

Principles of Hiking Light (and therefore, with comfort and safety)

Presentation by Bill Gurwell at Richland Public Library, May 25, 2010

Introduction

My background: Backpacking for 34 years. Started to lighten up 14 years ago, upon starting the Pacific Crest Trail (PCT), my first long-distance (LD) hiking experience. Started by working my way through commercially available gear, ran into Garrett Holmes on the PCT; took him about a year to convince me to start sewing my own gear. That was the real beginning of my lightening adventure. Since then I have lightened up, sewn a lot, and custom designed a lot with occasional successes, while hiking the Pacific Crest, Continental Divide and Appalachian Trails. It's been an evolutionary process, a great hobby. I learned a lot of the principles of LD hiking as I went, even though I had read and studied Jardine's writings on LD hiking. I now find that Ray Jardine already carefully laid out revelations I had along the way.

I highly recommend his latest book, Trail Life, AdventureLore Press, 2009. Although, his last LD hike was PCT in '94, all the principles are the same. Some gear options have been refined, or are evolving (e.g., many options in trail running shoes now available), but the principles haven't changed. Another good book on lightweight backpacking is by Karen Berger, Hiking Light Handbook, The Mountaineers Books, 2004.

This talk will cover those principles, colored by my views, with samples to illustrate them. My gear only reflects my hiking style; yours will likely differ. Every hiker has a different style, which comes from a variety of influences. Style changes with experience and desire to change. Style is influenced by a range of factors including fear, experience, hiking skills, available gear, personal values (safety, comfort, competition, achievement, money, family, love, etc.). Each hiker will develop, evolve, to his own style. The underlying principles remain; each hiker's execution will be different.

Jardine recorded his daily mileage as a function of total packweight (with food & water). His daily mileage increased as pack weight decreased; examples are: 10 mpd with 50 lb. pack, 23 mpd with 20 lb., 30 mpd with 10 lb. Indicative only; relationship varies by terrain, physical conditioning, motivation, footwear, and other factors. Importantly, there was equal effort for all points on the curve, which means that one can: 1) reduce weight to maximize mileage, or 2) reduce effort and maximize the hiking experience in any other way. In either case one is doing it with greater assurance of comfort and safety, LD hiking or short-distance hiking. Most people, especially LD hikers, associate lightweight with high mileage efforts - macho, adventurous, pushing the limits of safety. Lightweight is also making it possible to experience a backpacking adventure, short or long, with more comfort through reduced effort to start with, and more safety, through added mobility and flexibility; just plainly more enjoyable. Also, I believe, the lightweight clothing concepts are also safer and more comfortable overall, than traditional approaches. A light-weight shoe is important--It is general knowledge that 1 lb. of shoe equals 6 lbs. in the pack.

To begin, one has to believe that lighter-weight gear will work for you. Obvious, but critical!

Many newspaper and magazine articles say light is dangerous, hanging it out there. A few typical statements are:

- "But (light wt.) doesn't mean life is easy. Or inexpensive. Or that there's any lack of misery".
- "you'd have to have a much higher pain threshold".
- "we were walking astride a very fine line between sheer stupidity and well, sheer stupidity".

I regard such statements as journalistic attention-grabbers. Of course, one can choose to go without essential items and be uncomfortable and unsafe. Such ideas are not necessary or real for the vast majority of lightweight hikers.

My objective is to show, and convince, that one can be comfortable and safe while light, and that one does not have to leave the trail and find shelter in town whenever the weather gets bad or some minor problem arises. I will be making some suggestions, but there is more than one right way. Your approach may be completely different. We all aspire to be comfortable (warm/cool/dry/bug-free), fed, located and prepared for emergencies. Per Ray Jardine: "no shivering nights, self-denial, and suffering." Gear needs to be "carefully thought out, in some cases specially built or customized, smaller, lighter."

You may sew some gear with help from lightweight sewing plans and materials merchants:

Ray Jardine	rayjardine.com
Quest Outfitters	questoutfitters.com
Seattle Fabrics	seattlefabrics.com
Outdoor Wilderness Fabrics	owf.inc
The Rain Shed	therainshed.com
Into The Wind	intothewind.com

You may purchase gear; the following are some of the lightweight equipment merchants:

Gossamer Gear	gossamergear.com
Tarptent	tarptent.com
Six Moon Designs	sixmoondesigns.com
Ultralight Adventure Equipment	ula-equipment.com
GoLite	golite.com

My equipment list is on the following page. I'm not going to go over it in detail, but will use it to illustrate the principles that make it all work. I now hike w/12 lbs., more or less, plus food and water, *utterly comfortable & safe. I challenge anyone to dispute that.* Suffice to say that everything is there that I really need.

