

The Backpack

Heavy

A pack weighing more than 3.5 pounds and/or larger than 4500 cubic inches.

Light

A pack weighing more than 2 pounds but less than 3.5 and having around 3500 to 4000 ci.

A pack weighing less than 2 pounds and having 3000ci or less.

Types of Backpacks:

There are two basic categories for backpacks: External Frame and Internal Frame. You can find lightweight packs that fall in either category. There are also some frameless packs that fall in the lightweight category (weighing around half a pound, but must pack carefully and are very limited in the amount of weight they can carry).

Advantages of Internal Frame: More popular than external and therefore have many many more choices when looking for a pack. Fit closer to the body and are narrower which improves the amount of work to carry a load and improves stability and balance. I recommend an internal frame pack.

Advantages of External Frame: Allows strapping on a lot of gear. Can handle very heavy loads. Allows more ventilation than internal frame.

What is the right size backpack for you?

Waist size: _____

Torso length: _____

Space: Try to find a pack with around 3500ci.

Packing a Backpack:

You want the center of gravity to be as close to your back as possible. First, reduce the amount of gear you are packing. You also want the center of gravity to be balanced. To keep the center of gravity low and close to the pack, pack in this order:

1. Sleeping bag on bottom (low density and provides cushioning)
2. Food (high density and usually controls the pack's center of gravity)
3. Rest of your gear (heavy items close to back, light items further away)

Work done with a backpack:

Average person lifts their center of gravity a few inches off the ground with each step. If he moves forward 24 inches with every step (typical trail stride), then in a mile he will have walked 2,640 steps. If the walker weighs 100 pounds, that will be 100 foot-pounds of work with every 6 steps. That's 44,000 foot-pounds of work each mile. With a 20 pound pack, that becomes 52,800. A 40 pound pack is 61,600 foot-pounds. (Stay with me here...)

If that person walked 10 miles gaining 3000 feet in elevation, with a forty pound pack, he would have performed 1,000,000 foot-pounds of work. Had that pack weighed 20 pounds, he would have performed 900,000 foot-pounds of work. The difference is 100,000 foot-pounds, which is the work it would take to lift a fully loaded tractor trailer one foot off the ground (*Lightweight Backpacking and Camping*, pg. 84). Descending the slope would take a large amount of energy too, because you are stopping yourself from falling down the slope!

Some recommendations for backpacks:

Buying a backpack is a very personal decision. Different packs fit people differently. It is important to find one that not only fits size-wise, but also feels comfortable. Most packs have enough adjustments that getting one in the proper size should be adjustable to get the right fit. However, if you plan to go to Dallas anytime, it would be a great idea to go to the REI store and try on some packs with weight in them and walk around. Locally, there are a few packs at Bass Pro Shops, but they do not have a very large selection. I have purchased a backpack online from REI. It didn't fit right, returned it no problem. Was able to find another that did fit me well. So, your results may vary on this.

Online sites to look for backpacks:

<http://www.rei.com> – Lots of selection online and great service. Also can go into their store in Dallas and try some packs out.

<http://www.campmor.com> – Get great deals on discontinued packs or models that are left over from previous seasons. Lots of gear at good prices.

<http://www.gearfinder.com> – Compare gear and look for backpacks that might fit the criteria you are using.

<http://www.armysurplusforless.com> – Some backpacks and gear for inexpensive prices. However, the site does not have a lot of detailed information about the products, so you will need to research it elsewhere.

<http://www.ebay.com> – Obviously, here is a place to look for all kinds of gear.

Scouts are growing in size, so you may want to look for packs that are adjustable within a range. There are some external frames and internal frames that have these features.

Look to spend around 50-60 on the lower end, and I wouldn't spend much over 100 on the more expensive end for a scout's first backpack. However, you will most likely need an EXTERNAL frame pack unless the sleeping bag and shelter system are lightweight. The sleeping bag will need to be strapped onto the pack unless it is a lighter down or other synthetic, compressible bag.

Specific deals right now:

http://www.campmor.com/outdoor/gear/Product___80733 – Golite is a great brand. This is a just over 1 pound pack with 3100ci in medium and 3300 in lg. This is a great pack at a great price (69.97).

