolled up are not allowed.
- All liquids, gels and aerosols must be placed in a **single, quart-size, zip-top, clear plastic bag**. Gallon size bags or bags that are not zip-top such as fold-over sandwich bags are not allowed.
- *Make everyone's life easier by placing all liquids and gels in your checked luggage.*



Backpacking Etiquette - The Finer Points

A good high adventure team is like a powerful, well-oiled, finely-tuned marriage. Members cook meals together, face challenges together, and finally go to bed together. A bad adventure, on the other hand, is an awkward, ugly, embarrassing thing characterized by bickering, filth, frustration, and crispy meals.

Nearly all bad adventures have one thing in common: poor behavior. This is true even if team members follow the stated rules, such as Don't Wear Muddy Boots into the Tent, Separate Fuel and Food, No Soap in the River, Wash your Hands Before Cooking, Keep your Trekking Pole Out of My Eye, etc.

Unfortunately, too many rules of backpacking etiquette remain unspoken. Leaders seem to assume that their team members already have strong and generous characters like their own. But judging from a few of the backpackers we've encountered, more rules ought to be spelled out. Here are ten of them.

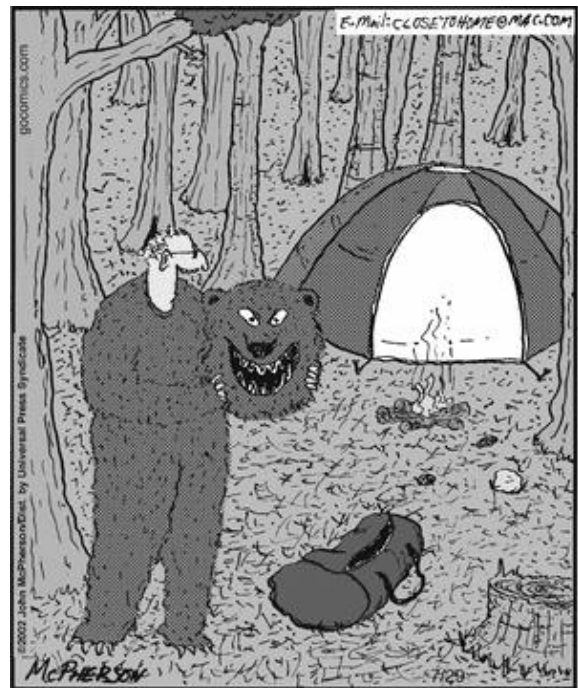
RULE #1 Get your butt out of bed. Suppose your team members get up early to fetch water and fire up the stove while you lie comatose in your sleeping bag. As they run an extensive equipment check, pack gear, and fix your breakfast, they hear you snoring. Last night you were their buddy; now they're drawing up lists of things about you that make them want to spit. They will devise cruel punishments for you. You have earned them. The team concept is now defunct. Had you gotten out of bed, nobody would have had to suffer.

RULE #2 Do not be too cheerful before breakfast. Some people wake up perky and happy as fluffy bunny rabbits. They put stress on those who wake up mean as rabid wolverines. Exhortations such as "Rise and shine, sugar!" and "Greet the dawn, pumpkin!" have been known to provoke pungent expletives from wolverine types. These curses, in turn, may offend fluffy bunny types. Indeed, they are issued with the sincere intent to offend. Thus, the day begins with flying fur and hurt feelings. The best early-morning behavior is simple: **Be quiet.**

RULE #3 Do not complain about anything, ever. You are cold and wet, visibility is four inches with wind driven sleet granules embedding themselves in your face like shotgun pellets, mosquitoes and black flies are sucking one quart of blood per hour, and the day's route has an elevation increase of 5000 feet. Must you mention it? Do you think your friends haven't noticed the conditions? Make a suggestion. Tell a joke. Lead a prayer. Do not lodge a complaint. Your pack weighs 87 pounds and your cheap backpack straps are actually cutting into your flesh. Were you promised a personal Sherpa? Did somebody cheat you out of a mule team? If you can't carry your weight, get a motor home.

RULE #4 Learn to cook at least one thing right. One expedition trick is so old that it is no longer amusing: on the first cooking assignment, the clever cook prepares a dish that resembles, say, Burnt Sock in Toxic Waste Sauce. The cook hopes to be relieved permanently from cooking duties. This is the childish approach to a problem that's been with us since people first started throwing lizards on the fire. Tricks are not a part of a team spirit. If you don't like to cook, say so. Offer to wash dishes and to prepare the one thing you do know how to cook, even if it's only boiled water. Remember that talented camp cooks sometimes get invited to join major expeditions in Nepal, all expenses paid.