Total Pack Weights	
Normal	11.8 lbs.
With Cold Weather & No Trees (need poles to set up tent)	13.5 lbs.
Cutting Excessive Items	9.9 lbs.
More Severe Cutting- (this is not minimalist)	7.8 lbs.

Example of Light Weight Backpack Loading		
<i>Bill Gurwell, bgurwell@hotmail.com</i>	<i>May 2010</i>	Category
Category & Items - with item weights in oz.	Wt.-oz.	Description
Backpack -12 oz	12	<i>Homemade and designed</i>
40" of Z-Rest -7.5 with 1.1 oz ripstop cover-1	8.5	
Wind gear , jacket-6.5 w/hankie & lip balm-0.5, wind pants-4.5	11.5	<i>Homemade</i>
Attached to Shoulder Straps: Camera w/film-6 and iodine-1 in case-1, and photon light, watch, whistle & compass/thermometer-2	10	<i>Olympus Stylus Epic</i>
In Long Side Pocket of Pack: Tarp Shelter-23, stakes-4, groundsheet-3 (? need poles-5.5 ?), camp towel-1.5, Rain ParCho-7.5 & Pants-3, Sun hat-3	45 (?50.5)	<i>Homemade silnylon 1-person Tarp Shelter. Homemade silnylon ParCho & pants</i>
In Top Right Pocket: Guide book-7, journal-4, pen, resupply schedule, packing list, phone list, trail-3 & state-1.5 maps, postcards, stamps, stove windscreen-1	18	
In Bottom Right Pocket: Water bottles, 1-liter, 2 ea.	3	<i>1-Liter pop bottles</i>
Stuff Sack -1 with 40 degree-Sleeping bag-16 (? or 20 deg-28 oz ?)	17 (?29)	<i>Western Mountaineering Highlite (?Feathered Friends Hummingbird)</i>
Stuff Sack for suppers, stove & P51 can opener-4.1, fuel-7, pot-2.7, toothbrush&paste-1.6, spoon-0.5, 30 ft. 1/16" cord-1	17	
Stuff Sacks for breakfasts and lunches	2	
1/2 Stuff Sack: fleece hooded sweater-11, cap-2 & mittens-1.5 (?need underwear top-5.5 & pant-3.6 ?)	14.5 (?23.5)	<i>Polartec 100M microfleece</i>
1/2 Stuff Sack: Mosquito mitts & booties-1.5, 2 pr socks-2.8, extra shorts-2.7 & shirt-3.5, soap-2, spare glasses & polarizers-1.5, extra film-1, toilet paper-3, mosquito repellants (rub on & aerosol)-3, valuables-2 (driver lisc., money, credit, debit & health cards), and: <u>Ditty bag</u> -7.5 with knife, tweezers, nail clippers, razor, <u>Emergency kit</u> in Ziploc (5 ft. duct tape, sew kit, safety pins, eyeglasses kit, lighter & candles), <u>First Aid kit</u> in Ziploc [Lorcet (pain), Neosporin, Amoxicillin (antibiotic), Immodium & Cipro, aspirin, Spenco adhesive knit, moleskin, salt tabs, first aid guide, Band-Aids, ibuprofen]	30.5	<i>Swiss Army "Classic" knife</i>
Total Normal Packed Weight w/o Food & Water	189 oz.	= 11.8 lbs.
Totals with Modification		
Total in Cold Weather & No Trees, add 26.5 oz (1.7 lb.): 20 degree bag+12, underwear+9, tent poles+5.5	215.5 oz	= 13.5 lbs.
Total - Cutting Excessive Items, lose 30 oz (1.9 lb.): camera-8, minimize guide book-6 & journal-3, extra shorts & shirt-6, soap-2, 3/8 foam pad instead of Z-rest-5	159 oz.	= 9.9 lbs.
Total - More Severe Cutting, lose 34 oz (2.1 lb.) more: Substitute poncho for the ParCho & tent-22, no cooking-stove, fuel & windscreen-12	125 oz.	= 7.8 lbs.
Clothing Worn: shirt-5.5, shorts-3.5, hankie-0.5, shoes-32, socks-1.5	43 oz.	= 2.7 lbs.