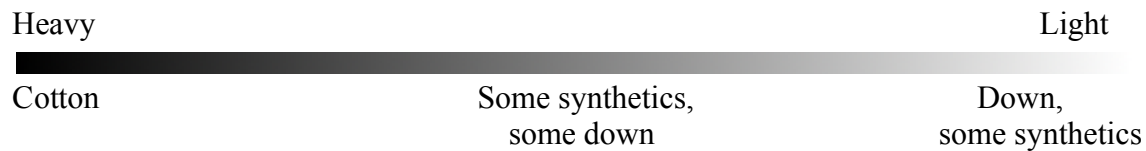
http://www.campmor.com/outdoor/gear/Product___90429 – Pinnacle makes good packs. Here is one for smaller folks that holds 3160ci and weighs 3lbs, 8oz (a little heavy), but only costs 39.97.

http://www.campmor.com/outdoor/gear/Product___90387 – An EXTERNAL frame backpack. Weighs 3lbs, 10oz (kinda heavy), holds 2780ci (should be fine with ability to strap on gear externally), and costs 39.97.

<https://secure.armysurplusforless.com/productView.php?id=3117> – Not sure of the weight or of the size, but holds 3050 ci and costs 49.97. Unfortunately, I was unable to find additional info on this.

<http://www.backcountry.com/store/JAN0303/JanSport-Big-Bear-63-Backpack-3600cu-in.html> – Doesn't say on the site, but this fits from 17-21 inch torsos. Weighs 2lb, 15oz, and costs 89.90.

The Sleep System



The sleeping system is a very important component. A high-quality bag that, when stuffed, is smaller and lighter than a loaf of bread and can keep you warm in very cold temperatures is pretty amazing and useful. If I had to choose, I would put most of my budget into the sleeping bag. A regular sized bag, even if a scout does not continue to backpack, will be comfortable and convenient for many, many years.

Warmth:

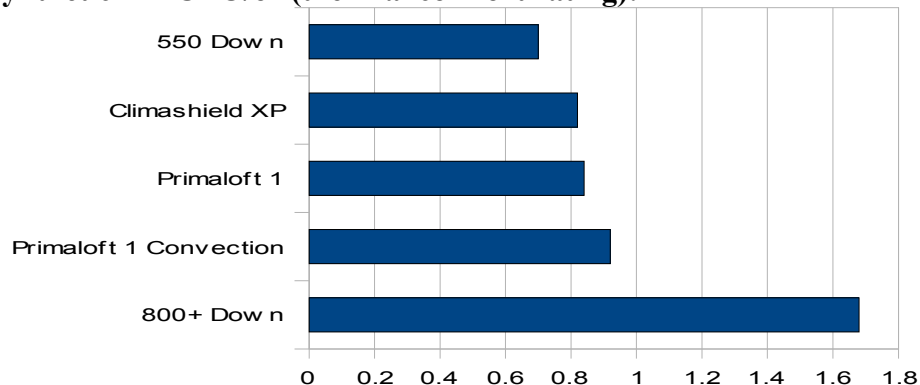
- Bags keep you warm by minimizing the loss of body heat.
- Loft (the thickness of the insulation) and the type of insulation determine warmth. Degree ratings are only useful when comparing within a single brand's product line.
- The thickness of the loft on the top of the bag is the only useful loft. This is because when laying in a bag, the bottom is compressed, minimizing the insulation ability.
- The baffles (the lines that segment the parts of the bag) should not be sewn through (this increases heat loss dramatically).

- General rule of thumb for warmth with down:
 - 1 inch for 40-50 degree nights
 - 2 inches for 25-40 degree nights
 - 3 inches for 10-25 degree nights

Bag Design:

- Rectangular Advantages: more room to move around, can be used as a quilt.
- Mummy: Weighs much less because not as much material/insulation (lighter by 20-40 percent). More efficient at keeping a person warm.
- Quilts: sewn foot-box with straps to attach sleeping pad to it. Eliminates the weight of the insulation on the bottom of the bag; straps to keep cold spots from developing.

Down versus Synthetic Fill CLO/oz (thermal comfort rating):



From the chart, it is easy to see that, per ounce of weight, a high-quality down provides dramatically warmer insulation. I did not have direct numbers for 600 fill down or 700 fill down, but I think it would be reasonable to say that 600 falls around .80 to .90, and 700 probably is around 1.2. However,

there are downsides to down and upsides to synthetics as well.

