Chapter 8: **Shelter**

By Rick Dreher

One of the happy challenges that hikers tackle is finding shelter for the night. Yurts and lean-tos, tarps and teepees, igloos and snowcaves, tents and hammocks—they all aim to keep you comfortable during your nights in the wilderness.

Your shelter can be more than simply a spot to sleep. In the best of times it's a place to reflect on your journey and consider the rewards of being out in the wilderness. Sometimes it's a comfy cocoon while a storm howls and rages inches away. Sometimes it's a window on a 100-mile panorama of mountaintops. Or a ringside seat to the inner workings of an elk herd. Sometimes, your shelter is a respite from clouds of shrieking bloodthirsty insects.

Not every night goes according to plan. Fierce winds rip tents and tarps from their moorings and threaten to send them to the next county. Rain insinuates itself through seams and zippers and doors and floors, making you cold, wet, and worried that morning will never arrive. Relentless mosquitoes on a hot muggy night force you to button up so much that you end up in a puddle of your own sweat. Snow piles onto walls, pressing in until you've scarcely got room to turn

over. Rodents large and small cavort, chew, and tap dance in and out of your dreams—and your gear and your food.

For the lightweight backpacker, shelter is a three-part challenge—all while maintaining the minimalist approach to weight and bulk.

- Select the right shelter
- Master how to use that shelter in a wide range of conditions
- Choose the right place to set up camp

Shelter Basics

Shelter can be a roof; a roof and walls; or a roof, walls, and floor. Shelter can be a feature of your destination, something you carry with you, or something you create when you arrive. Different destinations dictate different shelter types, depending on campsite and conditions. Most commonly, campers need to get out of the weather—the cold, wind, rain, or snow. In other regions and times of year, it might mean sun, heat, and dust. Sometimes, even in the most pleasant of weather, shelter is needed to keep nature's critters at bay—including the two-legged hominid type as well.

As is emphasized throughout this book, planning is paramount to the lightweight backpacker. We have to research the conditions we'll be facing before making our shelter selection. You don't lug a full mountaineering tent to the desert, and you don't tote a tarp to Everest camp 3.

The *al fresco* approach. Many hikers prefer nothing at all, sleeping out in the open when they can. It simply requires that you predict conditions as part of your trip planning, and size up conditions in the field as you get ready to select your sleeping site for the night.

A ROOF OVER YOUR HEAD

A wilderness shelter can be tight as a 55-gallon drum or as gauzy as one of Salome's veils. When and why do you choose one over the other? Cozy/sweltering/clammy/frigid—what can happen during the night?

Our primary focus here is on fabric shelters for the backpacker. With some exceptions, these take one of five forms:

- Tents
- Tarps
- Bivy sacks
- Teepees
- Hammocks

When selecting a shelter, the lightweight hiker keeps in mind the following ratio: *pounds per sleeper* (PPS), as in, pounds of shelter carried per person who will be sleeping in it. Summertime conditions can often accommodate a PPS of less than 2 and even less than 1. Wintertime travel, or a trip into chronically unsettled climes, can dictate a PPS far higher. Only after you've determined what conditions you're facing can you sink your teeth into shelter selection.

The successful lightweighter looks at shelter one piece at a time. What comprises a shelter? Simply put, it's everything that combines into creating your home for the night:

- Fabric body—be it a tent, tarp, teepee, or hybrid
- Groundcloth—your floor, if not an integral part of the body
- Skeleton—generally, any support poles
- Rigging—lines and stakes

If little lightbulbs are glowing above your head as you think, *Hey, I can use something I'm already carrying for one of these parts*, you're on the right track. A poncho can serve as a tarp for one, or as a groundcloth if used carefully. Trekking poles can support tarps and certain tents, as can handy sticks. Sometimes poles are avoided completely by rigging a ridgeline between trees or dropping a topline from a handy overhead branch. Rocks, sticks, or bags filled with gravel or snow can fill in as stakes.

Nothing weighs less than . . . nothing. If sleeping under the stars appeals to you and you have confidence that conditions

warrant it, carry no shelter at all. Just you, the ground below, and the sky above. What could be simpler? You can even skip the groundcloth if you carry a pad that won't be damaged foam-a-terra. It's not at all uncommon on longer trips to choose sleeping al fresco, even if shelter is at hand. But in most parts of the globe, if the trip is going to be longer than a night or two, it's not the smartest approach to leave everything to chance. Our good search-and-rescue friends would certainly encourage you to be prepared for the unexpected. This book does the same. We will show how you can carry a complete shelter system that won't weigh you down.

WARM AND DRY VERSUS COLD AND WET

Fabric shelters provide warmth by fending off moisture, protecting us from the wind, and in the case of tents, trapping some of our body heat. Even tarps may play some role in capturing heat radiated from the earth and our bodies, but not a lot. On a cold, calm night, temperature readings taken inside and out will show that the tent is several degrees warmer. Windy weather will carry tent heat off more quickly, but the protection from wind chill might be even more important. We have to be careful, though, not to let this temperature advantage be overwhelmed by moisture. Think of the worst-case scenario: an unventilated tent entirely made of impervious material. Our respired and perspired moisture would begin condensing on the walls the minute we closed the door. After a few more minutes the condensation would accumulate into drops that would gather and run down the walls in rivulets and drip on us from the ceiling. Quite soon, this water would pond on the floor.

Not a big bother, though, because we'd soon be passed out from the accumulation of carbon dioxide.