Food and Water

Food and water are not on the list; but let's cover them first, because they're relatively simple to get out of the way. Basic fact: dry food averages roughly 115 calories/oz. (exceptions are nuts and fats, margarine for example). Therefore, to supply the usual 3500 to 4500 calories, one needs 2 to 2.5 lbs. of dry food/day; a little more or less depending on distance/weight/weather/terrain. Bottom line is that one can't cheat on food weight; ***one must carry the DRY food weight*** necessary for the hike/hiker conditions. (Classic bad practice is instant oatmeal for breakfast ~1/2-oz packet - takes 10 packets to make the calories in the 5-oz. cereal I eat). Spread meals out during the day to keep calories coming in while not sending all your blood to the stomach to digest a huge meal. Carry snack/junk foods to eat while walking, especially in the rain. Generally, don't carry hydrated foods; e.g., substitute dry meat or flavored tofu for canned meats, and minimize the amount of excess water carried. Another *plan ahead* weight saver is to plan for town meals and don't carry a meal that you're certain to get in town. Even though one can't reduce dry food weight significantly, one can reduce volume on large resupplies by carrying denser foods; e.g., museli or grape nuts, denser pastas. For the occasional family-sized bag of potato chips, use the top extension or outside attachment loops on your pack.

Stoves

This brings us to our first gear discussion, reliable light-weight stove options, specifically because it is a good example of thinking at the *system level* in making all your gear choices. Think about all that you have to carry to make a system work.

STOVE TYPE	Alcohol ¹	Butane ²	Wood	No Stove
Stove weight	1/2 oz.	3 oz.	5 oz.	0
Fuel -to boil 24 cups of water, ~2/dinner	8	4	-	-
Fuel Bottle	1	4		
Igniter	1/2	included	1	-
Windscreen	1	1	1	-
Pot Stand	1	included	included	
TOTAL -12 dinners	12 oz.	12 oz.	7 oz.	0
3 dinners	6 oz.	9 to 12 oz.	7 oz.	0

The above table shows that the lightest stove doesn't necessarily yield the lightest cooking system. Note that it takes about twice as much alcohol to do the same heating as butane, or for that matter white gas, so the longer your journey between resupplies the less advantageous is the alcohol stove. Other factors than weight may also be important in making your choice. Because fuel weight is such a significant part of the total stove weight, then we can save significant fuel weight with little loss of nutrition by cutting out coffee, hot chocolate, soup, and the like. Or, save all the stove weight by eating cold meals.

¹ Ethyl isopropyl alcohol sold at hardware and convenience stores, gas stations

² Butane available at outdoor stores. Mail to resupply locations in the USA plainly marked on the address label: Consumer Commodity SURFACE MAIL ONLY ORM-D

Major Gear

If you're serious about dropping gear weight, **get a 2 lb. or so postal scale** to verify actual weights of items, which are often hidden or misquoted. Don't be afraid to carry it into stores to get precise data before making a purchase. **Also, think systems, and also multiple function** in bedding, shelter, rain gear, stoves, etc. (but not clothing, where layering and ventilation reign; more about this later). The "Big Three" weight and volume items are 1) Dry Shelter 2) Sleeping Pad & Bag, & 3) Pack; choose these together and in harmony. Clothing and food will have somewhat less impact on pack size. The point is that you must first choose shelter and sleeping bag & pad to know how much pack volume you need, if your goal is weight reduction.

1) Dry Shelter: Desirable features for long-term comfort and safety are: one piece design (sets up and takes down in rain w/o getting interior wet), awning over doorway (so you can enter and exit without getting the interior wet, have a place to put on/take off and leave wet rain gear and shoes, and have a place to cook in the rain), sit-up height, low condensation (no close, single-wall sidewalls), good ventilation. Most tent designs fail in one or more of these areas; I know of none that have an awning, which you could add. Fear not; tarps fulfill all these requirements with admirably low weight, if properly erected. Mosquito problems? Add a separate mosquito enclosure, but to save some redundant weight get a Tarptent (by Henry Shires at tarptent.com) or a Tarp Shelter (bgorwell@hotmail.com). Hammocks (nice in the jungle and cluttered forests, like the northern AT) and Poncho/Tarps are becoming popular lightweight options. I would need to figure out how to work with them in the rain, i.e., setting up, holing up & cooking, taking down.