I'm not bringing cotton into this discussion for several reasons: it does not compress well, so it's a big bag which is hard to fit in a pack; it provides little warmth per ounce, which means a heavy bag is needed to get a reasonable temperature range; when wet, it is extremely heavy and does not dry out for a long time; and, when wet, loses almost all of its insulation properties.

Synthetic fill weighs more per oz than down, but it does have advantages: when wet, it keeps its loft and retains its insulation ability. So, in wet weather or wet conditions, it makes sense to use one.

But down has way more advantages: It does lose its insulation when wet, so care has to be taken to keep it dry. But with care, it is not too difficult to keep dry (easier than cotton since it compresses so small). Down compresses smaller than synthetics. A synthetic bag may lose 50% of its insulation ability after 100 days of use. Whereas a down bag will retain 75-80% of its insulation even after 10 years of heavy use. Again, the weight savings are dramatic enough to also make one consider down. Down is the bag of choice for most lightweight backpackers.

With all that said, down is not cheap. It is quite expensive. I recently priced buying some 800+ down. The price is 25.89 for three ounces. A warm bag containing 12 ounces of down would cost over 100 dollars in insulation alone. Add in the baffling material, the shell material, the engineering to design the bag and the craftsmanship of it, and you can easily see that down bags are expensive.

But, more than a backpack, more than shoes, more than the shelter I use, my down bag is by far my favorite piece of equipment that I own. And I plan to use it for a long time. So, I do think the investment in a nice 25 or so degree down bag is well worth it.

With all that said, if the prices are difficult to stomach, you can purchase an inexpensive mummy bag at academy or bass pro to work "in the meantime." However, that will limit what pack choices you can make (probably need to be external frame).

Where to Buy:

I suggest looking at REI: <http://www.rei.com> Or, for finding a used bag, look on ebay. You can also look for sales at <http://www.campmor.com> In fact, Campmor has more stats about the bags and the filling than does REI.

I own a Kelty Lightyear 25. They don't sell that anymore, but do sell a 20 degree. http://www.campmor.com/outdoor/gear/Product_43125 – it's on "sale" for 149.99. The 25 degree bag has been great for me.

Look for a 2 pound down bag, otherwise go as light as you can within budget.

Sleeping Pad: A sleeping pad is important to insulate the body from the ground. Since a sleeping bag gets compressed, the ground will pull out the heat from a person unless a sleeping pad is present. There are various types: open cell, inflatable, closed cell, etc. For the purposes of backpacking, a **closed cell** pad is the best. It prevents water from entering, retains shape, but still allows small air pockets of warm air to insulate.

There are products that provide better insulation per oz of weight, but you can't go wrong with a cheap blue pad from Wal-mart. Cut it $\frac{3}{4}$ length and you have a lightweight sleeping pad.

The Shelter

Heavy		Light
Tents	Some tents, tarps	Some tarps, bivy sacks

There are several options when using a shelter when backpacking: Tent, Tarp, and Bivy. And the weight goes from heavy to light in that order.

- Tent: The tents used by the troops weigh around 5 pounds.
- If you and a hiking partner split the tent material and the poles and stakes, that would be 2 and a half pounds per partner. This is a reasonable weight for each, but difficult to pack in a internal frame pack. In a downpour, these tents will leak. They dry within a reasonable time (if there is sun). In a tent, the protection from the wind adds 10% of warmth. Also protect against insects.
- Blue Tarps: A 8x10 tarp weighs around 2 and a half pounds. If two people are sleeping under it, this is not a bad weight.
 - That is by no means light and they are difficult to pack. However, they are extremely durable and totally waterproof. Plus they are fairly inexpensive. Does not provide the wind protection or warmth a tent provides.
- Nylon Tarp: More expensive than blue tarps, but lighter and more “packable.” Not as waterproof as a blue tarp, but is more resistant than tents due to the design.
- Silnylon/Spinnaker/Cuben Fiber Tarps: Extremely light and packable, but expensive fabrics. More fragile and can develop tears. Must have seams sealed to make them waterproof.
- Plastic Drop Cloths: Fairly light, extremely inexpensive. No tie-ons or grommets, so must improvise with rocks or other ideas when tying it up. It is clear, so no sun protection. Reliable water resistance.
- Bivy: Basically a bag that covers your sleeping bag and head. This can include bug protection; may even include a hoop pole to give some headroom. Very light and minimal, but not good for claustrophobia. Also has little room or ability to cook under or in. Does protect against wind and water. However, with a down bag, a bivy can cause the bag to get wet due to condensation and evaporation from a person's body.
- The Stars: The lightest option is no shelter. This is a wonderful way to feel more connected with the outdoors, but not good for a weekend when a shower or other bad weather may appear.