The opposite of the impermeable tent is one made entirely of netting, with a separate fly that's used in cool or wet weather. In fact, most so-called, three-season tent designs use considerable mesh in their bodies to aid airflow and carry away excess heat and moisture. The question remains, what happens to that moisture when it gets to the top of the fly? Does it accumulate there and inevitably condense, or can it

disperse? A few tents have one or more vents atop the fly. Others rely on the circulation afforded by the gaps between tent body and fly and the fly and the ground. In practice, the effectiveness of these strategies depends on conditions.

Some staunch tarp advocates consider this drenching to be the inevitable fate of all tent dwellers. But there are at least as many staunch tent dwellers that have never been soaked out in this fashion. There are too many variables to declare either side as entirely right. The proof is too tangled up with all those variables—tent design and location, climate and present conditions, the occupants and how they use the tent, the position of Jupiter and the price of a cup of coffee in Duluth. Vancouver Island's soggy west coast presents an entirely different set of challenges and requirements than the high and arid Gobi Desert. Chances are good that you'll be doing most of your camping in conditions somewhere between these extremes.

MOISTURE CONTROL

Moisture is an excellent conductor of heat. Air, by contrast, is an insulator and doesn't conduct heat nearly as well. To stay warm we must stay dry, and that is shelter's most important role.

Moisture sources can be obvious. Rain and snow are the prime culprits, and much of our shelter's responsibility revolves around keeping it away. Fog is another source and, traveling quietly like a cat, can invade your sleeping quarters in spite of the roof. California's coastal redwood forest ecosystems depend on fog as their moisture for the otherwise dry summer and fall. The trees accumulate moisture in droplets that gather and literally rain from the drooping redwood branches. The lush redwood undergrowth—home to the famous banana slug!—is testament to the system's effectiveness. In this elegant model, we find there's a way to get wet without a drop of real rain. Heavy fog can wet everything in an open-walled shelter.

Even without visible fog, humid air can be wet and cold enough that our breath and insensible sweat will nudge the air to the point where condensation forms on tent ceiling

and walls, on sleeping bag shells, and inside sleeping bag insulation. Tarps and well-ventilated tents are generally best at dissipating hiker-generated moisture. Tight, impervious, waterproof tents and snow shelters are the worst. Single-walled, waterproof-breathable tents are an interesting case and discussed in more detail later.

The science behind condensation is simple: The colder the air, the less moisture it can hold. Condensation forms when moist air is either chilled—fog—or contacts a cold-enough surface—surface moisture, or dew. The temperature at which condensation forms is called the *dew point*, something we're all familiar with from the local weather forecast. Greater altitudes with lower barometric pressure wring even more moisture out of the air.

The primary means of combating condensation in a shelter is to improve ventilation. To this extent, flat sheet tarps are the most condensation-resistant shelters. They do not restrict airflow by forcing it through vents, doors, or around beaks.

The other major source of moisture is the ground. Saturated soil and springtime snowpack can pump lots of water into the air and microclimate of your wilderness bedroom. Your groundcloth, bivy sack floor, or tent floor seals this moisture out.

Tarps

Nylon, twine, stakes, poles, some creativity—*voilá*, a bedroom! The humble tarp represents shelter at its most basic, yet at its lightest and most versatile. Fabric advances give us astonishingly light and strong tarps that can, for example, shelter two or three at less than a pound. If you're in an area with enough trees or brush to leave your poles at home, the addition of lines and stakes along with a groundcloth completes your shelter.

A tarp is a flat piece of fabric with grommets or loops at the corners and at intervals along the sides. Sometimes, there are one or more loops down the center as well. Some tarps are square, but most are rectangles. Sizes vary, with a generally acceptable minimum being 5´ x 8´ feet to perhaps 10´ x 12´. An 8´x 10´ tarp is a popular size that can easily shelter

two and even three sleepers if need be. A typical 8´x 10´ tarp made from silicone-coated nylon weighs 1–2 ounces under a pound and costs a little under $100. Folded, it takes up a tiny portion of precious pack space—a dinner-sized burrito's worth. And what a burrito!

Other tarps, made of the more common, urethane-coated nylon are available at perhaps half the price and twice the weight of the silnylon. Even at 2 pounds, a bargain tarp is still a lightweight trail home. Don't hesitate to use one of these, especially if you aren't sure whether or not tarping is for you.

Even cheaper are tarps of plastic sheeting or even Tyvek. A sheet of 4-millimeter plastic can make an adequate shelter. The challenge is attaching your lines so that they'll hold and won't tear the plastic or pull off. There are several ways to accomplish this. One is to tie directly to the tarp with a sheetbend knot. This works pretty well on the corners, less well along the sides. The second method is to form a pocket in the plastic with a smooth pebble or small pinecone, for example, and tie it off with a piece of line. The third is to use one of the devices sold for this purpose. One such device is called the *Visklamp* and is a variation on the second method above. It's a wire "key" that fits over a small rubber ball that you place behind the sheeting. The guyline ties to the wire.

TYVEK AND THE BLUETARP

Tyvek is a brand of spun polyethylene made by Dupont. There are a myriad of Tyvek varieties, but the one that commonly interests backpackers is the HomeWrap type. Tyvek is quite tough, being both tear and puncture resistant. The problem with HomeWrap is that it's uncoated and, therefore, porous. This makes perfect sense in home construction, where its breathability prevents the damage of moisture buildup in wall cavities. It makes less sense for its potential use as rain protection. Nevertheless, Tyvek has its adherents and is suitable for shelter in all but the hardest rain.