RULE #5 Either A) Bathe, or B) Accept an unflattering new nickname. After a week or so on the trail, without bathing, hair forms angry little clumps and wads and the body odor is extreme. This leaves the person looking and smelling like an escapee from the basement of a mental ward outhouse. Such an appearance could shake a team's confidence in your judgment let alone your tentmate's willingness to share space with you. If you can't bathe, be prepared for others to do it for you when you least expect it.



"I'm gonna gather a little firewood, honey.
You go ahead and get some sleep."

RULE #6 Do not ask if anybody's seen your stuff. Experienced backpackers have systems for organizing their gear. They very rarely leave it strewn around camp or lying back on the trail. One of the stupidest things you can do is ask your tentmate if they've seen the tent poles you thought you packed 15 miles ago. Even in the unlikely event you get home alive, you will not be invited on the next trip. Should you ever leave the tent poles 15 miles away, do not ask if anybody's seen them. Simply announce, with a good-natured chuckle, that you are about to set off in the dark on a 30-mile hike to retrieve them, and that you are sorry. Also, it's unprofessional to lose personal items such as your spoon or your toothbrush. If something like that happens, don't mention it to anyone.

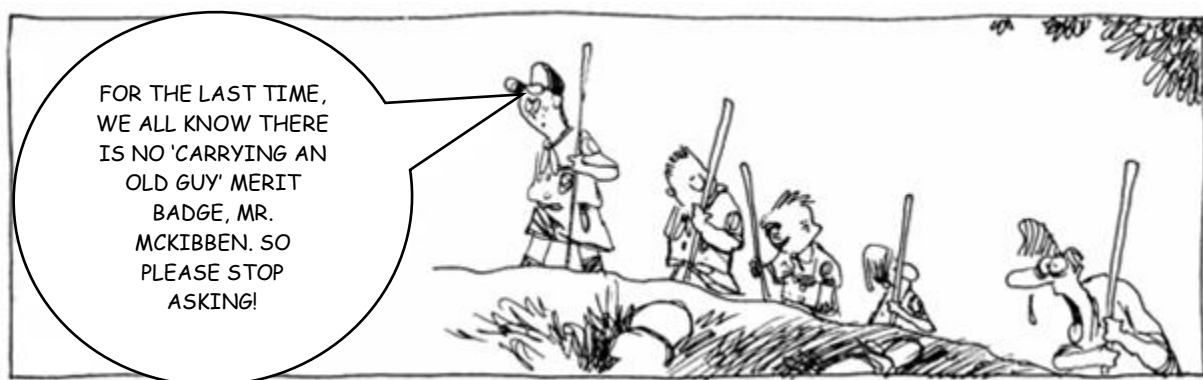
RULE #7 Never ask where you are. If you want to know where you are or how much farther the destination is, look at the map. Don't verbalize your question. Everyone is encouraged and welcome to participate in the evening or morning route planning sessions, or you may want the challenge to try to figure it out yourself. Go for it. If you're still confused, feel free to discuss the identity of landmarks around you and how they correspond to the cartography. But if at some point you: A) suspect that a mistake has been made, B) have experience in interpreting topographical maps, or C) are certain that your group leader is a novice or on drugs, speak up. Otherwise, follow the group like sheep.

RULE #8 Always carry more than your fair share. When the trip is over, would you rather be remembered as a stud or a sissy? Keep in mind that a pound or two of extra weight in your pack won't make your back hurt any more than it already does. In any given group of flatlanders, somebody is bound to try and lighten their overall weight by not carrying their fair share; usually by stating that their bear canister or pack has no more room. When an argument begins, take the extra weight yourself. Then shake your head and gaze with pity upon the slothful one. This is the mature response to childish behavior. On the trail that day, during a break, load the offender's pack with a few extra pounds of rocks or gravel.

RULE #9 Do not get sunburned. Sunburn is not only painful and unattractive. It's also an obvious sign of inexperience. Most newbies wait too long before applying sunscreen. Once you've burned on an expedition, you may not have a chance to get out of the sun. Then the burn gets burned, skin peels away, blisters sprout on the already swollen lips. Anyway, you get the idea. Wear SPF 30 protection. It gives you just about 100% protection. It does get on your sunglasses, all over your clothes and in your mouth. But that's OK. Unlike sunshine, sunscreen is non-toxic.

RULE #10 Do not get killed. Suppose you make the summit of Mount Everest solo, without bottled oxygen, and carrying the complete works of Hemingway in hardcover. Pretty macho, huh? Suppose now that you take a vertical detour down a crevasse and never make it back to camp. Would you still qualify as a hero? And would it matter? Nobody's going to run any fingers through your new chest hair. The worst thing to have on your outdoor resume is a list of the possible locations of your body. Besides, your demise might distract your team members from enjoying what's left of their vacations.