Ground Cloths: Use the lightest weight drop cloth one can find. Cut it to size (a few inches on each side of your bag, a few inches above head, and a few inches below the bottom of the bag. This has good water protection and is fairly light, packable, and cheap.

Stakes and Guylines: For stakes, use aluminum or titanium, not steel. Or, cut coat hangers and bend them to make your own stakes. It's steel, but it's pretty thin. For guylines, use a lightweight nylon or spectra cord, which is available from <http://www.gossamergear.com>. Just make sure you get the kind covered with a nylon sheath to help it hold knots.

Lightweight Hiking Boots/Shoes

Heavy

Light

Leather boots

Some lighter fabric boots, some shoes

Light shoes

Hiking boots or shoes are not part of the “big three” components to backpacking, but are essential to comfort in the outdoors when hiking. From *Camping and Woodcraft*: “...in ten miles there are 21, 120 average paces. At one extra pound to the pace, the boots make you lift in a ten mile tramp, over ten tons more footgear.” A Mount Everest study in 1953 found that in terms of physical effort, one pound on the feet is equivalent to five pounds on the back.

When you have a heavy backpacking load, heavy boots are important for stability and to support that weight. But with lighter loads, lighter boots and even regular trail shoes or running shoes can be used.

Some boots come with a waterproof-breathable layer to prevent water from entering the shoe. However, these shoes and boots are much hotter than those without that barrier, and more expensive. They can also lead to feet sweating, which then cannot evaporate due to the waterproof barrier. During warm or cool weather, it makes more sense to have a shoe that has more mesh in the upper to allow breathability and also allow quick drying.

With regards to scouting, if the pack is light, I would recommend using standard tennis shoes that a scout already has. If you do want to buy specific boots or shoes for hiking, go with the lightest pair one can find. Weight is talked about online as the weight of one size 9 shoe. So compare and shop for what you want.

Make sure the shoes are broken in before using them on the trail. In other words, wear them around the house and walk a fair amount in them so you will not develop blisters on the trail.

Socks:

Never wear cotton socks on the trail: they get wet and do not dry easily. Instead, wear a thin pair of smartwool or other wool blend sock. The wool continues to insulate even if it is wet, dries fairly quickly, and the blends help wick water and sweat away. The wool also does not hold odor as much as other fabrics. You can most likely find a wool blend at Wal-mart or for sure at a sporting goods store.

For a trip, I would bring 2 pairs of socks: one on your feet, the other ones drying/airing out to wear in your sleeping bag that night and on the trail the next day.

Feet are very important. After all, if you have a foot problem, that is going to affect your entire trip. Having breathable, lightweight shoes and light socks will aid in preventing blisters or hot spots.

When crossing streams, some people like to have aqua socks or other shoes. This is a good idea, but I do not use it. I just cross using shoes that dry quickly once I start on the trail again. However, you must have something, because crossing a stream barefoot is excruciatingly painful when the water is cold and there are rocks along the bottom.

The 10 Essentials

The ten essentials were developed by a hiking group in the 1930's and are suggestions for what anyone should carry when in the back country. The ideal is to have as many of these essential 10 things on your person in case you get separated from your pack. I have not developed a perfect method for this yet, but I've been thinking about how to do it.