The ubiquitous bluetarp—the grommetted, fiber-reinforced, plastic jobs sold by the millions at discount stores everywhere—are a legitimate waterproof shelter option. They

are neither lightweight nor especially compact. Their stiffness makes them challenging to set up and extraordinarily bulky. Groundcloths made from bluetarp fabric wear like iron but, again, are heavy.

GROMMETS OR LOOPS

Grommets in your tarp can fail by tearing out. They're especially troublesome in silnylon, because the fabric is particularly thin and slippery. In urethane-coated nylon they're more likely to stay put under stress. Silnylon tarps are better when made with webbing loops instead of grommets.

SEAM SEALING

Fabric tarps wider than 5 feet will have a center seam running down their length. (Five feet is a typical maximum width for bulk fabric rolls.) Generally, the seam is flat-felled and does not need to be sealed for silnylon tarps, but it definitely needs to be sealed for urethane-coated nylon tarps. In the case of standard coated nylon a number of sealants are available. They come either in a bottled liquid that can be brushed or daubed, on or in a thicker form in a tube that is squeezed, brushed, or spread on using an irrigation syringe (McNett Seam Grip is a popular and effective brand).



Stealth 1 Tarp by Bozeman Mountain Works; Madison River, Beartrap Canyon, Montana.

Silicone nylon requires silicone sealant. This can either be a commercial preparation, such as McNett SilNet, or a homebrew made by thinning silicone sealant with a solvent, such as paint thinner or even white gas. A complete seam-sealing job covers the fabric joints and the stitching lines on both sides. For the common flat-felled center seam, you'll want to coat the two stitching

lines and the seam itself—where the two pieces of fabric meet. Sealing the tie-out points is not necessary to prevent leakage, but it protects the seam from water absorption and increase seam strength when under stress.



An 8' x 10' tarp pitched as an **A-frame shelter with trekking poles**. A minimum of six stakes are required, but 8-12 stakes adds stability in high winds. Guylines can be used at the corners and sides (shown here) for more interior room and better ventilation, or the corners and sides can be staked directly to the ground for better wind resistance.

TARP CONFIGURATIONS

There are a lot of ways to pitch a tarp: some simple and obvious, some rather complex and elegant. Cut a sheet of typing paper to 8 x 10 inches and you have a practice tarp that is a miniature replica of a full-size 8-x-10-foot backpacking tarp. What options do you have? You can practice all of the following. An office meeting is a highly recommended place to practice.



One set of end corners of a tarp pitched in **A-frame mode** can be drawn inward and staked to create a closed end for more weather resistance.

THE A-FRAME

Think pup tent without the front and back doors and floor, and you've got the basic A-frame tarp. At a minimum, you need a ridgeline and attachment at the four corners. In practice, it's generally necessary to use more anchoring lines, especially if there's any wind or rain.

THE FLYING DIAMOND

Turn your tarp 45 degrees, making one corner the foot and the opposing corner the entrance, and you have the basics of the flying diamond. Useful in foul weather, the flying diamond



Pitched in the **Flying Diamond** configuration, an 8' x 10' tarp provides terrific headroom, shead, overhead rain protection, and wind resistance from two sides. However, if the wind shifts and weather is stormy, the massive open front leaves you exposed to the elements. Use creativity in pitching the flying diamond according to weather and the number of people under your tarp. Lower the peak for better weather resistance, increase the height of the sides with guylines for better ventilation, or add trekking pole(s) to the interior (**shown**) to improve headroom and stability.

doesn't provide the maximum living space but protects from weather on three of four sides. The opening is generally the only corner supported by a pole. The flying diamond works best with a square tarp—a 9′ x 9′ is ideal. But it also works with rectangles if the length and width aren't too different.

THE FLAT ROOF AND LEAN-TO

It's possible to string your tarp as a flat roof—an awning. This is a good method in fair weather, especially if sun protection is desired. If you're lucky enough to be able to do so from trees and bushes, you can have a high ceiling and no guylines to trip over. The flat roof is the worst configuration in the rain. Not only will it allow the weather in from all sides, water



A flat tarp gives you maximum creativity in creating a shelter that meets your needs, adapts to the environment, and reflects your style. Pitching a tarp elegantly is as much about art as it is about technique. Here, dual trekking poles are used to create more headroom in an 8' x 10' tarp, with two and a half sides pitched directly to the ground for weather resistance.

will pool in your awning and either bring it to the ground or gush off in multi-gallon surges.

A variation, the *lean-to*, has one side—usually a long side—guyed or staked directly to the ground and the other elevated as the opening. The lean-to, with its ground-level "foot" pitched into the wind, is simple, roomy, and offers good weather protection.

In truly foul weather, you may have neither the means, the time, nor the desire to make an elegant tarp home. It's possible to quickly make an effective shelter by loosely guying down the four corners and raising a pole in the center. Once you've claimed this space out of the rain, you can arrange your gear underneath and adjust your shelter as time allows and needs dictate. While it will protect against stormy weather from all sides, the tarp teepee isn't the simplest to get in and out of.

TARPS THAT AREN'T FLAT

The simple tarp is a noble thing, providing a myriad of shelter possibilities. But there are weaknesses inherent to that flat sheet of cloth. First, it is impossible to rig them to be perfectly flat, with no sags, folds, or wrinkles. Beyond the aesthetics of not having a picture-perfect pitch, the sags and folds reveal high and low stress points, indicating areas of weakness. Rain can collect in folds, causing further sagging, and the whole works will flap in the wind. Lots of guy points and clever rigging reduce but never completely eliminate these flaws.