All backpacking etiquette really flows from this one principle: Think of your team, the beautiful machine, first. You are merely a cog in that machine. If you can't think about others first, forget about joining the high adventure. Your team will never have more than one member.



High Adventure Duty Roster

Crew Leaders:

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Navigator							
Trashman							
Fireman							
AM Waterman 1							
AM Waterman 2							
AM Cook							
PM Waterman 1							
PM Waterman 2							
Mr. Clean							
PM Cook 1							
PM Cook 2							
PM Cook 3							
KP 1							
KP 2							
KP 3							

Crew Leaders: Ensure all participants are aware of their duties and that the duties are carried out. The crew leaders also participate in the duties.

Navigator: Goes over the maps the evening before their assignment with the adult leaders. Reports the next day's hike details to the group prior to bedtime. Leads crew decision making at trail crossings.

Trashman: Compacts and carries the day's trash. Responsible for organizing the clean-up of the campsite before leaving in the morning.

AM Cook: Immediately upon waking up, set up a stove and heat water for breakfast.

Fireman: Check fuel level in fuel bottles and adjust as necessary. Set up and light stoves at the appropriate time for cooking under orders of the cooks. Break down and store stoves and fuel bottles after KP is done.

Watermen (AM): Prior to breakfast, collect and fill all crew water bottles as necessary.

Watermen (PM): Immediately after camp is set up, fill crew water bladders with filtered water as necessary. Collect and fill all crew water bottles as necessary. Be available if needed during cooking and KP

Mr. Clean: Responsible for filling and hanging shower/wash bags in an appropriate area immediately after setting up camp. After bathing is done, empty the bags, turn inside out, and set out to dry.

PM Cooks: Cook 1 is in charge. Lead the other cooks, fireman and watermen in getting dinner done. Rehydrate food and get water boiling in a timely manner. Cook according to package instructions. Serve food to the crew, being careful of not spilling food. Control the cooking area. Keep others out of the way unless they are assisting.

KP: KP 1 is in charge. Clean out all cooking pots as completely as possible before dish washing begins. Prepare large pot of water for heating. Use a large cooking pot as wash pot and another pot as a rinse pot. Wash all personal gear before crew gear. Dispose of wash water appropriately. Lay out all cookware to dry overnight

Crew duties sequence upon reaching camp:

1. Locate the "bearmuda" triangle at camp - bear canisters, cooking, and sleeping area.
2. Set up the crew fly in the cooking area, if necessary.
3. Place all crew gear and bear canisters in the cooking area.
4. Set up personal tents and stow all personal gear.

Crew duties before going to bed:

1. Place all personal smellables in the bear canisters and store for the night.
2. Take down crew fly.
3. Pack all personal and non-smellable crew gear possible.

Crew duties before hiking in the morning:

1. Immediately upon awakening pack all personal gear, take down and pack tents if dry.
2. After breakfast, pack bear canisters and crew gear.

Any crew gear you carry is yours to carry for the entire trek. Remember what you are carrying in case it is needed in an emergency.

Leave No Trace Principles

The tremendous rewards of high-adventure treks are drawing more and more people to the backcountry. At the same time, the vast territory suitable for treks is shrinking in size. More people and less land mean we all must be careful not to endanger the wild outdoors we have come to enjoy.

A High-Adventure Ethic

A good way to protect the backcountry is to remember that while you are there, you are a visitor. When you visit a friend you are always careful to leave that person's home just as you found it. You would never think of dropping litter on the carpet, chopping down trees in the yard, putting soap in the drinking water, or marking your name on the living room wall. When you visit the backcountry, the same courtesies apply. Leave everything just as you found it.

Hiking and camping without a trace are signs of an expert outdoorsman, and of a Scout or Scouter who cares for the environment. Travel lightly on the land.

The Principles of "Leave No Trace"

"Leave No Trace" is a nationally recognized outdoor skills and ethics education program. The Boy Scouts of America is committed to this program. The principles of Leave No Trace are not rules; they are guidelines to follow at all times.

The Leave No Trace principles might not seem important at first glance, but their value is apparent when considering the combined effects of millions of outdoor visitors. One poorly located campsite or campfire is of little significance, but thousands of such instances seriously degrade the outdoor experience for all. Leaving no trace is everyone's responsibility.

Plan Ahead and Prepare

Proper trip planning and preparation helps hikers and campers accomplish trip goals safely and enjoyably while minimizing damage to natural and cultural resources. Campers who plan ahead can avoid unexpected situations, and minimize their impact by complying with area regulations such as observing limitations on group size.

Proper planning ensures:

- Low-risk adventures because campers obtained information concerning geography and weather and prepared accordingly.
- Properly located campsites because campers allotted enough time to reach their destination.
- Appropriate campfires and minimal trash because of careful meal planning and food repackaging and proper equipment.
- Comfortable and fun camping and hiking experiences because the outing matches the skill level of the participants.