1. Map: It's good to have a small map and any trail guide information with you.
2. Compass: A regular scout compass will work here.
3. Sunglasses and Sunscreen: Should not need this unless in mountains/snow.
4. Extra Food and Water: Difficult to carry extra food on your person, but should carry at least one extra meal in your pack that is light and does not require much preparation. Pack a few iodine tablets with you to treat water. Pack all of these essentials in a quart ziploc bag to also be used as a water holder.
5. Extra Clothes: Again, can't really carry this on your person. For me, an extra pair of socks and shorts is enough. I consider this more of a "comfort" issue than mandatory, but that's me.
6. Headlamp/Flashlight: A small headlamp that runs on a couple button batteries is great to have on your person. You can get these cheap at a sports store, or buy a Photon Microlight, which are the brightest on the market (19 bucks).
7. First Aid Kit: This area is a debatable topic for people. You have to consider where you are going and how far you are from help. Here's what I consider needed in a backpacking first aid kit:
 - Six standard bandaids
 - Two 4x4in gauze pads
 - Two butterfly bandages
 - Iodine pads for sterilization
 - Moleskin for blisters
 - Tylenol or other mild pain medication
 - Ace bandage
 - Benadryl
 - Pepto tablets
8. Fire Starter: A couple of Esbit tablets or some dryer lint works well.
9. Matches: A mini-lighter or a few strike anywhere matches dipped in paraffin wax (will burn for 15 minutes or so).
10. Knife: A pocketknife is used surprisingly few times on the trail if you have prepared well. However, it's good to have a small, lightweight knife for those "just in case" times. A swiss army knife with a single blade, scissors, and tweezers is a good option. They also sell that model with a built-in Photon Microlight (29.99).

Gear List with Lightweight in Mind

I had hoped to have some approximate weights for these items on here, but was unable to get that done. However, you can use a list like this, add up your Total Base Pack Weight (everything in your pack except food, water, fuel), add up your Total Out of Pack Weight (everything on your body with the exception of the pack), and finally your Consumables Weight (water, food, and fuel) to determine how heavy your pack is.

The main advice I can give is this: Think of multi-use gear and never pack items that have the same function.

Clothing Worn:

Hat: Full-brimmed hat or baseball cap

Shirt: Fast drying (duodry from Target) or Polyester shirt from Walmart.

Bottom:

Shorts: Fast drying (duodry from Target) or other active-wear shorts with an inner liner (to work as underwear)

OR

Pants: If colder weather, instead of shorts, use nylon wind pants or other fast-drying, breathable pants.

Socks: Smartwool or other wool blend socks

Shoes: Tennis shoes or lightweight hiking shoes/boots.

Other Gear Worn or Carried (The 10 Essentials):

Map

Compass

Flashlight/Headlamp

Water: Treatment and Ziploc Bag holding essentials

Food: Extra meal in pack

First Aid

Pocket Knife

Waterproof Matches

Firestarter

(Sunglasses should not be needed)

Packing:

Backpack: About 3000ci, internal frame.

Stuff sack: for inside gear to stay dry, use a turkey bag

Black Trash bag: For emergency shelter or raingear use

Shelter and Sleep System:

Shelter: 8x10 tarp, for cheap go with thicker plastic drop cloth

Sleeping Bag: A 25-30 degree rated down (600 or better fill) mummy bag.

Sleeping Pad: $\frac{3}{4}$ length closed foam (blue foam at wal-mart, etc.)

Waterproof ground cloth: Painter's plastic, cut to size.

Stakes: 6 Titanium skewer stakes or for cheap use aluminum or make your own using coat hangers

Guylines: Use spectra cord in polyester sheath or nylon rope

Cooking and Hydration:

Stove: Alcohol stove or backpacking stove
Fuel Bottle: Bottle for alcohol fuel or canister for backpacking stove
Pot: Aluminum or Titanium pot
Utensil: Lightmyfire all-in-one utensil or lexan spoon or Ti spoon
Bowl: Ziploc disposable bowl
Cup: Cut top off a gatorade or Soda bottle
Bear Bag: Plastic grocery bag or nylon or silnylon sack (could use sleeping bag bag)
Rope: 50 ft spectra cord or nylon rope for bear bag
Water Bottles: 2 bottles that add up to 3 L (Use platypus bottles or gatorade/soda bottles)
Water Treatment: Water Filter shared by group or use Aquamira
Matches: 1 book of matches in small baggie.