In response, some tarp designs incorporate angled ends that form small downward sloping "porch" areas at the head and foot. These help strengthen and stabilize the tarp, and enable it to better shed rain and wind, increasing protection for the sleepers. Other tarps incorporate *catenary* designs that provide a natural curve along the ridgeline or sides. Think of a chain spanning two fence posts: It always is bowed in a curve described as catenary. By replicating this curve in the ridgeline, the tarp's natural tendency to sag down its center is incorporated into the design. Such wing-style tarps pitch beautifully and can be guyed drum-tight. They are probably the strongest of all tarp-style shelters. They can't, however, be pitched in the many variations of the flat tarp.



Stealth Poncho Tarp by Bozeman Mountain Works; Lost Coast, California



Stealth Poncho Tarp by Bozeman Mountain Works – Spanish Peaks, Montana – pitched in a hybrid style: A-frame at the foot end, and lean-to at the head end. This pitch provides the better protection of an A-frame pitch while still affording the views and ventilation of a lean-to pitch.

WHEN THE WEATHER TURNS FOUL

Anybody who tarps often enough will be blessed with a stretch of awful weather. You can keep wind and rain at bay by first picking a high or sloped piece of ground that won't channel or puddle water into your sleeping quarters. This can be a challenge, especially in established campsites that typically have several well-used tent sites forming perfect little ponds in the rain. If it's already raining, you can easily spot these sites and avoid them, but if rain is still only threatening, you'll need all your observation skills to find the right site.

Become a weatherman. Try to determine which way the prevailing winds are blowing, and set up your shelter with the foot end into the wind. Pitch the foot and sides as low as possible without actually contacting your sleeping bag. If your tarp has guy points on the sides and in from the edges, using them will pull the walls up and away from you, add interior space, reduce flapping, and prevent rain from pooling on the tarp itself and coming off in waves.

If it's raining while you are setting up, use your basic pitch to gain fast shelter for yourself and your gear. Once out of the rain, you can get organized, change out of your wet clothes, and watch the conditions to decide how to do the



In the half-pyramid configuration, a tarp provides outstanding weather resistance when pitched with the foot of the tarp into the wind. This 8' x 10' tarp requires only four stakes (peak, two front corners, and rear center), with the rear corners tucked inward to provide a dry place for gear storage, useful when camping on snow or wet ground.

rest of your rigging. You might even cook dinner first or have a hot drink to take off the chill. Then take as much time as you need to fix your home, even if it means making the head end the foot, and vice versa. In the mountains especially, the wind can shift and swirl, channeled by the land's contours.

If your tarp is large enough, segregate your wet and dry gear. Hang wet clothing from the ridgeline (if you use one). Footwear is kept by the front door, out of the rain, and safely away from your sleeping area. It's sometimes advisable to keep wet gear on a small tarp or plastic trash bag. Don't keep anything that's dripping wet on your main groundcloth, lest water run toward your dry clothes and sleeping gear. If you have a poncho, you can extend your tarp's front entrance for a really large, protected sleeping and relaxing space. Finally, once you're battened down, enjoy the storm from the comfort of your bed and perhaps think about the less fortunate folks back home trapped in their boring houses.

BUGS

Into every tarper's life some bugs crawl. Be it resolute carpenter ants skidding audibly down your nylon sleeping bag or incessant whining clouds of mosquitoes, your missing walls, doors, and floor open you wide to the invading hordes. (Okay, you're the invader, but the better you sleep, the sooner you'll leave.) Some bug netting can stave off the invasion. There are several options.

Headnet

A netting sack large enough to cover your sleeping bag's head is the minimum to keep bugs out of your bag and off your face. You may need to sew Velcro patches to the bag and netting to keep it in place. If you're hot and need to sleep partway out of your bag, you'll defeat the netting's protection.

Netting bivy

Several framed netting shelters are available. Some cover the sleeping bag's top two-thirds, allowing you to leave your arms out. The framework keeps the netting well off your face,

meaning that mosquitoes can't bite you through it. The A-16 Bivy cleverly collapses into a disk that packs away easily. The Outdoor Research (OR) Bug Bivy is full-length, with a single hoop and coated nylon floor. While heavier than some of the competition, the OR bivy gives complete protection and can replace your groundcloth. It even provides a (tight) space for changing and allows you to sleep completely out of your bag on hot nights. Most bivy manufacturers offer netted openings to keep the bivy sack ventilated in warmer, buggy conditions.

Netted tarp

Netting doors and skirts can be sewn to a tarp and give surprisingly good protection while keeping ample ventilation. An added benefit is the netting catches rain splatter and slows the wind. Long netting skirts can be tucked under gear, rocks, sticks, the groundcloth—anything to hold it in place and keep your neighbors at bay.

Suspended netting shelter

You can fashion a netting tent underneath a tarp. This can be anything from an informal length of gathered netting suspended from the ridgeline to a full-blown netting tent with doors and floor, such as those made by GoLite and Oware.

THE GROUNDCLOTH

If the tarp is your roof and walls, then your groundcloth is your floor. You'll want one large enough to accommodate your sleeping area, gear, and clothing. If two or more are sharing the space, it's best to have a single cloth big enough for all. Groundcloths are, to an extent, sacrificial. They are, after all, what's between you and the cruel earth. Depending on what, where, and how they're used, a groundcloth can last a few nights or an entire PCT thru-hike. The cautious will begin simple, light, and cheap, and move up as the need arises.

There are several types. Groundcloth can be made of plastic sheeting, Mylar, Tyvek, fiber-reinforced plastic, or coated nylon.