Camp and Travel on Durable Surfaces

Damage to land occurs when visitors trample vegetation or communities of organisms beyond recovery. The resulting barren areas develop into undesirable trails, campsites, and soil erosion.

Concentrate Activity, or Spread Out?

In high-use areas, campers should concentrate their activities where vegetation is already absent. Minimize resource damage by using existing trails and selecting designated or existing campsites. In more remote, less-traveled areas, campers should generally spread out. When hiking, take different paths to avoid creating new trails that cause erosion. When camping, disperse tents and cooking activities-and move camp daily to avoid creating permanent-looking campsites. Always choose the most durable surfaces available: rock, gravel, dry grasses, or snow.

These guidelines apply to most alpine settings and may be different for other areas, such as deserts. Learn the Leave No Trace techniques for your crew's specific activity or destination. Check with land managers to be sure of the proper technique.

Pack It In, Pack It Out

This simple yet effective saying motivates backcountry visitors to take their trash home with them. It makes sense to carry out of the backcountry the extra materials taken there by your group or others. Minimize the need to pack out food scraps by carefully planning meals. Accept the challenge of packing out everything you bring.

Sanitation

Backcountry users create body waste and wastewater that require proper disposal.

Wastewater. Help prevent contamination of natural water sources: After straining food particles, properly dispose of dishwater by dispersing at least 200 feet (about 80 to 100 strides for a youth) from springs, streams, and lakes. Use biodegradable soap 200 feet or more from any water source.

Human Waste. Proper human waste disposal helps prevent the spread of disease and exposure to others. Catholes 6 to 8 inches deep and 200 feet from water, trails, and campsites are often the easiest and most practical way to dispose of feces.

Leave What You Find

Allow others a sense of discovery: Leave rocks, plants, animals, archaeological artifacts, and other objects as you find them. It may be illegal to remove artifacts.

Minimize Site Alterations

Do not dig tent trenches or build lean-tos, tables, or chairs. Never hammer nails into trees, hack at trees with hatchets or saws, or damage bark and roots by tying horses to trees for extended periods. Replace surface rocks or twigs that you cleared from the campsite. On high-impact sites, clean the area and dismantle inappropriate user-built facilities such as multiple fire rings and log seats or tables. Good campsites are found, not made. Avoid altering a site, digging trenches, or building structures.

Minimize Campfire Use

Some people would not think of camping without a campfire. Yet the naturalness of many areas has been degraded by overuse of fires and increasing demand for firewood.

Lightweight camp stoves make low-impact camping possible by encouraging a shift away from fires. Stoves are fast, eliminate the need for firewood, and make cleanup after meals easier. After dinner, enjoy a candle lantern instead of a fire.

If you build a fire, the most important consideration is the potential for resource damage. Whenever possible, use an existing campfire ring in a well-placed campsite. Choose not to have a fire in areas where wood is scarce-at higher elevations, in heavily used areas with a limited wood supply, or in desert settings.

True Leave No Trace fires are small. Use dead and downed wood no larger than an adult's wrist. When possible, burn all wood to ash and remove all unburned trash and food from the fire ring. If a site has two or more fire rings, you may dismantle all but one and scatter the materials in the surrounding area. Be certain all wood and campfire debris is dead out.

Respect Wildlife

Quick movements and loud noises are stressful to animals. Considerate campers practice these safety methods:

- Observe wildlife from afar to avoid disturbing them.
- Give animals a wide berth, especially during breeding, nesting, and birthing seasons.
- Store food securely and keep garbage and food scraps away from animals so they will not acquire bad habits.
- Help keep wildlife wild.

- You are too close if an animal alters its normal activities.

"Leave No Trace" Information

For additional Leave No Trace information, contact your local land manager or local office of the Bureau of Land Management, the Forest Service, the National Park Service, or the Fish and Wildlife Service. Or, contact Leave No Trace at 800-332-4100 or on the Internet at <http://www.lnt.org>.

For posters, plastic cards listing the Leave No Trace principles, or information on becoming a Leave No Trace sponsor, contact: Leave No Trace Inc., P.O. Box 997, Boulder, CO 80306, phone 303-442-8222.

Respect Others

Thoughtful campers:

- Travel and camp in small groups (no more than the group size prescribed by land managers).
- Keep the noise down and leave their radios, tape players, and pets at home.
- Select campsites away from other groups to help preserve their solitude.
- Always travel and camp quietly to avoid disturbing other visitors.
- Make sure the colors of their clothing and gear blend with the environment.
- Respect private property and leave gates (open or closed) as found.
- Be considerate of other campers and respect their privacy.





While hiking deep in the mountains, Gary and Brenda found the answer to a centuries-old question.