Clothing Packed:

Rain/Wind Gear: Nylon windpants/jacket or Tyvek pants/jacket
(Tyvek weighs next to nothing and is extremely cheap
from <http://www.disposable-garments.com>)

Extra Socks: Smartwool or other wool blend

Extra Shorts: Extra breathable shorts with inner liner
(or, an extra pair of synthetic underwear)

In Colder Weather:

Insulating Layer: Wool Sweater (check Goodwill for cheap ones)

Gloves: Thin, fleece-lined gloves at Wal-mart

Head Insulation: Wool or fleece beanie cap

Warmer Pants: lightweight fleece bottom long underwear

Other Gear:

Hand Sanitizer: Alcohol gel in small container

Toothbrush: Finger brush or brush with handle cut off

Soap: Campsoap or Dr. Bronner's soap repacked in small
bottle. Also use for dish cleanup. UNSCENTED!

Baking Soda: toothpaste, sting first aid, deoderant, etc.

Insect Repellant: Liquid form in small bottle

Sun Screen: Packaged in small bottle

Bandana: Only cotton item. Muti-function item

TP: Take an estimated need of toilet paper in zip-loc (not on roll)

Duct Tape: For repairs, first aid, etc. Take a piece of cardstock
about 3x3 inches, roll it, then wrap about 3 feet of
duct tape around this (do not bring a roll of tape)

Optional Gear:

Hiking Stick: Free from the ground

Camera: Disposable or light as possible

Camp Shoes: Can be used as water crossing shoes as well

Pen/Paper: Write about your adventures

After every trip, unpack and make stacks of items you used a lot, items you used a little, and items you used never. Re-evaluate what you should leave behind next time (without sacrificing safety).

Resources/Websites

Informational Sites:

- <http://www.backpacker.com> – The definitive source for all things backpacking. Great magazine and articles online about improving backpacking skills. Also contains gear reviews and other information.
- <http://www.backpackinglight.com> – The definitive source for all things lightweight backpacking. A 19.95 subscription gets you access to tons of member-only content and discounts on gear. Can get a membership along with the Backpackinglight book for a good deal. This is the website of the pioneers of backpacking light.
- <http://www.gearfinder.com> – Compare and contrast gear to find what you are looking for. This is offered by backpacker.com.
- <http://pages.prodigy.net/jcrochet/trails.htm> – A guide to hiking trails in Louisiana.
- <http://www.bplite.com/> - Extensive online forums dedicated to lightweight backpacking. Learn about making your own gear, what other people are doing, etc.
- <http://www.whiteblaze.net/> - The site for people hiking the Appalachian Trail. Information on long distance hiking, nutrition, gear, etc.
- <http://www.backpacking.net/> - Lots of information on backpacking, gear, making own gear, starting out with backpacking, etc.
- <http://www.adventurealan.com/> - One guy's quest to continually lighten his load. Lots of lists on where to get food, gear, and what the current trends are.
- <http://www.freezerbagcooking.com/> - Cooking meals using dehydrated ingredients. Focus is on simply boiling water, pouring the water into a plastic bag containing the food, waiting a few minutes, then eating.

Gear Purchasing Sites:

- <http://www.rei.com> – The ultimate place for buying gear. You can find pretty much anything here. However, they don't have some of the more lightweight options that you have to go other places for.
- <http://www.campmor.com/> - Get great sales and deals on discontinued or model year closeouts. Covers all types of camping/backpacking gear.
- <http://www.steepandcheap.com/> - One deal at a time. Once it sells out, another one comes up. Over and over again. The items offered vary, and you have to check frequently and hope to luck upon something you want. I've ordered several things here.
- <http://backpackingdeals.com/> - A smaller site run by backpackers. I have ordered a tarp from them. There was a problem with my order and they corrected it immediately. Various lightweight gear sold here.
- <http://www.backpackinglight.com> – The store is completely focused on lightweight gear. I've bought several things here and always satisfied.
- <http://www.gossamergear.com/> - this site is owned and operated by one of the pioneers of ultralight backpacking. Several items here can be used to lighten your load. I've ordered a lot of my gear from here.
- <http://www.disposable-garments.com/> - Get tyvek clothing here. Can purchase individual pieces.
- <http://drbronner.com/> - Outdoor soap made only of essential oils (get the unscented).
- <http://www.backcountry.com/> - Outdoor gear; usually put a lot of things on sale.
- <http://www.ebay.com> – This is always an option to find gear.