Plastic sheeting ranges from thin, painter's dropcloths (1–2 mm), to the heavier weights used in the construction industry (3–6 mm). The thinner dropcloths are light, cheap, and compact, but puncture easily. Heavier weight plastic is plenty strong but can be quite slippery and heavy. All plastic attracts a lot of dirt.

Mylar is strong for its thickness and very light, but crinkles underneath. The Mylar used in emergency blankets punctures easily. Stronger Mylar sheeting is used in the construction industry and can be purchased at big box home improvement stores.

Tyvek, discussed earlier, is very strong. Crinkly when new, you can run it through a washing machine to soften it before using. A gentle rinse cycle is sufficient. Remember not to rely on Tyvek if you're going to be in very wet conditions.

Fiber-reinforced plastic is heavier than most of the other options, but is nearly indestructible. The emergency blanket version, which is aluminized on one side, is often purchased on the premise that some heat will be reflected back to the sleeper. Don't count on it.

Urethane-coated nylon groundcloths are among the more expensive options but do a good job without being slippery. Silicone-coated nylon groundcloths are lighter, strong enough, exceedingly slippery, and effective dirt magnets. The slipperiness can be reduced by applying a pattern of silicone sealant in dots or stripes across the surface. The silicone might slow the sliding if the bead is large enough, but it will add weight.

Tents

The most popular of all wilderness shelters is the tent. And why not? Tents are the closest thing to a home away from home that you can carry on your back. There's something almost magical about unrolling the wad of nylon and string from its sack and in a few minutes having it become your own little fabric fort.

Tents vary from the miniscule to airy multi-room palaces. Some are single skinned and others are double walled. Tents without floors are discussed elsewhere. For our purposes, a tent, at a minimum, has a floor, door, roof, and walls.

It's the separation from the outdoors that many tent detractors dislike, preferring as they do, to sleep in the open, or at most, under a tarp. They have a point. There is perhaps more a sense of being outdoors when the view is 360 degrees from under a tarp. But when the storm is lashing, the bugs bombing, the wind ripping, or the neighbors' eyes prying, a tent can be the better place. Tent detractors also maintain that tents are fatally flawed because they drench their occupants in condensation. It's certainly possible and does happen. But proper tent design and correct use can keep this problem under control in most situations. (And lest we kid ourselves, under-tarp soakings happen too.)



The TarpTent by Henry Shires is one of the most aesthetic and effective single-wall shelters available. The two-person Squall model, shown here in the Spanish Peaks of Montana, weighs less than 2 pounds and provides effective protection from weather and insects with excellent views and ventilation through the mesh front door.

TENT TYPES

We'll focus primarily on double versus single wall, and free-standing versus hoop tents.

Double wall

Most common of all tents, the double-wall combines a tent body (floor, walls/ceiling, and door) with a separate waterproof nylon or polyester rainfly. The floor is most commonly made of nylon waterproofed with a heavy urethane coating, and the walls, doors, and ceiling of noncoated nylon—either ripstop or taffeta. Floor seams, either across the floor or up the sides and corners, are factory taped in all but the least expensive models, making them impervious to water. Most floors extend some amount up the walls, the theory being that this "bathtub" keeps striking rain and even pooling water at bay.

All but the most serious mountaineering tents are fitted with netting-backed vents and windows. Airflow, as we shall see, is important. Schemes to keep both the air flowing and the insect world at bay are an important part of tent design. The rainfly will stretch at least over all windows, doors, and uncoated portions of the tent body. Some rainflys completely enclose the tent, extending sideways well beyond the doors to form *vestibules*—like little front porches. Rainflys must never touch the tent body. The airspace between body and fly is needed to carry away moisture and to prevent condensation from forming inside the tent. Fly edges also have to stop short of the ground to allow air to flow underneath, lest they smother the tent occupants and trap moisture.

Single wall

Simpler and generally lighter than double-wall tents are single-wall tents. These fall into two camps: breathable and ventilated impermeable.

In the first kind, breathable fabrics, similar to those used in waterproof-breathable raingear, comprise the walls, doors, and ceiling. Designed and used correctly, they keep rain out yet don't collect significant interior condensation,

since interior moisture can be driven through the walls. Those made of impermeable fabrics take the other route: adding extensive and aggressive ventilation schemes to keep airflow high and limit accumulation of interior moisture and subsequent condensation. In-between are mountaineering single-wall tents of fabrics that breathe well enough in the mountains where the air is typically drier.

Single-wall tents were on their way to claiming a large portion of the backpacking market when, in the 1980s, they were hit by US federal regulations requiring fire-retardant tent fabrics. The Gore-Tex fabrics commonly in use at the time didn't meet the regulations, and the tents disappeared from the market. Today, there are a few waterproof-breathable tents available. They are mostly freestanding models, and many are aimed at the mountaineering market. They are reasonably light and are certainly worth considering. It should be noted that they also tend to be expensive.

In use, single-wall tents require some different techniques than the typical double-wall design. They sometimes have doors exposed to the elements, meaning that there is no vestibule. Ventilation is usually provided by vents, windows, or netting-backed doors. However, there's another trick that dates back to the Gore-Tex tents made by Early Winters. They recommended that, if the tent were suffering from condensation, to shut the doors and windows. This traps more heat and increases the temperature differential between indoors and out, driving the moisture through the fabric. Remarkably, given the right combination of environmental conditions, this does the trick and can be helped along considerably by a candle.

Single-wall impermeable tents make no concessions in the need for aggressive ventilation. The best scheme is to let in air at ground level and vent at or near the tent's high point (hot, moist air rises). Some are equipped with massive awning-protected windows that usually vent quite effectively.