Food handlers gloves weigh nothing and will save your hands when rolling up a frosted tent. Stealth camping, sitting on soft, natural terrain makes a softer bed and cuts down spatter in hard rain.

2) Sleeping Pad and Sleeping Bag:

Sleeping Pad Many use 3/8" foam pads with soft terrain. Otherwise thicker, up to Z-Rest; e.g., in AT conditions with hard-packed camping areas & hard-floored huts. Cut to 36" to 42" long.

Sleeping Bag With dry shelter, 750+ fill down bags are great. With lightweight fabrics they weigh only 1 to 2 lbs. for 40 to 20 degree bags. Down is lighter and much more durable than synthetic insulation. The two-person sleeping quilt is a great option for two people who are on an intimate basis. By the way, sharing gear, essentially everything but food and clothing, is a great way to reduce pack weight. The Jardines reduced their pack weights to 8 lbs. from what would otherwise be 12-lb. pack for someone hiking alone. The downside is that you have to stay closely together.

Use extra clothing under the bag to cushion & insulate if needed. Make a pillow from extra clothing or gear. Wear clothing to bed for extra warmth; e.g., sweater, long johns, warm cap. Wind gear makes versatile pajamas. Wind pants warm legs just like long john bottoms. Hooded wind jacket is really comfy around shoulders, neck and head, and defeats mosquitoes.

3) Pack: Lots of good, lightweight packs are available, 1-2 lb. or less. The hip belt need only be 2-3 oz. to help with the loads over 20 lbs. Have an outside pocket for wet tent and rain gear, and a waterproof liner for main compartment (trash bag or seam-sealed silnylon [1.1 oz silicone-coated ripstop] bag). If using hip belt with heavy loads, pack tightly to stiffen the pack (instead of metal frame or stays); size stuff sacks to fit tightly, both horizontal & vertical in pack.

Clothing

Be as Warm/Cool/Dry/Bug-Free as desired for the wide range of conditions encountered in long-distance hiking, by applying two important clothing principles, one of Use and one of Function. If adhered to, they will yield the lightest, most comfortable and safe clothing.

Clothing Use and Function Principles

HIKE SLIGHTLY ON THE COOL SIDE because,

- One hikes more efficiently & comfortably
- Less moisture (sweat) is generated which then condenses on clothing
- One's body heat keeps clothing warmer to transmit and evaporate moisture better

To obtain this use principle one must layer clothing, manage insulation, & have ventilation options.

SEPARATE the FUNCTIONS of RAIN, WIND PROTECTION, & INSULATION,

- Your dry wind and insulation garments are used while resting, in shelter, & in bed. Wet rain gear and shoes remain outside the shelter, under the awning.
- Separate wind and insulation garments allow effective, comfortable layering, with the least weight and bulk.

The following paragraphs expound on these principles from the viewpoint of different weather conditions.

DRY & WARM: heat & moisture travel away freely without clothing, less so with heavy clothes. Wear light clothing and ventilate.

DRY & COLD &/or WINDY (including below freezing): Outer, wind layer maintains air film on skin (significantly reduces wind chill). There is little sweat; any sweat generated flows easily through outer wind layer. Uncoated fabrics breathe best. Waterproof, breathable fabric (WPBF) succeeds mostly because, there is little sweat; if there is too much insulation there is much sweat, and some moisture resides in the insulation and some condenses on the inside surface of the cold WPBF. Ripstop nylon breathes better. However, in either case, one eventually needs to MANAGE their clothing - reduce insulation and/or ventilate. There is no magic fabric with automatic temperature/moisture control.

WET & WARM: WPBF is thick and hot; waterproof, unbreathable-coated nylon is cooler. You are hot & sweaty. In both cases one needs to remove clothing & ventilate. If it's warm, why keep clothing and self dry? 1) Your body will cool and chill on resting, and 2) more importantly, the weather often turns cold and windy rapidly as you top a ridge. By the way, WPBF needs durable, water-repellant finish (similar to ScotchGard); otherwise a continuous water film forms on the exterior, cutting off breathing. Water beading is good! (Uncoated ripstop nylons should also have durable, water-repellant coating to ward off light rain.)