Freestanding tents

Freestanding tents are supported by a crisscrossing set of poles that completely support the tent and fly without sig-

nificant guying. These take a bewildering variety of shapes. The simplest have rectangular floors and use a pair of poles that attach at opposite corners, crossing overhead dead center. As poles are added to the tent design, complexity abounds. There are many, many three-, four-, five-, and even six-pole designs. The poles are sometimes erected inside the body, especially with single-wall tents, leaving a smooth exterior that doesn't catch the wind or easily trap snow and rain. More common is to crisscross the poles as an exoskeleton over the outside body, attached using external fabric sleeves or suspension clips. The pole tips normally clip into grommets in webbing tabs sewn to the tent floor. The fly is draped over this assembly and oftentimes clips to buckles on webbing extending from the pole attachment points at the tent floor. Defying this description of "freestanding," the flys on these tents generally need guying to create adequate space between canopy and fly, minimize flapping in the wind or sagging in the rain and snow, and keep the whole works from blowing off the lip of that ridge. Freestanding tents filled with gear take flight surprisingly often.

Hoop tents

Hoop tents are a variation of the canvas covering on a Conestoga wagon. A series of hoops, usually two or three, runs essentially parallel to one another. In a tapered design, the pole at the foot will be the shortest. If a double-wall tent, the fly extends beyond the door to create a vestibule and to keep rain off the inner door itself. Recent hoop tents often have a front door that's along one side, rather than dead center of the head end. This arrangement can help reduce the rain or snow that gets inside when entering or leaving.

Solo tents

The solo traveler has several small tents to choose among, but at a fairly high PPS. Some one-man designs exceed 5 pounds of trail weight. Most ultralight models are coming in at 2.5–3.5 PPS. Thus, a tent seldom offers the best PPS for the solo hiker, but can compare favorably for parties of two or more. In addition to a high PPS value, most solo tents

severely cramp living space. They are best suited for those who hike all day and only need a place to sleep at night, rather than to hang out and camp. Spending a few days hunkered down in a tiny tunnel solo tent while waiting out a storm will certainly cause you to come back to this book and star the margin here.

FOOTPRINTS

Nearly every tent made offers a companion *footprint*, a piece of coated nylon that goes under the tent's floor. The rationale is that the tent floor needs protection from the ground, lest it spring leaks from punctures and wear spots. Costing from $30 to $50, these footprints beg the questions: Is the tent floor strong enough? And if not, why?

The extra weight and expense can be avoided two ways. Keep the tent floor healthy by carefully selecting tent sites and not wearing shoes inside. Or take along a thin sheet of plastic, perhaps a painting dropcloth or Mylar rescue blanket, and fashion your own lightweight footprint. In areas where sharp rock or thorns can't be avoided, this second floor might be necessary. Trim the sheet to be smaller than the tent so that it doesn't funnel water underneath.

Another possible reason to opt for the footprint is that certain tents can be pitched using the fly, poles, and footprint only. In some cases leaving the tent body at home can save several pounds. How well this arrangement works depends on the tent's design.

CHOOSING A TENT

How do we choose among the hundreds of tents on the market? Because of our focus on weight, most of them will fall off the list right away. Many have PPS weights of 4–6 pounds, with that solo-tent PPS among the highest of all.

There are two issues:

- Creative manufacturer weights
- The packed/minimum weight paradox

As with the other major pieces of gear, tent weights are frequently misstated, so they turn out to be heavier than claimed. Also, the interpretation of "packed" and "minimum" weights vary from manufacturer to manufacturer. "Packed" can include tent, fly, poles, lines, stakes, and sacks, or it can include all that plus instructions, seam sealer, hang tags—everything that ships with a new tent. "Minimum" weight is even more confusing, ranging from just the tent, fly, lines, and poles, to just the fly, poles, and (optional) footprint.

If your head is swimming, you know what you have to do. Take your own scales to your local gear emporium and weigh the candidates yourself. Once you have some finalists, have them set up and climb inside. You need room to sleep and live. However many occupants you're planning for need to fit inside along with their sleeping gear and at least a few extras.



Hammock shelters allow you to spend the night in places no one sleeping on the ground would even think about. Here, a Hennessy Adventure Racing Hammock is pitched on a steep forested slope. The stock silnylon fly has been replaced by a Bozeman Mountain Works Stealth 1, which adds space, offers more flexible pitching options, and saves weight. The total package shown here, which includes the hammock, tarp, six titanium tent stakes, and Spectra guylines weighs less than 1 pound.

You may also want to bring in your gear or leave it protected under a vestibule. If so, make sure your tent can do it.

- Can you sit up without your head grazing the ceiling?
- Can you stretch out without your sleeping bag touching any tent walls?
- Can you hang clothing, a flashlight, or lantern from the ceiling?
- How is the door(s) configured?
- Can two or more people get in and out without climbing over their tentmates or without letting rain or snow inside?
- Can you scoot in backward, take off your shoes out of the weather, and leave them outside still protected from the rain?

Next, ask yourself what the ventilation is like. Look for the ability to take in fresh air at ground level and exhaust it above. This flow will help reduce the accumulation of moisture. Some tents vent well even with the fly configured to fend off rain. Others don't and become veritable saunas that will soak the occupants. In hot, dry weather, a tent that opens wide while keeping bugs away is best.

And, for many ultralighters, perhaps the best reason for never bringing a tent should be the top priority when selecting yours: How are the views? Forget about plastic windows. They fog with condensation and lack optical clarity after only a short time of use. Look for flys that can be rolled back and pitched open and voluminous mesh bodies that allow you to enjoy the surroundings in the absence of bad weather and in the presence of swarms of mosquitoes.

HAMMOCKS

"I'm swingin' in the rain. . . ." There's nothing new about hammocks. Tropical dwellers have used them for centuries, perhaps millennia. They've never been an especially popular option for backpackers, perhaps because nobody had taken the time to sort through and overcome their limitations. That's changed.

First, to state the obvious, a hammock has to attach on either end. So high-alpine, desert, and tundra hikers will probably have to take a pass. But where there are trees, or even sturdy bushes, stringing a hammock is a legitimate bedroom option. The simple and elegant Hennessy Hammock is a two-piece miracle of fabric and line. The body strings between two trees a few paces apart. Two sidelines spread the body and prevent excessive sway. A rainfly covers the works, attaching to the mainline and sidelines. The fabric body and a surprisingly slender ridgeline provide its strength.

To get inside, you enter headfirst through an opening slit in the bottom that extends from the end about a third of the way to the center. You sit on the floor and bring your feet up and in, swinging them away from the opening, which snaps shut. Other hammock brands offer a more traditional configuration, including entrance from the side. They are generally heavier and more complex than the Hennessy. But more innovation is likely to come in the hammock arena.

A hammock seldom allows for gear storage. Your gear can either stay directly underneath, protected by the fly overhead, or perhaps be hung from one of the supporting trees.

Keeping warm on cold nights in a hammock is a challenge. It hasn't been well quantified how much more heat is lost while suspended in air compared to sleeping on the ground with a pad. If heat loss is through a combination of conduction, convection, radiation, and evaporation, it's likely that hammocking significantly increases convection. The body is exposed to free-flowing air all around. By comparison, the ground directly under an earthbound sleeper slowly warms and probably carries away less total heat. Because the hammock fabric presses both from underneath and the sides, an insulating pad should wrap around the torso where the sleeping bag insulation is compressed. An added radiant barrier in the form of an emergency blanket or other reflective fabric can preserve more of the sleeper's body heat. Hammocks seem to match well to blanket-and-pad combinations, such as the Rab, Golite, Nunatak, or Big Agnes.



Pyramid shelters like the Black Diamond Megalite and Oware Alphamid (both shown in this photo on a backcountry ski and snowshoe trek in the Montana Beartooths) provide adequate shelter for mild winter storms, but attention needs to be paid during heavy snows (digging is required to keep the shelters from collapsing) and setup takes some time due to the high number of snow stakes required for a taut pitch.

TEEPEES AND OTHER ODDITIES

There are still shelters that don't fall into the other categories we've discussed. Teepees are single-wall and usually floorless, with a single center pole. They are equipped with a simple door and some sort of vents near the top. Made of waterproof-coated material, usually nylon, teepees rely on venting to clear out moisture. In fair weather, many teepee designs allow the floor to be raised above ground level, allowing good airflow but admitting critters. In anticipation, some have a netting skirt. Others, targeted at wintertime camping, have fabric skirts upon which snow can be heaped to provide a shield from the wind and weather. Curiously, teepee doors never seem to be fitted with netting backing to allow for bug-free ventilation in hot weather. At least one, however, offers a netting door insert as an optional accessory.

And another offers a fully enclosed, netted, inner-teepee tent with a floor.

Teepees are useful year round. In winter, quite the living space can be excavated underneath with sleeping platforms, etc. You just need to accommodate the center pole with some sort of support that won't allow it to sink into the snow. Something like a small plywood disk will do. The Megamid by Black Diamond is a popular floorless teepee, but lighter ones are available, including Black Diamond's MegaLite, the GoLite Hex, and other models from Oware and Tipi Kifaru.

There are other fabric shelters. Some are tentlike but you supply the frame, or they're suspended from a ridgeline and spread out with lines and stakes. The Six Moon Designs Lunar Solo shelter is an example. Created by lightweight backpacking enthusiast Ron Moak, the Lunar Solo is a silnylon-and-netting tent that relies on trekking poles for support and large vents and awnings for minimizing condensation. It provides effective shelter for 1.5–2.0 pounds. The Integral Designs Silshelter is a floorless tentlike shelter that relies on trekking poles for support and weighs about a pound. A series of fully enclosed shelters with netted doors are also available from the likes of TarpTent, TrailQuest, GoLite, and Six Moon Designs.

BIVY SACKS

Covered previously, bivy sacks deserve mention in this shelter discussion too. First, there are bivy sacks that blur the line between bivy and tent. They have one or more hoop poles, and some even have open head areas and netting-backed, zippered doors. All are single walled and made of waterproof-breathable fabric, some with coated nylon floors. These are for folks who don't suffer from the merest hint of claustrophobia and who aren't interested in bringing much gear or doing much more than sleeping inside. In the event of long stretches of bad weather, the bivy should probably be paired with a small tarp to protect gear, the bivy entrance, and cooking out of the weather.

Maybe the bivy's biggest appeal is its ability to occupy the smallest possible bit of real estate, miniscule campsites that everybody else has to pass by. A spot in a tiny mountainside meadow that faces east can reward the lucky bivouac'er with a sunrise to remember forever. In addition, a bivy takes little pack space. Many, but not all, are quite light. Some of the more complex designs are well over 2 pounds.

In the case of the simpler overbag-style bivy, their sheltering qualities keep away wind and wind-driven rain and snows, making tarp camping in nasty weather far less risky.