WET & COLD: WPBF works OK if given some heat, but fails if too much insulation makes sweat. Then the moisture from sweat condenses on the inner surface of the cold WPBF. So, reduce insulation & ventilate. Why not lighter, waterproof, unbreathable coated nylon w or w/o ventilation as needed?

Bottom Line: Do we need heavy one-piece-insulated fabrics? No!

Do we need heavy water-proof-breathable fabrics? Not really!

What we need to do is to manage insulation (by layering) and ventilation. Ideally, hike on the slightly cold side for better hiking energy/efficiency and comfort, as well as minimizing condensation.

Obviously, it is important to stay dry to be warm in hypothermia conditions (cold, sunless, moist, and windy). The less water fabrics absorb and hold, the less body heat is required to evaporate the water. My drying tests to determine water retention of fabrics (washed & spin-dried clothing, hung to dry) show the following significant influences of fabric weight and type:

- 1) Thin fabric with tight weave (mosquitoes can't bite thru) retains the least water and dries quickly.
- 2) Fabric type influences water retention and drying time. In order of decreasing performance: polypropylene, nylon, polyester. Way down there is wool and cotton.
- 3) Insulating fabrics, such as winter weight long johns, Polartec, can hold as much water as the same weight cotton T-shirt, but they don't feel as wet. The real champ was Polartec 100 microfleece, which actually felt dry very quickly, in 5 min, even though it took ~2 hr to dry. Bottom line on insulating fabrics is to keep them dry; don't sweat them out. Repeating again for the last time, **manage insulation, and ventilation**.

The above discussions/concepts lead to some important clothing design principles.

Clothing Design Principles

- **Lighter, thinner, tightly-woven fabrics** dry faster and block wind & mosquitoes.
- **Multicoverage** is better because there are fewer clothing gaps to lose body heat from, as well as a degree of convenience.
- Incorporate **ventilation options**.
- **Layer** for maximum comfort with minimum weight.

These principles are incorporated in the following clothing examples (a detailed list follows this clothing discussion). Please keep in mind that your preferences will vary somewhat, but by following the principles you will end up with clothing systems that are comfortable and safe as well as light.

Shirt - lightweight, full opening. Nylon is ideal but not available; polyester may be. Men's dress shirts containing 65% polyester and 35% cotton are thin enough to dry quickly.

Shorts - lightweight, thin waistband for comfort with pack hip belt.

Shell/Wind Gear - 1.9 or 1.1 oz ripstop nylon (light, fast drying, mosquito- proof). Jacket with hood, full zipper, extra long sleeves to cover hands, pockets. Very comfortable as pajamas. Patterns: Kwik-Sew #2293 (use #2149 or #2046 for spacious pockets). Commercially available wind jackets have to be modified to get all the desirable features; current examples are Patagonia's, Eddie Bauer's and Golite's Shirts. Finding really lightweight wind pants on the market is difficult too; sew them yourself, using Green Pepper pattern #128. Frogg Toggs are a popular WPBF option I haven't tried simply because they're not as durable or breathable, and if worn for rain gear, useless in shelter and in bed (Use two sets of Frogg Toggs?).

Insulating Layers - Polartec 100 m sweater (light & warm, fast warming if wet) with hood, full zipper, extra long sleeves, weighs 10.5 oz.; same warmth at half the weight as a conventional Polartec 200 sweater with watch cap and gloves. In freezing nights one may need 100 microfleece watch cap & mittens, and long john top & bottom.

Rain Gear/Umbrella - Need the ability to ventilate; that's why an umbrella works so well in light, calm rains. Otherwise, one needs a poncho or a ParCho (bgurwell@hotmail.com); these ventilate well and keep your pack dry too. FroggToggs are a popular option, but they are not waterproof, breathable fabric (WPBF) parkas don't ventilate all that well or keep your pack dry. Keep in mind that to be completely comfortable and dry, one needs to maintain sufficient dry clothing - shorts/shirt/wind gear, shelter & sleeping bag.