Trail Shelters & Structures

Some parts of the US offer the option of trail shelters, cabins, or lean-tos. These range from the most basic of accommodations—a roof and a spot to sleep—to a multi-room cabin. Significant stretches of the Appalachian Trail can be hiked without carrying any sort of tent or tarp. The shelters are abundant. The same is true of New Zealand's Great Tracks and many hiking areas of Asia, Europe, and the United Kingdom. Clearly, for those minimizing pack weight, planning to stay in manmade shelters means having to carry no shelter at all.

As appealing as this may sound, they are sometimes full, meaning a hike to the next one or perhaps even backtracking to the last. Crowded into a shelter with several strangers isn't always a recipe for a good night's sleep or a practice in exercising social graces. And some shelters are overrun by vermin. You can spend the night fending off mice or rats. But to some, there's an appeal to solid walls and a roof, a fireplace and a kitchen, and a place to dry wet clothes. Granted, many ultralight backpackers call these places their "house" or "apartment"—the very place they're trying to escape from.

Shelters that are staffed and managed usually operate on a reservation system so that they are, in fact, dependable. Some backcountry shelters can also be reserved, including a great many US Forest Service cabins and fire lookouts. In

many parts of the Western US, trail shelters were once common, but many have been removed over the last couple of decades by the National Park and Forest Services, making the shelter option just a memory.

SNOW SHELTERS

Sleeping in the snow requires special preparation and care. The shelter's job remains staving off the cold and wet. Typical four-season and mountaineering tents are bombproof and bomb heavy, often sporting a PPS of 4–5 pounds. What alternatives are there for the lightweight hiker?

Two options that come to mind are the igloo and the snow cave. Igloos are walled domes made from snow blocks that you cut yourself from the floor area and surrounding snow pack. You'll need a snow saw, snow shovel, time, practice, and snow with a reasonable amount of water content.

Snow caves are caverns dug into a very deep and thick snow bank. They require snow shovels, time, waterproof clothing, and practice.

The positives of igloos and snow caves are many. They are shelters made of available materials, freeing the camper of carrying a tent. A snow shovel is generally carried anyway, and a snow saw for igloo making along with a ground tarp are it—perhaps 2 pounds versus 10. Neither of these options are a casual shelter. You don't pull into camp at 4:00 and crawl into bed by 5:00. Igloos and snow caves take hours to construct, and residents are tempted to tweak the interiors for hours more. They're not for sleep-quick-and-split winter fastpacking.

If you supply the roof, you can fairly quickly dig a living space in the snow. A teepee, a tarp stretched over a line or pole can be used in an emergency.

Stakes and Guylines

Myriad tent stakes exist on the market, with only three types that distinguish themselves from the rest and are actually worth considering.

The first type is the titanium skewer, usually 1/8 inch or so in diameter and 6 inches in length. At less than a 0.25 ounces apiece, they are far and away the lightest stakes you can buy. They are strong enough for most soils. Considering that you can carry double the amount of titanium stakes for the same weight of cheaper stakes, they are very popular among tarp campers who like to dance with foul weather and need plenty of additional guy-out points to secure their shelter. The primary disadvantage with titanium stakes is that they are expensive: $2.50 to $3.00 apiece, but are available to BackpackingLight.com website subscribers for as little as $1.75 each. And in a natural color that can only be described as stealth gray, they're easy to lose. Bozeman Mountain Works addresses the issue with an even more expensive option by offering hi-visibility orange coatings on their 0.22-ounce titanium stakes. Hikers buy them on the theory that money invested up front in loss protection is money saved in the long run.

The other type of stake that works well in a wider variety of snow conditions and offers greater strength is the nail stake. Budget hikers claim the performance of an aluminum gutter nail purchased from the hardware store is sufficient, but our experience tells us differently. Anodized aluminum nail pegs with rectangular cross sections, as distributed with MSR (US) and Lightwave (UK) tents are superior. They weigh only 0.5 ounces apiece. For serious pegging in rocky environments, 0.5-ounce titanium nail pegs from both Snow Peak and Vargo Outdoors are available.

The third type of stake that is popular comes with the tent you purchase. Quality, size, strength, and weight vary widely. You may perceive that you are getting a free set of pegs with your tent. Soon enough the quality will reflect that and you'll seek replacements.

Snow and sand stakes tend to be heavier (1+ ounces apiece) and come in two primary designs: *flukes*, such as the SMC T-Anchor that work well in soft snow, and *crescent moon pegs*, which have a semicircular cross section that works better in harder snow. Sand and snow anchors can be as simple

as a small, silnylon stuff sack filled with sand or snow, and weigh less than 0.1 ounces apiece.

Virtually any thin (1–2mm) cord material works well enough for guylines, but weights, strengths, handling properties, water absorption, and stretch varies widely. The gold standard for lightweight hiking has long been Kelty Triptease. At $15 per 50 feet, it is an expensive ounce of equipment. On par, but with higher strength/weight ratios, are pure braided Spectra lines, such as those available from Gossamer Gear and Bozeman Mountain Works (AirCore 1 and 2). From a weight standpoint, these guylines are the lightest you can buy. But they suffer from tangling in long lengths, especially during storage. Also, they absorb some water into the core of the braid, and they are only available in white. To address these issues, Bozeman Mountain Works offers AirCore Pro, a urethane-coated, 100-percent Dyneema guyline dyed bright yellow for visibility.

Conclusion

At the end of the day, backpackers need to find shelter to get out of the weather, rest, and refuel. Hopefully, they will stay comfortable during the wilderness night. Shelter can take on many forms, but for the lightweight backpacker, it's a three-part challenge: selecting the right shelter, mastering how to use that shelter in a wide range of conditions, and choosing the right place to set up camp—all while maintaining the minimalist approach to weight and bulk.