Shoes - Trail runners, with full cleats of pliable rubber for traction, good heel fit, extra length (and width?) for toe wiggle room. Synthetic fabric uppers for fast drying. No Gore-Tex, which will retain water inside from rain and stream crossings. Best to get fitted at a good running shoe store. Use duct tape *immediately* on hot spots. Orthotic inserts may be helpful. Remember that 1 lb of shoe equals 6 lbs in the pack.

Socks: Light weight for fast drying and moisture transport away from foot; with toe wiggle room, they are warm, even in cold weather. Examples are single-layer, either nylon or better yet polypropylene/stretch nylon liners.

Light-Weight Layering Systems

Body – 35 oz. total

- 7 ½ oz. Rain ParCho – w/long sleeves & hood
- 6 ½ oz. Wind Jacket – w/long sleeves & hood – *Stops Mosquitoes*
- 11 oz. Sweater, full zip – w/long sleeves & hood
- *5 ½ oz. Underwear Top
- *4 ½ oz. Thin, Short Sleeve Shirt

Legs – 11 ½ oz. total

- 3 oz. Rain Pants
- 4 ½ oz. Wind Pants (preferred) – *Stops Mosquitoes*
and/or *3 ½ oz. Underwear Bottom
- *4 oz. Light weight shorts

Hands – 4 ¼ oz. total

- Long Sleeves on Rain Coat/Parka, Wind Jacket, Sweater
- *3 oz. Fleece Mittens
- *½ oz. Plastic Gloves for Wet Tent
- ¾ oz. Ripstop Mosquito Mittens

Head – 1 ½ oz. total

- Stocking Cap
(Already calculated hoods on rain parka, wind jacket, and sweater)

All the above weighs 52¼ oz. (3 lb. 4 oz.), fits in one, small stuff sack (1 oz.).

Feet

- *16 oz. (per shoe) Trail Running Shoe
- *1 ½ oz. Polypro/Nylon Liner Socks
- 1 oz. Ripstop Mosquito Booties

* Items marked with * are available commercially for purchase. All others have to be homemade, or modifications of commercially available clothing, to obtain all features that will maximize performance and comfort while maintaining lightest weight.

Basic reference for lightweight hiking techniques is Ray Jardine's Trail Life, AdventureLore Press, LaPine, OR, 1999.

For store-bought and internet connections to making your own, see Karen Berger's Hiking Light Handbook, The Mountaineer Books, 2004.

Other Comfort & Safety Factors

Independent of lightweight gear, the following add to comfort and safety, regardless of pack weight.

Know Your Location: Keep track of where you are using compass and maps. Use both detail maps, and large-area maps for emergency escape routes. Hike toward known points while keeping track of progress (estimated miles per hour).

Learn to use a GPS and determine waypoints. Learn how to interpolate, which allows one to determine waypoints from the printed map or the opposite, to locate known waypoints on the map. Large-area maps are sufficient for GPS navigation on trails, requiring fewer maps (less weight).

Emergency Preparedness: A lot of the above prepares one for emergencies. Can't carry enough to cover all possibilities, therefore plan to improvise: extra clothing for bandages & duct tape, extra cord, whistle, LED, PAIN KILLER for exit walking (or what if you can't walk, sufficient food, clothing, shelter & sleeping bag?), ibuprofen, Immodium, antibiotic pills & cream, fire starters (vaseline-soaked cotton balls, candles, matches/lighter), Sm. Swiss Army Knife (knife, tweezers, scissors). Know a few simple knots - overhand, slip, square, or better, bowline, tarbuck or tautline, figure 8.

Physical Conditioning: Both better conditioning and lighter pack weight allow one to expand the range of comfortable and safe hiking. Hiking is the best overall training; cross training and aerobics are good. Strength training and stretching help avoid injuries.

Hike in Good Weather: Less snow means less heavy clothing and snow travel gear. Reduce exposure to extreme weather conditions by camping lower and/or earlier when bad weather threatens.

In conclusion, it is appropriate to summarize Jardine's "Joys of a Lighter Pack". A lighter pack is easier, increases mobility and safety, simplifies trail life, increases enjoyment and wilderness experience, reduces complexities, lessens fatigue, and reduces stresses & chances of injury.

HAPPY HIKING! Bill Gurwell